Land Use Conflict Risk Assessment

Planning Proposal Lots 831, 832 and 833
DP847683
Reardons Lane Swan Bay

HEALTH SCIENCE ENVIROMENTAL EDUCATION
ENVIRONMENTAL AUDITOR

Land Use Conflict Risk Assessment

Planning Proposal Lots 831, 832 and 833 DP847683 Reardons Lane Swan Bay

Prepared for: Envirosafe Products Property Pty Ltd

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1. Introduction

Tim Fitzroy & Associates has been engaged by Envirosafe Products Pty Ltd to undertake a Land Use Conflict Risk Assessment (LUCRA) for land described in real property terms as Lots 831, 832 and 833, DP 847683 Reardons Lane Swan Bay (see Site Locality Plan **Illustration 1**). This report has been prepared to accompany a planning proposal to Richmond Valley Council for a 43 lot rural residential development at the subject site. The site is zoned RU1 Primary Production under the Richmond Valley Local Environment Plan (LEP) 2012.

The purpose of the Planning Proposal is to change the town planning provisions applying to Lots 831, 832, 833 DP 847683 to rezone part of the land presently zoned RU1 – Primary Production to R5 – Large Lot Residential in accordance with the provisions of the Richmond Valley Local Environmental Plan 2012.

The land to which this LUCRA relates has an area of approximately 131 hectares and is located on the corner of Reardon's Lane and Darke Lane Swan Bay. The bulk of the land is under sugar cane cultivation. A series of cane drains and road crisscross the site. Site improvements include two free standing dwellings, and a series of sheds.

The subject lands are adjoined by farmland to the north, east and south and rural residential properties to the west and south east. The two existing dwellings are serviced by a septic tank and absorption trenches.

We note that the surrounding land use includes: sugar cane to the north and east and low intensity cattle (beef) grazing to the south east, regrowth bushland to the south and west, together with a smattering of rural dwellings. Further to the north (within 1.5km) is a rural residential development and the Newman's Landscaping Depot.

The *Living and Working in Rural Areas Handbook* (Department of Primary Industries et.al 2007) denotes a number of recommended buffer distances to *residential areas and urban development* and to *rural dwellings*. The planning proposal comprises rual residential allotments range in size from 0.75 to 1.49 hectares. Default buffer to rural residential settings are not specified.

It is our considered view that given the relative size of the proposed allotments that the buffer distances are akin to a *rural dwelling* than a *residential/urban development*. The relevant default buffers applicable to this proposal are therefore as follows:

- *50 metres to grazing of stock*
- *200 metres to sugar cane, cropping and horticulture*
- *200m from Cattle Dip Sites*

Onsite wastewater Management Systems are to be:

- *>250m from Groundwater well/s*
- *>6m up-gradient and >12m down-gradient from property boundaries*
- *>40m from intermittent watercourses/gullies*

Note: The closest point to the active face of the Mooniimba Quarry (Lot 193 DP 755603) to the subject site is approximately 17km, while the closest point of the land occupied by the Mooniimba Quarry to the subject site is approximately 12km.

The subject site exceeds the 1km minimum buffer distance for operations involving blasting (Table 6 Recommended minimum buffers (metres) for primary industries (DPI 2007).

While a default buffer area of 200m width is recommended between cropping and rural dwellings the actual width of the buffer should in practice be dependent on the most limiting factor involved (i.e. the factor that will require the widest buffer). In theory, this would lead to all other factors being adequately addressed.

The proposed development should be designed to minimise instances of incompatibility such that normal farming practice are not inhibited. Where such instances do arise, measures to ameliorate potential conflicts should be devised wherever possible.

Conflict between residential development and agricultural land uses is likely to occur where residential land uses directly abut, or are sufficiently close to, farmland such that they are likely to be affected by agricultural activities. Such conflict can arise from the use of agricultural chemicals noise, dust and odour generating activities. Adverse impacts of rural residential development on farmland include sediment and stormwater run-off.

When considering potential land use conflict between residential and agricultural activities it is important to recognise that all agricultural activities:

- should incorporate reasonable and practicable measures to protect the environment in accord with the Protection of the Environment Operations Act (POEO) and associated industry specific guidelines; and
- are legally conducted as required by other legislation covering workplace health and safety, and the use and handling of agricultural chemicals.

Nevertheless, certain activities practised by even the most careful and responsible farmer may result in a nuisance to adjacent residential areas through, for example, unavoidable odour drift and noise impacts.

Typical conflicts between agricultural enterprises and residential development as provided in Table 1 below:

Table 1 Typical Conflicts between agriculture and adjoining rural residential areas

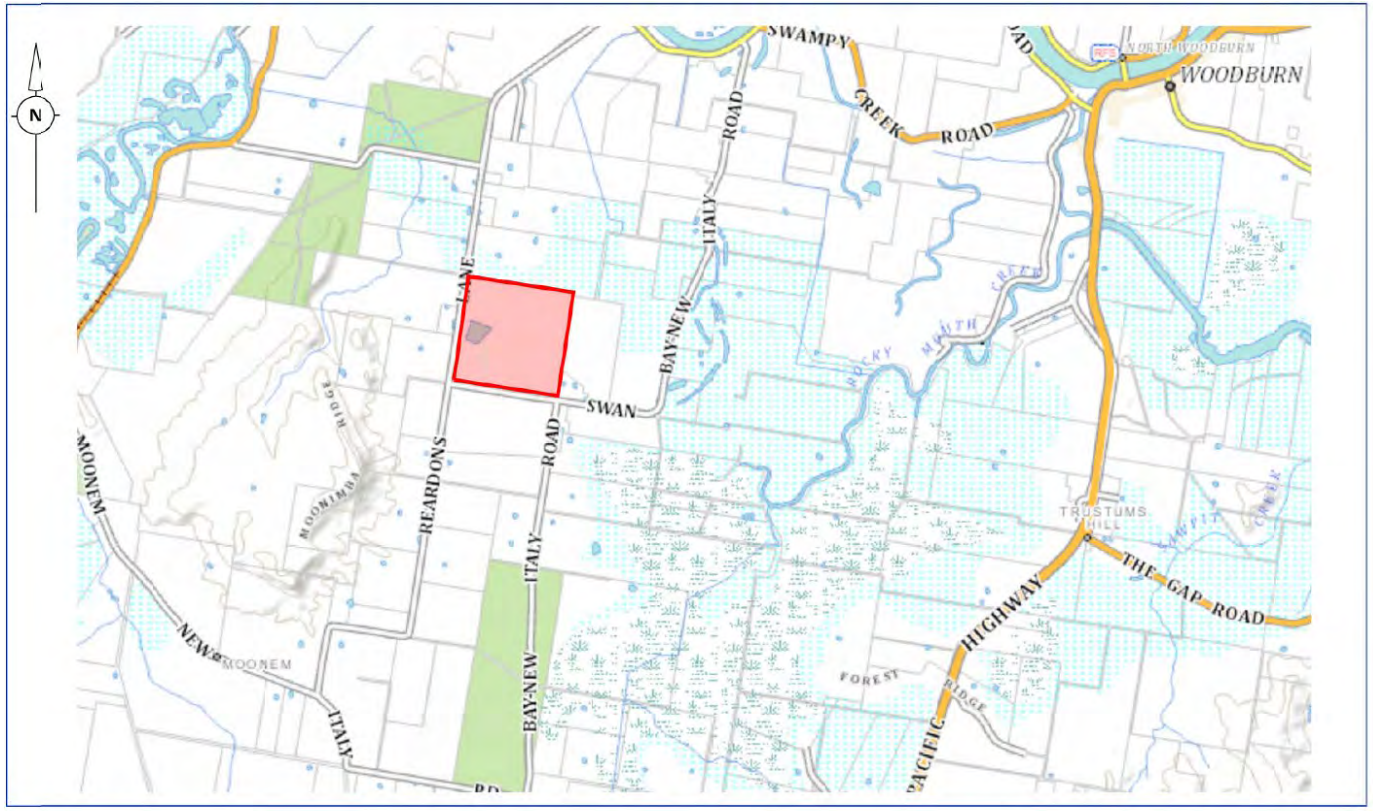
Noise	• Dogs, livestock. • Farming equipment, pumps, spray machines, transport. • Ancillary equipment associated with on-farm processing.
Odour	• Agricultural fertilisers and chemicals. • Intensive animal industries. • Application of effluent to pasture
Health concerns	• Chemicals. • Spray drift. • Smoke.

