ATTACHMENT 4 – SERVICING FEASIBILITY ASSESSMENT

Planning Proposal - SP18063 - McMaster (November 2021)

Sept 2021

Servicing Feasibility Assessment

MJM
CONSULTING ENGINEERS
CIVIL • STRUCTURAL • BUILDING DESIGN • PLANNING

REPORT REFERENCE [210177]

Document Verification Schedule

Project:

Airport Street, North Street, Mimosa Street and Bartondale Road, Temora

Servicing Feasibility Assessment

Revision	Date	Prepared By		Checked By		Approved By	
01-Draft	08/10/21	Michael McFeeters		M.M		B.S	
02-Final	04/11/21	Michael McFeeters		B.S		B.S	

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1. Executive summary

The feasibility of potentially introducing up to six new dwellings within the precinct identified in Figure 1 below was investigated to determine if there was sufficient infrastructure capacity, sewer, stormwater, potable water, electricity, gas and telecommunications to support any proposed development. The current proposal is for an LEP Amendment to reduce minimum lot size from 2ha to 1ha, resulting in a potential introduction of up to an additional six dwellings within the precinct.

Figure 1. Precinct area

In summary the services within the area can cater for up to six additional blocks

Service	Summary	Requires Augmentation to existing system	Ability to service up additional six Blocks
Sewer	The geotechnical report requires min area of 250m^2 for disposal for each dwelling, this area will be easily incorporated into each land parcel therefore the sewer capacity for the additional lots is acceptable.	No	Yes
Stormwater	The existing stormwater system will need augmentation with one of the options below 1) Upgrade or duplicate the culvert in Airport Street to ensure that the hazard of water on the roadway is kept to at least the status quo or to remove water from crossing in anything other than the 1% AEP. 2) Stipulate that all additional dwellings have a discharge equivalent to predeveloped peak discharge from 20% to the 1% AEP	Yes	Yes
Potable Water	There is enough capacity within the network to supply the up to an additional six lots.	No	Yes
Electricity	There may need to be augmentation and or upgrades to the existing services to accommodate up to an additional six blocks.	Yes	Yes
Gas	The capacity of the existing main will service future and existing block demand New mains will need to be installed in Mimosa Street, Bartondale Road and North Street and service lines within Airport Street	Yes	Yes
NBN	NBN has identified the area as NBN Fixed wireless.	No	Yes
Telstra	Telstra network should not be required due to the area being identified as NBN Fixed wireless	No	Yes

All Services have the ability with some augmentation to supply up to the proposed six additional lots.

2. Introduction

This report has been prepared to investigate the feasibility of servicing the up to six additional lots which could result from a proposed to amendment the LEP to reduce the minimum lot size from 2 ha to 1 ha. The report will determine:

- the land capability for effluent systems to service the proposed development.
- the capacity of the Essential Energy network to service the additional lots.
- if there is capacity within the Goldenfields water network and
- options available to facilitate servicing of the proposal.

3. Services Capacities

3.1 Sewer Capacity

The existing sewer is septic and there is no formal sewer infrastructure within the area. Each lot caters for its own sewer discharge via a bio septic system and an irrigation area or an absorption trench.

It is proposed that the system of disposal of sewer for the addition lots incorporate a similar system as the existing, given this we engaged Aitken Rowe Geotechnical investigate the site for the capacity for the additional lots and they have recommended for a 4 Bedroom House

Absorption Area	250m^2
Or Absorption trench	192mx 0.6m x 0.7m

This would easily be incorporated into the proposed 10,000m^2 area.

In summary

The capacity of the sewer is dependent on the lands capability to accept the produced grey water from the septic systems. It has been shown as above that the area could be incorporated into each land parcel therefore the sewer capacity for the additional lots is acceptable.

Please refer to attached Geotechnical Report attached to this report

3.2 Stormwater

There is no formal pipe network for the existing Stormwater within the surrounds of the site.

