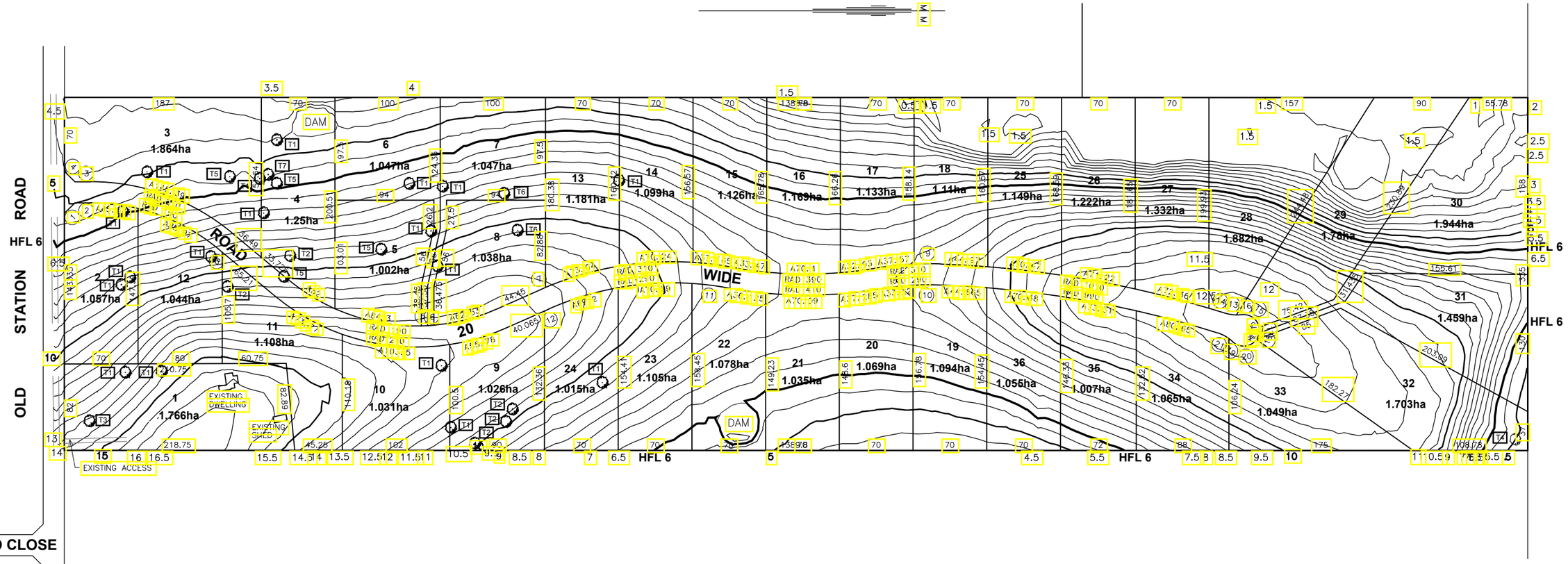
APPENDIX A – CONCEPT SUBDIVISION PLAN



SHORT LINE TABLE

REF	RADIUS	ARC	DIST.
1			14.14
2			14.86
3			14.86
4			14.14
5	190	6.005	6.005
6	190	6.015	6.015
7	310	5.555	5.555
8			5.005
9	310	25.115	25.105
10	290	25.42	25.41
11	290	34.515	34.495
12			4.39
13	35	10.415	10.38
14	1010	16.515	16.515
15	15	22.615	20.53
16	35	5	4.995
17	15	5.33	5.3
18	15	6.855	6.795
19	35	4.68	4.675
20	15	25.855	22.77
21	35	11.5	11.45

TREE SCHEDULE MARCH 2017

MARK	SPECIES	NUMBER	
T1	TALLOWWOOD	18	
T2	BRUSHBOX	5	
T3	GREY GUM	1	
T4	BLACKBUTT	1	
T5	BLOODWOOD	4	
T6	RED MAHOGANY	2	
T7	WHITE MAHOGANY	1	
		32	

NOTES

DIMENSIONS AND AREAS SUBJECT TO FINAL SURVEY AND COUNCIL APPROVAL.

EACH LOT TO HAVE MINIMUM 1 ha.

HIGH FLOOD LEVEL RL 6.0M AHD.

EACH LOT TO HAVE MINIMUM 1000m^2 ABOVE H.F.L.

ROAD 6M KERB - KERB (MOUNTABLE KERB).

RIGHT OF WAY 4M SEAL ON 5M FORMATION.

ALL LOTS TO HAVE TOWN WATER, UNDERGROUND ELECTRICITY & TELSTRA.

PROPOSED STAGING

STAGE 1	LOTS 1-12	12 LOTS
STAGE 2	LOTS 13-24	12 LOTS
STAGE 3	LOTS 25-36	12 LOTS
		36 LOTS

No.	Date	Revision
1	29.03.2017	TREE SPECIES ADDED

Scale (@A1): 1:2000
Datum : AHD
Drawn By : DM / KSL
Approved :
Date : 29/03/2017
Drawing Ref.: 50786-05 [REV 1].dwg

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L.G.A. KEMPSEY

PROPOSED REZONING & SUBDIVISION
LOT 7, DP 255922
No. 145 OLD STATION ROAD
EAST KEMPSEY
FOR: MORGAN THOMPSON
-

Council File: -
File Ref.: 50786-05 [REV 1]
Format: A1
Rev. No.: 1
Sheet Ref.
Sheet 1 of 1

S:\Cad\Dwgs\JOBS\50786 Morgan Thompson\50786-05 [REV 1].dwg, Thursday, 30 March 2017 11:04:12 AM

APPENDIX B – SITE SPECIFIC REPORTS

Bushfire Assessment
Onsite Waste Water Assessment
Operational Noise Report extracts

BUSHFIRE HAZARD ASSESSMENT

Proposed Subdivision
36 x Lots

Lot 7 DP 255922
No 145 Old Station Road
Verges Creek
East Kempsey NSW
2440

Morgan Thompson
& Simone Kennett

November 2016

41 Belgrave Street, Kempsey NSW 2440 – PO Box 353 Kempsey NSW 2440 – phone 0265631292 – mecham@bigpond.com – ABN 32098436812

TABLE OF CONTENTS

1.0 INTRODUCTION

As requested a Bushfire Risk Assessment has been carried out for the proposed subdivision at Lot 7 DP 255922 No 145 Old Station Road, Verges Creek.

This report is based on a site assessment carried out on the 14th November 2016.

The subject lot has been identified by Council in their Rural Residential Land Strategy and this report considers the rezoning and the proposed subdivision of the subject lot.

The report is to demonstrate that bushfire risk is manageable.

The development would be an integrated development and has a requirement for a Bushfire Safety Authority under Section 100B of the *Rural Fires Act 1997*.

NOTE

The report has been prepared with all reasonable skill, care and diligence.

The information contained in this report has been gathered from field survey, experience and has been completed in consideration of the following legislation.

1. Rural Fires Act 1997.
2. Environmental Planning and Assessment Act 1979.
3. Building Code of Australia.
4. Council Local Environment Plans and Development Control Plans where applicable.
5. NSW Rural Fire Services, Planning for Bushfire Protection, 2006. (PfBP, 2006)
6. AS 3959-2009 Construction of Buildings in Bushfire Prone Areas.

The report recognizes the fact that no property and lives can be guaranteed to survive a bushfire attack. The report examines ways the risk of bushfire attack can be reduced where the subdivision site falls within the scope of the legislation.

The report is confidential and the writer accepts no responsibility of whatsoever nature, to third parties who use this report or part thereof is made known. Any such party relies on this report at their own risk.

1.1 Objectives

The objectives of this report are to:

- Ensure that the proposed subdivision meets the aims and objectives of NSW Rural Fire Services, *Planning for Bushfire Protection*, 2006 and has measures sufficient to minimize the impact of bushfires; and
- Reduce the risk to property and the community from bushfire; and
- Comply where applicable with AS3959 – 2009.

1.2 Legislative Framework

In NSW, the bushfire protection provisions of the BCA are applied to Class 1, 2, 3, Class 4 parts of buildings, some Class 10 and Class 9 buildings that are Special Fire Protection Purposes (SFPPs).

The BCA references AS3959 – 2009 as the deemed-to-satisfy (DTS) solution for construction requirements in bushfire prone areas for NSW.

All development on bushfire prone land in NSW should comply with the requirements of Addendum Appendix 3 and other bushfire protection measures identified within PfBP, 2006.

The proposed subdivision is required to obtain a Bushfire Safety Authority from the NSW Rural Fire Service.

1.3 Location

The site is located at No 145 Old Station Road Verges Creek.

The site is positioned approximately 2.7km east of the Kempsey CBD.

Locality – Verges Creek
Local Government Area – Kempsey Shire Council
Closest Rural Fire Service – Kempsey
Closest Fire Control Centre – Kempsey

The site location of the proposed dwelling can be seen in **Figure 1** and **Figure 2** below:

Figure 1 – Topographic Map

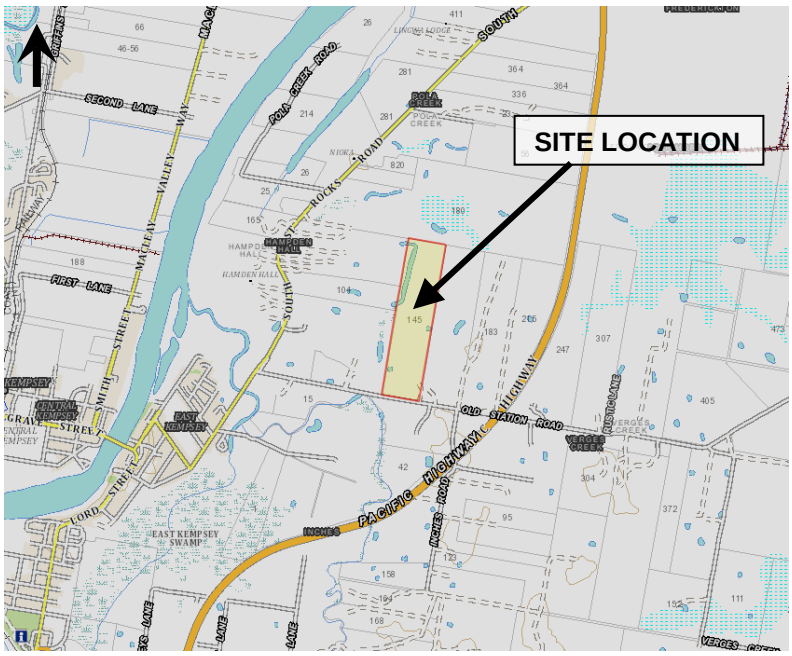


Figure 2 – Aerial View

Figure 3: Aerial View Close Up showing the Proposed Lots

1.4 Development Proposal and History

The subject site is approximately 46.3ha in size. The site is currently mostly grassland managed by cattle grazing with an existing dwelling associated with the use.

It is proposed to subdivide the lot into 36 residential lots. The subdivision layout can be seen in **Appendix 1**.

2.0 BUSHFIRE HAZARD ASSESSMENT

2.1 Assessment Methodology

Several factors need to be considered in determining the bushfire hazard.

These factors are slope, vegetation type, distance from the hazard, access/egress and fire weather. Each of these factors has been reviewed in determining the bushfire protection measures.

The assessment of slope and vegetation being carried out in accordance with Appendix 2 and Appendix 3 of NSW Rural Fire Service, *Planning for Bushfire Protection*, 2006 and Section 2 of AS 3959 - 2009.

2.2 Slope Assessment

Slope is a major factor to consider when assessing the bushfire risk. The slopes were measured using a Suunto PM-5/360 PC Clinometer.

The slopes that are present on the adjoining lots range from 0-5° downslopes.

The slopes present on the subject lot range from 0-5° downslope over the majority of the lot with a 6° downslope in the northern end of the subject lot. The following table shows the results:

Table 1 – Hazard Vegetation Slopes for adjoining land

Hazard Aspect	Slope	Upslope/Downslope or Flat
North	0-5°	Downslope
North East	6°	Downslope
East	0-5°	Downslope
South	0-5°	Downslope
West	0°	Flat

With respect to the slopes on the subject land a 0-5° downslope has been adopted for the majority of the lot and consideration of a 5-10° downslope in the northern part of the lot.

2.3 Vegetation Assessment

The vegetation on and surrounding the subject site was assessed over a distance of 140m.

The vegetation formations were classified using the system adopted as per Keith (2004) initially for the Asset Protection Zone calculation and then converting Keith to AUSLIG using Table A3.5.1 of Appendix 3 (2010) for assessment of the Bushfire Attack Level.

2.3.1 Vegetation on and Adjoining/Adjacent to the Subject Lot

The vegetation on the subject lot consists mainly of grassland that is currently managed by cattle grazing.

There is an area of low lying land in the north western area of the lot that is currently due to the characteristics of this area unmanaged. The adjoining land to the north, east and west is all land currently managed by cattle grazing.

With respect to the land to the east there is an area of remnant forest that has a ground cover and shrub layer managed by cattle grazing. There are fewer disturbances by cattle grazing further to the east of this remnant forest.

Photo 1 - shows the grassland to the north of the subject lot

Photo 2 - shows the area of remnant forest to the north eastern side of the subject lot past an area of grassland both currently being managed by cattle grazing

Photo 3 - shows the extent of the management within the remnant

Photo 4 - shows the western grassland including the low lying area in the north western area of the subject lot

Photo 5 - shows an area of grassland on the eastern side of the subject lot

Photo 6 - shows an area of grassland looking west from the southern part of the subject lot

Photo 7 - shows the existing rural residential development to the south of the subject lot

The following table details the hazards for the proposed lots:

Table 2 – Hazard Vegetation

Hazard Aspect	Vegetation
North	Grassland
East	Remnant Forest
East	Grassland
South	Grassland
West	Grassland

2.4 Hazard

The hazards have been adopted to the north, south, east and west of the subject lot.

To the north, east and west of the subject lot the land is currently being managed by cattle grazing, this includes an area of remnant forest in the adjoining lot to the northeast.

For the purpose of this report the existing managed grassland as shown on the hazard map has been considered as a grassland hazard.

To build a factor of safety into the report the remnant forest area currently having the ground cover and shrub layer managed by cattle grazing has been considered as a forest hazard.

To the south is an area of rural residential development which for the purposes of the report has been considered as grassland hazard.

Currently the subject lot is being managed by cattle grazing with the exception of the low lying area.

The report considers that the low lying area is a grassland hazard and that the management practice of cattle grazing is unlikely to happen once the subdivision has commenced, therefore it is assumed that there will be a grassland hazard over the subject lot.

The slopes on the subject lot range from 0-5° downslope for the majority of the lot and a 5-10° downslope in the northern part and therefore in accordance with AS 3959 (2009).

The hazard vegetation can be seen in ***Figure 4*** below:

Figure 4: Hazards

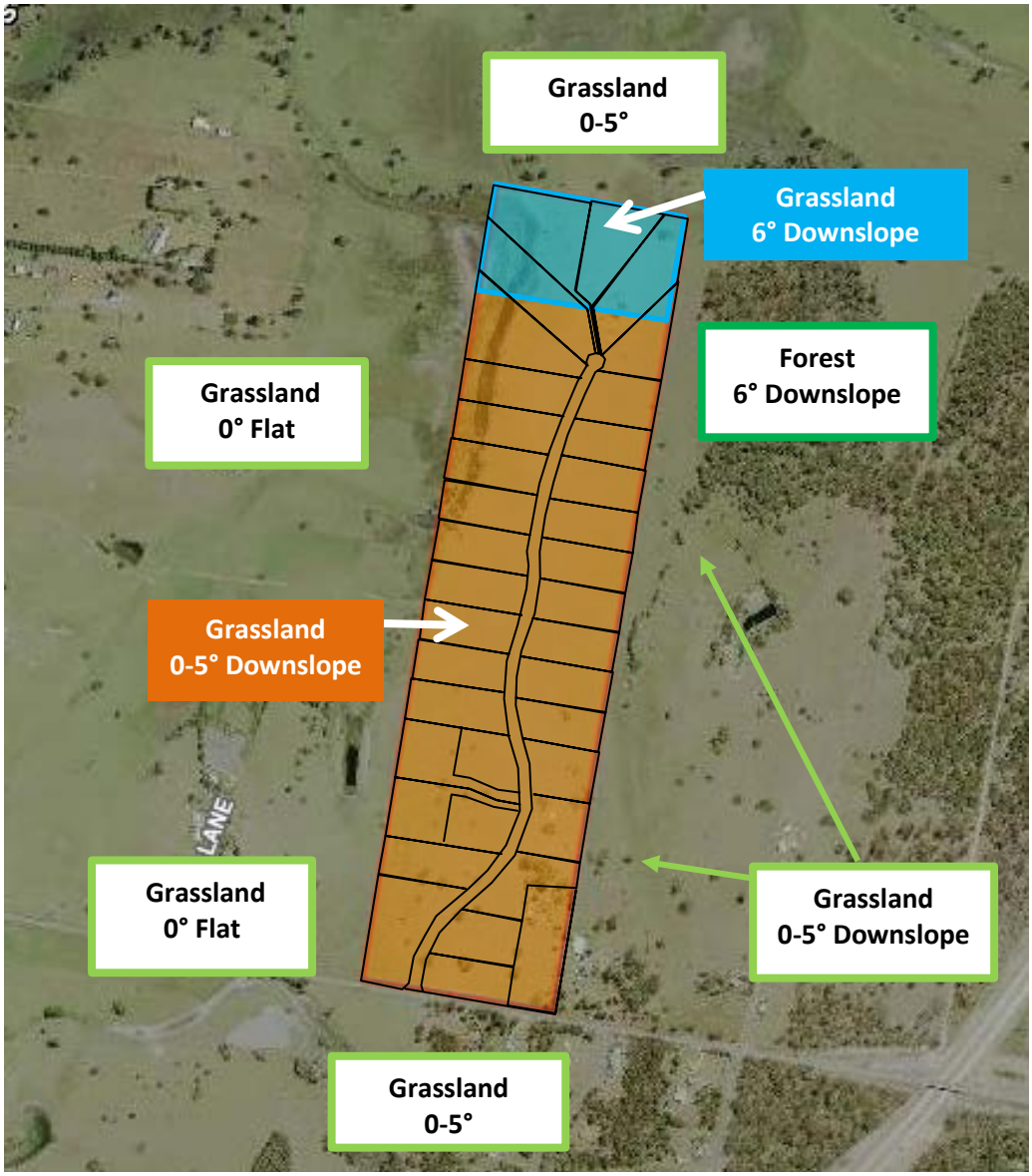


Table 3 – Summary of Hazard Characteristics

Hazard Aspect	Hazard	Slope	Upslope/Downslope or Flat
North	Grassland	0-5°	Downslope
East	Forest	6°	Downslope
East	Grassland	0-5°	Downslope
South	Grassland	0-5°	Downslope
West	Grassland	0°	Flat

2.5 Fire Danger Index

The fire weather for the site is assumed on the worst-case scenario. In accordance with NSW Rural Fire Services, PfBP, 2006 and Table 2.1 of AS3959 - 2009, the fire weather for the site is based upon the 1:50 year fire weather scenario and has a Fire Danger Index (FDI) of 80.

3.0 BUSHFIRE THREAT REDUCTION MEASURES

3.1 NSW Rural Fire Services, *Planning for Bushfire Protection*, 2006

The following provisions of PfBP 2006 have been identified:

3.1.1 Defendable Space/Asset Protection Zone (APZ)

To ensure that the aims and objectives of NSW Rural Fire Services, PfBP, 2006, a defendable space between the asset and the hazard should be provided. The defendable space provides for, minimal separation for safe firefighting, reduced radiant heat, reduced influence of convection driven winds, reduced ember viability and dispersal of smoke.

The proposed development is not considered to be subject to the Special Fire Protection Purpose requirements which are applicable to schools, (the proposed development is not a school).