Water	• Access. • Pumping. • Quantity.
Smoke and ash	• Burning of pasture, stubble or 'rubbish'. • Cane fires.
Visual intrusion	• Hail netting. • Polyhouses.
Nuisance	• Stray dogs. • Vandalism. • Trespass. • Noxious and environmental weeds.

The Living and Working in Rural Areas Handbook (NSW DPI et. al 2007), in particular Chapter 6 Development Control, provides guidance in the assessment and mitigation of potential land use conflict matters and has been used as a resource for this Land Use Conflict Risk Assessment (LUCRA).

This LUCRA has been prepared to assist Council in assessing potential land use conflicts between the proposed development at the subject site and the neighbouring agricultural developments.

Illustration 1 Site Locality Plan



LEGEND:

SITE BOUNDARY

SOURCE PLAN: www.maps.six.nsw.gov.au - accessed 03.07.14

k:\jobs\2014\14227 - newman\planning\planning plans\ndc plans\cad files\14227 - newman rev b.dwg - plan 1 - location plan

Newton Denny Chapelle

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PLAN 1 - LOCATION

CLIENT: NEWMAN

LOCATION: LOT 831, 832, 833 DP 847683
REARDONS LANE
SWAN BAY NSW

DATE: 17.12.15 REF: 14/227

SCALE: nts DRAWN: bk

1.1 Scope of Works

This assessment has been undertaken to determine the potential land use conflicts between the proposed rural residential development and the neighbouring agricultural enterprises. The proposed development comprises 43 rural residential allotments ranging in size from 0.75 to 1.48 hectares plus residual land.

The bulk of the subject site is under sugar cane cultivation. A series of cane drains and roads crisscross the site. Site improvements include two free standing dwellings, and a series of sheds.

The surrounding land use includes: sugar cane to the north and east and low intensity cattle (beef) grazing to the south east, regrowth bushland to the south and west, together with a smattering of rural dwellings. Further to the north (within 1.5km) is a rural residential development and the Newman's Landscaping depot.

The tasks involved in undertaking this assessment were to:

Step 1: Gather information

- Determine the nature of the land use change and development proposed.
- Assess the nature of the precinct where the land use change and development is proposed.
- Appraise the topography, climate and natural features of the site and broader locality
- Conduct a site inspection
- Describe and record the main activities of the surrounding agricultural land use and their regularity, including periodic and seasonal activities that have the potential to be a source of complaint or conflict.

Step 2: Evaluate the risk level of each activity

- Record each activity on the risk assessment matrix, and identify the level of risk of a land use conflict arising from the activity.

Step 3: Identify the management strategies and responses that could help lower the risk of the issue resulting in a dispute and conflict

- Identify management strategies for each activity
- Prioritise Strategies
- Provide Performance targets for each activity

Step 4: Record the results of the LUCRA

- Summarise the key issues, their risk level, and the recommended management strategies

2. Gather Information

2.1 Nature of the land use change and development proposed

Newton Denny Chapelle (NDC) on behalf of Envirosafe Products Pty Ltd are in the process of preparing a planning proposal to Richmond Valley Council for a 43-lot rural residential development at the subject site (see Site Layout Plan **Appendix A**).

The subject site is legally described as Lots 831, 832 and 833, DP 847683 Reardons Lane Swan Bay. The site has a total of 131ha in area, and has access to both Reardons and Darke Lane. The bulk of the subject site is under sugar cane cultivation. A series of cane drains and roads crisscross the site. Site improvements include two free standing dwellings and a series of farm sheds.

2.2 Nature of the precinct where the land use change and development is proposed

The site is zoned RU1 Primary Production under the Richmond Valley Local Environment Plan (LEP) 2012.

The relevant buffer applicable to this proposal are as follows:

- *50 metres to grazing of stock*
- *200 metres to sugar cane, cropping and horticulture*
- *>250m from Cattle Dip Sites*