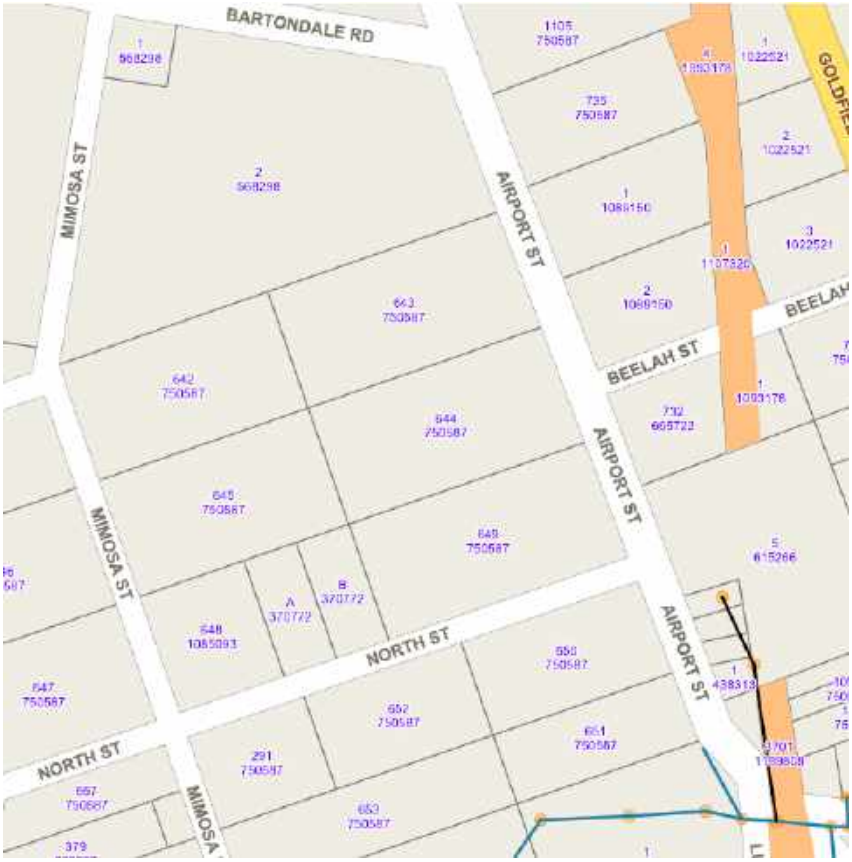

Figure 2. Existing Stormwater – Source Temora Council

The site is primarily drained through swale drains on the side of the roadway. As shown below

Figure 3. Shallow table drains Airport Street looking south east- source Google earth

The site generally falls from Mimosa Street to Airport Street with a gradient of approximately 2%. Mimosa Street is situated on a crest and forms a catchment boundary. The catchment to the west of Mimosa Street falls to Trigalong Creek. The Subject site's main catchment falls from Mimosa Street to Airport Street, Airport Street falls to an existing dam located approx. 200m north of North Street as

shown in the figure below. The outlet of the dam then discharges into the swale in Airport Street and then flows across Airport Street via a small culvert 250m north of North Street as shown in blue below.

Figure 4. Catchment Plan with outlet – Source Google Earth

Figure 5 Small Culvert inlet Airport Street looking south west- source Google earth

Figure 6 Small Culvert Outlet on Airport Street looking east- Source Google earth

The catchment area is approx. 18.7ha. The current culvert will cater for minor flows and larger flows would cross Airport Street approximately at the culvert location. This system is not ideal as it discharges water over Airport Street in a larger storm event which is hazardous to traffic using this street. Adding additional residences will exacerbate the situation, although there are several solutions to improve the situation.

These options are

3) Upgrade or duplicate the culvert In Airport Street to ensure that the hazard of water on the roadway is kept to at least the status quo or to remove water from crossing in anything other than the 1% AEP.
4) Stipulate that all additional dwellings have a discharge equivalent to predeveloped peak discharge from 20% to the 1% AEP

In summary

If either of the above-mentioned options are implemented, stormwater system could easily be developed to cater for the future loads.

3.3 Potable water

The existing study area has infrastructure within its surrounds which service the existing lots. The ring main around the development would be able to supply up to an additional six lots according to Goldenfields water. Some augmentation to the system may need to be carried out depending on the layout this would be mainly service conduits to the new lots this may require under-boring of the road.

