

Land Use Conflict Risk Assessment

Planning Proposal Residential Rezoning for land
located at Lot 202 in DP 874273 (northern portion
only) – Woolgoolga



HEALTH SCIENCE ENVIRONMENTAL EDUCATION
ENVIRONMENTAL AUDITOR

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1. Introduction

Tim Fitzroy & Associates (TFA) has been engaged by Resource Design Management to undertake a Land Use Conflict Risk Assessment (LUCRA) to accompany a *Planning Proposal* to Coffs Harbour City Council for land located at Lot 202 DP 874273 (northern portion only) Bark Hut Road Woolgoolga to permit a residential rezoning (see Locality Plan **Illustration 1.1**).

The whole of lot 202 is 25.64 hectares with the northern portion being 16.41ha and the southern portion (not part of the subject Planning Proposal) has an area of 9.229ha. The existing configuration is provided in **Illustration 1.2**.

The key constraint regarding the proposed rezoning is the blueberry farm to the immediate north.

The subject site is zoned as follows under the Coffs Harbour LEP 2013:

- RU2 Rural Landscape.

The *Living and Working in Rural Areas Handbook* (Department of Primary Industries et.al 2007) denotes a number of recommended buffer distances to residential development. The relevant buffer distances to a future residential land release is

- **200 metres to greenhouse and controlled environment horticulture.**

It should be noted Councils Development Control Plan (DCP) 2015 refers to the *Living and Working in Rural Areas Handbook* (DPI 2007).

LUCRA's were initially conceived in the *Living and Working in Rural Areas Handbook* (Department of Primary Industries et.al 2007) by the Centre for Coastal Agricultural Landscapes in partnership with the Northern Rivers Catchment Management Authority as a tool to better manage potential land use conflicts between residential development and rural activities and environmental attributes/assets on the NSW North Coast.

The actual width of any 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 *Planning Proposal* should be designed to minimise instances of incompatibility such that normal farming practice are not inhibited and natural ecosystems and attributes are enhanced where possible. 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 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 accordance 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 activities and residential development as provided in Table 1.1 below:

Table 1.1 Typical Conflicts between Agricultural Activities and adjoining residential areas

Noise	<ul style="list-style-type: none"> • Farming equipment, pumps, spray machines, transport. • Ancillary equipment associated with on-farm processing.
Odour	<ul style="list-style-type: none"> • Fertilisers and chemicals.
Health concerns	<ul style="list-style-type: none"> • Chemicals. • Spray drift.
Water	<ul style="list-style-type: none"> • Access. • Pumping. • Quantity. • Runoff, sedimentation
Smoke and ash	<ul style="list-style-type: none"> • Burning of pasture, stubble or 'rubbish'.

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 blueberry farm to the north.

Illustration 1.1



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1.1 Scope of Works

This assessment has been undertaken to determine the potential land use conflicts between the future owners/occupiers of residential dwellings at Lot 202 in DP 874273 (northern portion only) – Woolgoolga and

- the blueberry farming activities at adjoining property to the:
 - north (Lot 1 DP808207).

This Land Use Conflict Risk Assessment (LUCRA) is to accompany a *Planning Proposal* to Coffs Harbour City Council for land located at Lot 202 DP 874273 (northern portion only) Bark Hut Road Woolgoolga to permit a residential rezoning.

The whole of lot 202 is 25.64 hectares with the northern portion being 16.41ha and the southern portion (not part of the subject Planning Proposal) has an area of 9.229ha. The existing configuration is provided in **Illustration 1.2**.

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

PLAN FORM 2

SIGNATURES, SEALS AND STATEMENTS of intention to dedicate public roads or to create public reserves, drainage reserves, easements, restrictions on the use of land or positive covenants.

Illustration 1.2 Existing Lot Layout

Plan Drawing only to appear in this space

OFFICE USE ONLY

DP 874273

Registered: 21-1-1998

CA: N° 134/97 OF 27-11-1997

Title System: TORRENS

Purpose: SUBDIVISION

Ref. Map: WOOLGOOLGA Sh.A

Last Plan: DP 242839

Last Plan: DP 259757

PLAN OF SUBDIVISION OF LOT 20 IN D.P. 800222

Lengths are in metres. Reduction Ratio 1:4000

LGA COFFS HARBOUR

Locality: WOOLGOOLGA

Parish: WOOLGOOLGA

County: FITZROY

This is Sheet 1 of 1 of my plan in sheets.