It is recommended that the defendable space for the proposed development be based upon the minimum requirements for Asset Protection Zones as set out in NSW Rural Fire Services, *Planning for Bushfire Protection*, 2006.

Table 4 - APZ Requirements (PfBP 2006) for the Proposed Lots of the Subdivision

Hazard Aspect	Vegetation Type	Slope	IPA	OPA	Total APZ Required (IPA + OPA)
North	Grassland	0-5° Downslope	9m		9m
East	Woodland	6° Downslope	22m		22m
East	Forest	0-5° Downslope	22m	5m	27m
East	Grassland	0-5° Downslope	9m		9m
South	Grassland	0-5° Downslope	9m		9m
West	Grassland	0° Flat	8m		8m

See **Appendix 2** for the Asset Protection lines (i.e. BAL-29 contour lines).

As stated previously, the report considers that the management practice of cattle grazing is unlikely to happen once the subdivision has commenced, therefore it is assumed that there will be grassland

hazard over the subject lot. The slopes on the subject lot range from 0-10° and therefore in accordance with AS 3959 (2009) a 10m has been conservatively adopted as a minimum internal APZ.

3.1.2 Operational Access and Egress

Access to and egress from each of the proposed lots will be via public roads to be completed as part of the subdivision.

3.1.2 Operational Access and Egress

Access to and egress from each of the proposed lots will be via public roads to be completed as part of the subdivision. The following tables consider access and egress with respect to the subdivision:

Table 5

Intent of measures: to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.		***Comment***
The intent may be achieved where:		
Performance Criteria	**Acceptable Solutions**	
Firefighters are provided with safe all weather access to structures (thus allowing more efficient use of firefighting resources)	• Public roads are two-wheel drive, all weather roads.	To Comply
Public road widths and design that allow safe access for firefighters while residents are evacuating an area.	• Urban perimeter roads are two-way, that is, at least two traffic lane widths (carriageway 8 metres minimum kerb to kerb), allowing traffic to pass in opposite directions. Non perimeter roads comply with Table 4.1 – Road widths for Category 1 Tanker (Medium Rigid Vehicle). • The perimeter road is linked to the internal road system at an interval of no greater than 500 metres in urban areas. • Traffic management devices are constructed to facilitate access by emergency services vehicles. • Public roads have a cross fall not exceeding 3 degrees. • All roads are through roads. Dead end roads are not recommended, but if unavoidable, dead ends are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a	Internal road to comply with requirements for Perimeter Roads. Perimeter roads applicable in Urban Areas. To comply To comply See below

	dead end and direct traffic away from the hazard. • Curves of roads (other than perimeter roads) are a minimum inner radius of six metres and minimal in number, to allow for rapid access and egress. • The minimum distance between inner and outer curves is six metres. • Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient. • There is a minimum vertical clearance to a height of four metres above the road at all times.	To comply To comply To comply To comply
The capacity of road surfaces and bridges is sufficient to carry fully loaded fire fighting vehicles.	• The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles (approximately 15 tonnes for areas with reticulated water, 28 tonnes or 9 tonnes per axle for all other areas). Bridges clearly indicate load rating.	To comply
Roads that are clearly sign- posted (with easily distinguishable names) and buildings/properties that are clearly numbered.	• Public roads greater than 6.5 metres wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water for fire suppression. • Public roads between 6.5 metres and 8 metres wide are No Parking on one side with the services (hydrants) located on this side to ensure accessibility to reticulated water for fire suppression.	To comply To comply
There is clear access to reticulated water supply	• Public roads up to 6.5 metres wide provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression. • One way only public access roads are no less than 3.5 metres wide and provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression.	N/A N/A
Parking does not obstruct the minimum paved width	• Parking bays are a minimum of 2.6 metres wide from the kerb edge to road pavement. No services or hydrants are located within the parking bays. • Public roads directly interfacing the bushfire hazard vegetation provide roll top kerbing to the hazard side of the road.	To comply To comply

The road length is approximately 1.2kms. With respect to the single access the following should be noted:

a) The existing grassland vegetation to the north, east and west of the subject lot is currently managed and to the north and east due to the characteristics of the land is very likely to stay grazing land. It is noted that the land to the east of the subject lot to the highway has been included in Council's Rural Residential land strategy. It is further noted that exiting from the subdivision will be away from the remnant forest hazard.

b) It is recommended that the internal road comply with the minimum dimensions of a perimeter road and have a roll back kerb.

Table 6

Performance criteria	**Acceptable solution**	**Comment**
The intent may be achieved where:		
• Access to properties is provided in recognition of the risk to fire fighters and/or evacuating occupants	• At least one alternative property access road is provided for individual dwellings (or groups of dwellings) that are located more than 200 metres from a public through road	All property access roads will be less than 200m
• The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles • All weather access is provided	• Bridges clearly indicate load rating and pavements and bridges are capable of carrying a load of 15 tonnes • Roads do not traverse a wetland or other land potentially subject to periodic inundation (other than a flood or storm surge)	Can Comply Can Comply
• Road widths and design enable safe access for vehicles	• A minimum carriageway width of four metres for rural residential areas, rural landholdings or urban areas with a distance of greater than 70 metres from the nearest hydrant point to the most external part of a proposed building (or footprint) • In forest, woodland and heath situations, rural property access roads have passing bays every 200 metres that are 20 metres long by two metres wide, making	Can Comply N/A

	a minimum trafficable width of six meters at the passing bay.	
	• A minimum vertical clearance of four metres to any overhanging obstructions, including tree branches.	N/A
	• Internal roads for rural properties provide a loop road around any dwelling or incorporate a turning circle with a minimum 12 metre outer radius.	A reversing bay may be provided in lieu of a loop road around the dwelling or a turning circle. Where a reversing bay is provided it shall be not less than 6m wide and 8m deep with an inner minimum turning radius of 6m and an outer radius of 12m.
	• Curves have a minimum inner radius of six metres and are minimal in number to allow for rapid access and egress.	Can Comply
	• The minimum distance between inner and outer curves is six metres.	Can Comply
	• The crossfall is not more than 10 degrees.	Can Comply
	• Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads.	Can Comply

It is considered that the relevant acceptable solutions as provided for by 4.1.3 of NSW Rural Fire Service, PfBP, 2006 are capable of being complied with and as such the intent for the provisions of services can be achieved.

3.1.3 Services - Water, Gas and Electricity

As set out in Section 4.1.3 of NSW Rural Fire Services**,** *Planning for Bushfire Protection*, 2006, developments in bushfire prone areas must maintain a water supply for firefighting purposes.

Electricity supply is available and will be connected to the subdivision site.

Reticulated water supply is available and is connected to the site. If Council cannot guarantee a water supply then a Water Supply for Fire Fighting of 20,000 litres in accordance with Fast Fact 3/08 and Planning for Bushfire Protection, 2006 is to be provided for the dwelling (See **Appendix 3).**

Any tanks will require the following at a minimum.

- A suitable connection for firefighting purposes is made available and located within the IPA and away from the structure. A 65mm Storz outlet with a Gate or Ball valve is provided.

- Gate or Ball valve and pipes are adequate for water flow and are metal rather than plastic.
- Underground tanks have an access hole of 200mm to allow tankers to refill direct from the tank. A hardened ground surface for truck access is supplied within 4 metres of the access hole.
- Above ground tanks are manufactured of concrete or metal and raised tanks have their stands protected. Plastic tanks are not used. Tanks on the hazard side of a building are provided with adequate shielding for the protection of fire fighters.
- All above ground water pipes external to the building are metal including and up to any taps.
- Pumps are shielded.

The use of heavy-duty hoses with wide spray nozzles is recommended with hoses able to reach all parts of any dwelling.

Bottled gas supplies are to be installed and maintained in accordance AS 1596. Metal piping is to be used. All fixed gas cylinders are to be kept clear of all flammable materials to a distance of 10m and shielded on the hazard side of the installation. If gas cylinders need to be located close to the building, the release valves are to be directed away from the building and at least 2 metres away from any combustible material so they do not act as a catalyst to combustion. Connections to and from gas cylinders are metal.

The services requirements are summarized below:

Table 7 - Service Provision Requirements

Intent of measures: to provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building		
Performance Criteria	**Acceptable Solutions**	**Compliance Comment**
The intent may be achieved where:		
Reticulated water supplies • water supplies are easily accessible and located at regular intervals	• reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads. • fire hydrant spacing, sizing and pressures comply with AS 2419.1 – 2005. Where this cannot be met, the RFS will require a test report of the water pressures anticipated by the relevant water supply authority. In such cases, the location, number and sizing of hydrants shall be determined using fire engineering principles. • hydrants are not located within any road carriageway • all above ground water and gas service pipes external to the building	To Comply To Comply To Comply To Comply

	are metal, including and up to any taps. • the provisions of parking on public roads are met.	To Comply
Electricity Services • location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings • regular inspection of lines is undertaken to ensure they are not fouled by branches.	• where practicable, electrical transmission lines are underground. • where overhead electrical transmission lines are proposed: - lines are installed with short pole spacing (30 metres), unless crossing gullies, gorges or riparian areas; and - no part of a tree is closer to a power line than the distance set out in accordance with the specifications in 'Vegetation Safety Clearances' issued by Energy Australia (NS179, April 2002).	To Comply To Comply
Gas services • location of gas services will not lead to ignition of surrounding bush land or the fabric of buildings	• reticulated or bottled gas is installed and maintained in accordance with AS 1596 and the requirements of relevant authorities. Metal piping is to be used. • all fixed gas cylinders are kept clear of all flammable materials to a distance of 10 metres and shielded on the hazard side of the installation. • if gas cylinders need to be kept close to the building, the release valves are directed away from the building and at least 2 metres away from any combustible material, so that they do not act as a catalyst to combustion. Connections to and from gas cylinders are metal. • polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not used.	To Comply at DA/CC stage for dwelling To Comply at DA/CC stage for dwelling To Comply at DA/CC stage for dwelling To Comply at DA/CC stage for dwelling

It is considered that the relevant acceptable solutions as provided for by 4.1.3 of NSW Rural Fire Services, PfBP, 2006 are capable of being complied with and as such the intent for the provision of services can be achieved.

3.1.4 Landscaping

Landscaping is a major cause of fire spreading to buildings, and therefore any landscaping proposed in conjunction with the proposed development will need consideration when planning, to produce gardens that do not contribute to the spread of a bushfire.

When planning any future landscaping surrounding any proposed building or subdivision, consideration should be given to the following:

- The choice of vegetation – consideration should be given to the flammability of the plant and the relation of their location to their flammability and ongoing maintenance to remove flammable fuels.
- Trees as windbreaks/firebreaks – Trees in the landscaping can be used as windbreaks and also firebreaks by trapping embers and flying debris.
- Vegetation management – Maintain a garden that does not contribute to the spread of bushfire.
- Maintenance of property – Maintenance of the property is an important factor in the prevention of losses from bushfire.

Appendix 5 of NSW Rural Fire Services, *Planning for Bushfire Protection*, 2006, contains standards that are applicable to the provision and maintenance of landscaping. Any landscaping proposed to be undertaken in conjunction with the proposed development is to comply with the principles contained in Appendix 5 of NSW Rural Fire Services, PfBP, 2006.

Compliance with Appendix 5 of NSW Rural Fire Services, PfBP, 2006, will satisfy the intent of the bush fire protection measures that are applicable to the provision of landscaping.

3.2 Construction of Buildings

3.2.1 General

The deemed-to-satisfy provisions for construction requirements are detailed in AS 3953-2009. The relevant Bushfire Attack Level and Construction Requirements have been determined in accordance with Appendix 3 (2010) of PfBP, 2006 and Section 2 of AS 3959-2009. The additional construction requirements with respect to A3.7 of Appendix 3 (2010) of PfBP (2006) are required to be added to the standards for each Bushfire Attack Level.

3.2.2 Vegetation

To complete the assessment under AS 3959-2009 the vegetation, as originally assessed in accordance with Keith, has to be converted to AUSLIG.

The following table shows the conversion:

Table 8 – Summary of Vegetation Characteristics

Vegetation Classification – (Keith, 2004)	Vegetation Classification – (AUSLIG 1990)
Forest	Forest
Grassland	Grassland
Woodland	Woodland

3.2.3 AS3959 – 2009 Construction of Buildings in Bushfire Prone Areas

The following construction requirements in accordance with AS 3959 – 2009 Construction of Buildings in Bushfire Prone Areas is required for the bushfire attack categories.

Table 9

Bushfire Attack Level (BAL)
BAL - LOW No construction requirements under AS 3959-2009
BAL - 12.5
BAL - 19
BAL - 29
BAL - 40
BAL - FZ

There is a proposed lot layout plan in **Appendix 2** that shows the BAL-29 contour lines.

Compliance with these requirements will ensure that any new dwelling complies with the requirements of AS3959-2009 Construction of Buildings in Bushfire Prone Areas, for the siting, design and construction.

4.0 REQUIREMENTS

The following requirements are considered to be integral to this bushfire risk assessment:

1. An Asset Protection Zone as detailed in Section 3.1.1 of this report is provided.
2. Access and Egress is to be provided as detailed in Section 3.1.2 of this report is to be provided.
3. Services as detailed in Section 3.1.3 of this report are to be provided.
4. Adopt landscaping principals in accordance with Section 3.1.4 of this report.
5. In addition to the requirements of this report it is recommended that a bushfire survival plan be developed and implemented for the subject site. In this regard your attention is drawn to the Rural Fire Service website.

5.0 CLAUSE 44 CONSIDERATIONS

Table 10

Environmental/Heritage Feature	Comment
Riparian Corridor	Not considered in this report
SEPP 14 – Coastal Wetland	Not considered in this report
SEPP 26 – Littoral	Not considered in this report
SEPP 44 – Koala Habitat	Not considered in this report
Areas of geological interest	Not considered in this report
Environment protection zones	Not considered in this report
Land slip	Not considered in this report
Flood prone land	Not considered in this report
National Park Estate or other reserves	Not considered in this report
Threatened Species, populations, endangered ecological communities and critical habitat	Not considered in this report
Aboriginal Heritage	Not considered in this report

6.0 CONCLUSION

It is suggested that with the implementation of this report, and its recommendations, that the bushfire risk is manageable and will be consistent with the acceptable bushfire protection measure solutions, provided for in Section 4.3.5 of NSW Rural Fire Services, PfBP, 2006.

The report provides that the required APZ's can be achieved and that any proposed new dwelling can be constructed so as to comply with the requirements of AS 3959-2009 and Appendix 3 of PfBP, 2006, Construction of Buildings in Bushfire Prone Areas.

This report is however contingent upon the following assumptions and limitations:

Assumptions

1. For a satisfactory level of bushfire safety to be achieved, regular inspection and testing of proposed measures, building elements and methods of construction, specifically nominated in this report, is essential and is assumed in the conclusion of this assessment.

2. There are no re-vegetation plans in respect to hazard vegetation and therefore the assumed fuel loading will not alter.

3. It is assumed that the building works will comply with the DTS provisions of the BCA including the relevant requirements of Australian Standard 3959 – 2009.

4. The proposed development is constructed and maintained in accordance with the risk reduction strategy in this report.

5. The vegetation characteristics of the subject site and surrounding land remains unchanged from that observed at the time of inspection.

Limitations

1. The data, methodologies, calculations and conclusions documented within this report specifically relate to the proposed subdivision and must not be used for any other purpose.

2. A reassessment will be required to verify consistency with this assessment if there is any alterations and/or additions, or changes to the risk reduction strategy contained in this report.

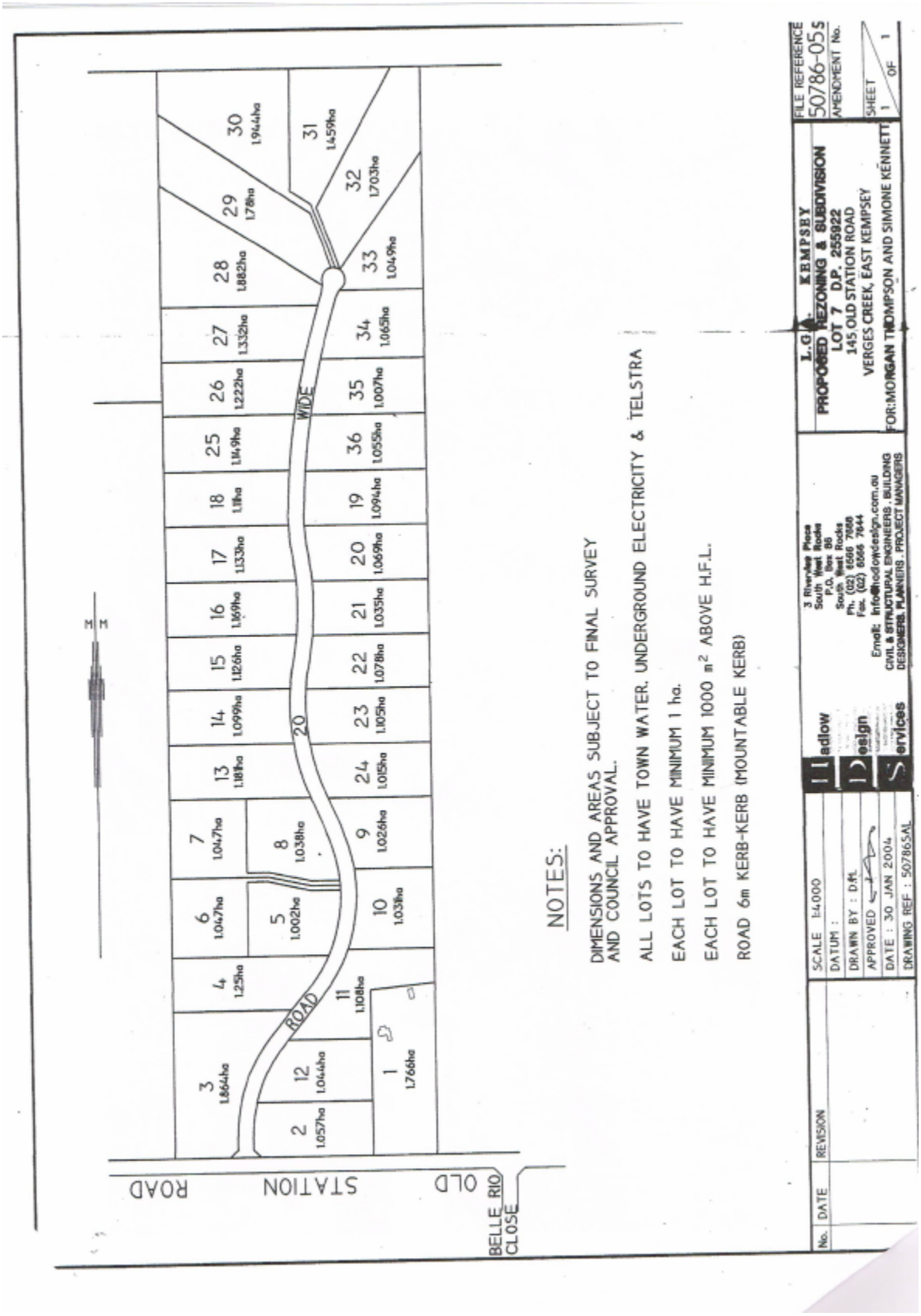
Regards

Tim Mecham
Midcoast Building and Environmental

7.0 REFERENCES

NSW Rural Fire Services, ***Planning for Bushfire Protection***, 2001
NSW Rural Fire Services, ***Planning for Bushfire Protection***, 2006
AS 3959-2009 ***Construction of Buildings in Bushfire Prone Areas***
Keith David 2004, Ocean ***Shores to Desert Dunes, The Native Vegetation of New South Wales and the ACT***, Department of Environment and Conservation
NSW State Government (1997) Rural Fires Act 1997
NSW Rural Fire Service – ***Guideline for Bushfire Prone Land Mapping 2002***

APPENDIX 1: Subdivision Layout



APPENDIX 2: BAL-29 Contour Lines

The internal BAL lines are not shown but the indicative 10m scale below shows the impact on each lot

10m

Note: BAL Contour Lines are indicative only

APPENDIX 3 – Water Supply Requirements

NSW RURAL FIRE SERVICE

COMMUNITY RESILIENCE FAST FACTS **3/08**

Water Supply for Fire Fighting Purposes

This Fast Fact clarifies the NSW Rural Fire Service (RFS) position on the requirement for water supplies for development in bush fire prone areas.