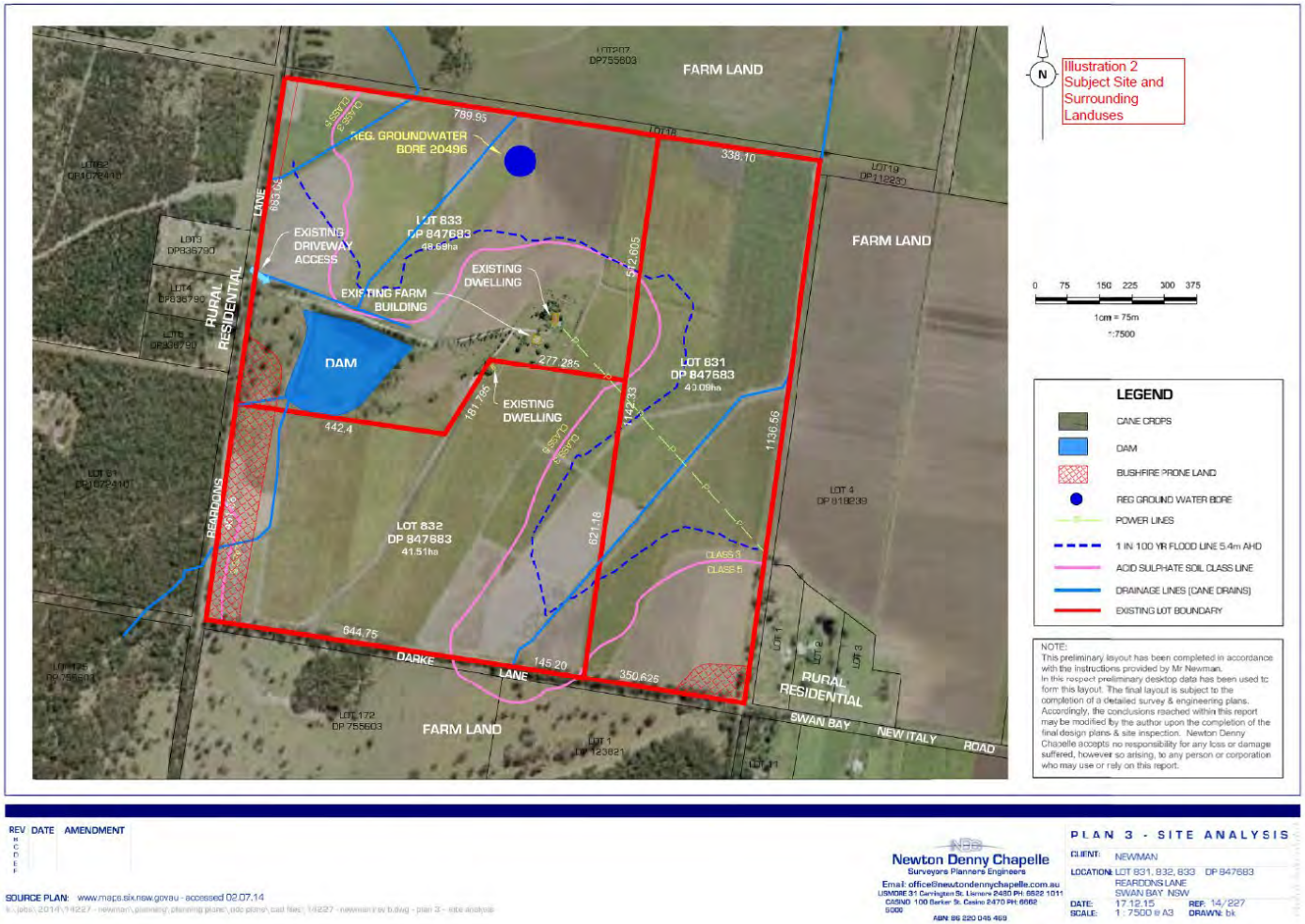
Onsite wastewater Management Systems are:

- *>40 metres intermittent watercourses, gullies*
- *>250m from Groundwater well/s*
- *>6m up-gradient and >12m down-gradient from property boundaries*

The bulk of the subject site is under sugar cane cultivation.

The surrounding land use includes: sugar cane to the north and east and low intensity cattle (beef) grazing to the south east, regrowth bushland to the south and west, together with a smattering of rural dwellings. Further to the north (within 1.5km) is a rural residential development and the Newman's Landscaping depot (1.8km) (see **Illustration 2.2**).

Illustration 2 Subject Site and Surrounding Land uses



2.3 Topography, Climate and Natural Features

The relief of the majority of the site varies between 16 and 4 m AHD. Slopes on the site are in the range of 0 to 7%.

The site is mostly within the sedimentary landscape (Jurassic Walloon shales and sandstones) while the drainage lines in the north east corner in the lower area reflect Quaternary alluvial soil. Other areas of the existing holding are not being subdivided because of their low lying nature in this black alluvium.

The site is situated with the sub-tropical climatic zone and the climate can be described as humid sub-tropical, characterised by hot, humid summers and mild winters. Rainfall is seasonally distributed, being concentrated mainly in the summer months.

Climate averages from the Evans Head Weather Station over the past 15 years are provided **Table 2.1**. Whilst not replicating the exact onsite weather conditions the Evans Head Weather station results provide a good indication of the general weather experienced in the locality.

Wind from the south-easterly quadrant predominates in summer and autumn. South-westerlies are the main winds in winter, whereas in the spring months, wind directions are equally divided between the north and south-east.

Although the strong winds are generally from the south-east and north, strong north-westerly winds, occur approximately one day per month during summer.

Table 2.1 Local Climatic Conditions

Australian Government
Bureau of Meteorology

Climate statistics for Australian locations

Monthly climate statistics

All years of record

Site information

Site name: EVANS HEAD RAAF BOMBING RANGE AWS
Site number: 058212
Latitude: 29.18 °S **Longitude:** 153.40 °E
Elevation: 63 m
Commenced: 1998 **Status:** Open
Latest available data: 03 Apr 2014

Additional information

Additional site information

Nearest alternative sites

1. 058052 TABBIMOBILE STATE FOREST (12.7km)
2. 058065 BROADWATER SUGAR MILL (18.7km)
3. 058012 YAMBA PILOT STATION (27.9km)

View: Main statistics All available | Period: 30 year period not available | Text size: Normal Large

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years	
Temperature															
Mean maximum temperature (°C)	28.1	27.7	26.7	24.4	21.8	19.7	19.5	21.1	24.0	25.3	26.1	27.7	24.3	15	1998 2013
Mean minimum temperature (°C)	19.8	19.7	18.8	16.4	13.2	11.2	10.2	10.8	13.3	15.1	16.8	18.6	15.3	15	1998 2013
Rainfall															
Mean rainfall (mm)	160.3	150.8	176.4	167.0	111.6	187.0	74.9	74.7	53.0	93.0	132.2	86.4	1472.3	16	1998 2014
Decile 5 (median) rainfall (mm)	146.5	146.6	153.6	134.1	112.4	177.7	59.1	51.8	41.4	63.7	132.0	70.8	1464.8	16	1998 2014

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2.4 Site Inspection

A site inspection was conducted of the subject site on 25 October 2021. The land is composed of three ridges with gentle slopes, one along Reardon's Lane, the second running roughly north-east through the centre of the proposed subdivision, and the third on the eastern boundary. An access road exists on this central ridge, from which the land slopes gently to the drainage lines to the east and west. Other than a two shelter belts of pine trees, the remaining land has been cleared and cultivated for growing sugar cane.

Site improvements include two free standing dwellings and a series of sheds. Photographs of the site subject and surrounds were taken (see **Appendix B**).

Wind conditions at the time of inspection were south east approximately 10 to 15 km/hr. Observations recorded during our site inspections did not reveal any distinguishable impacts (noise, odour, dust) from any adjoining operations on the subject site.

2.5 Potential Land Use Conflicts

The following key items have been identified as potential land use conflicts between the surrounding agricultural/horticultural operations and the proposed development.

2.5.1 Agricultural Chemical Spray Drift

The off-target movement of agricultural chemicals can be a cause for concern to residents in proximity to farming areas. These concerns are largely based on fears of exposure to agricultural chemicals but also due to detection of odours associated with the chemical. In addition fertilisers applied to assist the growth of sugar cane can also be of cause of concern and complaint.

Information on farm operations was garnered from discussions with the Farm Operator, Noel Newman. Insecticides, fungicides and fertilisers are applied by direct injection into ground from tractor. As per Protection of the Environment Operation Regulation spraying is restricted to calm conditions to ensure that spray drift is restricted to the target crops. No aerial agricultural spraying is known to occur in the area. Given the use of ground cropping chemical application it is assumed that spray drift would be limited.

Very fine or fine droplets pose the highest risk of spray drift; it is the single most important factor controlling drift potential. The selection of applicators and nozzles that give the correct droplet size range is important.

The higher droplets are released, the greater potential for drift. Given the adjacent land use consists of ground vegetable cropping and the relatively low height at which spray released the risk of spray drift is reduced.