GREGORY J. NEWMHAM
NEWMHAM KARL & PARTNERS
of 5, MURDOCK ST. COFFS HARBOUR

A surveyor registered under the Surveyors Act 1929, hereby certify that the survey represented in this plan is accurate, has been made in accordance with the Survey Practice Regulation 1990 and was completed on 10th OCTOBER 1997.

Signature: [Signature]
Surveyor registered under the Surveyors Act 1929

Plans used in preparation of survey/compilation:
D.P. 800222 D.P. 602323
D.P. 519650 D.P. 255635
D.P. 242839 D.P. 261413
D.P. 227586 D.P. 830936
F.3846 1810 F.4186 1810

PANEL FOR USE ONLY for statements of intention to dedicate public roads or to create public reserves, drainage reserves, easements, restrictions on the use of land or positive covenants.

IT IS INTENDED TO DEDICATE LOT 201 TO THE PUBLIC AS PUBLIC RESERVE.

COR.	BEARING	DISTANCE	FROM
A	35° 21' 45"	0.51	R.M. G.I. PIPE FD. D.P. 242839
B	50° 34' 40"	0.61	R.M. G.I. PIPE FD. D.P. 227586
C	230° 34' 40"	1.222	R.M. G.I. PIPE FD. D.P. 227586
D	189° 12' 35"	0.5	R.M. G.I. PIPE FD. D.P. 602323
E	9° 12' 35"	0.5	R.M. G.I. PIPE FD. D.P. 602323
F	9° 12' 35"	1	R.M. G.I. PIPE FD. D.P. 261413
G	189° 12' 35"	4.34	D.H. & WING FD. D.P. 255635
H	53° 49' 55"	1.325	R.M. G.I. PIPE
I	5° 38' 55"	1	R.M. G.I. PIPE FD. D.P. 259757
J	124° 30' 10"	11.71	S.S.M. N° 48785 FD.
K	185° 38' 55"	1	R.M. G.I. PIPE FD. D.P. 259757
L	280° 23' 25"	0.51	R.M. G.I. PIPE
M	63° 56'	0.695	R.M. G.I. PIPE
	268° 20' 20"	10.175	1 OAK

MARK	I.S.G. CO-ORDINATES		ZONE	AOC
	EASTING	NORTHING		
S.S.M. 62126	317 730.118	1667 948.422	5612	2
P.M. 72007	317 847.318	1667 911.238	5612	2
S.S.M. 48785	317 933.603	1669 158.807	5612	2
SOURCE S.O.I.M.S. DATE: 2.4.1993				
COMBINED SCALE FACTOR 0.99994				