Adequate water supply is critical for effective fire fighting. Where a non reticulated water supply is provided or the reticulated water supply is deemed inadequate, an additional onsite stored supply of water for fire fighting will be required. Non reticulated water is a supply that is not piped by council or a water authority and includes rainwater, ground water or surface water.

In the past, additional water sources could take the form of a static water supply (SWS) or a dedicated water supply. The RFS has traditionally required that an alternate supply of water be 'dedicated' for fire fighting purposes in line with the provisions of *Planning for Bush Fire Protection* 2006 (PBP). Dedicated water implies that the supply shall be in the form of a tank of water and has traditionally not included swimming pools or dams. The term also implies that the supply must be isolated from other domestic water supplies and used solely for fire fighting purposes.

From a practical fire fighting point of view, any source of available water will be utilised during a bush fire event and dedicated tanks are not always the most practical option.

In light of the above and the increasing demand for sustainable and efficient use of our water resources, the RFS will no longer require water to be solely 'dedicated' for fire fighting purposes and will allow more flexibility in satisfying the water requirements of PBP. As such, water holding structures such as tanks, swimming pools and dams can be considered.

Therefore, the RFS conditions addressing water supply will no longer refer to a 'dedicated' water supply and will simply state that a supply of water shall be provided for 'fire fighting purposes'. This position will also apply to previously issued conditions referring to dedicated supplies. As such, the water source can be used for other purposes and allow for the circulation of fresh water. The onus will be on the property owner to provide suitable water supply arrangements for fire fighting that meet the RFS requirements and ensure that any water sources are maintained at the appropriate capacity (see Table 4. of PBP).

Water capacities, access (tanker or pedestrian) for fire fighters and the provision of appropriate connections should also be considered when determining if a proposed water source is suitable. Furthermore, the property owner is encouraged to place a 'SWS' sign in a visible location on the street front.

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1 of 1

Version 3 – February 2012

ONSITE SEWAGE MANAGEMENT ASSESSMENT

Proposed Subdivision
36 x Lots

Lot 7 DP 255922
No 145 Old Station Road
Verges Creek
East Kempsey NSW
2440

Morgan Thompson
And
Simone Kennett

November 2016

1.0 Introduction

This report has been prepared on behalf of the owners for a proposed subdivision on land known as Lot 7 DP 255922 No 145 Old Station Road, Verges Creek, East Kempsey.

The report contains an assessment of soil and site conditions and provides recommendations for the most suitable types of on-site sewage management systems that could be utilized.

Site investigations were carried out on the 14th November 2016 to determine site and soil conditions.

The site and soil assessment, design details and calculations have been carried out in accordance with the following technical and regulatory documents:

- AS/NZS 1547-2012 On-site domestic-wastewater management.
- NSW Government Environment and Health Protection Guidelines - On-site Sewage Management for Single Households.

NOTE

This report has been prepared with all reasonable skill, care and diligence.

The information contained in this report has been gathered from the field survey and experience.

The report recognizes the importance of the correct installation of onsite sewage management systems, coupled with ongoing appropriate and regular maintenance in ensuring that satisfactory environmental health outcomes are obtained and maintained into the future.

The report is confidential and the writer accepts no responsibility of whatsoever nature, to third parties who use this report, or part thereof is made known.

Any such party relies on this report at their own risk.

2.0 Site Description

The site is located at Lot 7 DP 255922 No 145 Old Station Road, Verges Creek, East Kempsey and is situated within the Kempsey Shire Local Government Area.

The site is positioned approximately 2.7km east of the Kempsey CBD.

Leave Kempsey CBD and travel south over the bridge, take the second left onto Gill Street it continues then turns into Macleay Street and into Washington Street and then along the South West Rocks Road for 1km. Turn right at Old Station Road and travel 1 km and the subject site is on the left.

These roads are all public sealed roads.

Figure 1 and **Figure 2** below show the site location.

Figure 1 –Topographical Map

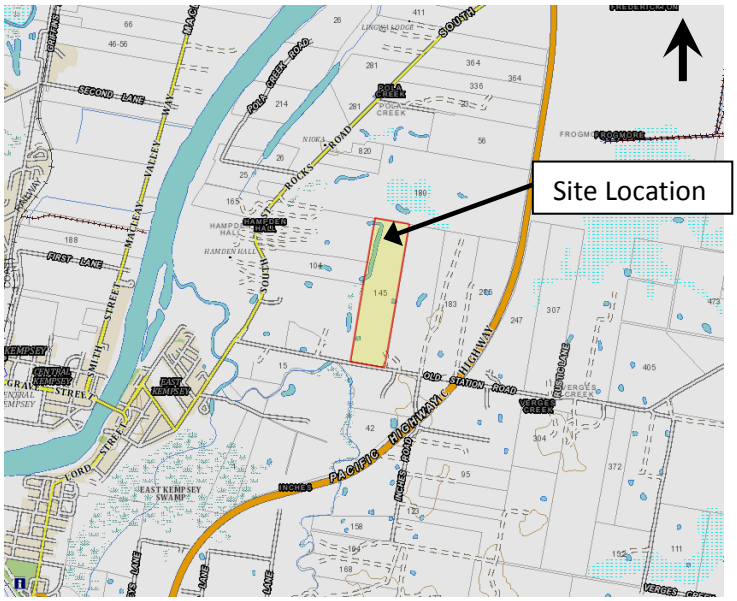


Figure 2 – Aerial Photograph

3.0 History and Proposed Development

It is proposed to subdivide the lot into 36 rural residential lots.

The subject site is approximately 46.3ha in size.

The site has one (1) dwelling currently being occupied on the site. It is assumed that there is one (1) approval to operate an on-site sewage management system from Kempsey Shire on the subject site.

The disposal area for the existing dwelling shall be contained within the proposed lot (Lot 1) with regard to the appropriate buffer distances.

The subdivision plan can be seen in **Appendix 1**.

4.0 Site Assessment

The following table outlines the major site features relevant to on-site sewage management.

Table 1: Site Assessment Results

SITE FEATURE	DESCRIPTION	LIMITATION
Climate	Annual rainfall – 1126.4mm (Kempsey BOM) Annual pan evaporation – 1597mm (BOM)	Moderate
Flood/inundation potential	Given the likely dwelling positions it is not anticipated that there will not be any flooding or localized storm water inundation issues for the site and associated infrastructure	Minor See Report for further detail
Exposure	The aspect of the site provides for high levels of wind and sun exposure	Minor
Slope	The proposed road runs though the centre of the site with the slope running away from either side. Slopes range from 0 to 10%	Minor
Landform	Gently sloping rolling hills	Minor
Run-on & Seepage	Given the nature of the soil there is likely to be run-off unless measures are not implemented	Moderate
Erosion Potential	No signs of erosion potential present	Minor
Drainage	The site generally has good drainage as it rises through the centre and then slopes towards the boundaries from each direction	Minor
Fill	There is no evidence of fill in the area assessed for onsite sewage management	Minor
Buffer Distances	Buffer distances are achievable, refer to ***Table 2***	Minor
Land Area	As indicated previously the lot size is approximately 46.3 hectares	Minor
% Rocks and /or Outcrops	There were no rocks or rock outcrops viewed during the site assessment	Minor

The relationships of rainfall to evaporation, the management of overland storm water run-on and seepage from the disposal area have been identified as moderate.

The above limitations will require attention in the design of the onsite sewage management system.

Photograph 1: Showing the Proposed site

5.0 Soil Assessment

Soil samples were taken at the site, in locations determined to represent the soil profiles that could exist on the subject property in the area identified as being suitable for onsite sewage management systems.

Due to the varying soil profiles, eight (8) test pits were dug on the subdivision site and the soils tested.

These pits were considered representative of the expected location of the onsite sewage management system and were excavated to a depth of approximately 1000mm to 1200mm.

Observations of soil characteristics were made and noted with soil samples being taken from the following test pits.

The location of the test pits were determined based upon lot layout and landform.

After inspection of the test pits there was three defined areas, **Area A, Area B and Area C.**

- **Area A** has the majority of lots relating to the northern and central section of the site. The 1 in 100 flood line encroaches on all lots to the west and to a lesser extent to the east.

- **Area B** relates to the lots to the southeast which the soils indicated that excess moisture was evident in the lower profiles. All the lots encroach the 1 in 100 flood line.

- **Area C** relates to the lots to the southeast where the refusal of the auger indicated that there was hardpan at a depth of one (1) metre.

Figure 3 - Aerial showing three defined areas

- **Measurements are indicative and not to scale**

AREA A

Test pit (1) is representative of twenty eight (28) lots being Lots 5, 8, 9, 10 and 13 to 36.

The soil samples that have been taken are considered to be representative of the various soil profiles on the subject lots.

The location of the test pits can be seen in **Appendix 2** and possible disposal areas in **Appendix 3**.

AREA B

Test pit (6) representative of four (4) lots being Lots 3, 4, 6, and 7.

The soil samples that have been taken are considered to be representative of the various soil profiles on the subject lots.

The location of the test pits can be seen in **Appendix 2** and possible irrigation areas in **Appendix 3**.

AREA C

Test pit (8) representative of four (4) lots being Lots 1, 2, 11 and 12.

The soil samples that have been taken are considered to be representative of the various soil profiles on the subject lots.

The location of the test pits can be seen in **Appendix 2** and possible irrigation areas in **Appendix 3**.

5.1 Soil and Wastewater Assessment for AREA A

Test pits (1), (2), (3), (4) and (5)

Soil permeability was established using field textural classification techniques.

The five (5) test pits were very similar soil types with little variations in the (3) profile depths.

The soils from the five (5) test pits were tested and test pit 1 was considered representative for Area- (A) which contains the 28 Lots, 5, 8, 9, 10 and Lots 13 to 36.

As stated above, field observations by Midcoast Building and Environmental indicated soil conditions in Test Pit 1 generally consisted of three (3) horizons being:

Test Pit 1

- Profile A – 0mm to 300mm
- Profile B – 300mm to 600mm
- Profile C – 600mm to 1200mm

Field observation and soil analysis information is presented in **Appendix 4**.

Generally the top soil, (Profile A), was a very dark grey clay loam. Profile A had a smooth texture with few, (<20%), small course fragments with a sub angular blocky ped structure and an estimated clay content being 25-35%.

Profile B was underlain is a reddish brown light to medium clay. Profile B had a smooth texture with few, (<20%), small course fragments with a sub angular blocky ped structure and an estimated clay content being 35-55%.

Profile C was a yellowish red medium to heavy clay. Profile C had a smooth texture with few, (<20%), small course fragments with a sub angular blocky ped structure and an estimated clay content of more than 50%.

Photograph 2: Showing the 3 Soil Profiles from Test Pit 1

The following table outlines the major soil features relevant to on-site sewage management at the site.

Table 2 – Soil Assessment Results Area A

SOIL FEATURE	DESCRIPTION	LIMITATION
Depth to bedrock/hardpan	Bedrock/hardpan was not encountered in any test pits	Minor
Depth to water table	No water was encountered in the test pits	Minor
Soil permeability (Category)	Profile A – (clay loam) Profile B – (light to medium clay) Profile C – (medium to heavy clay)	Minor Moderate Moderate (Major to Absorption Systems)
Soil structure	Profile A – Sub angular Blocky Profile B – Sub angular Blocky Profile C – Sub angular Blocky	Minor Minor Minor
Course fragments%	Profile A – less than 20% Profile B – less than 20% Profile C – less than 20%	Minor Minor Minor
pH	Profile A – 6.3 Profile B – 6.0 Profile C – 6.0	Minor Minor Minor
Electrical conductivity	Profile A – 0.00 Profile B – 0.00 Profile C – 0.00	Minor Minor Minor
Dispersability (Emerson Class)	Profile A – 3 Profile B – 3 Profile C – 3	Moderate Moderate Moderate

Soil permeability and dispersability was identified as moderate limitations to the wastewater system.

The above limitations will require attention in the detailed design of onsite sewage management systems to service the subject site.

Soil and Wastewater Assessment for AREA B

Test pits (6) and (7)

Soil permeability was established using field textural classification techniques.

The four test pits were very similar soil types with very little variations in the (3) profile depths.

The soil from Test Pit 6 was tested and considered representative for Area B which contains the 4 lots 3, 4, 6, and 7. Field observation and soil analysis information is presented in **Appendix 4**.

As stated above, field observations by Midcoast Building and Environmental indicated soil conditions in Test Pit 8 generally consisted of three (3) horizons being:

Test Pit 6

- Profile A – 0mm to 300mm
- Profile B – 300mm to 600mm
- Profile C – 600mm to 1200mm

Generally the top soil, (Profile A), was a very dark grey clay loam. Profile A had a smooth texture with few, (<20%), small course fragments with a sub angular blocky ped structure and an estimated clay content being 25-35%.

Profile B was underlain by dark reddish brown light to medium clay. Profile B had a smooth texture with few, (<20%), small course fragments with a sub angular blocky ped structure and an estimated clay content being 35-55%.

Profile C was a mottled yellowish red medium to heavy clay. Profile C had a smooth texture with few, (<20%), small course fragments with a sub angular blocky ped structure and an estimated clay content of more than 50%.

Photograph 3: Showing the 3 Soil Profiles from Test Pit 6 with a mottled lower profile

The following table outlines the major soil features relevant to on-site sewage management at the site.

Table 3 – Soil Assessment Results Area B

SOIL FEATURE	DESCRIPTION	LIMITATION
Depth to bedrock/hardpan	Bedrock/hardpan was not encountered in any test pits	Minor
Depth to water table	No water was encountered in the test pits	Minor
Soil permeability (Category)	Profile A – (clay loam) Profile B – (light to medium clay) Profile C – (medium to heavy clay)	Minor Moderate Moderate (Major to Absorption Systems)
Soil structure	Profile A – Sub angular Blocky Profile B – Sub angular Blocky Profile C – Sub angular Blocky	Minor Minor Minor
Course fragments%	Profile A – less than 20% Profile B – less than 20% Profile C – less than 20%	Minor Minor Minor
pH	Profile A – 5.1 Profile B – 5.0 Profile C – 5.0	Minor Minor Minor
Electrical conductivity	Profile A – 0.10 Profile B – 0.09 Profile C – 0.09	Minor Minor Minor
Dispersability (Emerson Class)	Profile A – 3 Profile B – 3 Profile C – 3	Moderate Moderate Moderate

Soil permeability and dispersability was identified as a moderate limitation to the wastewater system.

The above limitations will require attention in the detailed design of onsite sewage management systems to service the subject site.

Soil and Wastewater Assessment for AREA C

Test pit (8)

Soil permeability was established using field textural classification techniques.

The soil from Test Pit 8 was tested and considered representative for Area C which contains the 4 lots 1, 2, 11 and 12. Field observation and soil analysis information is presented in **Appendix 4**.

As stated above, field observations by Midcoast Building and Environmental indicated soil conditions in Test Pit 8 generally consisted of three (3) horizons being:

Test Pit 8

- Profile A – 0mm to 300mm
- Profile B – 300mm to 600mm
- Profile C – 600mm to refusal at 1000mm

Generally the top soil, (Profile A), was a very dark reddish grey clay loam. Profile A had a smooth texture with few, (<20%), small course fragments with a sub angular blocky ped structure and an estimated clay content being 25-35%.

Profile B was underlain by dark reddish brown light to medium clay. Profile B had a smooth texture with few, (<20%), small course fragments with a sub angular blocky ped structure and an estimated clay content being 35-55%.

Profile C was a grey medium to heavy clay. Profile C had a smooth texture with few, (<20%), small course fragments with a sub angular blocky ped structure and an estimated clay content of more than 50%.

Photograph 4: Showing the 3 Soil Profiles from Test Pit 8

The following table outlines the major soil features relevant to on-site sewage management at the site.

Table 4 – Soil Assessment Results Area B

SOIL FEATURE	DESCRIPTION	LIMITATION
Depth to bedrock/hardpan	Bedrock/hardpan was encountered in test pits at approximately 1m	Moderate (Major to Absorption Systems)
Depth to water table	No water was encountered in the test pits	Minor
Soil permeability (Category)	Profile A – (clay loam) Profile B – (light to medium clay) Profile C – (medium to heavy clay)	Minor Moderate Moderate (Major to Absorption Systems)
Soil structure	Profile A – Sub angular Blocky Profile B – Sub angular Blocky Profile C – Sub angular Blocky	Minor Minor Minor
Course fragments%	Profile A – less than 20% Profile B – less than 20% Profile C – less than 20%	Minor Minor Minor
pH	Profile A – 5.2 Profile B – 5.2 Profile C – 5.6	Minor Minor Minor
Electrical conductivity	Profile A – 0.00 Profile B – 0.00 Profile C – 0.00	Minor Minor Minor
Dispersability (Emerson Class)	Profile A – 3 Profile B – 2 Profile C – 2	Moderate Moderate Moderate

Soil permeability, depth to bedrock/hardpan and dispersability was identified as a moderate limitation to the wastewater system.

The above limitations will require attention in the detailed design of onsite sewage management systems to service the subject site.

6.0 Waste Water Characteristics and Generation

Having regards to the domestic nature of the occupation of the proposed subdivision it is considered that low strength effluent will be generated following treatment.

Assumed characteristics of effluent which requires disposal would therefore be as follows:

Table 5: Effluent Characteristics

PARAMETER	STRENGTH
Total Nitrogen	<50mg/L
Total Phosphorus	<10mg/L
BOD	<40mg/L
TDS	<500mg/L

Effluent loading is based on two persons for a master bedroom, two persons for a guest room and one person per additional bedroom. A study or any other room that has the potential to be used as a bedroom will be considered as an additional bedroom.

It has been assumed that standard water reduction measures will be installed as a result of compliance with the BASIX requirements.

For the purposes of this report the volume of wastewater which is predicted to be produced is provided for in ***Table 6*** below.

Table 6: Estimation of Effluent Generation

USAGE	OCCUPANCY RATE	EFFLUENT – LITRES PER PERSON PER DAY	PREDICTED EFFLUENT GENERATION - LITRES/DAY
3	5	150 L	750 L
5	7		1050 L

It is therefore considered that a total daily effluent production rate from the above table should be applied to the determination of the minimum onsite effluent disposal requirements for any new dwelling on the proposed lots dependant on the number of bedrooms.

7.0 System Design Assumptions

The following design assumptions have been adopted for the purposes of investigating system design options.

Table 7: Design Parameters

DESIGN PARAMETER	DESIGN ASSUMPTION
Soil Permeability	0.5 m/d-0.06 m/d
Hydraulic Loading - Number of persons	5 persons (3 Bedroom Dwelling) 7 persons (5 Bedroom Dwelling)
Hydraulic Loading - Expected Wastewater Quantity	150 L/p/d
Crop Factor	0.75
Rainfall	1126.4mm BOM Kempsey
Design Irrigation Rate (DIR) Secondary Treatment	14mm/week
Design Loading Rate (DLR) Secondary Treatment	7mm/day

For the purposes of this report, as the soil is a constraining issue, secondary treatment for ETA beds has been recommended with a Design Loading Rate of 7mm/day. The 7mm/day is considered a conservative rate and when it comes to individual design the loading rate may increase.

A design irrigation rate (DIR) of 14mm/week and a design loading rate (DLR) of 7mm/day were conservatively adopted.

8.0 On-site Sewage Management System

The soil samples above, although being similar in structure, soil testing indicated that the soils across the site three had (3) distinct areas.

Area B showed mottling of the soil in the lower soil profile indicating high moisture content, **Area C** had a shallow depth to hardpan of approximately one (1)metre.