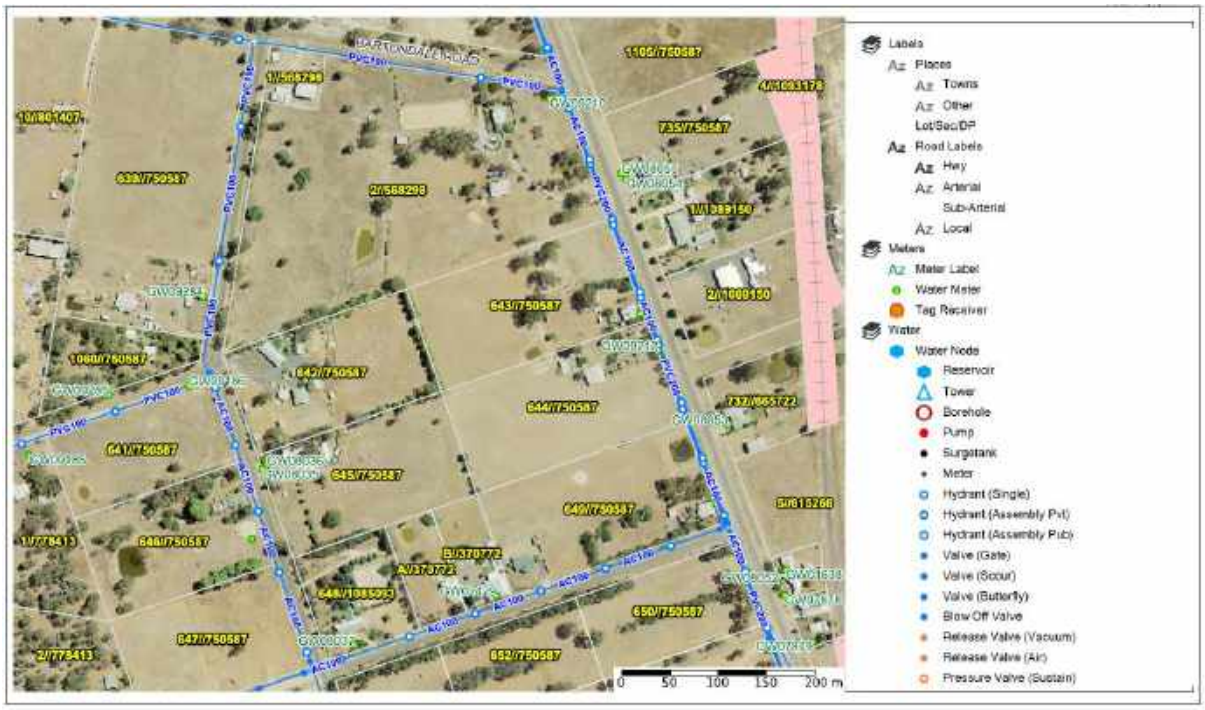

Figure 7 Existing Water Supply – Source GWCC

In summary

There is enough capacity within the network to supply the up to an additional six lots.

3.4 Electricity

There is existing infrastructure within the surrounds of the site as shown below.

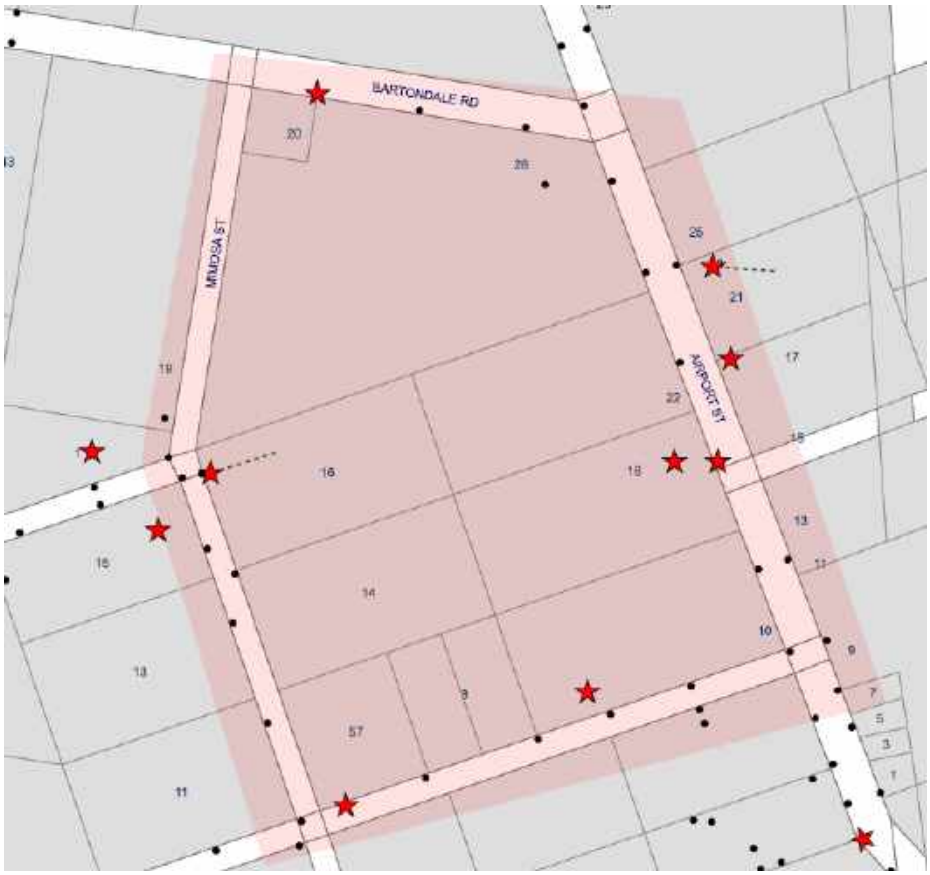

Figure 8 Existing Electrical layout – Source DBYD

MJM consulting engineers contracted David Bridle from DeltaStar designs to access the capacity.

Please find below response from David in relation to existing and capacity and his experience with the area.