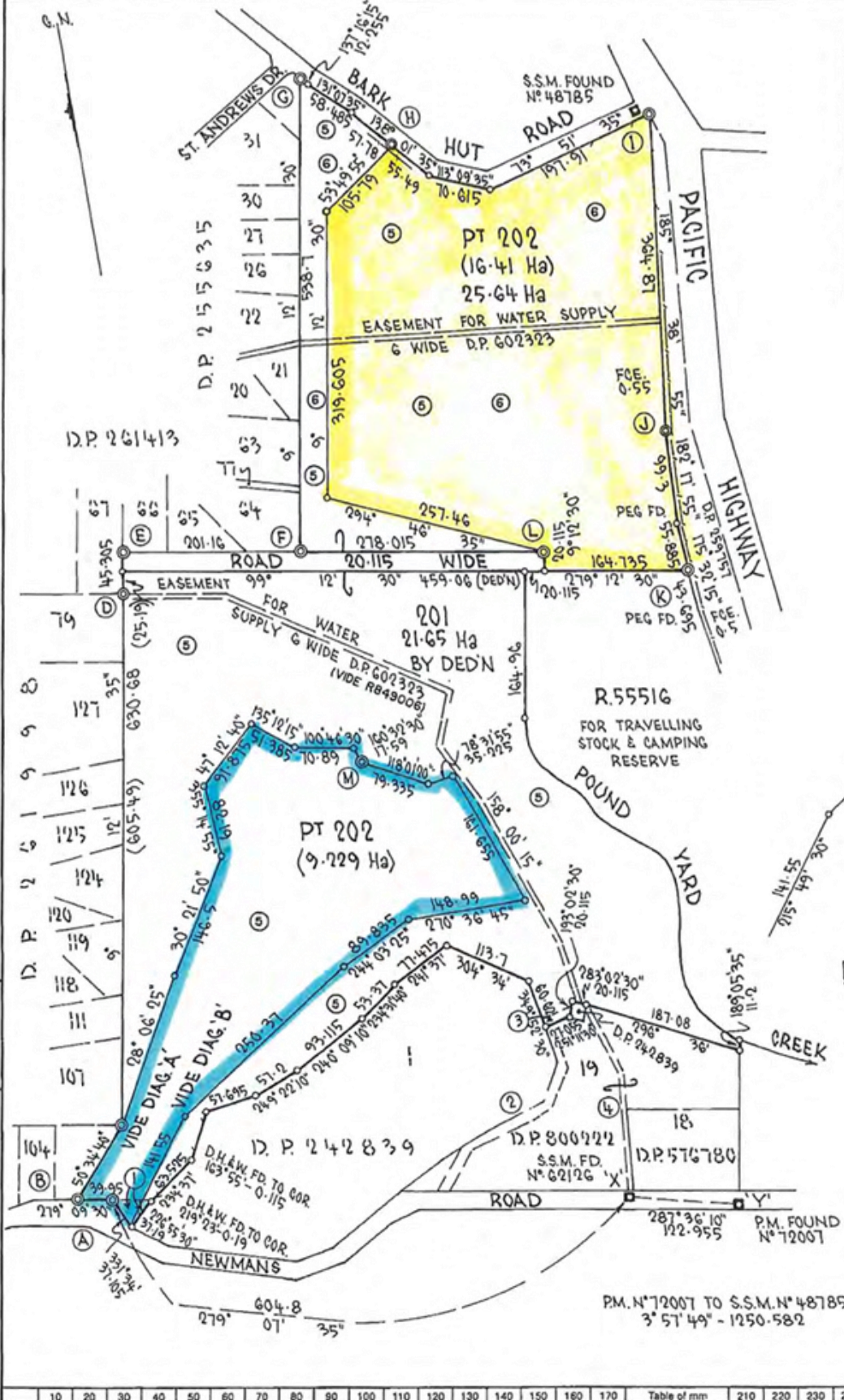


DIAGRAM 'B'

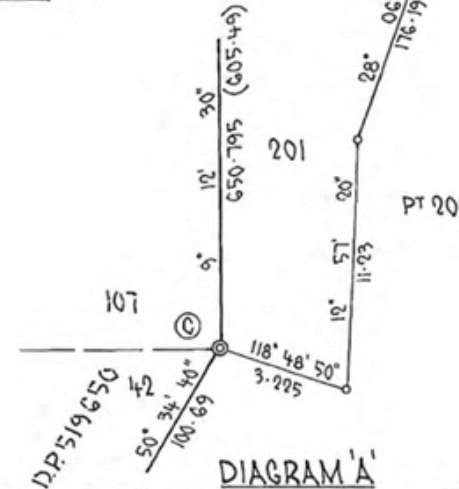


DIAGRAM 'A'

Crown Lands Office Approval

PLAN APPROVED: _____
Authorized Officer

Land District: _____
Paper No.: _____
Field Book: _____ pages

Council's Certificate

I hereby certify that -

(a) the requirements of the Local Government Act, 1919 (other than the requirements for the registration of plans); and

(b) the requirements of the Local Government Act, 1919, or 1 Part 5 Division 2 of the Hunter Water Board Act 1987, or 1 Part 5 Division 2 of the Hunter Water Board (Corporation) Act 1987;

have been complied with by the applicant in relation to the proposed SUBDIVISION

(Insert "new road", "subdivision" or "consolidated lot" set out herein)

Subdivision No. 134/97

Date 27/11/97

(Signature) _____
General Manager/Authorized Person

Council File No. _____

"This part of the certificate to be deleted where the application is only for a consolidated lot or the opening of a new road or where the land to be subdivided is wholly outside the areas of operations of the Water Board and the Hunter Water Corporation Ltd."

1 Delete if Inapplicable

SURVEYOR'S REFERENCE: 1888 2874 NKP.

WARNING: CREASING OR FOLDING WILL LEAD TO REJECTION

DP 874273

2. Gather Information

2.1 Nature of the land use change and development proposed

The subject site is currently vacant. The site includes eucalyptus trees to a height of 25m spaced at between 2 and 5m apart along the northern boundary with Bark Hut Road and along the eastern boundary with Solitary Islands Way. The majority of the site appears to have been previously cleared. Patches of regrowth are present across the site interspersed with exotic grasses and weeds.