Given the above constraints in **Areas B and C** they are unsuitable for evapotranspiration beds**.**

It is noted that the soil throughout the site is generally unsuited to absorption based systems therefore evapotranspiration beds have been recommended as an option for **Area A**.

Therefore, it is recommended that:

- It is recommended that the effluent be treated to a secondary standard in all three (3) areas.

- The lots in **Area A** can have the effluent disposed by subsurface irrigation, surface irrigation, or evapotranspiration beds*.*

- The lots in **Area B and Area C** can have the effluent disposed by subsurface irrigation, or surface irrigation (ETA Beds are unsuitable).

Based on the above site assessment, the type of treatment proposed for the effluent, and the

likely quantity and quality of wastewater to be generated it is considered that the site is suitable for disposal of effluent by the following.

8.1 Primary and Secondary Treatments

AREA - A

Option 1

Secondary Treatment

An Aerated Wastewater Treatment System with nutrient removal then to either:

Subsurface irrigation
Surface irrigation
Evapotranspiration beds

Option 2

Primary and Secondary Treatments

Primary treatment by 3000 litre septic tank approved by the NSW Department of Health to an approved reed bed system then to either:

Subsurface irrigation
Evapotranspiration beds

It is recommended that an outlet filter is to be installed into the septic tank.

The depth of the Subsurface irrigation is to be 300mm deep as per NSW Health Department guidelines as the effluent is not disinfected.

AREA – B and AREA - C

Option 1

Secondary Treatments

An Aerated Wastewater Treatment System then to either:

Subsurface irrigation
Surface irrigation

Option 2

Primary and Secondary Treatments
Primary treatment by 3000 litre septic tank approved by the NSW Department of Health to an approved reed bed system then to Subsurface irrigation

An outlet filter installed into the septic tank outlet is required.

The depth of the Subsurface irrigation is to be 300mm deep as per NSW Health Department guidelines as the effluent is not disinfected.

It is noted that sand mounds are also considered an option for secondary treatment.

8.2 Disposal Area, Irrigation

Option 1: Irrigation Systems (Secondary Treated Effluent)

A design irrigation rate of 14mm per week has been conservatively adopted for all areas. The design irrigation rate may be increased with individual assessments.

Either a below or above ground system would need to be constructed.

The irrigation area is to be planted with suitable vegetation (shrubs or lawns) to assist in nutrient uptake and improve effluent disposal through evapotranspiration.

All storm water is to be directed away from the disposal area. This includes the stormwater from any proposed dwelling and any ground water run-off.

The irrigation area sizing is based on hydraulic loading without consideration of a nutrient balance calculation.

It is considered nutrient build up in soil within the effluent disposal area will be minimised due to the natural filtration process that occurs in clay soils. Plantings in the irrigation area will also help with the nutrient uptake.

Surface Irrigation Area

(i) Irrigation Area Required

- **For 5 persons (3 bedroom dwelling) a minimum irrigation of 337m² is required for surface irrigation**. **Design calculations are presented in** Appendix 5 **of this report.**
- **For 7 persons (5 bedroom dwelling) a minimum irrigation of 472m² is required for surface irrigation**. **Design calculations are presented in** Appendix 5 **of this report.**

Components of this system would include:

- A designated surface irrigation area.
- Irrigation area to contain suitable vegetation to assist effluent disposal through evapotranspiration.
- The positioning of the disposal area is to comply with the requirements of Kempsey Shire Council.
- The installation of the irrigation area is to comply with the Kempsey Shire Councils technical standards.
- The design and construction of surface irrigation areas is to comply with Appendix M of Australian Standard 1547 – 2012.
- The proposed irrigation area may be benched to ensure a slope of less than 10%.
- Sprinklers are to be evenly distributed throughout the irrigation area.
- The main irrigation line is to be buried.
- Irrigation area to have boundaries clearly delineated by appropriate vegetation or other types of borders.
- Storm water is to be diverted away from the irrigation area.
- The positioning of the irrigation area is to be determined on site.

Spray-irrigation systems shall:

a) Distribute the effluent evenly in the designated area;

b) Control the droplet size, throw and plum height of the sprinkler system so that the risk of aerosol dispersion and likelihood of wind drift distributing any effluent beyond the designated area is negligible.

c) Have warnings, complying with AS 1319 or NZS/AS 1319, at the boundaries of the designated area in at least two places, clearly visible to property users, with wording such as 'Recycled Water - Avoid Contact - DOT NOT DRINK';

d) Meet the application disinfection criteria, see 5.4.2.5.1; and

e) Be provided with buffer area to ensure that any potential spray drift is absorbed within the appropriate setback distances

f) The main irrigation line is to be buried.

The soil should be rotary hoed or ripped and lime or gypsum added, (at a rate of 200g/m²). This will also raise the pH and improve the emersion class rating.

An example of layout components spray irrigation is shown in **Appendix 6**.

Subsurface Irrigation Area

(ii) Irrigation Area Required

- **For 5 persons (3 bedroom dwelling) a minimum irrigation of 337m² is required for surface irrigation. Design calculations are presented in** Appendix 5 **of this report.**
- **For 7 persons (5 bedroom dwelling) a minimum irrigation of 472m² is required for surface irrigation. Design calculations are presented in** Appendix 5 **of this report**

Sub-surface systems include:

a. Shallow subsurface drip irrigation

Shallow subsurface drip irrigation shall be installed at 100-150 depth into 150 to 250mm of top soil in grassed or other suitably vegetated areas. Secondary treated effluent shall be distributed from a system of pressure compensating drip emitters into the topsoil layer.

b. Covered subsurface drip irrigation

In systems using subsurface drip irrigation, effluent shall be applied directly to the surface of the soil under a cover of mulch or other approved cover material, which shall be held in place by durable bird resistant mesh netting pinned securely to the ground surface. Secondary treated effluent shall be distributed from pressure compensating drip emitters to achieve effective coverage of the design area.

Components of a sub-surface system would include:

- A designated subsurface irrigation area.
- Irrigation area to contain suitable vegetation to assist effluent disposal through evapotranspiration.
- The positioning of the disposal area is to comply with the requirements of Kempsey Shire Council.
- The installation of the irrigation area is to comply with the Kempsey Shire councils technical standards.
- The design and construction of subsurface irrigation areas is to comply with Appendix M of Australian Standard 1547 – 2012.

An example of layout components subsurface irrigation is shown in **Appendix 7.**

Irrigation Generally

All irrigation systems shall be designed to ensure that effluent is not applied at rates which exceed the absorption capacity of the soil. Care shall be taken to ensure that the application rate does not lead to:

a) Adverse effects on soil properties and plant growth through excess salt accumulation in the root zone during extended dry periods;

b) Harmful long term environmental effects to the soil of the land application system or the adjacent surface water and ground water; or

c) Increased risk to public health from surface ponding in the land application area or channelling or seepage beyond the land application area.

All irrigation systems shall be designed to promote evapotranspiration. The irrigation area is to be planted with suitable vegetation (shrubs or lawns) to assist in nutrient uptake and improve effluent disposal through evapotranspiration. Care shall be taken to ensure that the irrigation is well planted with plant species that are:

- Water tolerant;
- Appropriate for site conditions; and
- Planted at an appropriate density for evapotranspiration.

All stormwater is to be directed away from the disposal area. This includes the stormwater from any proposed dwelling and any ground water run-off.

The soil should be rotary hoed or ripped and lime or gypsum added, (at a rate of 200g/m²). This will also raise the pH and improve the emersion class rating.

The positioning of the irrigation area is to be determined on site however an indicative positioned is nominated in **Appendix 3.**

Option 2: ETA Beds (Secondary Treated Effluent)

(iii) Evapo-Transpiration Bed Area Required

- **For 5 persons (3 bedroom dwelling) a minimum evapo-transpiration bed of 67m long by 1m wide is required (3 beds x 23m); design calculations are presented in** Appendix 8 **of this report.**
- **For 7 persons (5 bedroom dwelling) a minimum evapo-transpiration bed of 93m long by 1m wide is required (4 beds x 24m); design calculations are presented in** Appendix 8 **of this report.**

The evapo-transpiration beds are required to be constructed in accordance with Appendix L of AS/NZS 1547 – 2012 (Figure L6 see **Appendix 9**). It is noted that an individual evapo-transpiration bed is not to exceed 25m in length and the beds are to be positioned 90 degrees to the slope of the land.

The trenches are to be evenly dosed and this is normally completed by way of a distribution box.

All storm water is to be directed away from the disposal area. This includes the stormwater from any proposed dwelling, additions and alterations, subdivision and existing dwelling and any ground water run-off.

Construction Techniques

The following techniques shall be observed so as to minimise the risk of damage to the soil:

a. Plan to excavate only when the weather is fine;

b. Avoid excavation when the soil has moisture content above the plastic limit. This can be tested by seeing if the soil forms a wire when rolled between the palms;

c. During wet seasons or when construction cannot be delayed until the weather becomes fine ,smeared soil surfaces may be raked to reinstate a more natural soil surface, taking care to use fine tines and only at the surface

d. When excavating by machine, fit the bucket with ‘’raker teeth ‘if possible, and excavate in small ‘bites’ to minimise compaction; and

e. Avoid compaction by keeping people off the finished trench or bed floor.

In particular for trenches and beds:

a. If rain is forecast then cover any open trenches, to protect them from rain damage;

b. Excavate perpendicular to the line of fall or parallel to the contour of sloping ground; and

c. Ensure that the inverts are horizontal.

d. During construction gypsum shall be applied at 1 kg/m2 to the base of the trench or bed to prevent the clay dispersing. The trench shall be closed in, as soon as possible to protect the gypsum from raindrop impact.

8.2.1 Plants

Surface vegetation for ETA/ETS beds/trenches shall be plants such as grasses and shrubs that tolerate wet conditions and have a high evapotranspiration capacity

The exact positioning of the beds is to be determined on site; the proposed effluent disposal area can be seen in **Appendix 3**.

8.3 Buffer Distances

Given the size of the subject lot and the flexibility which exists for the positioning of an onsite effluent disposal area it is considered that appropriate buffer zones can be provided.

The irrigation area is to be kept at a minimum distance of 6m up gradient and 3m down gradient from the property boundaries, and 15m away from the dwelling with the spray irrigation.

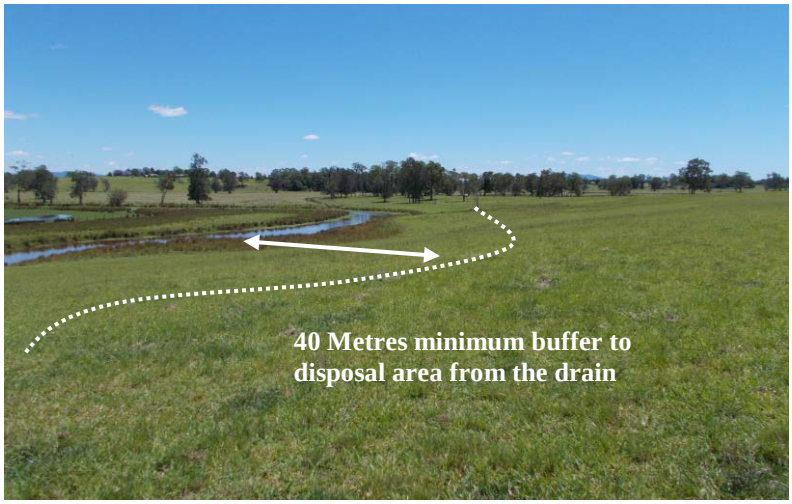
The disposal area is to be located at least 40m from any dams and drainage channels.

It is recommended that the buffer distances be provided in accordance with the following table:

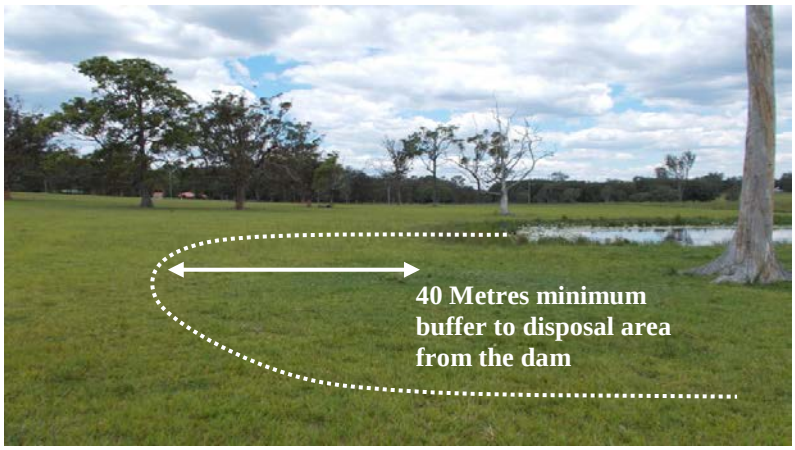
Table 8: Recommended Buffer Distances for Onsite Sewage Management

SYSTEM	BUFFER DISTANCES
All Systems	• 100m to permanent surface waters (rivers, creeks, lakes etc.). • 250m to domestic ground water supplies • 40m to other waters (farm dams, intermittent creeks/drainage depressions, drainage channels etc.)
Surface Spray Irrigation Systems	• 6m between irrigation area and property boundaries/driveways if area up gradient and 3m if down gradient • 15m to dwellings or other buildings • 3m to paths and walkways • 6m to swimming pool
Surface Drip/Trickle Irrigation Systems Shallow Subsurface Irrigation Systems	• 6m between irrigation area and property boundaries/driveways, swimming pools, dwellings and buildings if area up gradient and 3m if down gradient
Absorption Trenches and Evapotranspiration/ Absorption Systems	• 12m if the disposal area is upslope of property boundaries • 6m if the disposal area is down slope of property boundaries • 6m between disposal area and swimming pools, sheds dwellings driveways if disposal area is upslope • 3m between disposal area and swimming pools, sheds dwellings driveways if disposal area is down slope

Photograph 5: Showing indicative 40m buffer required from drain



Photograph 6: Showing indicative 40m buffer required from dam



8.4 Reserve Area

Over time the operation and performance of disposal area can become compromised by the effects of wastewater on the soil characteristics within the disposal area.

In accordance with AS 1547-2012 a reserve area of 100% of the design area shall be available on site. A reserve area is available for the site.

8.5 Mitigation Measures

The following mitigation measure is necessary to ensure the sustainability of the recommended onsite sewage management system:

- Installation of up-slope surface water (and subsurface) drainage to divert run-on and seepage water from the land application area. The diversion system is to be designed and constructed in accordance with the technical requirements of Kempsey Shire Council.
- The soils within the effluent disposal area are to be rotary hoed or ripped to a depth of 200mm to improve moisture retention.
- During construction of ETA beds gypsum shall be applied at 1 kg/m2 to the base of the trench or bed to prevent the clay dispersing. The trench shall be closed in, as soon as possible to protect the gypsum from raindrop impact.
- Soil of good permeability is to be placed around ETA beds and trenches.
- Irrigation areas are to be planted with suitable vegetation to assist in nutrient uptake and improve effluent disposal through evapo-transpiration.
- An outlet filter is to be installed into the septic tank and will be required to be maintained.
- The positioning of the disposal area is to comply with the requirements of Kempsey Shire Council.

9.0 Flooding

The 1 in 20 year flood level can be seen on the subdivision plan.

10.0 Recommendations

With the introduction of the new system the following recommendations should be implemented:

- Be water wise.
- Use low sodium washing detergents.
- Use 'septic friendly' cleaning agents.

11.0 Conclusion

The site and soil characteristics of the allotment are suitable for the use of the onsite sewage management systems identified in this report.

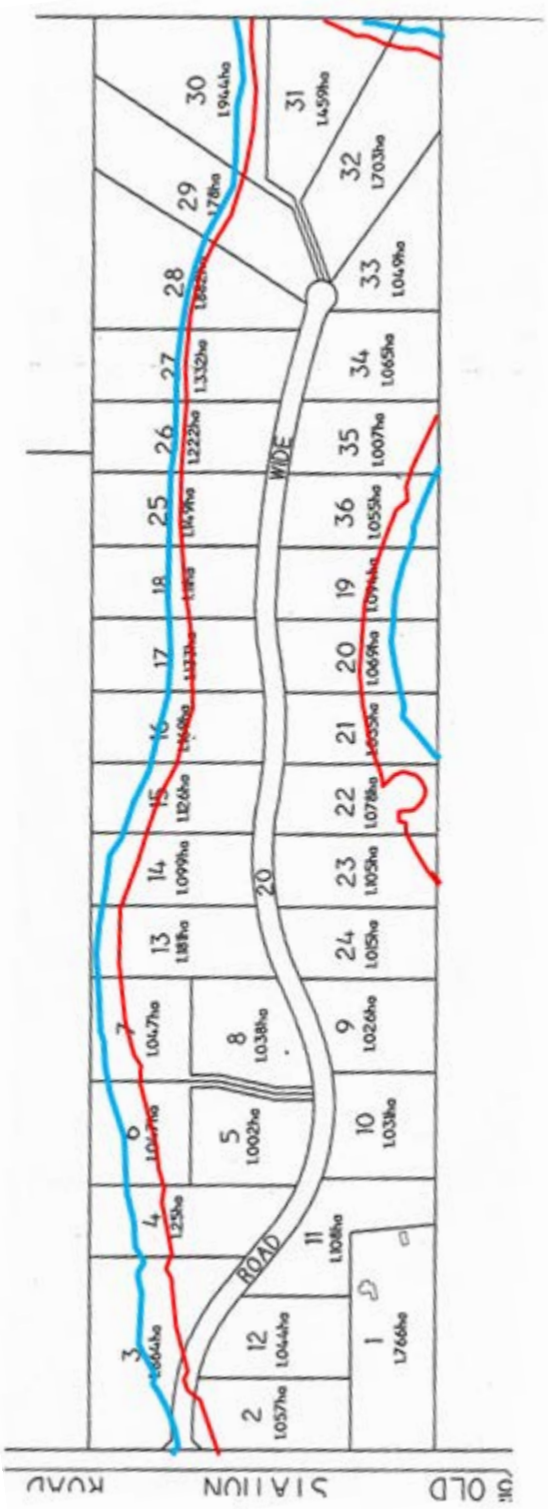
In this regard the Mitigation Measures outlined in Section 8.5 of this report must be implemented in respect of the system utilized.

It must however be recognized that the sustainable disposal of effluent is heavily reliant upon the correct installation of onsite sewage management systems coupled with ongoing appropriate and regular maintenance if satisfactory environmental health outcomes are obtained and maintained into the future.