A variety of insecticides, fungicides and fertilisers are used each year on the sugar cane plantation (see **Table 2.2** below). The average frequency and method of application has been provided for chemicals utilised on the sugar cane plantation has also been included in Table 2.2.

Table 2.2 Chemicals (pesticides, herbicides and fertilisers) used on site

Chemicals	Type	Frequency Average	Application	Timing
Insecticides	Lorsban	Once a year during planting	Cane millet dumped into dip and then planted (no spray)	Day
Fungicides	Shirton	1 time each year	Cane millet dumped into dip and then planted (no spray)	Day
Fertilisers	Pot ash, phosphate & nitrogen/urea	Every second year	Injection via tractor	Day

Herbicides	Diuron (diurox)	1 time each year	Boom Spray	Day
	Paraquot	1 time each year	Boom Spray	Day

Note: Rodenticides are not used. Rodents (rats) require protein (found in grass seed) for sustenance. Well maintained perimeter grass to the cane farm is successfully used to manage the rat population. Rats will use cane farm for shelter but cannot live off sugar cane.

The greatest risk of drift potential relates to the use of the Boom Sprayer, however this impact is limited. Boom spraying is undertaken amongst established cane and within 300mm of the ground surface on two occasions per year. It is nevertheless important that all existing protocols are maintained to minimise spray drift.

From a planning perspective, it is not considered practical to base buffer area dimensions on individual chemicals or formulations. Based on the available research on chemical spray drift, the planning guidelines have adopted a minimum width of 200 m where open ground conditions apply (to rural dwellings); and a minimum width of 40 m where a vegetated buffer element can be satisfactorily implemented and maintained.

It should be noted that the recommended vegetated buffer (which includes multiple rows of trees) will not capture 100% of the chemical spray drift, but may reduce spray drift to less than 1% at a sensitive receptor when managed in terms of porosity, litter build up and noxious weed control to ensure effectiveness.

2.5.2 Odour

Odour from cropping and horticulture can arise from use of chemical sprays and fertilisers (inorganic and organic). Such detrimental odours can impact on residential amenity and have the potential to affect public health.

Odour is often a major factor in many complaints about off-site chemical spray drift where there is sometimes no objective evidence of toxic exposure. Some agricultural chemicals contain 'markers' (strong odours) to allow easy identification and these markers or mixing agents are sometimes detected at a distance from the target area and cause concern even though in some circumstances extremely low levels of the active ingredients may be present.

Residents' association of the odour with the chemical is sufficient to raise fears of exposure. In addition perceptions of an odour's acceptability and individual capacity to detect particular odours can vary greatly.

Factors affecting complaints from odour are influenced by the frequency, intensity, duration and offensiveness of the odour. An objectionable odour may be tolerated if it occurs infrequently at a high intensity, however a similar odour may not be tolerated at lower levels if it persists for a longer duration.

2.5.3 Cane Firing

Cane firing as a prelude to cane harvesting is a potential land use conflict for the proposed development. Whilst attempts have been made in recent years to harvest green cane locally, firing of cane remains in place for the foreseeable future.

On the subject site (131 hectare farm) there is four to six cane fires struck each year, depending on the paddock size. The average period of cane fire is 30 minutes, while a large fire will last up to 1 hour (pers.com Noel Newman).

In effect in any given year at the subject site the actual period of cane firing is on average 150 minutes (2.20 hours).

Cane firing is carefully managed by experienced cane farmers. Cane is burnt in the early evening. In the summertime (afternoon) south easterly winds predominant. Cane farmers will allow the south easterly breeze to desist prior to striking the fire. The orientation of the subject site and residual cane farm will result in cane ash and smoke (under slight south easterly breeze) being pushed to the north-west away from future residences within the proposed development.

Cane farmers notify neighbours in advance of firing.

2.5.4 Noise

The most likely types of noise associated with agricultural activity which may lead to land use conflict in the locality would be intermittent noise from tractors and other machinery and during cane harvesting.

Because background noise levels are low in the locality, excessive noise from vehicles, machinery and mechanical equipment may cause complaints from the prospective residents. Complaints are more likely to result when noisy activities are undertaken at night when background noise levels are low and neighbours may be sleeping.

Routine sugar cane operations occur from 6am until 4pm (Monday to Saturday). These times may be extended during the harvesting period. Noisy activities associated with sugar cane operations are intermittent.

Key operations and timetabling resulting in machinery noise from sugar cane production* include:

1. Cultivation (till soil and remove weeds) (3 to 4 times every second year);
2. Planting (once a year);
3. Fertilising (every second year);
4. Spraying (pre-emergents); and
5. Harvesting (12 days per year). Occurs in 4 rounds; 3 days at a time. Generally runs from April to September, weather permitting.

* The above operations and timetabling relate to the existing 131 hectare farm operation.

Given the intermittent and transient nature of farm noise sources coupled with the ample proposed allotments (0.75 to 1.49 hectares) noise decay through distance attenuation only will be sufficient to reduce noise impacts to a negligible level at the nearest affected residences.

2.5.5 Dust

The main sources of dust from a sugar cane cropping include cultivation prior to planting, tractor, harvesting and transport movements. Contemporary farming practices incorporate measures to minimise loss of soil, but at times it is necessary to leave land unplanted for extended periods, which can lead to the movement of dust.

Local conditions, including wind strength and direction, rainfall, humidity and ambient temperatures, soil type, vegetative cover and type of on-site activity determine the extent of the nuisance.

The vegetated buffer designed to capture chemical spray drift will also be effective in reducing conflict resulting from dust.

2.5.6 Surface Water and Sediment Runoff

The proposed development will alter land surface characteristics and the hydrological balance on the subject site and has the potential to impact adjoining farmland. The increase of impermeable surfaces and changes to drainage patterns can accelerate soil erosion, siltation and sedimentation; and increase the risk of flooding.

As the proposed land to be developed is upslope of surrounding cane lane techniques to alleviate conflict due to downstream effects of residential development are proposed which will include suitable erosion, sediment and stormwater control during the construction and operational stages of the development.

A Soil and Water Management Plan for the construction and operation phases of the development and management of stormwater run-off should be prepared. The SWMP should incorporate buffer areas and be designed to divert and spread stormwater to reduce negative impacts on water quality.

2.5.7 Pests

Pests primarily include flies and rodents. Practices that minimise breeding on farm are necessary since pest's impact directly on community amenity and increase the risk of disease transfer. All pest control materials need to be used in strict adherence with labelling directions. They must be correctly stored away from children and domestic animals. Records of pesticide use should also be maintained.

2.5.8 Operating Times

General farm operations are from 6am to 4:00pm, Monday to Saturday. Two staff operate the farm, outside of harvesting, when contract harvesters are employed.

The cane harvest period generally runs from the end of April to September, however the duration is subject to changeable weather conditions.

2.5.9 Chemical Use

Volatile components of chemicals sprayed may affect neighbours if not used in accordance with manufacturer and workplace health and safety requirements. Spraying should also be avoided during adverse weather conditions that may impact on neighbours.