> *Hi Andrew,*
>
> *It is difficult to tell network capacity without requesting loads from Essential Energy but from the network models I have I can make the following comments (please note that these are not confirmed by Essential Energy and are based on experience with networks and not specific network modelling in this case).*
>
> *Airport Road*
>
> 1. *The HV network along Airport street is a large conductor (7/4.50 AAAC) which is used in urban areas, this line has the potential to support upgrades on this street.*
> 2. *The existing substation – Sub 74-318302 along Airport road is already loaded above capacity so would required to be upgraded to support more dwellings*
> 3. *The LV network along Airport Street is a large conductor (7/4.50 AAAC) which is used in urban areas, pending the block layout and the location of future lots I would expect this to require upgrade*
>
> *North Street*

1. *The HV Network along North Street is a small conductor (6/1/2.50 ACSR) which is used in more rural areas, as this is a spur it may support upgrades on the network. EE may also request it be brought to a larger conductor to meet load requirements. This would need to be confirmed in a DIP.*
2. *The Existing substation Sub 74-318002 along North Street is at its capacity and would be required to be upgraded to support more dwellings.*
3. *The LV is a mix match of sizes and I am unsure of the open point. I would expect this to be required to be upgraded to an ABC.*

Mimosa Street

1. *There is no HV network. Pending the block layout, HV may be required to be run to support a future pole mounted substation*
2. *No Substation is existing. This area is fed from Sub 74-318002 and I would not expect it to meet compliance at any point*
3. *The LV along Mimosa Street is a large conductor (7/4.50 AAAC) but due to its length I do not believe it would be compliant to current standards and a substation would be required on this street to service these blocks.*

As this land is R5 zoned, Each block would be required to be supplied with 3ph LV.

I would recommend obtaining a Feasibility DIP for this site once some form of site plan can be developed. This can be done prior to DA and the DIP need to be reissued once the DA is released.

Thanks

David

In summary

There may need to be augmentation and or upgrades to the existing services to accommodate up to an additional six blocks.

3.5 Gas

The existing study area has infrastructure within its surrounds, not withstanding this the existing lots are not serviced as indicated in the figure below. MJM have contacted APA (Phil Jenkins by phone 8/10/2021) and he has confirmed the 63dia main running along Airport Street has the capacity to cater for the overall area (existing and proposed). Mains would need to be augmented in North Street, Mimosa Street, Bartondale Road

Figure 9 Existing Gas layout – Source DBYD

In summary

Gas has identified that the capacity of the existing main will service the possible future demand and the existing blocks if they opt to connect.

3.6 NBN

The existing site is designated as Fixed wireless as per the figure below

Figure 10 NBN Service Allocation -Source NBN

There is existing infrastructure within 520m within the Area which means there would be a possibility of applying for fibre to the kerb because the infrastructure is located within 1km of the site. Please see below figure showing closest location.

Figure 11 NBN Service Allocation -Source NBN

In summary

NBN has identified the area as NBN Fixed wireless.

There is an option to request fibre to the kerb as there are existing services exist within 1km of the site.

3.7 Telstra

There is Telstra infrastructure within the bounds of the site as shown in figure 12. The area is designated as fixed wireless by NBN therefore there should be no requirement to augment Telstra Infrastructure