Regards

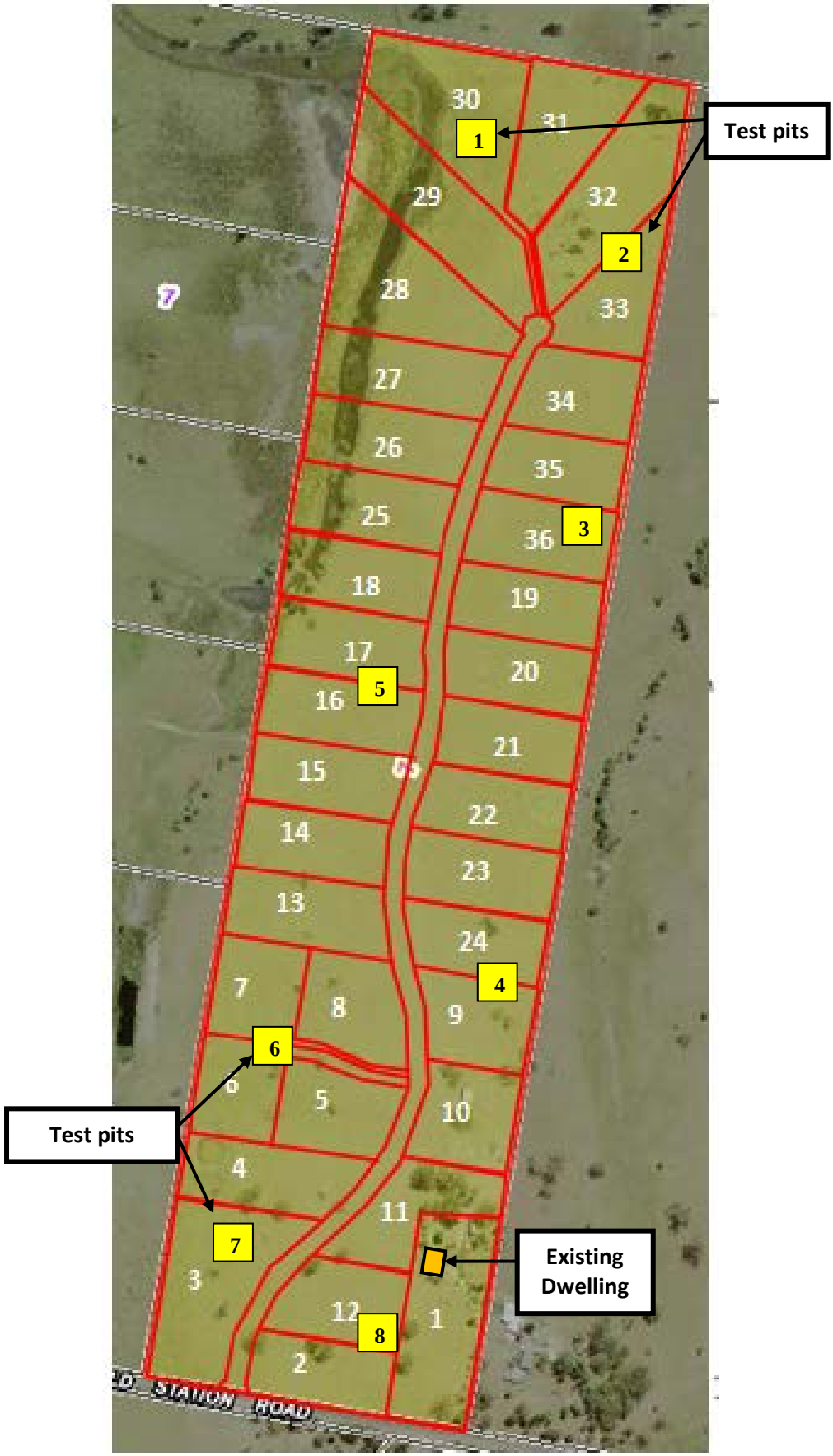
Tim Mecham
Midcoast Building and Environmental

APPENDIX 1 – Subdivision Plan also showing approximate Flood Level Contours (Indicative only)



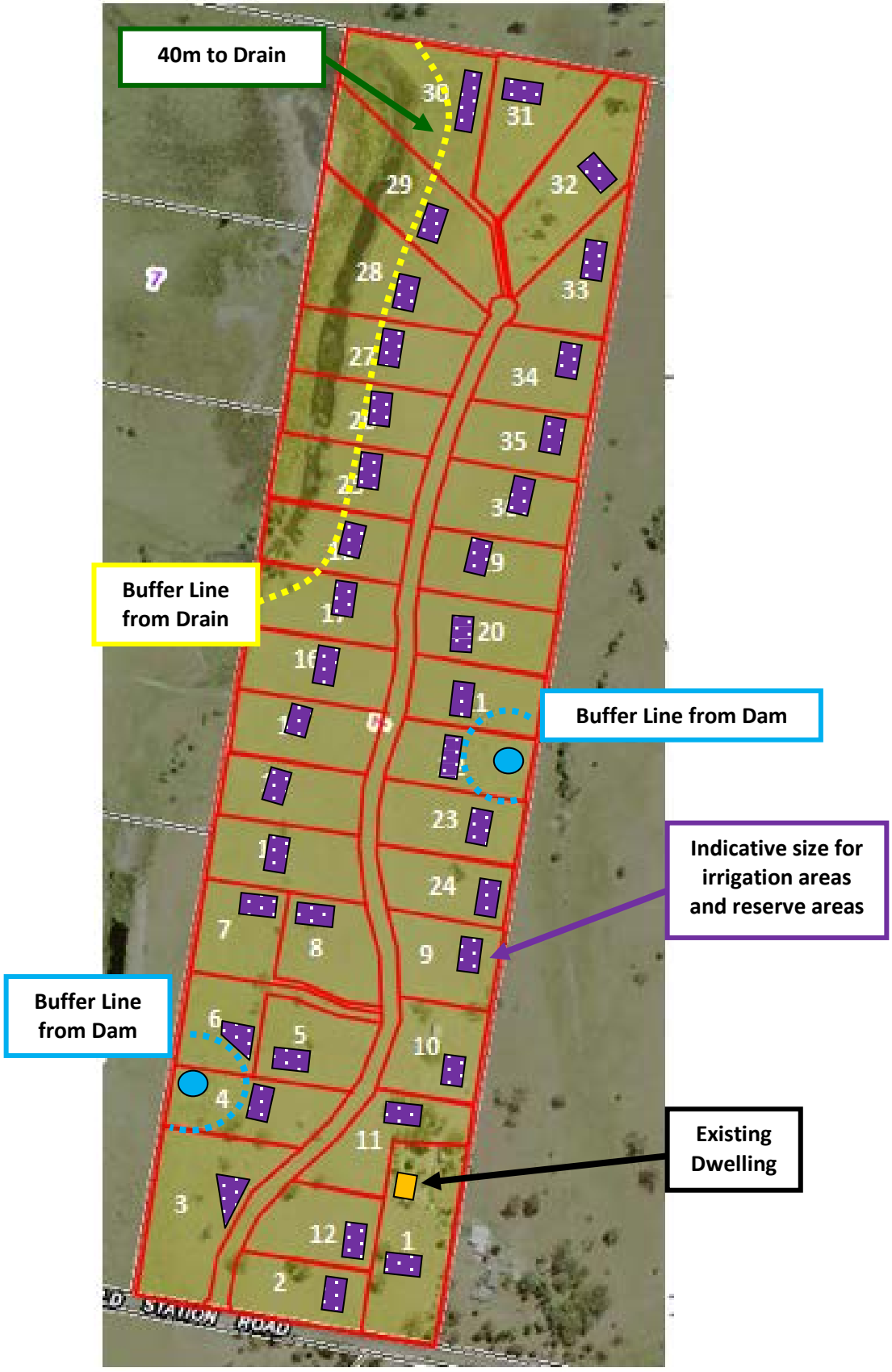
HFL 6m	
1 in 20 year FL 5m	

APPENDIX 2



- **Measurements are indicative and not to scale**

APPENDIX 3: Possible Irrigation Areas with 100% Reserve and Buffer Lines – Indicative only (Note Flood Contours shown on Subdivision plan)



Note. The above areas for irrigation and reserve areas are indicative only and can be move throughout the site with consideration of recommended buffer distances as detailed above.

APPENDIX 4 - Soil Profile Descriptions

Test Pit 1 - Representative of Area A

Sample	Test hole layer	Ped Structure	pH (1:5) soil/water	Emerson Class	ECe	Salinity
A	0mm-300mm	sub-angular blocky	6.3	3	0.00	Low
B	300mm-600mm	sub-angular blocky	6.0	3	0.00	Low
C	600mm-1200mm	sub-angular blocky	6.0	3	0.00	Low

Sample	Texture class	Approximate % of clay	Course Fragments %	Soil Colour	Munsel Colour
A	Clay Loam	25-35 %	<20%	Very dark grey	5yr 3/1
B	Light to Medium clay	35-45 %	<20%	Reddish brown	5yr 4/3
C	Medium/heavy clay	+50 %	<20%	Yellowish Red	5yr 4/6

Test Pit 6 - Representative of Area B

Sample	Test hole layer	Ped Structure	pH (1:5) soil/water	Emerson Class	ECe	Salinity
A	0mm-300mm	sub-angular blocky	5.1	3	0.10	Low
B	300mm-600mm	sub-angular blocky	5.0	3	0.10	Low
C	600mm-1200mm	sub-angular blocky	5.0	3	0.09	Low

Sample	Texture class	Approximate % of clay	Course Fragments %	Soil Colour	Munsel Colour
A	Clay Loam	25-35 %	<20%	Very dark grey	5yr 3/1
B	Light to Medium clay	35-45 %	<20%	Dark Reddish brown	5yr 3/3
C	Medium/heavy clay	+50 %	<20%	Yellowish Red	5yr 4/6

Test Pit 8 - Representative of Area C

Sample	Test hole layer	Ped Structure	pH (1:5) soil/water	Emerson Class	ECe	Salinity
A	0mm-300mm	sub-angular blocky	5.2	3	0.00	Low
B	300mm-600mm	sub-angular blocky	5.2	2	0.00	Low
C	600mm-Refusal @1000mm	sub-angular blocky	5.6	2	0.00	Low

Sample	Texture class	Approximate % of clay	Course Fragments %	Soil Colour	Munsel Colour
A	Clay Loam	25-35 %	<20%	Dark Reddish Grey	5yr 4/2
B	Light to Medium clay	35-45 %	<20%	Dark Reddish Brown	5yr 3/3
C	Medium/heavy clay	+50 %	<20%	Grey	5yr 5/1

APPENDIX 5 - Surface and Subsurface Irrigation Areas Calculations for Both 3 and 5 Bedroom Dwellings

3 Bedrooms Calculations

Minimum Area Method Water Balance and Wet Weather Storage Calculations (Kempsey)

Design Wastewater Flow (Q):	l/day	750
Design Percolation Rate (R):	mm/wk	14

Sub-Surface Irrigation Area from a Secondary Treatment System
Design Irrigation Rate 14

Parameters					Outputs			Inputs					
Month	Days (D)	Precipitation (P)	Evaporation (E)	Crop factor (C)	Evapotranspiration (ET)	Percolation (B)	Total Outputs (ET+B)	Retained Precipitation P=1	Possible Effluent Irrigation (W)	Actual Effluent Production (I)	Inputs	Storage (S)	Cumulative Storage (M)
	days	mm/month	mm/month	-	mm/month	mm/month	mm/month	mm/month	mm/month	mm/month	mm/month	mm/month	mm
Jan	31	132.7	189.0	0.75	141.75	62.00	203.75	132.7	71.05	66.78	199.48	-4.27	0.00
Feb	28	170.7	154.0	0.75	115.5	56.00	171.50	170.7	0.80	66.78	237.48	65.98	65.98
Mar	31	145.1	147.0	0.75	110.25	62.00	172.25	145.1	27.15	66.78	211.88	39.63	105.61
Apr	30	79.2	111.0	0.75	83.25	60.00	143.25	79.2	64.05	66.78	145.98	2.73	108.34
May	31	75.3	98.0	0.75	73.5	62.00	135.50	75.3	60.20	66.78	142.08	6.58	114.92
Jun	30	106.0	70.0	0.75	52.5	60.00	112.50	106	6.50	66.78	172.78	60.28	175.20
Jul	31	23.1	73.0	0.75	54.75	62.00	116.75	23.1	93.65	66.78	89.88	-26.87	148.33
Aug	31	52.5	98.0	0.75	73.5	62.00	135.50	52.5	83.00	66.78	119.28	-16.22	132.10
Sep	30	45.0	129.0	0.75	96.75	60.00	156.75	45	111.75	66.78	111.78	-44.97	87.13
Oct	31	75.0	160.0	0.75	120	62.00	182.00	75	107.00	66.78	141.78	-40.22	46.91
Nov	30	115.3	173.0	0.75	129.75	60.00	189.75	115.3	74.45	66.78	182.08	-7.67	39.24
Dec	31	106.5	195.0	0.75	146.25	62.00	208.25	106.5	101.75	66.78	173.28	-34.97	4.27
Total	365	1126.4	1597		1197.75	730.00	1927.75	1126.4	801.35	801.35	1927.75	-	-

Irrigation Area (L) m2 **336.93**

Storage (V) **largest M mm** **175.20**
(VxL)/1000 m3 **59.03**

RAINFALL BOM Kempsey
EVAPORATION BOM

C=0.75
P (r) = 1.0

5 Bedrooms Calculations

Minimum Area Method Water Balance and Wet Weather Storage Calculations (Kempsey)

Design Wastewater Flow (Q):	l/day	1050
Design Percolation Rate (R):	mm/wk	14

Sub-Surface Irrigation Area from a Secondary Treatment System
Design Irrigation Rate 14

Parameters					Outputs			Inputs					
Month	Days (D)	Precipitation (P)	Evaporation (E)	Crop factor (C)	Evapotranspiration (ET)	Percolation (B)	Total Outputs (ET+B)	Retained Precipitation P=1	Possible Effluent Irrigation (W)	Actual Effluent Production (I)	Inputs	Storage (S)	Cumulative Storage (M)
	days	mm/month	mm/month	-	mm/month	mm/month	mm/month	mm/month	mm/month	mm/month	mm/month	mm/month	mm
Jan	31	132.7	189.0	0.75	141.75	62.00	203.75	132.7	71.05	66.78	199.48	-4.27	0.00
Feb	28	170.7	154.0	0.75	115.5	56.00	171.50	170.7	0.80	66.78	237.48	65.98	65.98
Mar	31	145.1	147.0	0.75	110.25	62.00	172.25	145.1	27.15	66.78	211.88	39.63	105.61
Apr	30	79.2	111.0	0.75	83.25	60.00	143.25	79.2	64.05	66.78	145.98	2.73	108.34
May	31	75.3	98.0	0.75	73.5	62.00	135.50	75.3	60.20	66.78	142.08	6.58	114.92
Jun	30	106.0	70.0	0.75	52.5	60.00	112.50	106	6.50	66.78	172.78	60.28	175.20
Jul	31	23.1	73.0	0.75	54.75	62.00	116.75	23.1	93.65	66.78	89.88	-26.87	148.33
Aug	31	52.5	98.0	0.75	73.5	62.00	135.50	52.5	83.00	66.78	119.28	-16.22	132.10
Sep	30	45.0	129.0	0.75	96.75	60.00	156.75	45	111.75	66.78	111.78	-44.97	87.13
Oct	31	75.0	160.0	0.75	120	62.00	182.00	75	107.00	66.78	141.78	-40.22	46.91
Nov	30	115.3	173.0	0.75	129.75	60.00	189.75	115.3	74.45	66.78	182.08	-7.67	39.24
Dec	31	106.5	195.0	0.75	146.25	62.00	208.25	106.5	101.75	66.78	173.28	-34.97	4.27
Total	365	1126.4	1597		1197.75	730.00	1927.75	1126.4	801.35	801.35	1927.75	-	-

Irrigation Area (L) m2 **471.70**

Storage (V) **largest M mm** **175.20**
(VxL)/1000 m3 **82.64**

RAINFALL BOM Kempsey
EVAPORATION BOM

C=0.75
P (r) = 1.0

APPENDIX 6 - Spray Irrigation Example of Layout Components

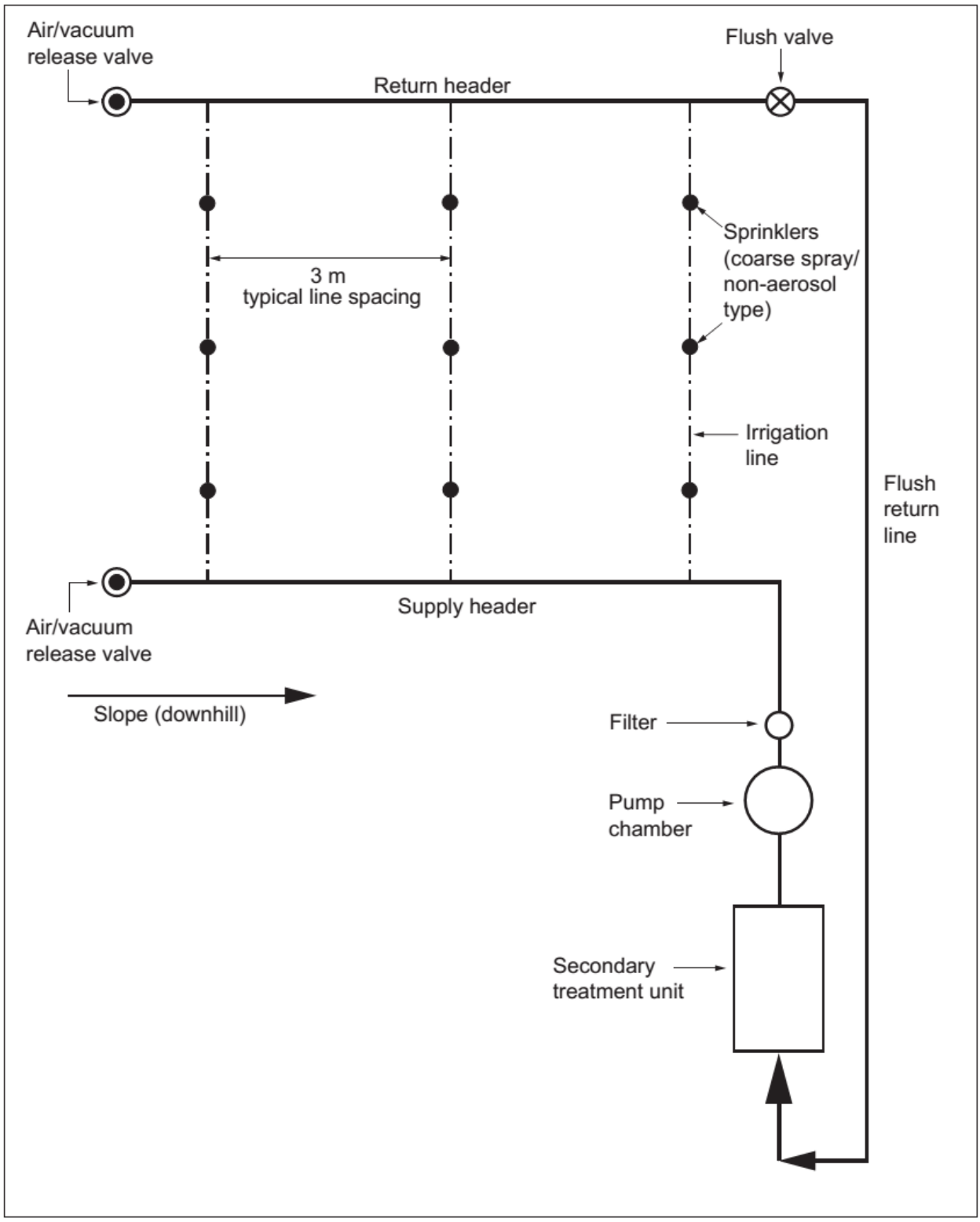


FIGURE M2 SPRAY IRRIGATION SYSTEM – EXAMPLE LAYOUT OF COMPONENTS

APPENDIX 7 - Subsurface Irrigation Example of Layout Components

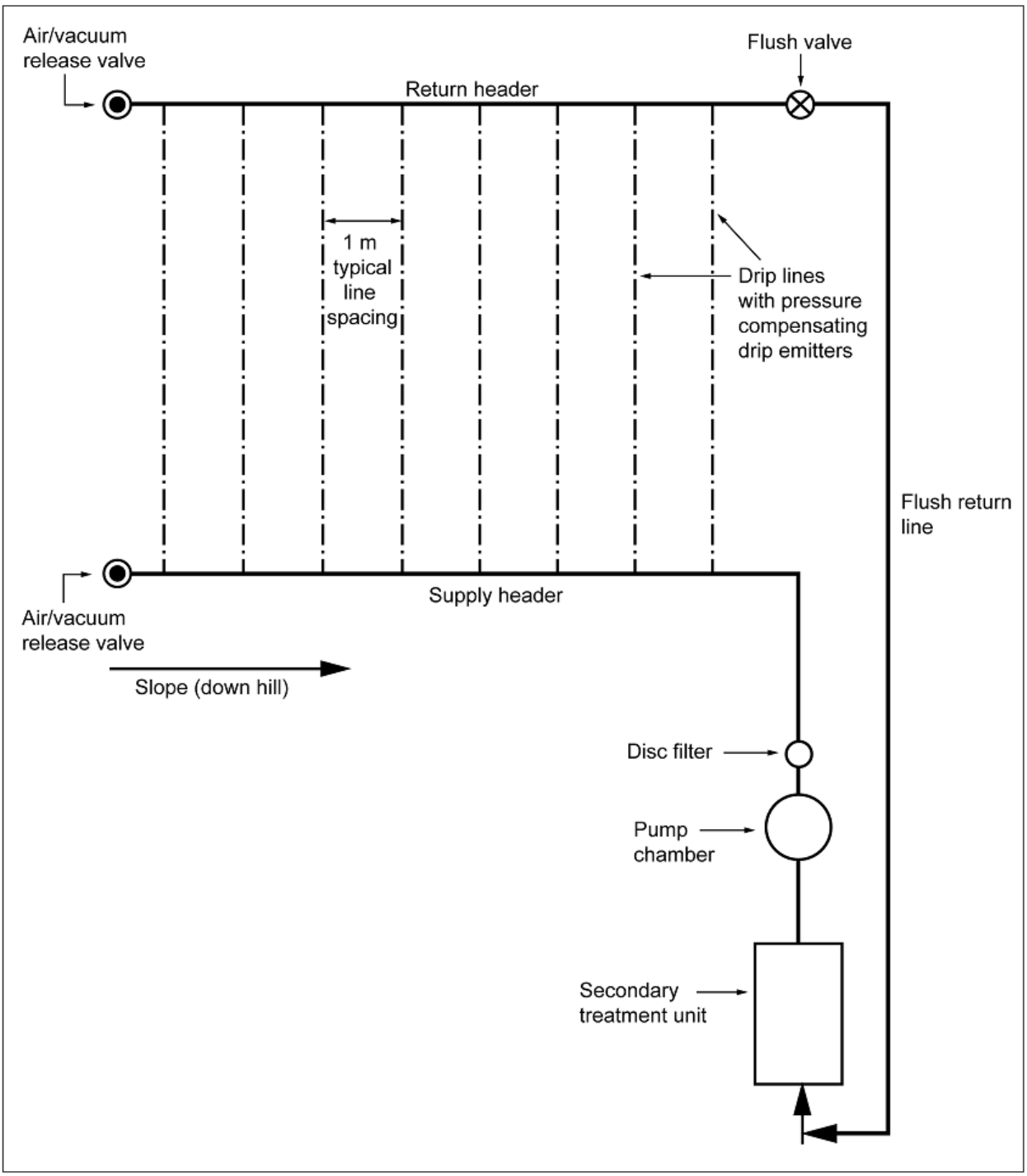


FIGURE M1 DRIP IRRIGATION SYSTEM – EXAMPLE LAYOUT OF COMPONENTS

APPENDIX 8 - Evapo-Transpiration Bed/Trench System Calculation
3 Bedrooms Calculations