2.5.10 Site Location: Vehicular Access

The subject site has direct access to Reardons and Darke Lanes. Two cane haulage roads exist on the subject site:

- Boyds Lane; and
- Darke Lane.

Boyds Lane is located approximately 300m north of the site dam, while the Darke Lane cane haulage road enters the site from the south. It is unlikely that the proposed

development will be significantly impacted by cane haulage or vehicle deliveries to the adjoining farms/businesses.

Any dust impacts from cane haulage trucks will be mitigated through the installation of a 40 metre wide vegetated buffer along the northern and eastern site boundaries.

3. Land Use Conflict Risk Assessment

3.1 Introduction

In this report, a risk assessment matrix is used to rank the potential Land Use Conflicts in terms of significance. The matrix assesses the environmental/public health and amenity impacts according to the:

- Probability of occurrence; and
- Severity of impact.

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The procedure of environmental/public health & amenity hazard identification and risk control is performed in three stages.

1. Environmental/public health & amenity hazard identification,
2. Risk assessment and ranking,
3. Risk control development.

Procedure:

1. Prepare LUCRA Hazard Identification and Risk Control form.
2. List all hazards associated with each activity.
3. Assess and rank the risk arising from each hazard before “controls” are applied on the LUCRA form.
4. Develop controls that minimise the probability and consequence of each risk using the five level methods. Record these controls on the form.
5. Re-rank each risk with the control in place to ensure that the risk has been reduced to an acceptable level. If the risk ranking is not deemed to be acceptable consideration should be given to whether the proposed activity should be allowed to proceed.

3.2 Risk Assessment and Risk Ranking

It is necessary to differentiate between an 'environmental hazard' and an 'environmental risk'. 'Hazard' indicates the potential for harm, while 'risk' refers to the probability of that harm occurring. For example, the presence of chemicals stored in a building is a hazard, but while the chemicals are stored appropriately, the risk is negligible. **Table 3.1** defines the hazard risks used in this report.

The Risk Ratings (severity of the risks) have been established by assessing the consequences of the risks and the likelihood of the risks occurring.

Table 3.1 Measure of Consequence

Level	Descriptor	Description	Examples/Implications
1	Severe	• Severe and/or permanent damage to the environment • Irreversible with management	• Damage or death to animals, fish, birds or plants • Long term damage to soil or water • Odours so offensive some people are evacuated or leave voluntarily • Many public complaints and serious damage to Council's reputation • Contravenes Protection of the Environment & Operations Act and the conditions of Council's licences and permits. Almost certain prosecution under the POEO Act
2	Major	• Serious and/or long-term impact to the environment • Long-term management implications	• Water, soil or air impacted badly, possibly in the long term. • Limited damage to animals, fish or birds or plants • Some public complaints Impacts pass quickly • Contravenes the conditions of Council's licences, permits and the POEO Act • Likely prosecution
3	Moderate	• Moderate and/or medium-term impact to the environment • Some ongoing management implications	• Water, soil or air known to be affected, probably in the short term • No damage to plants or animals • Public unaware and no complaints to Council • May contravene the conditions of Council's Licences and the POEO Act • Unlikely to result in prosecution
4	Minor	• Minor and/or short-term impact to the environment • Can be effectively managed as part of normal operations	• Theoretically could affect the environment or people but no impacts noticed • No complaints to Council • Does not affect the legal compliance status of Council

Level	Descriptor	Description	Examples/Implications
5	Negligible	• Very minor impact to the environment • Can be effectively managed as part of normal operations	• No measurable or identifiable impact on the environment

This report utilises an enhanced measure of likelihood of risk approach1 which provides for 5 levels of probability (A-E). The 5 levels of probability are set out below in **Table 3.2.**

Table 3.2 Probability Table

Level	Descriptor	Description
A	Almost certain	Common or repeating occurrence
B	Likely	Known to occur, or 'it has happened'
C	Possible	Could occur, or 'I've heard of it happening'
D	Unlikely	Could occur in some circumstances, but not likely to occur
E	Rare	Practically impossible

3.3 Risk Ranking Method

For each event, the appropriate 'probability' (i.e. a letter A to E) and 'consequence' (i.e. a number 1 to 5) is selected.

The consequences (environmental impacts) are combined with a 'probability' (of those outcomes) in the Risk Ranking Table (Table 3.3) to identify the risk rank of each environmental impact (e.g. a 'consequence' 3 with 'probability' D yields a risk rank 9).

The table yields a risk rank from 25 to 1 for each set of 'probabilities' and 'consequences'. A rank of 25 is the highest magnitude of risk that is a highly likely, very serious event.

A rank of 1 represents the lowest magnitude or risk, an almost impossible, very low consequence event.

Table 3.3 Risk Ranking Table

PROBABILITY	A	B	C	D	E
Consequence					
1	25	24	22	19	15
2	23	21	18	14	10
3	20	17	13	9	6
4	16	12	8	5	3
5	11	7	4	2	1

NOTE
A risk ranking of 25-11 is deemed as an unacceptable risk.

A risk ranking of 10-1 is deemed as an acceptable risk.

Thus, the objective is to endeavour to identify and define controls to lower risk to a ranking of 10 or below.

3.4 Risk Reduction Controls

The process of risk reduction is one of looking at controls that have and effect on probability such as the implementation of certain procedures; new technology or scientific controls that might lower the risk probability values.

It is also appropriate to look at controls which affect consequences e.g. staff supply with a mechanism to change impacts or better communications established. Such matters can sometimes lead to the lowering of the consequences.

Table 3.4 LUCRA Site Assessment

Site Feature	Condition/Comments	Potential Conflict
Rural Residential Development/Buffer Distances	The proposed development is • Located on a sugar cane plantation • Within 200m of sugar cane Default Buffer distances: • *50 metres to grazing of stock* • *200 metres to sugar cane, cropping and horticulture* • *40 metres intermittent watercourses*	Moderate
Site Location: Vehicular Access	The subject site has direct access to Reardons and Darke Lanes. It is unlikely that the site will be significantly impacted by vehicle deliveries to the adjoining farms/businesses	Low-Moderate
Aspect	North and Easterly	Low
Exposure	Predominately (28%) from south westerly at 9am and south-easterly(25%) and northerly (18%) breezes at 3pm. (BOM 2014) During calm conditions (1-2%) (BOM 2014)	Moderate