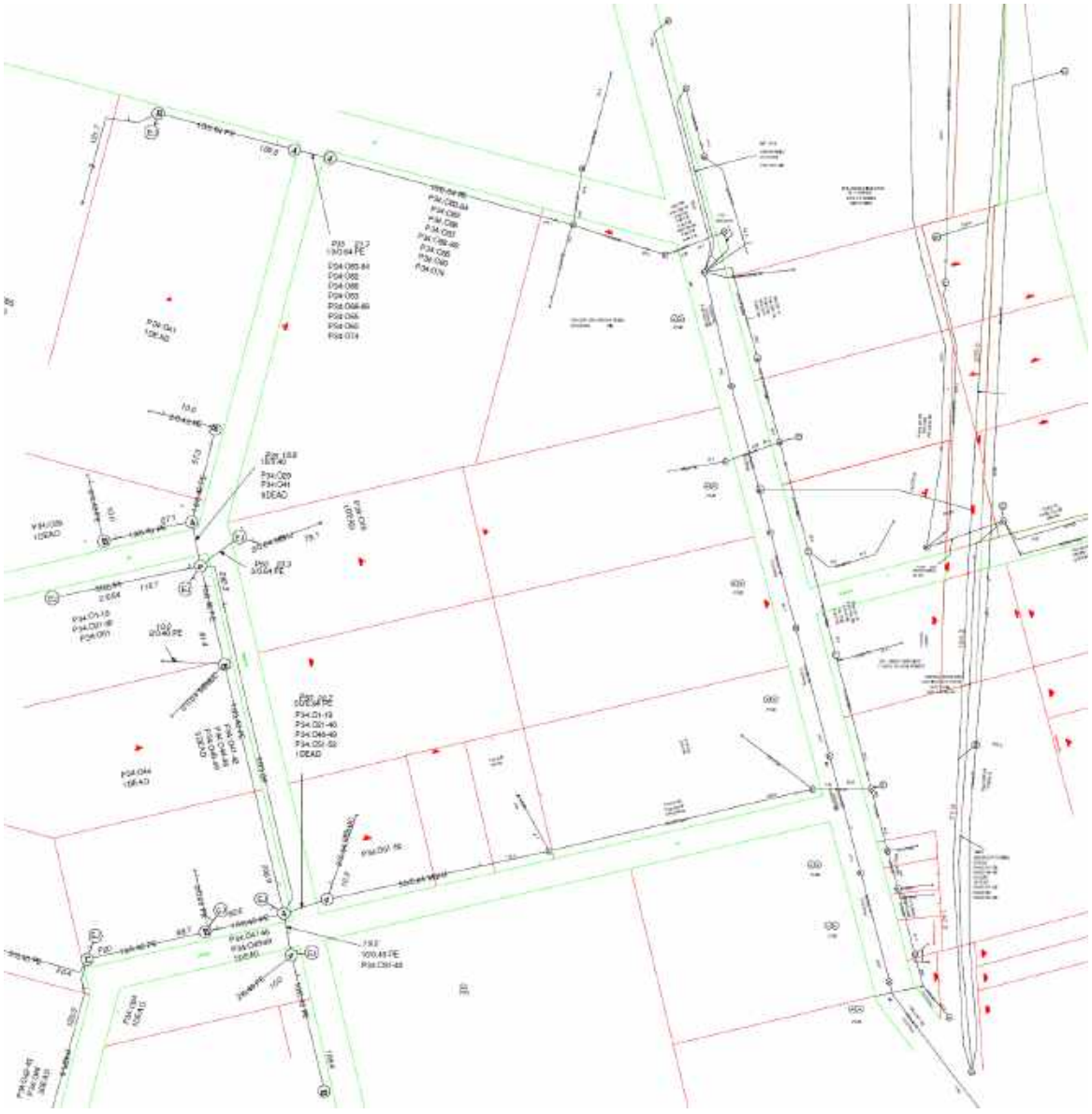

Figure 12 Existing Telstra layout – Source DBYD

In summary

Telstra network should not be required due to the area being identified as NBN Fixed wireless

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1/60 BORONIA STREET ALBURY, 2640
TEL (02) 6040 1661

Site Assessment For Effluent Disposal System Report

CLIENT:	MJM CONSULTING ENGINEERS
LOCATION:	PROPOSED SUBDIVISION, AIRPORT STREET, TEMORA, NSW
REGISTRATION No:	ED21-296
PROJECT DESCRIPTION:	PROPOSED EFFLUENT DISPOSAL SYSTEM
DATE REQUESTED:	28 JULY 2021
DATE OF INVESTIGATION:	12 AUGUST 2021
DATE REPORTED:	15 SEPTEMBER 2021

ARTL - NATA ACCREDITED LABORATORIES

INTRODUCTION AND PROJECT UNDERSTANDING

It is the purpose of this investigation to assess the above site for the suitability of an onsite treated effluent disposal system. It is understood that the proposal consists of subdividing the site to allow a further 8 residential dwellings. It should be noted that this is a preliminary investigation to aid in the subdivision process. It is highly recommended to undertake individual investigations for each residential development.

The field investigation including detailed site visit, excavation of a borehole (BH1) to 2.0m and percolation testing were carried out on the 12th August 2021. Laboratory testing (Emerson Class and Soil Grading) were completed on recovered samples at our NATA accredited laboratory in Wagga Wagga. A site plan showing borehole/percolation test locations, borehole log and test reports are attached to this report.

SITE DESCRIPTION

The site is located within the township of Temora, New South Wales. The site is situated to the west of Airport Street and is generally flat to slightly undulating.

The borehole investigation revealed the site is underlain by topsoil to 0.1m overlying medium to high & high plasticity clays extending to the borehole termination depth at 2.0m. No groundwater or seepage was encountered during the drilling, however it should be noted that variations to the water table level could fluctuate with changes to the season, temperature and rainfall.

There was no evidence of surface seepage and soaks and the surface soil was moist at the time of the investigation. No sign of erosion was evident and therefore the site should not pose the problem of uncontrolled run-off and erosion. However, run-on and upslope and down slope seepage, if any, to the land application system should be avoided by using earthworks or a drainage system approved by Council.

Table 1: Land Capability Rating

Land Features		Land Capability Class Rating					
		Very Good (1)	Good (2)	Fair (3)	Poor (4)	Very Poor (5)	Site Result
General Characteristics							
Site drainage / runoff		Very Slow	Slow	Moderate	Rapid	Very Rapid	1
Flood / inundation potential (yearly return exceedances)		Never		<1 in 100	<1 in 20	>1 in 20	1
Slope (%)		0 - 2	2 - 8	8 - 12	12 - 20	>20	1
Landslip						Present or past failure	1
Seasonal watertable depth (m) (inc perched water tables)		>5	5 – 2.5	2.5 – 2.0	2.0 – 1.5	<1.5	2
Rainfall (mm/yr)		<450	450 - 650	650 - 750	750 - 1000	>1000	2
Pan Evaporation (mm/yr)		>1500	1250 - 1500	1000 - 1250	-	<1000	2
Soil Profile characteristics	Structure	High	Moderate	Weak	Massive	Single Grained	1
	Profile Depth	>2m	1.5 – 2m	-	1.5m – 1.0m	<1m	1
	Percolation (mm/hr)	50 - 75	20 – 50 75 - 150	15 – 20 150 - 300	- 300 - 500	<15 >500	1-2
	Stoniness (%)	<10		10 - 20	-	>20	1
	Emerson Test (dispersion/slaking)	5&6	4	3	2	1	3-4