The western and southern western boundary is heavily wooded with native vegetation whilst there is an island of native vegetation in the central southern section of the site. The site slopes from the northern boundary in a southerly direction at between 5 and 20% for approximately 150m whereupon the grade dissipates.

At a distance of 45m south of the northern boundary there is no direct line of sight to the blue berry farm.

This Land Use Conflict Risk Assessment (LUCRA) is to accompany a *Planning Proposal* to Coffs City Council for land located at Lot 202 DP 874273 (northern portion only) Bark Hut Road Woolgoolga to permit a residential rezoning.

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

2.2.1 Topography and Soils

The site is located on the southern side of an east west trending ridge surrounded by undulating terrain. The site ranges from approximately RL 30m to RL 10m

The soils within the subject site consist of duplex soil comprising light to medium clay.

Runoff from the site drains in a south easterly direction via two gullies under the Solitary Islands Way to Woolgoolga Lake.

The subject site is zoned as follows under the Coffs Harbour LEP 2013:

- RU2 Rural Landscape, and

The subject site is vacant. Surrounding land uses include a blueberry farm to the north, the Solitary Islands Way to the immediate east, native vegetation and residential development further to the west and east (See **Illustration 2.1**).

2.3 Meteorology

Due to its latitude and proximity to the coast, Woolgoolga has a coastal sub-tropical climate. As a result, daily temperatures are in the warm to very warm range during summer months (18 - 26°C) and are milder during winter months (8 - 19°C).

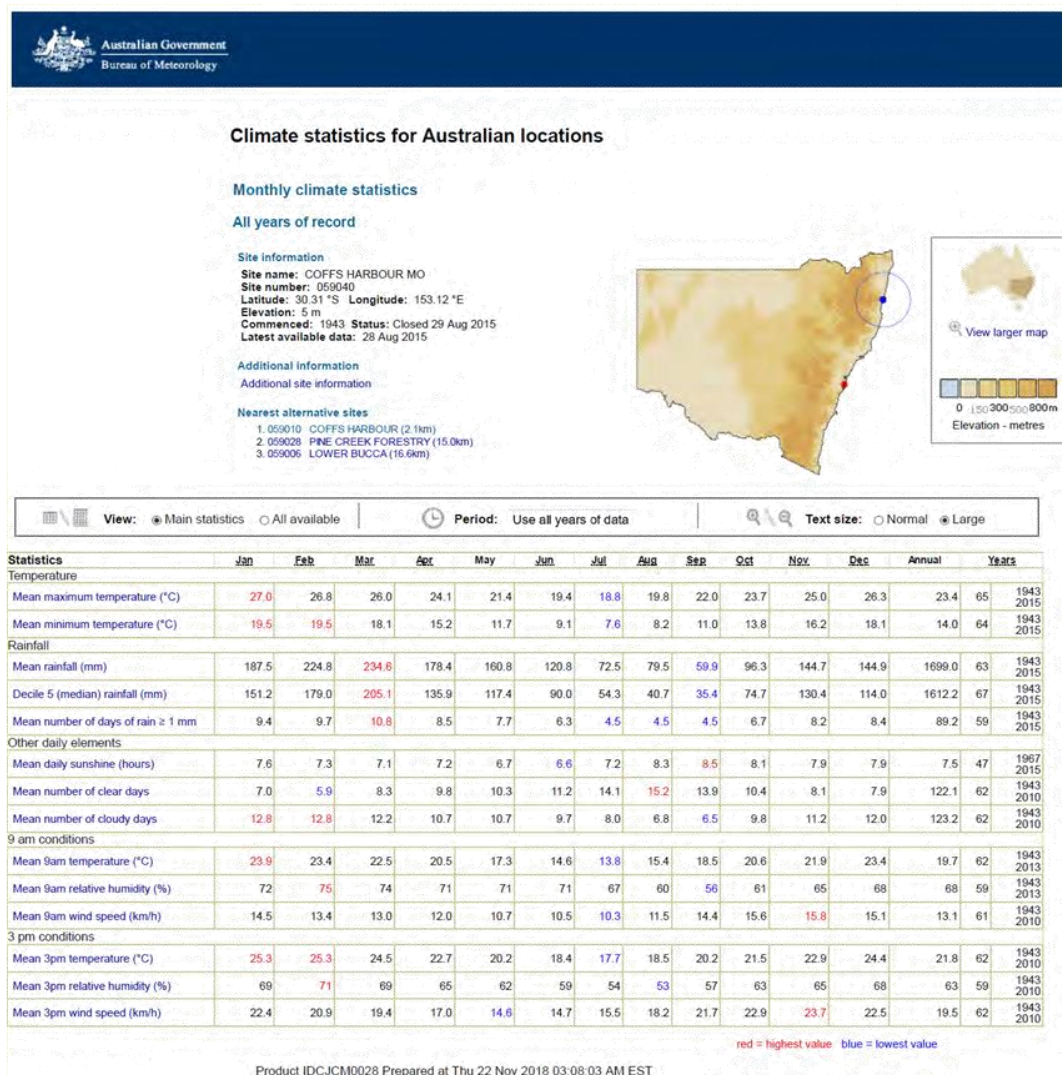
Rainfall is mainly distributed throughout November to May with 1,121 mm (72%) of the mean annual rainfall of 1563 mm falling during this period. The highest monthly rainfall occurs in February/March while the months July-October are much drier, generally receiving less than 100 mm each.