Run-on and Upslope Seepage Site Drainage and Water pollution	Run-on or seepage on adjoining farmland will be minimal given the size of the proposed allotments (0.75 to 1.49 hectares) and the relatively gentle slopes. The relief of the majority of the site varies between 16 and 4 m AHD. Slopes on the site are in the range of 0 to 7%. The site is mostly within the sedimentary landscape (Jurassic Walloon shales and sandstones) while the drainage lines in the north east corner in the lower area reflect Quaternary alluvial soil. Other areas of the existing holding are not being subdivided because of their low lying nature in this black alluvium..	Moderate
Agricultural Chemical Spray Drift	The off-target movement of agricultural chemicals can be a cause for concern to residents in proximity to farming areas. These concerns are largely based on fears of exposure to agricultural chemicals but also due to detection of odours associated with the chemical.	Moderate
Odour	Odour from cropping and horticulture can arise from use of chemical sprays, fertilisers (inorganic and organic), effluent disposal and composting. Such detrimental odours can impact on residential amenity and have the potential to affect public health.	Moderate
Noise	Because background noise levels are low in the locality, excessive noise from vehicles, machinery and mechanical equipment may cause complaints from the prospective residents. Given the intermittent and transient nature of farm noise sources coupled with the ample proposed allotments (0.75 to 1.49 hectares) noise decay through distance attenuation only will be sufficient to reduce noise impacts to a negligible level at the nearest affected residences.	Low
Dust	The main sources of dust from a sugar cane cropping include cultivation prior to planting, harvesting, tractor and transport (cane haulage movements).	Moderate
Smoke and Ash	Smoke and ash related to cane firing is generated under controlled conditions for a limited time each year (the equivalent of 2.20 hours)	Low
Cattle Dip Site	A search of the NSW Department of Primary Industries (DPI) Cattle Dip Site Locator tool (http://www.agric.nsw.gov.au/tools/dipsite-	Low

	locator/) indicated that the closest dipsite is approximately 2km from the subject site. Both the Reardons Lane and the Durrington's Dipsite have been decommissioned (see **Appendix C**). The cattle dip sites exceed the EPA investigation zone from the subject site and offer negligible risk to the proposed development.	

The areas of moderate potential conflict outlined in **Table 3.1** will be addressed through the following **Risk Reduction Controls**:

Table 3.5 Hazard Identification and Risk Control Sheet

Work undertaking Activity	Identified Hazard	Risk Ranking	Method of Control	Controlled Ranking
Use of Agricultural/ Horticultural Sprays	**Health and Safety** Spray drift from an application of agricultural chemicals has the potential to adversely affect the health and safety of persons in non-targeted areas.	**C3 = 13 Unacceptable**	Based on the surrounding land uses we recommend a vegetated buffer to provide an effective safeguard to spray drift. 1. A vegetated buffer based on the following criteria is to be installed on the subject site along the northern and eastern boundary where sugar cane farming abuts the common boundary: • a minimum total width of 40 m; and • contain random plantings of a variety of tree and shrub species of differing growth habits, at spacings of 4–5 m for a minimum width of 20 m. • include species with long, thin and rough foliage which facilitates the more efficient capture of spray droplets; • provide a permeable barrier which allows air to pass through the buffer. A porosity of 0.5 is acceptable (approximately 50% of the screen should be air space); • foliage is from the base to the crown; • include species which are fast growing and hardy; • have a mature tree height 1.5 times the spray release height or target vegetation height, whichever is higher; • have mature height and width dimensions which do not detrimentally impact upon adjacent cropped land;	**C4 = 8 Acceptable**

			• include an area of at least 10 m clear of vegetation or other flammable material to either side of the vegetated area; Note: The Pesticides Act 1999 regulates the use of pesticides in NSW. Management practices must either eliminate spray drift or at least minimise it to a level where it will not cause adverse health impacts.	
Odour	Chemical sprays, fertilisers (inorganic and organic)	**B4 = 12 Unacceptable**	The nominated vegetated buffer designed to capture chemical spray drift will also be effective in reducing conflict resulting from odour	**D4 = 5 Acceptable**
Noise	Vehicles, machinery,	**D3 =9 Acceptable**	The most likely types of noise associated with agricultural activity which may lead to land use conflict in the locality would be intermittent noise from tractors and other machinery. Measures to reduce conflict include: Given the intermittent and transient nature of farm noise sources coupled with the ample proposed allotments (0.75 to 1.49 hectares) noise decay through distance attenuation only will be sufficient to reduce noise impacts to a negligible level at the nearest affected residences. Standard (Category 1) building design will be sufficient to afford acoustic protection to residents	**D4 = 5 Acceptable**
Dust	Cultivation prior to planting, tractor and	**B3 = 17 Unaccep**	The nominated vegetated buffer designed to capture chemical spray drift will also be effective in reducing conflict resulting from dust.	**D4 = 5 Acceptable**

	transport (cane haulage) movements	**table**		
Residential Development /Buffer Distances	The proposed development is approximately • 40m vegetated buffer to northern and eastern boundaries • 5m vegetated buffer to cattle grazing	**B3 = 17 Unacceptable**	The nominated vegetated buffer designed to capture chemical spray drift will also be effective in reducing conflict resulting from activities associated with surrounding land uses.	**D4 = 5 Acceptable**
Run-on and Upslope Seepage Site Drainage and Water pollution	Increase of impermeable surfaces and changes to drainage patterns can accelerate soil erosion, siltation and sedimentation;	**C3 = 13 Unacceptable**	A Soil and Water Management Plan for the construction and operation phases of the development and management of stormwater run-off should be prepared. The SWMP should incorporate buffer areas including: • Incorporate designs to divert and spread stormwater to reduce conflicts from stormwater run-off between the proposed development and adjacent farmland. • A minimum 40m buffer from Onsite wastewater management system to dam and gullies	**D4 = Acceptable**
Cane Firing	Smoke and ash from fires	**C3 = 13 Unacceptable**	Cane firing is carefully managed by experienced cane farmers. Cane is burnt in the early evening. In the summertime (afternoon) south easterly winds predominant. Cane farmers will allow the south easterly breeze to desist prior to striking the fire. The orientation of the subject site and residual cane farm will result in cane ash and smoke (under	**D4 = Acceptable**

			slight south easterly breeze) being pushed to the north-west away from future residences within the proposed development. Cane farmers notify neighbours in advance of firing	

4. Discussion

While a default buffer area of 200m width is recommended between cropping and rural dwellings the actual width of the buffer should in practice be dependent on the most limiting factor involved (i.e. the factor that will require the widest buffer). In theory, this would lead to all other factors being adequately addressed.

The LUCRA identified that the most limiting factor is agricultural spray drift and odour.

The proposed development should be designed to minimise instances of incompatibility such that normal farming practice are not inhibited. Where such instances do arise, measures to ameliorate potential conflicts should be devised wherever possible.

Conflict between rural residential development and agricultural land uses is likely to occur where residential land uses directly abut, or are sufficiently close to, farmland such that they are likely to be affected by agricultural activities. Such conflict can arise from the use of agricultural chemicals noise, dust and odour generating activities. Adverse impacts of residential development on farmland include sediment and stormwater run-off.

When considering potential land use conflict between residential and agricultural activities it is important to recognise that all agricultural activities:

- should incorporate reasonable and practicable measures to protect the environment in accord with the Protection of the Environment Operations Act (POEO) and associated industry specific guidelines; and
- are legally conducted as required by other legislation covering workplace health and safety, and the use and handling of agricultural chemicals.

Nevertheless, certain activities practised by even the most careful and responsible farmer may result in a nuisance to adjacent residential areas through, for example, unavoidable odour drift and noise impacts.