Evapotranspiration-absorption Area Calculation

	Daily Flow	750	Enter daily vol and calc appears in (8)			DLR	7		
Size of Area for Each Month						Enter daily vol and calc appears in (4)			
(1) Month	**(2) Pan Evaporation E mm**	**(3) Evapotranspiration ET (ET=0.75 E) mm**	**(4) Rainfall R mm**	**(5) Retained Rainfall Rr (Rr=0.75 R) mm**	**(6) LTAR per Month mm**	**(7) Disposal Rate per Month (3)-(5)+(6) mm**	**(8) Effluent Applied per month L**	**(9) Size of Area (8)/(7) m2**	
January	189.0	141.75	132.7	99.525	217	259.225	23250	89.69042	
February	154.0	115.5	170.7	128.025	196	183.475	21000	114.457	
March	147.0	110.25	145.1	108.825	217	218.425	23250	106.4439	
April	111.0	83.25	79.2	59.4	210	233.85	22500	96.21552	
May	98.0	73.5	75.3	56.475	217	234.025	23250	99.34836	
June	70.0	52.5	106	79.5	210	183	22500	122.9508	95.76553
July	73.0	54.75	23.1	17.325	217	254.425	23250	91.38253	
August	98.0	73.5	52.5	39.375	217	251.125	23250	92.58337	
September	129.0	96.75	45	33.75	210	273	22500	82.41758	
October	160.0	120	75	56.25	217	280.75	23250	82.81389	
November	173.0	129.75	115.3	86.475	210	253.275	22500	88.83625	
December	195.0	146.25	106.5	79.875	217	283.375	23250	82.04676	

Depth of Stored Effluent

(1) Month	**(2) Trial Area m2**	**(3) Application Rate (8)*/(2) mm**	**(4) Disposal Rate per Month mm**	**(5) (3)-(4) mm**	**(6) Increase in Depth of Stored Effluent (5)/n (n=0.3) mm**	**(7) Depth of Effluent for Month (x-1) mm**	**(7) Increase in Depth of Effluent + 6 mm**	**(7) Computed Depth of Effluent for Month (x) mm**
December	95.76553							
	95.76553							
January	95.76553	242.7805	259.225	-16.4445	-54.8151	0	-54.8151	-54.8151
February	95.76553	219.2856	183.475	35.81058	119.3686	-54.8151	119.3686	64.55347
March	95.76553	242.7805	218.425	24.35546	81.18487	64.55347	81.18487	145.7383
April	95.76553	234.9488	233.85	1.098835	3.662782	145.7383	3.662782	149.4011
May	95.76553	242.7805	234.025	8.755462	29.18487	149.4011	29.18487	178.586
June	95.76553	234.9488	183	51.94883	173.1628	178.586	173.1628	351.7488
July	95.76553	242.7805	254.425	-11.6445	-38.8151	351.7488	-38.8151	312.9337
August	95.76553	242.7805	251.125	-8.34454	-27.8151	312.9337	-27.8151	285.1185
September	95.76553	234.9488	273	-38.0512	-126.837	285.1185	-126.837	158.2813
October	95.76553	242.7805	280.75	-37.9695	-126.565	158.2813	-126.565	31.71619
November	95.76553	234.9488	253.275	-18.3262	-61.0872	31.71619	-61.0872	-29.371
December	95.76553	242.7805	283.375	-40.5945	-135.315	-29.371	-135.315	-164.686
								351.7488

Trench length		L= A/B				
		A=	95.76553			
		B =	1.45		**Rainfall BOM**	Kempsey
					Evaporation BOM	
Trench Length	=		**66.05**	**m**		
Trench Width	=		**1m**			
Trench Depth	=		**500mm**			
Depth of Aggregate	=		**450mm**			

5 Bedrooms Calculations

Evapotranspiration-absorption Area Calculation

Daily Flow 1050 Enter daily vol and calc appears in (8) DLR 7

Size of Area for Each Month Enter daily vol and calc appears in (4)

(1) Month	(2) Pan Evaporation E mm	(3) Evapotranspiration ET (ET=0.75 E) mm	(4) Rainfall R mm	(5) Retained Rainfall Rr (Rr=0.75 R) mm	(6) LTAR per Month mm	(7) Disposal Rate per Month (3)-(5)+(6) mm	(8) Effluent Applied per month L	(9) Size of Area (8)/(7) m2	
January	189.0	141.75	132.7	99.525	217	259.225	32550	125.5666	
February	154.0	115.5	170.7	128.025	196	183.475	29400	160.2398	
March	147.0	110.25	145.1	108.825	217	218.425	32550	149.0214	
April	111.0	83.25	79.2	59.4	210	233.85	31500	134.7017	
May	98.0	73.5	75.3	56.475	217	234.025	32550	139.0877	
June	70.0	52.5	106	79.5	210	183	31500	172.1311	134.0717
July	73.0	54.75	23.1	17.325	217	254.425	32550	127.9355	
August	98.0	73.5	52.5	39.375	217	251.125	32550	129.6167	
September	129.0	96.75	45	33.75	210	273	31500	115.3846	
October	160.0	120	75	56.25	217	280.75	32550	115.9394	
November	173.0	129.75	115.3	86.475	210	253.275	31500	124.3707	
December	195.0	146.25	106.5	79.875	217	283.375	32550	114.8655	

Depth of Stored Effluent

(1) Month	(2) Trial Area m2	(3) Application Rate (8)*/(2) mm	(4) Disposal Rate per Month mm	(5) (3)-(4) mm	(6) Increase in Depth of Stored Effluent (5)/n (n=0.3) mm	(7) Depth of Effluent for Month (x-1) mm	(7) Increase in Depth of Effluent + 6 mm	(7) Computed Depth of Effluent for Month (x) mm
December	134.0717							
	134.0717							
January	134.0717	242.7805	259.225	-16.4445	-54.8151	0	-54.8151	-54.8151
February	134.0717	219.2856	183.475	35.81058	119.3686	-54.8151	119.3686	64.55347
March	134.0717	242.7805	218.425	24.35546	81.18487	64.55347	81.18487	145.7383
April	134.0717	234.9488	233.85	1.098835	3.662782	145.7383	3.662782	149.4011
May	134.0717	242.7805	234.025	8.755462	29.18487	149.4011	29.18487	178.586
June	134.0717	234.9488	183	51.94883	173.1628	178.586	173.1628	351.7488
July	134.0717	242.7805	254.425	-11.6445	-38.8151	351.7488	-38.8151	312.9337
August	134.0717	242.7805	251.125	-8.34454	-27.8151	312.9337	-27.8151	285.1185
September	134.0717	234.9488	273	-38.0512	-126.837	285.1185	-126.837	158.2813
October	134.0717	242.7805	280.75	-37.9695	-126.565	158.2813	-126.565	31.71619
November	134.0717	234.9488	253.275	-18.3262	-61.0872	31.71619	-61.0872	-29.371
December	134.0717	242.7805	283.375	-40.5945	-135.315	-29.371	-135.315	-164.686
								351.7488

Trench length L= A/B

A= 134.0717

B = 1.45

Rainfall BOM Kempsey

Evaporation BOM

Trench Length = 92.46 m

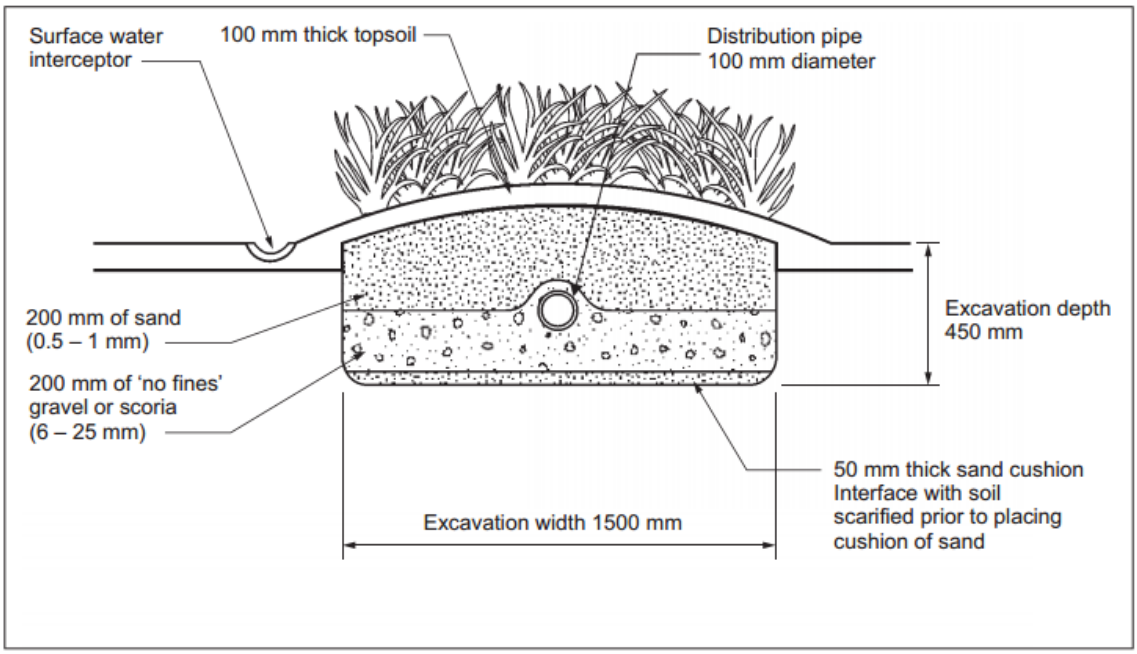
Trench Width = 1m

Trench Depth = 500mm

Depth of Aggregate = 450mm

APPENDIX 9 - Evapo-Transpiration Bed Specifications

AS/NZS 1547:2012 154



NOTE: An LPED line can be used to dose load the ETA/ETS bed.

FIGURE L6 ETA/ETS BED DETAILS

Table 16 Adjusted Predicted versus Measured Noise Levels – Year 2013

Receiver ID[1]	Address	Noise Level (dBA)					
		Measured (dBA)		Predicted (dBA)		Difference[2] (dB)	
		LAeq (15h)	LAeq (9h)	LAeq (15h)	LAeq (9h)	LAeq (15h)	LAeq (9h)
1a*	600 Pacific Highway , South Kempsey	63	59	63	60	0	-1
1c*	554A Pacific Highway, South Kempsey (front)	59	57	61	59	-2	-2
	554A Pacific Highway, South Kempsey (back)	54	53	-	-	-	-
3b*	487 Pacific Highway, South Kempsey	56	54	56	54	0	0
3d*	477 Pacific Highway, South Kempsey	53	52	56	54	-3	-2
3g*	27 Shannon Close, South Kempsey	57	56	59	57	-2	-1
4b*	The Mountain Nursery, South Kempsey	51	47	51	50	0	-3
6e#	7 Bruces Lane, South Kempsey	50	48	51	49	-1	-1
6q	40 Bruces Lane, South Kempsey	51	45	-	43	-	2
7d*	19 Bingis Lane , South Kempsey	57	56	57	55	0	1
7t	165 Crescent Head Road, South Kempsey	51	48	-	46	-	2
8e	73 Bruces Lane, South Kempsey	52	48	51	50	1	-2
8l#	141 Blairs Lane, East Kempsey	53	51	52	51	1	0
9b	18 Lyall Lane, South Kempsey	51	49	49	47	2	2
10c*	110 Inches Road, Verges Creek	52	53	-	-	-	-
10g	85 Inches Road, Verges Creek	54	54	53	52	1	2
10k#	74 Inches Road, Verges Creek	56	56	60	58	-4	-2
10o*	18 Gorman Lane, Verges Creek	54	54	53	52	1	2
11h	29 Belle Rio Close, Verges Creek	50	47	48	46	2	1
11q	183 Old Station Road, Verges Creek	49	48	51	50	-2	-2
12a*	595 South West Rocks Road, Bellimbopinni	55	55	-	-	-	-
14b	852 Pacific Highway Frederickton	49	50	50	48	-1	2
15a*	35 Lawson Street, Frederickton	51	49	50	48	1	1
15i#	781 Pacific Highway, Frederickton	57	53	-	-	-	-
16a*	888 Pacific Highway, Bellimbopinni	66	66	69	67	-3	-1
		Average Difference				**0**	**0**

Note 1: * indicates properties that have been offered noise mitigation treatments
# indicates property owned by RMS and identified for future treatments
- indicates excluded from validation process for reasons discussed in **Section 9.3**.

Note 2: Difference is Measured minus Predicted. A positive difference indicates that the measured level of road traffic noise is higher than the model prediction, a negative difference indicates the measured level is less than predicted level (ie the model is over predicting the impacts).

The revised predictions for the Year 1 As-Built 2013 situation in **Table 16** indicate that the difference between the measured and predicted levels is within the acceptable range of +2 dB at all locations where direct comparison of measured and predicted road traffic noise is possible.

It is concluded that (with the +1 dB adjustment to the tyned concrete pavement noise emissions) the model is valid for use to review the noise mitigation design for the 2024 Future *Design* scenario.

APPENDIX C – AGRICULTURAL AND FARMLAND MAPPING ASSESSMENTS

Gem Planning Projects:

- Soil Landscapes Decision making Criteria for Regionally Significant Farmland, Mid North Coast Farmland Mapping Project 2008

- Assessment of Potential Conflicting Land Use from the Living & Working in Rural Areas Handbook 2009, Department of Primary Industries, Northern Rivers CMA & Southern Cross University, and

- Interim Variation Criteria under the North Coast Regional Plan 2036, NSW Planning & Environment 2017.

Sloane Cook & King:

- Review of Zoning & Agricultural Use (14 February 2004)

Using soil landscape data to identify regionally significant farmland

The farmland mapping was built using soil landscapes which were selected on the basis of their agricultural potential. Regionally significant' farmland became defined as follows:

> *'Land capable of sustained use for agricultural production with a reasonable level of inputs and which has the potential to contribute substantially to the ongoing productivity and prosperity of a region.'*

BACKGROUND

The land qualities listed in the criteria are as described in soil landscape reports published by the former Department of Land and Water Conservation, mapped at a scale of 1:25,000. Soil landscapes were not mapped at property level. A soil landscape may include small areas which have different characteristics to those described for the whole soil landscape.

The farmland map is based on those soil landscapes which were selected based on the criteria above and utilizing the decision-making chart below. Selected soil landscapes generally occur on rolling low hills and undulating rises in the region's plateau areas and some other areas with suitable soils, on river floodplains, levees and terraces, and on the major deltaic floodplains.

The review of agricultural use by Mr J W S Mackenzie of Sloane Cook & King investigated the history of agricultural use of the land and references historical record identifying the area as having a carrying capacity of 25 cattle per 100 acres. Soils are identified a sedimentary soil type know as yellow podzolic. Noting that yellow podzolic soils are very low in natural fertility requiring large and regular applications of superphosphate to maintain grazing productivity and commonly having poor drainage, variable soil depth and high susceptibility to drought conditions.

The agricultural assessment also addresses the criteria for classifying agricultural potential of land:

- Climate
- Physical nature of the soils
- Chemical fertility of the soils
- Drainage
- Stoniness /Rock outcrops.

The assessment Sloane Cook & King assessment concludes that Lot 7 at 46.55 ha is "Class 4" agricultural land and has very limited agricultural potential. A copy of the 2004 assessment is attached.

The farmland mapping project established similar Definition Criteria to determine which soil landscapes represented regionally significant farmland was developed and the following qualities used in the broad soil landscape mapping:

Slope, Rockiness, Landform, Water holding capacity, Drainage, Intrinsic Soil Structure, Soil Depth, Soil Fertility, Stoniness and Soil Surface Qualities. Summarised in Figure A below.