FIELD AND LABORATORY RESULTS

The permeability of the underlying clay was assessed by carrying out four series of percolation tests at the site. The tests indicated an average permeability of 0.17m/day on the underlying material. This classifies the underlying soil as “Category 5” as per Table 5.1 AS1547:2012 – “On-site domestic-wastewater management”. A soil grading was performed on the underlying material and confirms the soil to be a “Category 5”. An Emerson Class Test was also performed and indicated the material to be “potentially moderately dispersive”. The percolation, grading and Emerson class test reports are herewith attached. A land capability assessment has also been undertaken in Table 1 above. The results show that the site features range from very good to poor (emerson class) and therefore is considered suitable for primary and secondary treated effluent disposal systems **with appropriate management practices undertaken.**

Disposal Area Sizing

For the purpose of this preliminary investigation the calculations assume the treated effluent disposal area is to service a 4 bedroom residence that has reticulated water supply. Therefore the calculation rates are based on 150L/person/day (allow 5 persons). This assumption is based on Appendix H in AS1547.

It should be noted that if the above design flow rates are adopted then the minimum design capacity for the septic tank shall be determined by:

- Providing for around 24 hours settling volume plus 8 hours hydraulic buffering volume for the daily flows as adopted.
- Providing for scum and sludge accumulation over a 5 year period using the following rates;
    1) All waste ……. 80L/person/year
    2) Greywater ……. 40L/person/year
    3) Blackwater …… 50L/person/year

The required disposal area is calculated based on the soil data available for different types of land application system. The following assumptions are made in the calculation:

- Daily effluent flow rate per household - 750 litres*
- Design Loading Rate (DLR) - 10 mm/day
- Design Irrigation Rate (DIR) - 3mm/day
- Width of the trench (where applicable) - 600mm
- Depth of trench (where applicable) - 700mm
- Depth of aggregate (where applicable) - 300mm
- Depth of topsoil (where applicable) - 300mm
- The underlying materials are assessed to be “potentially non dispersive”.
- “Soil Category 5” as per AS1547
- Climatic data for Wagga Wagga provided by the Bureau of Meteorology is adopted.

Note: * - Assume 150 litres of waste water per person per day.

1. Absorption Trench (Single 4 Bedroom Residence)

Based on the above assumptions, climatic data and water balance analysis undertaken, the following minimum dimensions for the disposal area for the absorption trench disposal system are recommended.

- Minimum Absorption Area (wetted area) - 250m^2
- Minimum length of the trench - 192m (width 0.6m, depth 0.7m)

2. Evapotranspiration – Absorption Area/Trench (Single 4 Bedroom Residence)

Based on the above assumptions, climatic data and water balance analysis undertaken, the following minimum dimensions for the disposal area for the evapotranspiration disposal system are recommended provided that the rate of irrigation does not exceed 3mm/day. **It should be noted that this system is considered suitable for secondary treated effluent only.**

- Area - $180m^2$
- Length - 90m
- Depth of imported material - 200mm

It should be noted that adoption of smaller size disposal area would require deeper depth of imported material. **Vegetation planting on-site to encourage evapotranspiration is considered when calculating irrigation and absorption trench areas for this method of disposal.**

3. Pressurised Irrigation System

These systems may be used as alternatives to the conventional sub-surface disposal systems outlined in sections above. Consideration through consultation with the local authority will be required prior to choosing this method of disposal because the treatment system will need to conform to effluent quality standards to ensure protection of public health as such:

- Five days biochemical oxygen demand (BOD5) not greater than 20mg/L
- Suspended solids not greater than 30mg/L
- Thermotolerant coliforms not greater than 10 per 100mL.
- Where chlorine is used as a disinfectant, free residual chlorine measured by a field test at the first irrigation outlet, is not less than 0.5mg/L after a 30min contact period.
- Nutrients not more than authorised by the local authority.

All other requirements are to be met as per AS1547.

Irrigation Area (Single 4 Bedroom Residence)

Based on the above assumptions, water balance analysis and soil data available, the following minimum irrigation area is recommended provide proper control of the effluent is maintained and the rate of irrigation does not exceed 3mm/day. If planting is to occur on-site then the evapotranspiration method and disposal areas as discussed in section 2 can be adopted provided that the rate of irrigation does not exceed 3mm/day.

- Area - 250m2

COMMENTS AND RECOMMENDATIONS

- This investigation is preliminary only. It is recommended to undertake further works for each individual dwelling.
- Land application shall be placed at least 40m away from any channels and 250m away from any domestic groundwater well.
- The irrigation system can only be used for secondary-treated effluent.
- Primary effluent is normally not suitable for irrigation systems but may be permitted by the local authority under special circumstances.
- The proper drainage system should be incorporated with the land application system design as appropriate to ensure surface run-off does not enter into the system.