4.1 Vegetated Buffers

The use of vegetated buffers to separate incompatible land uses is gaining increasing interest as a means of reducing the need for physical separation and hence increasing development opportunities. Biological buffers can also contribute to increased biodiversity, shade, visual improvements, soil stability, water quality and amenity. The role of appropriately designed vegetative buffers in intercepting chemical drift and providing visual barriers is well recognised. Such benefits, however, are only derived from established and well-maintained buffers, which may take many years to realise and can prove difficult to enforce.

Biological buffers can also affect the local microclimate (either positively or negatively) through shading, taking up of water and nutrients, and altered airflow patterns. They

can also impede the views and amenity of nearby residents and, if inappropriately managed, can harbour exotic weeds or pests.

Vegetated buffers have other advantages in that they:

- create habitat and corridors for wildlife;
- increase the biological diversity of an area, thus assisting in pest control;
- favourably influence the microclimate;
- are aesthetically pleasing;
- provide opportunities for recreational uses;
- contribute to the reduction of noise and dust impacts.

In order to maximise beneficial effects and effectively reduce conflict, biological buffers need to be well planned and managed. This includes effective provision for ongoing management and maintenance of the values of the vegetated barrier so that it performs its function as a buffer.

It is recommended that a landscape plan be prepared indicating the extent of the buffer, the location and spacing of proposed and existing trees and shrubs and a list of tree and shrub species to be planted. The application should also contain details concerning proposed ownership of the vegetated buffer and the means by which the buffer is to be maintained.

All plantings are to be mulched, fertilised and watered for the first twelve months after planting.

The landscape plan must indicate:

a) proposed location for planted shrubs and trees;
b) botanical name of shrubs and trees to be planted;
c) mature height of trees to be planted;
d) location of trees identified for retention in the development application plans.

As a general rule, buffer areas should be properly designed to avoid special maintenance requirements whilst achieving their maximum desired effect of separating conflicting land uses. However, it will be necessary to ensure ongoing maintenance of buffer areas, including replanting, thinning, management for fire protection, herbicide damage, noxious weeds, feral animals, litter build-up etc. so that the buffer areas continue to be effective in reducing conflict. Vegetated buffers may require ongoing attention to maintain a porosity of 0.5 with suitable lower and upper storey vegetation to ensure their effectiveness in capturing spray drift.

Vegetated buffers may serve as components of wildlife corridors and improve opportunities for conserving wildlife habitat.

To achieve effective management, clear responsibilities for maintenance should be determined before the buffer areas are implemented. Responsibilities for maintenance will be largely determined by ownership.. In general, maintenance of buffer areas in private ownership will be the responsibility of the proprietor, as controlled by development conditions. The recommended mechanism is through planning conditions imposed on a development approval. These conditions attach to the land and are binding on successors in title.

The necessary controls to ensure this maintenance is carried out must be in place at the time the buffer area is created.

4.2 Building Orientation and Design

The most likely types of noise associated with agricultural activity which may lead to land use conflict in the locality would be intermittent noise from tractors and other machinery.

Measures to reduce land use conflict include:

- Given the intermittent and transient nature of farm noise sources coupled with the ample proposed allotments (0.75 to 1.49 hectares) noise decay through distance attenuation only will be sufficient to reduce noise impacts to a negligible level at the nearest affected residences.

- Standard (Category 1) building design will be sufficient to afford acoustic protection to residents.

4.3 Stormwater Management

The preparation of a Soil and Water Management Plan for the construction and operation phases of the development and management of stormwater run-off is required to minimise the potential for erosion and sedimentation, nutrient runoff and pollution of adjacent farm land, water courses and wetlands.

The nominated buffer areas can also be designed to utilise techniques such as water spreading and water diversion to reduce conflicts from stormwater run-off between residential development and adjacent farmland. Ongoing maintenance and enforcement must be identified and incorporated into conditions of approval.

4.4 Onsite Wastewater Management

Patterson (July 2006) advised that based upon the soil assessment as being unsuitable for septic tank and traditional trenches, he recommends that only aerated wastewater treatment systems with subsurface drip irrigation be installed on each of the 43 lots. A variation could be the use of a compost toilet and greywater treatment system. Mounds are not appropriate as the soil has an excellent deep loam for the surface soil, groundwater is at more than 5 m and the soil has an extremely high phosphorus sorption capacity.

It is recommended that greater and secondary treated effluent dispersal systems be installed a minimum 40m from any gully, drain on dam to ensure that all wastewater is sufficiently assimilated onsite.

5 Conclusions and Recommendations

This Land Use Conflict Risk Assessment is based on:

- a review of Preliminary Site Plan;
- discussions with Noel Newman;
- Liaison with Luke Fittock (NDC);
- site inspection; and
- review of surrounding land uses.

This LUCRA has concluded that the subject site is suitable for the proposed development as described in **Appendix A** subject to the recommendations provided below

- A vegetated buffer based on the following criteria is to be installed on the subject site along the northern and eastern boundary:
    - a minimum total width of 40 m; and
    - contain random plantings of a variety of tree and shrub species of differing growth habits, at spacings of 4–5 m for a minimum width of 20m.
    - contain random plantings of a variety of tree and shrub species of differing growth habits, at spacings of 4–5 m for a minimum width of 20 m.
    - include species with long, thin and rough foliage which facilitates the more efficient capture of spray droplets;
    - provide a permeable barrier which allows air to pass through the buffer. A porosity of 0.5 is acceptable (approximately 50% of the screen should be air space);
    - foliage is from the base to the crown;
    - include species which are fast growing and hardy;
    - have a mature tree height 1.5 times the spray release
    - height or target vegetation height, whichever is higher;
    - have mature height and width dimensions which do not detrimentally impact upon adjacent cropped land;

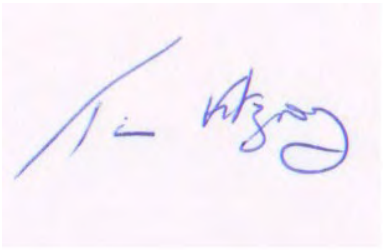
- Given the intermittent and transient nature of farm noise sources coupled with the ample proposed allotments (0.75 to 1.49hectares) noise decay through distance attenuation only will be sufficient to reduce noise impacts to a negligible level at the nearest affected residences.
- Standard (Category 1) building design will be sufficient to afford acoustic protection to residents
- The preparation of a Soil and Water Management Plan for the construction and operation phases of the development and management of stormwater run-off is required to minimise the potential for erosion and sedimentation, nutrient runoff and pollution of the farm dam.
- The nominated buffer areas can also be designed to utilise techniques such as water spreading and water diversion to reduce conflicts from stormwater run-off between residential development and adjacent farmland. Ongoing

maintenance and enforcement must be identified and incorporated into conditions of approval.
- Secondary treated effluent is to be applied a minimum of 40m setback from the dam, any gully or drain.

A number of factors have led to this conclusion including:

- No aerial agricultural spraying is known to occur in the area.
- Very fine or fine droplets pose the highest risk of spray drift; it is the single most important factor controlling drift potential. The higher droplets are released, the greater potential for drift. Given the adjacent land use consists of ground cropping and limited boom spray application and consequently the relatively low height at which spray is released the risk of spray drift is reduced.
- Low intensity cattle (beef) grazing to the south east, offer little potential risk of conflict.
- Noise associated with agricultural activity which may lead to land use conflict in the locality would be intermittent noise from tractors and other machinery.
- Cane firing is managed by experienced cane farmers and limited to an average of 2.20 hours per season.