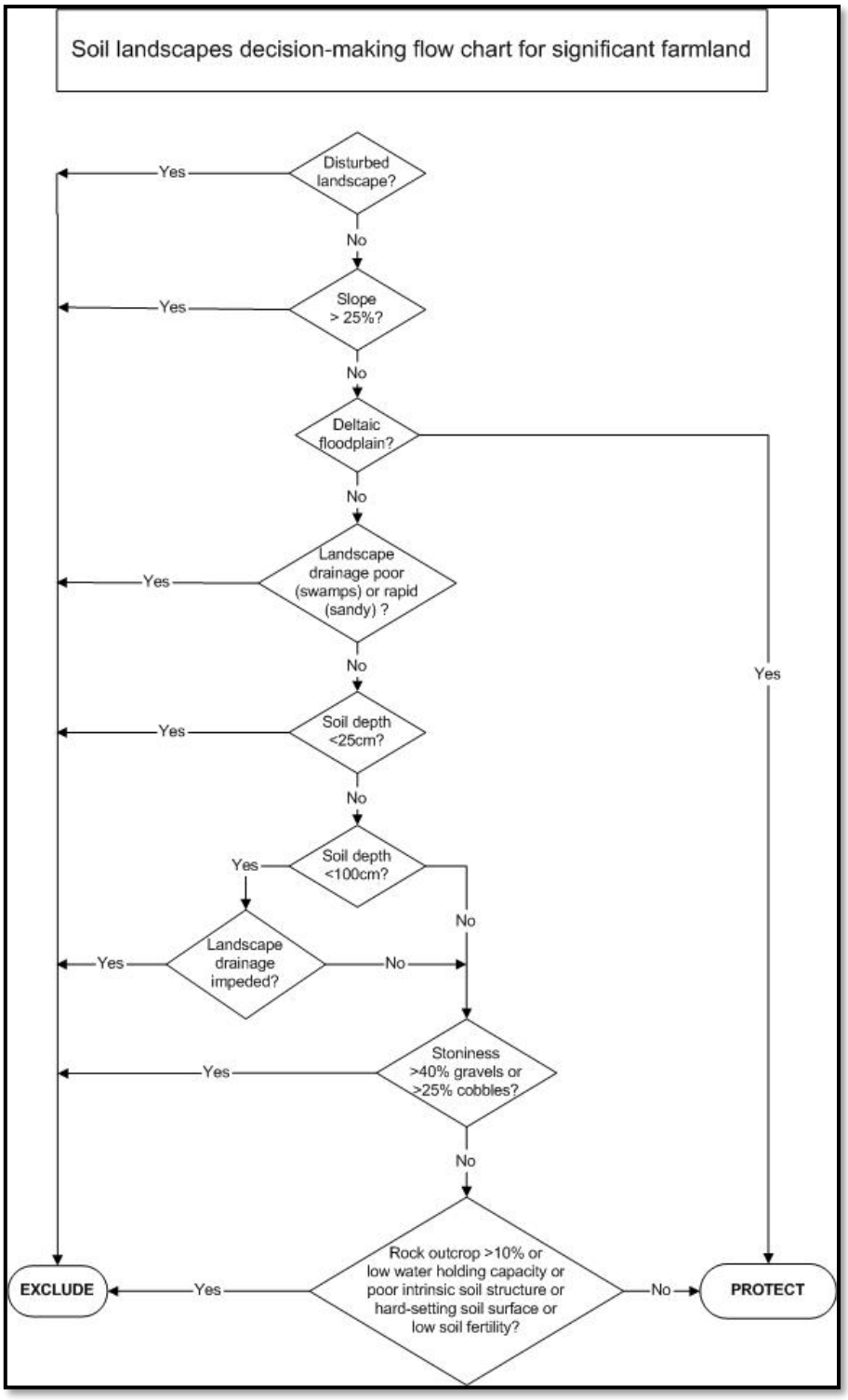


Figure A: Extract from Soil Landscapes Decision making Criteria for Regionally Significant Farmland: Mid North Coast Farmland Mapping Project 2008

Assumptions

In addition, a number of assumptions were relied upon.

• Current land use can be an indicator of agricultural quality, but cannot be used as a criterion for judging long-term agricultural capability.

• The project's focus is on protecting the land resource rather than individual industries; therefore the current value of agricultural industries is not a deciding factor. However, the soil landscapes used by key agricultural industries were taken into account.

• Water availability (irrigation licenses etc) is a variable which can change over time with policy or technology. It is not a land attribute in the same way that soil or slope is a land attribute, so is not a deciding factor.

• Fragmented allotment patterns do not affect the quality of the land but can affect management. As above, lot size can change as a result of policy. It is not a biophysical land attribute, so is not used as a deciding factor.

• Microclimate is an important factor in agriculture. However, data is not available on a regional scale to make microclimate a useful criterion for selecting suitable soil landscapes.

• Extent of clearing is not a criterion. Much cleared country has not proved to be valuable farmland. Conversely, the existence of vegetation on significant farmland should not be taken to mean the land has to be farmed, or that the vegetation values are secondary to the agricultural values.

• Acid sulfate soils have the potential to be farmed sustainably, provided they are not exposed to the air by excavation or drainage. The presence of acid sulfate soils is considered to be a management issue, rather than an eliminating factor.

• Areas which support intensive agriculture but are located on inferior soils and highly dependent on irrigation or fertilisers are not considered to be regionally significant farmland. The versatility and the long-term potential economic and environmental sustainability of such land are likely to be lower than that of land which could be farmed with a more reasonable level of inputs.

• Flooding is not seen as either a limitation or a necessary inclusion for regionally significant farmland. Many of the region's valuable farming areas are fertile because they are flood-prone. Some flood-prone areas have poor drainage and infertile soils.

• Erosion risk is not included as a criterion. Erosion risk is built into other criteria such as slope class and soil structure. Soil erodibility is also not a criterion. Most soils are erodible. Erodibility refers to a fixed, inherent quality of the soil. Erosion hazard is a variable condition which refers to a combination of factors including landform, soils (including erodibility) and land management.

The following summarises the characteristics of Lot 7 in relation to the soil landscape criterion and site specific information determined by the Ludwig Mueller & Associates.

Pasture: Broad Leaf Paspalum (paspalum mandioncanum), Kikuyu (Pennisetum Clandestinum), Setaria (Setari sphacelata), Senecio sp.

Slope: Varies 5% to >10%, N-S low ridge line rolling gently to gullies to the west and east.

Soils: Typical coastal podzolic soil type, low fertility and deficiencies in nutrients.

- Low Calcium to Magnesium ratio as well as high Sodium and low Potassium levels.
- Limited Phosphorous. Very low (under 5ppm)
- High sodium and low potassium levels.
- Less than desirable biological activity , high Organic Matter & low plant available nutrient conversion.
- Low pH, indicating low cation retention

Pasture Improvement: Land was cleared about 1975 and large amounts of fertiliser applied to establish Kikuyu based pasture grass. Subsequent ownerships have not maintained the high fertiliser and maintenance requirements as evidenced by pasture decline and invasion of weeds such as fireweed.

Infrastructure: The property currently has no irrigation license, contains a cottage and ancillary farm infrastructure and direct access onto Old Station Road.

Conclusion: The soil in its current state will not support primary production and the area identified under the Regionally Significant Farmland mapping is comprised of long narrow shaped areas along the property boundary.

The characteristics of the land does not fit the definition of :

> *'Land capable of sustained use for agricultural production with a reasonable level of inputs and which has the potential to contribute substantially to the ongoing productivity and prosperity of a region.'*

It is not capable of sustained use for agriculture and requires a high level of inputs. It does not have the potential to contribute substantially to the ongoing productivity and prosperity of the region.

Land Use Conflict Risk Assessment & Matrix

Consideration of potential impacts on adjacent agricultural land is discussed below and includes a Land Use Conflict Risk Assessment (LUCRA)

The neighboring properties to the west north are within 1 in 100 year flood zone, so intensive agriculture, such as horticulture (vegetables, citrus, stone fruit etc) and intensive livestock production (feed lotting, broiler or egg production, piggeries etc) are not economically viable due to flood risk for infrastructure, stock and vegetation.

In relation to adjacent farm infrastructure such as stockyards they are typically located on higher ground, typically also on a raised mound near the road frontages. The character of the adjacent farmlands is that that type of infrastructure is located at least 500m from the subject land and typically further.

Land to the south and east is under uses as rural lifestyle lots/large lot residential. As is some of the land to the fronting South West Rocks Road and along Rustic Lane.

Given the most productive agricultural pursuit for the adjacent land to the west and north would be grazing for beef production the following points detail the potential impacts to maintaining meaningful agricultural production, in the form of pasture and/or cropping improvements for livestock grazing, on the neighboring property.

Land Use Conflict Risk Assessment

Consideration	Response
The nature of the land use change and development proposed.	The nature of the land use change is to rural lifestyle lots.
The nature of the precinct where the land use change and development is proposed.	Adjacent land uses south and east of the site and adjacent smaller agricultural holdings, include a mix of rural lifestyle/large lot residential developments, as well as smaller farm holdings. Refer Image below of the nature of the uses in the precinct.
The topography, climate and natural features of the site and broader locality which could contribute either to minimising or to exacerbating land use conflict.	The sub-tropical environment of Kempsey supports year round production through the growth of warm climate species in summer, and temperate plant species in the cooler months. The benefit of such a climate is sub-tropical perennial grass species tend to dominate improved soils, and are only dormant during winter. A negative of this environment is winters are too cold to support year round growth of tropical species, as cold nights often kill tropical species. Due to these outcomes, and a slightly summer-dominant (although essentially year-round) rainfall pattern, pasture production for grazing livestock (beef and to a lesser extent dairy) tends to be the most reliable and best-suited industry. In terms of potential conflicting land uses Grazing livestock industries raise potential for conflict in terms of noise from cattle yards such as calves separated from their mothers, pumps and engines starting early, fence line weed spraying and the like.
The typical industries and land uses in the area where the development is proposed. This provides for a broad test of compatibility with the dominant existing land uses in the locality.	The typical land uses in the area proposed for rezoning is large lot residential consistent and flood prone grazing land beyond those areas.
The land uses and potential land uses in the vicinity of the proposed development or new land use.	Refer to figure below identifying land uses within 1 km radius.

Identifying and describing what's happening within a minimum 1km radius of the subject land and development site helps to establish the specific land uses in the locality that are most likely to have some effect on and be affected.	

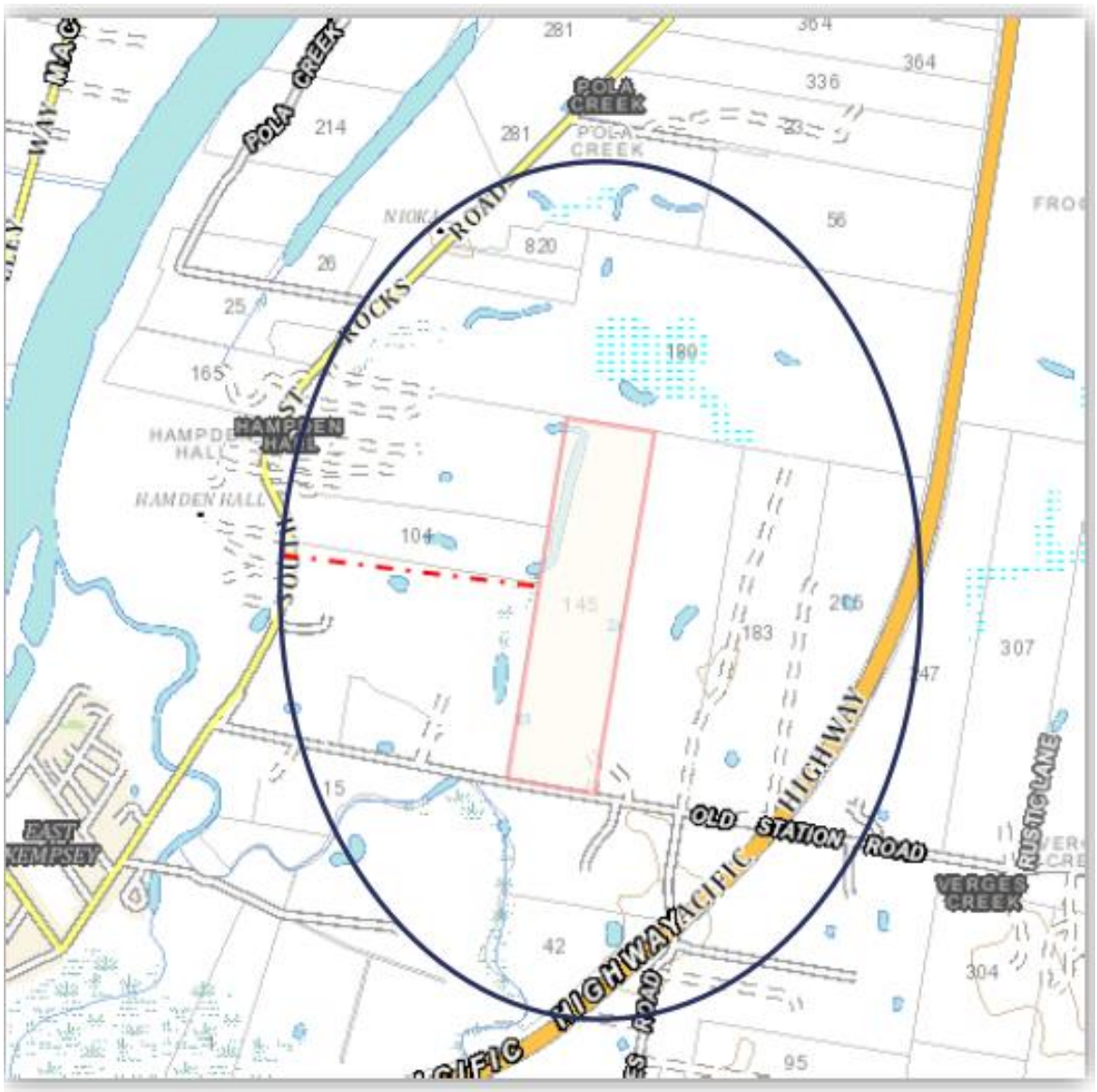
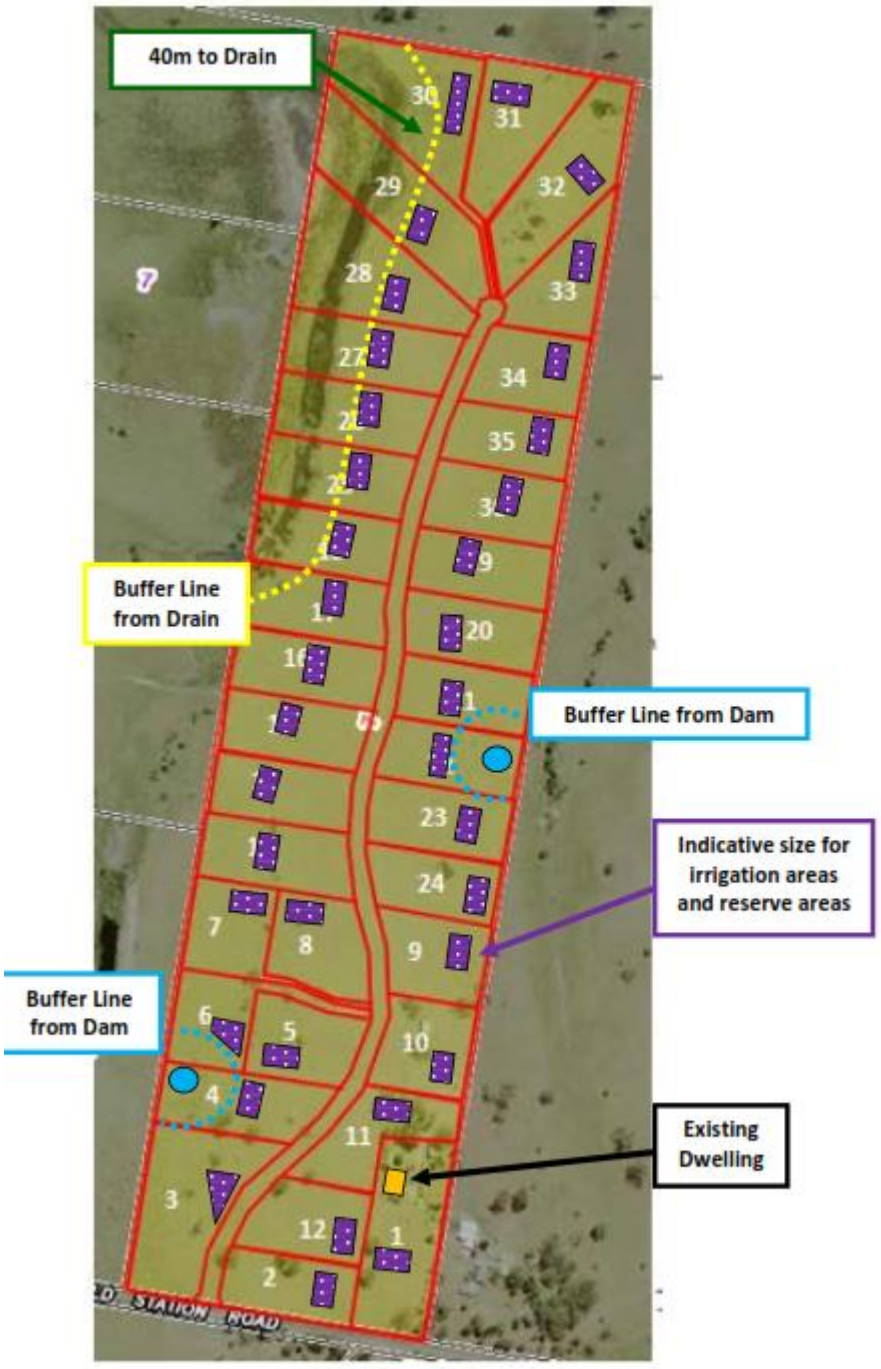


Figure B: Local character within 1 km radius – rural lifestyle & low intensity grazing.

Describe and record the main activities of the proposed land use and development as well as how regular these activities are likely to be. Note infrequent activities can create conflict.	Proposed land use is large lot residential. A 50m wide buffer is achievable within the 1 ha rural lifestyles lots and reinforced by the natural barrier created by the drainage line along the western boundary of the property. between proposed building envelopes and the grazing land to the west.
Describe and record the main activities of the adjoining and surrounding land uses as well as how regular these activities are, including periodic and seasonal activities that have the potential to be a source of complaint or conflict.	Adjoining agricultural land use activities to the north appears to be low intensity cattle grazing. To the south and east is large lot residential housing.
Compare and contrast the proposed and adjoining/surround land uses for incompatibility and conflict issues.	Potential impacts on adjacent agricultural uses include: a) **Potential backyard plant species to encroach on the neighbouring farmland** either through natural reproductive processes or even as simply as growing over the fence boundary. Only a very small percentage of backyard plant species are toxic to ruminant animals, and in most cases the toxic species need to make-up a large part of the animals daily diet to cause clinical symptoms. The proposal includes physical separation to the boundary of at least 50m and a physical buffer created by existing drainage line. The likely building envelopes and associated gardens are located at the front of the lots uphill fronting the proposed internal road. b) **Contamination of the dams areas** of the neighboring property, presumably currently used for stock drinking water, needs to be considered should stormwater run-off containing chemical or biological toxins enter these areas. The onsite waste water report demonstrates a number of treatment and disposal options for the lots, incorporating a 40m buffer to any

	drainage line or dam. Refer extract from the Onsite Waste Water assessment below. c) Domestic Pets and Animals potential for domestic pets and animals to adversely affect the potential for primary production on the neighboring property is real, however given the extend of the rural lifestyle housing south and along Old Station Road to the east, existing domestic pets and animals are already potentially present in the landscape. Domestic animal's chasing, and in rare cases attacking livestock, particularly calves, is always a possibility but is no more enhanced by the proposed extension to the R5 zone.. Subclinical livestock production losses, due to stress events, can be caused by excessive noise, or startling noise such as dogs barking. In this case, a 50m separation distance can be achieved for the majority of the lots and the reduces the potential impact domestic animals could have on livestock grazing the west and north. d) Animal disease as a potential risk. Poorly maintain residential areas can potentially harbor diseases that could cause sub-clinical production loss, and in extreme cases death of livestock. For example, rodent borne diseases, such as Botulism, have been known to kill livestock on the mid-north coast. In light of the high quality of housing established in the neighbourhoods to the south and the proponents desired to establish a quality lifestyle estate, this scenario is unlikely. Further, such issues are just as likely on any farmland from disease vector sources such as silage, hay, imported feed and dead plant and/or animal material.

APPENDIX 3: Possible Irrigation Areas with 100% Reserve and Buffer Lines – Indicative only (Note Flood Contours shown on Subdivision plan)



Note. The above areas for irrigation and reserve areas are indicative only and can be move throughout the site with consideration of recommended buffer distances as detailed above.

Figure C: On site waste water buffers.