Evaporation levels between September and January often exceed rainfall levels. However, as evaporation rates are low during the winter months, rainfall exceeds evaporation on an annual basis.

The climate and meteorology for the locality has been summarised in **Table 2.1** based on monthly climate statistics for the Coffs Harbour Airport Automatic Weather Station (AWS) with respect to 9am and 3pm statistics.

The Coffs Harbour MO AWS is situated at an elevation of 5 m, approximately 25km south of the site. The site opened in 1943 and closed on 29 August 2015. The records include the period 1943 to 2015 (see **Table 2.1** overleaf).

Table 2.1 Monthly Climate Statistics –Coffs Harbour MO (1943 – 2010)



Wind Regime

The wind regime for the site is based on annual wind roses for Coffs Harbour Meteorological Observations Automatic Weather Station (MO AWS).

Annual wind roses for the times of 9am and 3pm are shown in **Plate 2.1**. The wind roses are based on records from 1943 to 2015. The annual wind roses indicate that light to moderate winds are generally experienced from all directions. The wind roses also indicate the following:

- winds in the mornings are typically light to moderate to heavy winds from the south west, with lighter winds from the south, north and west;

- winds in the afternoon are typically more moderate winds from the north-east, south, south east and east; and
- Calm conditions are experienced 15% of the time at 9am in the morning and only 3% of the time at 3pm in the afternoons.

Based on the Coffs Harbour Weather Station* results over 67 years the wind frequency from the blue berry farm towards future sensitive receptors at the subject site is:

- At 9am less than 22%; and
- At 3pm less than 38%;

if three quadrants are added together (e.g. north east + north-west + north)

*The Coffs Harbour Weather Station results whilst not necessarily reflective as the exact wind patterns at the subject site have nevertheless been used to provide a guide as to the long-term wind regime patterns in the locality.

Rose of Wind direction versus Wind speed in km/h (01 Feb 1943 to 24 Aug 2015)

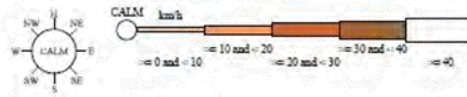
Custom times selected, refer to attached note for details

COFFS HARBOUR MO

Site No: 059040 • Opened Jan 1943 • Closed Aug 2015 • Latitude: -30.3107° • Longitude: 153.1187° • Elevation 5m