This report has been prepared by Tim Fitzroy of *Tim Fitzroy & Associates.*



Tim Fitzroy
Environmental Health Scientist

References

Department of Primary Industries et al 2007 Living and Working in Rural Areas-a handbook for managing land use conflicts on the NSW North Coast, NSW

Planning Guidelines Separating Agricultural and Residential Uses, Queensland Department of Natural Resources 1997

Personal Communication, Noel Newman 2013-2014 & 2021

Personal Communication, Luke Fittock 2021

Patterson, Robert, 2006, Onsite Wastewater Assessment for 66 lot Rural Residential Subdivision Lots 831, 832 and 833 DP 847683 Reardons Lane Swan Bay

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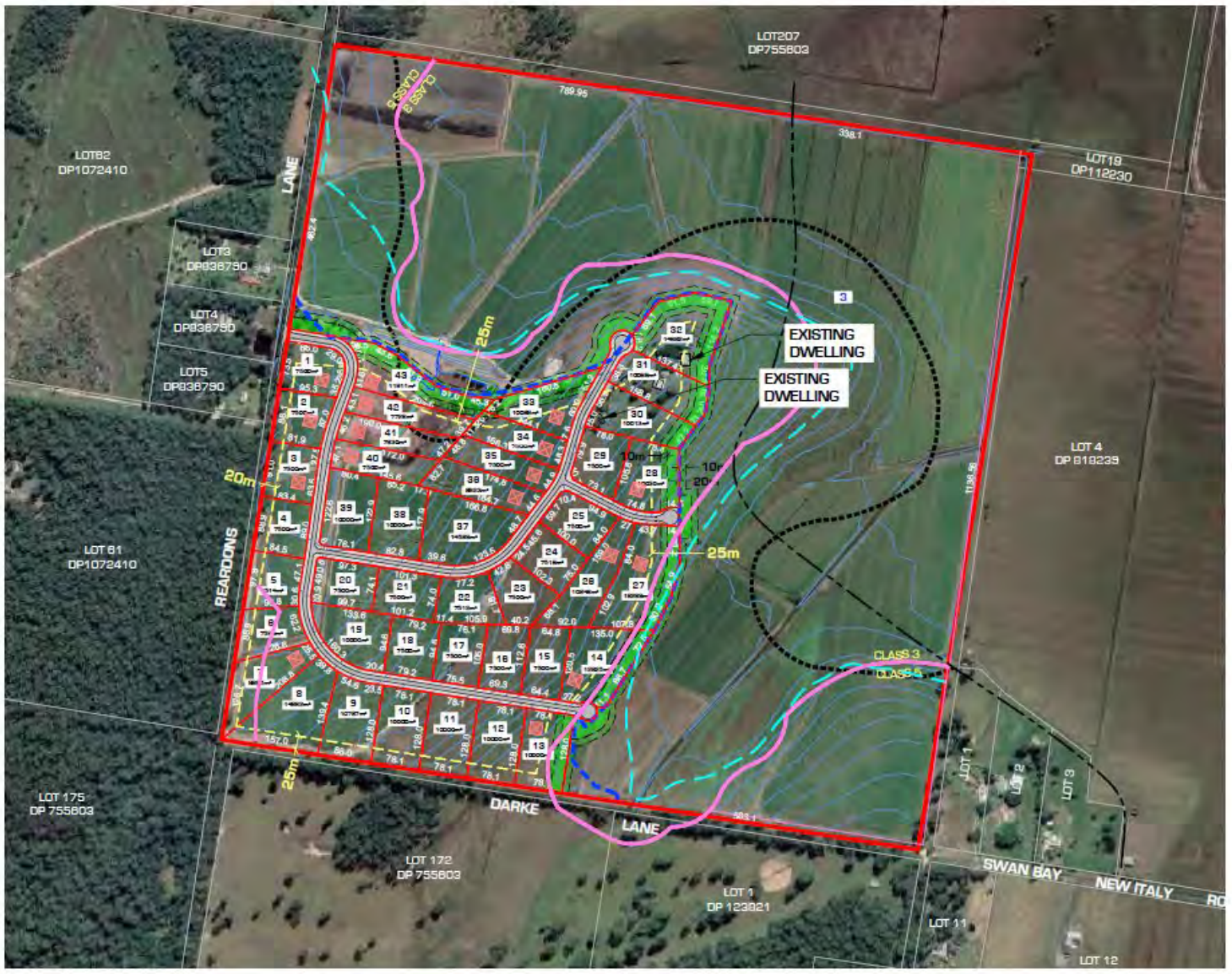
A Conceptual Site Layout Plan



LEGEND

- SITE BOUNDARY
- EXISTING BOUNDARY
- PROPOSED LOT BOUNDARIES
- RURAL RESIDENTIAL STRATEGY LINE
- CONTOURS
- REGIONALLY SIGNIFICANT FARMLAND
  SOURCE:
  Northern Rivers Farmland Protection Project
  Final Map 2005 (Section 117(2) Direction)
- APPROX. RL 5.4m AHD
  (1 IN 100 YEAR FLOOD LINE)
- PRIME AGRICULTURAL LAND - CLASS 3
- 40m VEGETATION BUFFER
  20m PLANTED &
  10m SEPARATION BUFFER EITHER SIDE
- ACID SULPHATE SOIL CLASS LINE
- APZ BUFFER
- INDICATIVE DWELLING ENVELOPE 20m X 20m

NOTE:
This preliminary layout has been completed in accordance with the instructions provided by Noel Newman.
In this respect preliminary desktop data has been used to form this layout. The final layout is subject to the completion of a detailed survey & engineering plans.
Accordingly, the conclusions reached within this report may be modified by the author upon the completion of the final design plans & site inspection. Newton Denny Chapelle accepts no responsibility for any loss or damage suffered, however so arising, to any person or corporation who may use or rely on this report.

REV	DATE	AMENDMENT
F	29.07.21	LOTS 14, 27 & 28 BOUNDARY AND ROAD
G	15.09.21	LOTS 43 AREA CORRECTED
H	01.11.21	VEGETATION BUFFER ADDED
I	04.01.22	ACID SULPHATE SOIL CLASS LINE ADDED
J	07.02.22	RURAL RES. LINE ADDED

SOURCE PLAN: N/A

I:\jobs\2014\14227 - newman\planning\planning plans\ndc plans\ cad files\ 14227 - newman.rev j.dwg - plan 4 - conceptual subdivision plan

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PLAN 4 - CONCEPTUAL SUBDIVISION PLAN

CLIENT: N. NEWMAN REV J
LOCATION: LOT 831, 832, 833 DP 847683
REARDONS LANE
SWAN BAY NSW
DATE: 08.02.2022 REF: 14/227
SCALE: 1 : 7500 @ A3 DRAWN: CD

B Photographs

Photo A Existing Cane Farm

Photo B Secondary Dwelling

Photo C Principal Dwelling

C Cattle Dip Site Locator