Should you have any queries, please do not hesitate to contact us.

Yours truly,

Nathan McLaren
Environmental Consultant

Attachments:

- Addendum
- Site Diagram showing Borehole and Percolation Test Locations
- Borehole Logs with Explanatory Note
- Percolation, Emerson Class, and Soil Grading Reports
- Water Balance Calculation

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. Because the investigation procedure generally includes sampling from either one, two or three boreholes, it may not be possible to conclusively establish the presence or extent the condition of the underlying soil and rock over the whole block until site work commences for the construction.

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.

ADDITIONAL INFORMATION

Refer also to the CSIRO Information Sheet: - BTF18 “Foundation Maintenance and Footing Performance: A Home Owner’s Guide, which can be accessed through http://www.publish.csiro.au/pid/7076.htm.

SITE PLAN

NOT DRAWN TO SCALE

AITKEN ROWE TESTING LABORATORIES PTY LTD

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

Ground Level: Existing
Method: Auger Drilling with TC Bit

Date: ***12/08/2021***
GPS N:
E:

USCS Symbol	Description	Depth (m)	Moisture Condition	Consistency/ Rel. Density	Sample Type	Sample No.	Lab. Test L.S % -2.36mm	Remarks & Field Records
ML	TOPSOIL: SILT; low plasticity, brown		MC=PL	F				NATURAL
CL	CLAY; low plasticity, trace fine to coarse sand, red brown		MC>PL	St.				
CI-CH	CLAY; medium to high plasticity, trace fine to coarse sand, orange red	0.5		VSt.				
		1.0						
CH	CLAY; high plasticity, trace fine to coarse sand, trace fine to coarse gravel, orange							
CH	CLAY; high plasticity, trace fine to coarse sand, mottled cream brown	1.5						
		2.0						
	End of Borehole (BH1) @ 2.0m							
		2.5						
		3.0						
		3.5						
		4.0						

Registration No.: ED21-296

Location: Proposed Subdivision, Airport Street, Temora, NSW

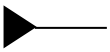
Client: MJM Consulting Engineers

Logged By: JAG

Scale: As shown

Groundwater: 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 (Clay or Silt based)	**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.
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 (Clay or Silt 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 % 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

PAGE: 1
OF: 1

TEST REPORT
SOIL PERCOLATION & EMERSON CLASS

DATE OF TEST: 12/08/2021

CLIENT: MJM CONSULTING ENGINEERS

PROPERTY LOCATION: EFFLUENT DISPOSAL ASSESSMENT - PROPOSED SUBDIVISION, AIRPORT STREET,TEMORA, NSW

TEST METHOD: AS1547
AS1289.3.8.1

MATERIAL TYPE: CLAY

REGISTRATION No.: **ED21-296**

MEASUREMENT OF DROP IN WATER LEVEL

Time Elapsed (minutes)	Water Level (mm)					
	P1	P2	P3	P4	P5	P6
0	*	*	*	*	*	*
10	8	10	8	10	12	10
20	18	19	16	18	20	19
30	18	28	23	26	27	27
40	23	36	28	33	34	34
50	28	38	30	39	39	37
60	30	40	30	42	42	38
Absorption rate mm/25mins	50.0	37.5	50.0	35.7	35.7	39.5

Time Elapsed (minutes)	Water Level (mm)					
	P7	P8	P9	P10	P11	P12
0	*	*	*	*	*	*
10	15	16	15	25	25	25
20	29	30	30	40	42	40
30	40	40	42	52	55	53
40	44	45	48	67	69	64
50	47	50	52	77	78	70
60	50	52	54	80	81	74
Absorption rate mm/25mins	30.0	28.8	27.8	18.8	18.5	20.3

Permeability: 0.17 m/day

D.L.R: 10 mm/day

D.I.R.: 3 mm/day

Emerson Class Number: 2-3

APPROVED SIGNATORY: Nathan McLaren

DATE: 30/8/2021

AITKEN ROWE Testing Laboratories Pty Ltd

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

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SAMPLED BY: ARTL

DATE SAMPLED: 12/08/2021

DATE SUBMITTED: 12/08/2021

SAMPLING METHOD: *

SAMPLING CLAUSE: *

DATES TESTED: 2/09/2021

ORDER No.: *

TEST REPORT: GEOTECHNICAL INVESTIGATION - SOIL ANALYSIS

CLIENT : MJM CONSULTING ENGINEERS

JOB DESCRIPTION : EFFLUENT DISPOSAL ASSESSMENT
PROPOSED SUBDIVISION, AIRPORT STREET, TEMORA, NSW
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MATERIAL SOURCE : IN-SITU BOREHOLES