Important Farmland Interim Variation Criteria	
Criteria	Comment
Agricultural capability: The land is isolated from other important farmland and is not capable of supporting sustainable agricultural production;	Complies: Agricultural review completed by J W S McKenzie of Sloane Cook & King Pty Ltd (2004) demonstrates that the narrow sliver of farmland mapped land is not capable of supporting sustainable agricultural production and would end up an isolated and fragmented piece of rural land on the edge of rural lifestyle lots.
Land use conflict: the land use does not increase the likelihood of conflict and does not impact on current or future agricultural activities in the locality;* ** an evaluation may be required in accordance with the NSW Department of Primary Industry land Use Conflict Risk Assessment guide (2011).*	Land Use Conflict Risk Assessment. Completed above.
Infrastructure: the provision of infrastructure (utilities, transport, open space, communications and stormwater) required to service the land is physically and economically feasible at no cost to State and local Government. adverse impacts on adjoining farmland must be avoided;	Satisfied: The site has frontage to Old Station Road and immediate proximity to existing Large Lot residential neighbourhoods and associated services and infrastructure. The site capacity reports address on site waste water management and bushfire safety. The land is physically capable of the proposed use.
Environment And Heritage: the proposed land uses do not have an adverse impact on areas of high environmental value, and aboriginal or historic heritage significance; and	An AHIMS search of the locality indicates no recorded sites within the property. It is anticipated that further consultation with the local aboriginal community will be required. There are no European heritage items identified.
Avoiding Risk: risks associated with physically constrained land are avoided and identified, including: flood prone; bushfire prone; highly erodible; severe slope; and acid sulfate soils.	The intended outcome plan at Appendix A demonstrates future building envelopes and waste water disposal areas above the identified flood planning level and the Bushfire Hazard assessment demonstrates requirements are met under Planning for Bushfire Guidelines.

APPENDIX D – S117 DIRECTIONS COMPLIANCE OR JUSTIFICATION

Table of Relevant 117 Directives		
Directive	*Key requirement*	*Complies or Justification*
1.2 Rural Zones The objective of this direction is to protect the agricultural production value of rural land. A planning proposal must: (a) not rezone land from a rural zone to a residential, business, industrial, village or tourist zone. (b) not contain provisions that will increase the permissible density of land within a rural zone (other than land within an existing town or village).	May be inconsistent if: (a) justified by a strategy which: (i) gives consideration to the objectives of this direction, (ii) identifies the land which is the subject of the planning proposal (if the planning proposal relates to a particular site or sites), and (iii) is approved by the Director-General of the Department of Planning, or (b) justified by a study prepared in support of the planning proposal which gives consideration to the objectives of this direction, or (c) in accordance with the relevant Regional Strategy or Sub-Regional Strategy prepared by the Department of Planning which gives consideration to the objective of this direction, or (d) is of minor significance.	Justification The planning proposal seeks to rezone the land from a RU1 Rural to R5 Large Lot Residential and therefore is inconsistent with (a) of 117 Direction 1.2. This inconsistency is justified by the Mid North Coast Regional Strategy and Kempsey Shire Council's adopted Rural Residential Strategy as follows: The Mid North Coast Regional Strategy 2009 proposes new rural-residential development within proximity of an existing settlement and states: *"However any new planning for rural residential settlement should focus on land close to an existing urban settlement, away from the coast, away from areas that may in the future have value as urban expansion areas, where significant vegetation clearing would not be required and where current or potential future primary production will not be affected. Protection of primary production and biodiversity values of rural areas will be achieved by limiting settlement and controlling subdivision."* The identified area is consistent with the above in that: • It is close to the existing township of Kempsey, away from the coast and not sufficiently proximate or connected to be an urban expansion area. • The site is adjacent existing large lot residential areas to the south and east. • The Planning Proposal will not result in the loss of significant vegetation or biodiversity values. A small part of the site is mapped under the Regionally Significant Farmland mapping. Analysis of this part of the site has been undertaken (at Appendix C) utilising the:

		• *Soil Landscapes Decision making Criteria for Regionally Significant Farmland, Mid North Coast Farmland Mapping Project 2008* • *Assessment of Potential Conflicting Land Use from the Living & Working in Rural Areas Handbook 2009, Department of Primary Industries, Northern Rivers CMA & Southern Cross University, and* • *Interim Variation Criteria under the Draft North Coast Regional Environmental Plan 2016 Department of Planning & Environment.*
1.5 Rural Lands The objectives of this direction are to: (a) protect the agricultural production value of rural land, (b) facilitate the orderly and economic development of rural lands for rural and related purposes. A planning proposal to which clauses 3(a) or 3(b) apply must be consistent with the Rural Planning Principles listed in *State Environmental Planning Policy (Rural Lands) 2008*.	A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the provisions of the planning proposal that are inconsistent are: (a) justified by a strategy which: i. gives consideration to the objectives of this direction, ii. identifies the land which is the subject of the planning proposal (if the planning proposal relates to a particular site or sites, and iii. is approved by the Director-General of the Department of Planning and is in force, or	Justification The Kempsey Shire Rural Residential Strategy seeks to facilitate the orderly and economic development for rural residential purposes and in doing so, must relate to adjacent rural lands and rural land uses. The Rural Planning Principles of SEPP (Rural Lands) 2008 are addressed in Appendix E. The proposal's impact on the agricultural production value of rural land is of minor significance and exclusion of the farmland mapped section would be contrary to achieve orderly and economic development under the Rural Release strategy. Consideration of the agricultural production value of the land has been completed under Appendix C as above. The impact of the planning proposal is considered to be of minor significance.

	(b) is of minor significance.	
2.1 Environment Protection Zones The objective of this direction is to protect and conserve environmentally sensitive areas.	A planning proposal must include provisions that facilitate the protection and conservation of environmentally sensitive areas. A planning proposal that applies to land within an environment protection zone or land otherwise identified for environment protection purposes in a LEP must not reduce the environmental protection standards that apply to the land (including by modifying development standards that apply to the land). This requirement does not apply to a change to a development standard for minimum lot size for a dwelling in accordance with clause (5) of Direction 1.5 *"Rural Lands"*.	Not applicable. The planning proposal does not impact upon land within an environmental protection zone or land otherwise identified for environmental protection.
2.2 Coastal Protection The objective of this direction is to implement the principles in the NSW Coastal Policy.	This direction applies to the coastal zone, as defined in the *Coastal Protection Act 1979*.	Not Applicable. Council GIS mapping indicates that the subject land is not mapped as part of the Coastal Zone mapping under SEPP 71.
3.1 Residential Zones		Consistent

The objectives of this direction are: (a) to encourage a variety and choice of housing types to provide for existing and future housing needs, (b) to make efficient use of existing infrastructure and services and ensure that new housing has appropriate access to infrastructure and services, and (c) to minimise the impact of residential development on the environment and resource lands. This direction applies when a relevant planning authority prepares a planning proposal that will affect land within an existing or proposed residential zone (including the alteration of any existing residential zone boundary).	A planning proposal must, in relation to land to which this direction applies: (a) contain a requirement that residential development is not permitted until land is adequately serviced (or arrangements satisfactory to the council, or other appropriate authority, have been made to service it), and (b) not contain provisions which will reduce the permissible residential density of land.	The land is proposed to be zoned R5 Large Lot Residential and has a suitable level of services available including sealed road frontage, electricity and telecommunications. Sustainability provisions for the site include on site water capture and re-use and on site waste water treatment and disposal systems.

3.4 Integrating Land Use and Transport The objective of this direction is to ensure that urban structures, building forms, land use locations, development designs, subdivision and street layouts achieve the following planning objectives: (a) improving access to housing, jobs and services by walking, cycling and public transport, and (b) increasing the choice of available transport and reducing dependence on cars, and (c) reducing travel demand including the number of trips generated by development and the distances travelled, especially by car, and (d) supporting the efficient and viable operation of public transport services, and (e) providing for the efficient movement of freight.	A planning proposal must locate zones for urban purposes and include provisions that give effect to and are consistent with the aims, objectives and principles of: (a) *Improving Transport Choice – Guidelines for planning and development* (DUAP 2001), and (b) *The Right Place for Business and Services – Planning Policy* (DUAP 2001).	Consistent with Council's Rural Residential strategy. Land has proximity to local bus services and Kempsey township is approximately 3.0 km to the west. A recently completed bus interchange at the intersection of Old Station Road and South West Rocks road provides for greater safety and access to local bus services Bus and sealed road services to Kempsey then link to rail station at Kempsey and national coach services on the Pacific Highway. A range of primary and secondary schools are available at Kempsey . Tertiary education by way of various Tafe campuses and University linked educational services at Port Macquarie.

4.1 Acid Sulphate Soils The objective of this direction is to avoid significant adverse environmental impacts from the use of land that has a probability of containing acid sulphate soils.	A relevant planning authority must not prepare a planning proposal that proposes an intensification of land uses on land identified as having a probability of containing acid sulphate soils on the Acid Sulphate Soils Planning Maps unless the relevant planning authority has considered an acid sulphate soils study assessing the appropriateness of the change of land use given the presence of acid sulphate soils.	Justified Kempsey LEP 2013 maps the majority of the site as Class 5 Acid Sulphate Soils with the low lying western edge along the drainage line mapped as a combination of Class 2 & 4 acid Sulphate Soils, corresponding with land below the 1% AEP flood level. The provisions of Council's LEP clause would continue to apply to the land. The gentle slopes and flood free character of the land means that substantial earthworks and excavations would not be required for construction of a dwelling nor ancillary features. The objective of the LEP provisions applying to ASS is to ensure that development does not disturb, expose or drain acid sulfate soils and cause environmental damage. Clause 7.1 of the LEP requires development consent for works which in relation to Class 5 ASS land within 500metres of adjacent Class 1,2,3 or 4 land that is below 5 m AHD and by which the watertable is likely to be lowered below 1 metre AHD on adjacent Class 1,2 3 or 4 land. It further requires preparation of an ASS management plan prior to Council granting any consent, subject to a number of exemptions. Exemptions relevant to this planning proposal and future subdivision application are: "(6) Despite subclause (2), development consent is not required under this clause to carry out any works if: (a) the works involve the disturbance of less than 1 tonne of soil, and (b) the works are not likely to lower the watertable. The intended outcome of the planning proposal and subdivision satisfies the exemption criteria (a) & (b) above.

4.3 Flood Prone Land The objectives of this direction are: (a) to ensure that development of flood prone land is consistent with the NSW Government's Flood Prone Land Policy and the principles of the *Floodplain Development Manual 2005*, and (b) to ensure that the provisions of an LEP on flood prone land is commensurate with flood hazard and includes consideration of the potential flood impacts both on and off the subject land. (4) A planning proposal must include provisions that give effect to and are consistent with the NSW Flood Prone Land Policy and the principles of the *Floodplain Development Manual 2005* (including the *Guideline on Development Controls on Low Flood Risk Areas*).	A planning proposal may be inconsistent with this direction only if the relevant planning authority can satisfy the Director-General (or an officer of the Department nominated by the Director-General) that: (a) the planning proposal is in accordance with a floodplain risk management plan prepared in accordance with the principles and guidelines of the Floodplain Development Manual 2005, or (b) the provisions of the planning proposal that are inconsistent are of minor significance. **Note:** "flood planning area", "flood planning level", "flood prone land" and "floodway area" have the same meaning as in the *Floodplain Development Manual 2005*.	Justified The planning proposal is in accordance with the requirements of Kempsey Shire floodplain risk management plan, prepared in accordance with the principles and guidelines of the Floodplain Development Manual 2005. One of the principal objectives of the policy is: *To ensure that new development in flood prone lands is compatible with the degree of flood hazard and that adequate flood risk management measures are incorporated in the design of the development thereby minimising the possibility of loss of life and damage to property* The policy defines **Flood Prone land.** Land which is inundated by a 1 in 100 year flood event. The **Flood Planning Levels** are the combination of the 1 in 100 flood levels and 0.5m freeboard and within the Policy are shown as minimum floor levels. Kempsey Shire Council has further adopted revised flood levels for the Lower Macleay Floodplain and coastal estuaries as an Interim Policy pending completion of the review of its Flood Risk Management Strategy Policy. The revised flood level for Old Station Road is estimated at 6.0 m AHD. The policy also states Council will not support the re-zoning of land for rural development unless it is shown to have at least 1000sqm at or above the flood planning level. The subdivision concept at Appendix A demonstrates each 10,000 sqm (1 ha) lot has well in excess of 1000 sqm above the identified flood planning level. Concept lot 30 is recommended to be revised at DA stage and provided with additional flood free land area, which can be achieved through boundary adjustment with concept Lot 31.

(5) A planning proposal must not rezone land within the flood planning areas from Special Use, Special Purpose, Recreation, Rural or Environmental Protection Zones to a Residential, Business, Industrial, Special Use or Special Purpose Zone.		Further the location of flood prone elements area at the fringe of the site and associated with gullies draining off the ridge. The entrance road can be designed to achieve flood free access levels at the entrance to Old Station road.
4.4 Planning for Bushfire Protection The objectives of this direction are: (a) to protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas, and (b) to encourage sound management of bush fire prone areas.	A planning proposal must: (a) have regard to *Planning for Bushfire Protection 2006*, (b) introduce controls that avoid placing inappropriate developments in hazardous areas, and (c) ensure that bushfire hazard reduction is not prohibited within the APZ.	Complies: The Bushfire Hazard Assessment by Midcoast Building and Environmental November 2016 has been prepared to meet the aims and objections of the NSW Rural Fire Service's *Planning for Bushfire Protection 2006* and Section 2 of AS 3959-2009 and has measures sufficient to minimise the impact of bushfire. The Bushfire Hazard Assessment is provided at **Appendix B.**
5.1 Implementation of Regional Strategies The objective of this direction is to give legal effect to the vision, land use strategy, policies, outcomes and actions contained in regional strategies.	A planning proposal may be inconsistent with the terms of this direction only if the relevant planning authority can satisfy the Director-General of the Department of Planning (or an officer of the Department	Justified The proposal, as it relates to the provision of the Regional Strategy on protection agricultural lands is of minor significance and does not undermine the achievement of the strategy. The proposal meets the variation criteria under the draft North Coast Regional Plan for farmland mapped areas has been justified in detail in the Planning Proposal and appendices above.

Planning proposals must be consistent with a regional strategy released by the Minister for Planning.	nominated by the Director-General), that the extent of inconsistency with the regional strategy: (a) is of minor significance, and (b) the planning proposal achieves the overall intent of the regional strategy and does not undermine the achievement of its vision, land use strategy, policies, outcomes or actions.	The detailed assessments at Appendix C have demonstrated this to be of minor significance.
6.1 Approval and Referral Requirements Objective The objective of this direction is to ensure that LEP provisions encourage the efficient and appropriate assessment of development.	A planning proposal must: (a) minimise the inclusion of provisions that require the concurrence, consultation or referral of development applications to a Minister or public authority, and (b) not contain provisions requiring concurrence, consultation or referral of a Minister or public authority unless the relevant planning authority has obtained the approval of: (i) the appropriate Minister or public authority, and	Complies: The planning proposal does not include any provisions that require the concurrence, consultation or referral of development applications to a Minister or public authority, other than those already required by existing "Integrated Development provisions and State Environmental Planning Policies.

	(ii) the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General), prior to undertaking community consultation in satisfaction of section 57 of the Act, and (c) not identify development as designated development unless the relevant planning authority: (i) can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the class of development is likely to have a significant impact on the environment, and (ii) has obtained the approval of the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) prior to undertaking community consultation in satisfaction of section 57 of the Act.	

6.3 Site Specific Provisions The objective of this direction is to discourage unnecessarily restrictive site specific planning controls.	A planning proposal that will amend another environmental planning instrument in order to allow a particular development proposal to be carried out must either: (a) allow that land use to be carried out in the zone the land is situated on, or (b) rezone the site to an existing zone already applying in the environmental planning instrument that allows that land use without imposing any development standards or requirements in addition to those already contained in that zone, or c) allow that land use on the relevant land without imposing any development standards or requirements in addition to those already contained in the principal environmental planning instrument being amended. A planning proposal must not contain or refer to drawings that show details of the development proposal.	Complies: The planning proposal seeks to rezone the site to an existing zone already applying in the environmental planning instrument consistent with item 4(b) of the 117 Direction and does not propose any additional development standards or requirements to those already contained in the relevant zone.

APPENDIX E – STATE ENVIRONMENTAL PLANNING POLICIES

E1. State Environmental Planning Policy (Rural Lands) 2008

The proposal to rezone rural land to Residential requires consideration of the provisions of the SEPP for Rural Lands and flags the Regionally Signficant farmland mapping for consideration.

In considering the rezoning Clause 7 of the SEPP for Rural Lands is applicable and is addressed as follows.

2 Aims of Policy

The aims of this Policy are as follows:

(a) to facilitate the orderly and economic use and development of rural lands for rural and related purposes,

(b to identify the Rural Planning Principles and the Rural Subdivision Principles so as to assist in the proper management, development and protection of rural lands for the purpose of promoting the social, economic and environmental welfare of the State,

(c) to implement measures designed to reduce land use conflicts,

(d) to identify State significant agricultural land for the purpose of ensuring the ongoing viability of agriculture on that land, having regard to social, economic and environmental considerations,

(e) to amend provisions of other environmental planning instruments relating to concessional lots in rural subdivisions.

Part 2 Rural Planning Principles

7 Rural Planning Principles

The Rural Planning Principles are as follows:

(a) the promotion and protection of opportunities for current and potential productive and sustainable economic activities in rural areas,

(b) recognition of the importance of rural lands and agriculture and the changing nature of agriculture and of trends, demands and issues in agriculture in the area, region or State,

(c) recognition of the significance of rural land uses to the State and rural communities, including the social and economic benefits of rural land use and development,

(d) in planning for rural lands, to balance the social, economic and environmental interests of the community,

(e) the identification and protection of natural resources, having regard to maintaining biodiversity, the protection of native vegetation, the importance of water resources and avoiding constrained land,

(f) the provision of opportunities for rural lifestyle, settlement and housing that contribute to the social and economic welfare of rural communities,

(g) the consideration of impacts on services and infrastructure and appropriate location when providing for rural housing,

(h) ensuring consistency with any applicable regional strategy of the Department of Planning or any applicable local strategy endorsed by the Director-General.

In considering the above Rural Planning Principles, principle (f) & (h) is most relevant to the subject Planning Proposal. The Planning Proposal is consistent with Council's rural lifestyle strategy (Kempsey Rural Residential Strategy) and utilises existing infrastructure for expansion of the existing rural residential area at Verges Creek.

E.2 State Environmental Planning Policy No. 44 – Koala Habitat

The site is mapped within the Kempsey LEP 2013 Koala Habitat Map. The Kempsey Comprehensive Koala Plan of Management was prepared under the provisions of SEPP 44.

Examination of the mapping associated with the Kempsey Comprehensive Koala Plan of Management indicates the land is classified as "unknown vegetation and part "not koala habitat".

Existing mature native trees on the site have been survey located and identified. The concept layout for the land demonstrates that each allotment has room for a dwelling and ancillary structures without disturbing the located trees.

E.3 State Environmental Planning Policy No. 71 – Coastal Protection

The land is not mapped as part of the Coastal Zone mapping under SEPP 71.

E.4 State Environmental Planning Policy No. 55 – Remediation of Land

Clause 6 of the *SEPP 55 – Remediation of Land* requires a planning authority to consider whether the land is contaminated and if the land is contaminated, to be satisfied that the land will be suitable for the proposed use or appropriately remediated.

In accordance with Clause 6(2) a preliminary investigation of the land in accordance with the contaminated land guidelines has been undertaken and the land has not been used for any of the purposes referred to in Table 1 of the contaminated land planning guidelines.

Enquiries of the current owners of the land indicate that:

- The previous and current land use has been rural cattle grazing land.
- There is no on site cattle tick dip or former tick dip site.
- The land has not been used for Market Gardens or Orchards.
- There are no former oil storage depots or former fuel depots associated with the past uses.
- There are no refuse or garbage land fill areas

Searches of the land contamination register, record of notices and contaminated sites notified to EPA have not identified the subject land Lot 7 DP 255922.

E5. State Environmental Planning Policy (Infrastructure) 2007

The aim of this policy is to facilitate the effective delivery of infrastructure across the State. Specifies exempt and complying development controls to apply to the range of development types listed in the SEPP.

Development potentially resulting from the developmelnt would not trigger the provisions of the SEPP (Infrastrucutre) Division 17 & Schedule 3 in relation to Traffic Generating Development.