PROPOSED USE : DESIGN

MATERIAL TYPE : REFER TO BOREHOLE LOGS

REGISTRATION No : R28 **ED21-296**

	SAMPLE NUMBER :	P1	P4	P7	P10	*	*
	SAMPLING LOCATION :	*	*	*	*	*	*
	DEPTHS BETWEEN WHICH SAMPLES TAKEN (mm) :	*	*	*	*	*	*
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 %	*	100	*	100	*	*
	PASS 9.50mm SIEVE %	*	95	*	99	*	*
	PASS 6.70mm SIEVE %	100	93	100	99	*	*
	PASS 4.75mm SIEVE %	100	90	99	97	*	*
	PASS 2.36mm SIEVE %	99	85	97	94	*	*
	PASS 1.18mm SIEVE %	96	78	93	91	*	*
	PASS 600µm SIEVE %	63	72	86	89	*	*
	PASS 425µm SIEVE %	91	70	84	88	*	*
	PASS 300µm SIEVE %	90	68	82	86	*	*
	PASS 150µm SIEVE %	87	65	79	83	*	*
	PASS 75µm SIEVE %	83	61	75	78	*	*
AS1289.3.8.1	EMERSON CLASS	3	2	2	3	*	*
(AIR DRIED)	TYPE OF WATER	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 : ..... DATE: 3/09/2021

Nathan McLaren

SIZE OF AREA FOR EACH MONTH (DISREGARDING STORAGE OF EFFLUENT) 750L/Day

Month	Pan Evaporation *E* mm	Evapotrans-piration *ET* *(ET=0.75E)*	Rainfall *R* mm	Retained rainfall R_r $R_r = 0.75R$	*LTAR* per Day mm	*LTAR* per month mm	Disposal rate per month mm	Effluent applied per month L	Size of Area m^2
Jan.	257.3	193	43	32	3	93	254	23250	92
Feb.	207.2	155	37	28	3	84	212	21000	99
Mar.	173.6	130	42	31	3	93	192	23250	121
Apr.	105	79	46	34	3	90	135	22500	167
May	58.9	44	56	42	3	93	95	23250	244
Jun	36	27	48	32	3	90	85	22500	265
Jul	40.3	30	56	42	3	93	81	23250	287
Aug	52.7	40	54	41	3	93	92	23250	253
Sep	75	56	55	41	3	90	105	22500	214
Oct	117.8	88	62	47	3	93	135	23250	173
Nov	177	133	44	33	3	90	190	22500	119
Dec	241.8	181	42	32	3	93	243	23250	96
	Sum	1156.95	584.7						
								Ave. Area =	177

DEPTH OF STORED EFFLUENT (TRIAL)

Month	First Trial area m^2	Effluent applied per month L	Application rate mm	Disposal rate per month mm	Gain/Loss mm	Increase in depth of stored effluent mm	Depth of Effluent for month mm	Increase in depth of effluent mm	Computed depth of Effluent mm
Dec.	180	-	-	-	-	-	-	-	0
Jan.	180	23250	129	254	-125	-415	0	-415	-415
Feb.	180	23250	129	212	-82	-275	-415	-275	-690
Mar.	180	23250	129	192	-63	-210	-690	-210	-900
Apr.	180	23250	129	135	-5	-18	-900	-18	-918
May	180	23250	129	95	34	114	-918	114	-804
Jun	180	23250	129	85	44	147	-804	147	-657
Jul	180	23250	129	81	48	160	-657	160	-496
Aug	180	23250	129	92	37	125	-496	125	-372
Sep	180	23250	129	105	24	81	-372	81	-291
Oct	180	23250	129	135	-6	-18	-291	-18	-310
Nov	180	23250	129	190	-61	-202	-310	-202	-512
Dec	180	23250	129	243	-114	-379	-512	-379	-891

CALCULATION OF IRRIGATION AREA

Area A_i = Q_w/DIR Qw = weekly effluent flow DIR = design irrigation rate

Qw= 5250Litre DIR= 21 mm/week

Irrigation A= 250 m^2

CALCULATION OF ABSORPTION TRENCH

Data
width b=750mm
depth d=700mm
aggregate depth=300mm

Note: b = minimum 200mm, max. 750mm, Typical 300-450mm
Depth of aggregate=min. 200mm, max. 400mm, Typical 200-400mm
Depth of topsoil= min. 100mm, max. 150mm, Typical 100-150mm
Aw= wetted area

Qd= design daily flow in L/Day DLR= Design Loading Rate in mm/d W=width in mm

Qd= 750 litre DLR(Primary)= 5 mm/day DLR (Secondary)= 8 mm/day

A_W = Q_d/LTAR Qd=daily effluent flow LTAR= Long Term Acceptance Rate (mm/day)

Qd= 750 litre LTAR= 3 mm/day

A_W = 250 m^2

L= $A_W/b+d_w$ L=trench length (m) Aw= wetted area b=trench width dw=2*0.5d
dw=allowance for depth of wetted walls (m)

Length, L= 192 m

L =Qd/DLR*W L=length in mm

Length, L= 214 m (for primary effluent) L= 134 m (for secondary effluent)

CALCULATION OF EVAPOTRANSPIRATION - ABSORPTION AREA/TRENCH

Area, Ae= 180m^2 Be=width +2depth
Length, L= Ae/Be

Length, L= 90 m