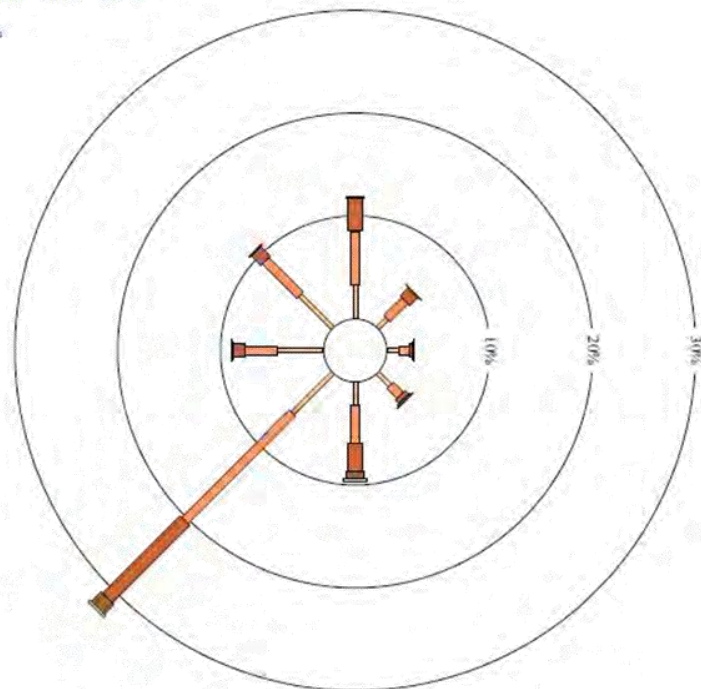
An asterisk (*) indicates that calm is less than 0.5%.

Other important info about this analysis is available in the accompanying notes.



9 am
24228 Total Observations

Calm 15%



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Prepared by the Bureau of Meteorology.
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Land Use Conflict Risk Assessment
Planning Proposal Residential Rezoning
Bark Hut Road Woolgoolga

tim
fitzroy & associates
environmental health · environmental education · environmental auditing

10

Rose of Wind direction versus Wind speed in km/h (01 Feb 1943 to 24 Aug 2015)

Custom times selected, refer to attached note for details

COFFS HARBOUR MO

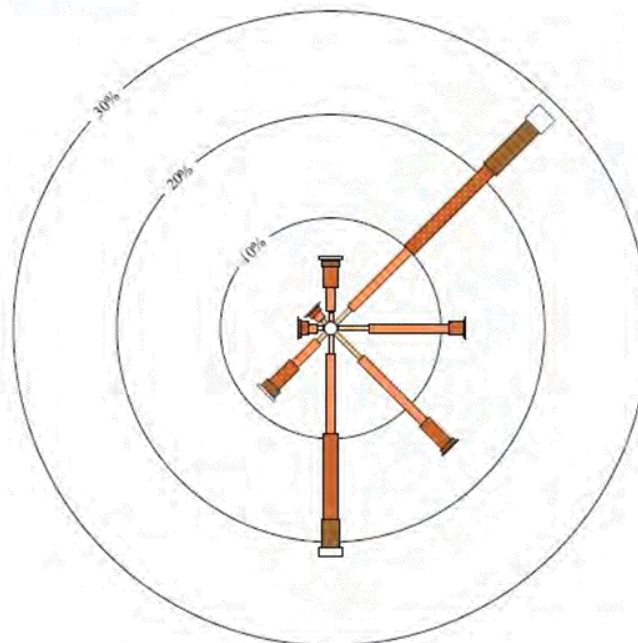
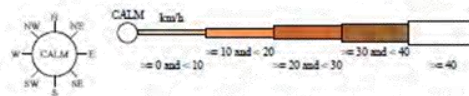
Site No: 059040 • Opened Jan 1943 • Closed Aug 2015 • Latitude: -30.3107° • Longitude: 153.1187° • Elevation 5m

An asterisk (*) indicates that calm is less than 0.5%.

Other important info about this analysis is available in the accompanying notes.

3 pm
24262 Total Observations

Calm 3%



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Plate 2.1 Annual Wind Roses (9am and 3pm) for Coffs Harbour MO

Source: Bureau of Meteorology

Illustration 2.1



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2.4 Site Inspection

A site assessment was undertaken on the 9 November 2018 by Tim Fitzroy. On the day of the site assessment the weather was clear. The subject site is currently vacant. The site includes eucalyptus trees to a height of 25m spaced at between 2 and 5m apart along the northern boundary with Bark Hut Road and along the eastern boundary with Solitary Islands Way. The majority of the site appears to have been previously cleared. Patches of regrowth are present across the site interspersed with exotic grasses and weeds.

The western and southern western boundary is heavily wooded with native vegetation whilst there is an island of native vegetation in the central southern section of the site. The site slopes from the northern boundary in a southerly direction at between 5 and 20% for approximately 150m whereupon the grade dissipates.

There were no observable impacts from the adjoining blue berry operation to the north at No 36 Bark Hut Road. Photographs of the site subject and surrounds were taken (see **Appendix B**).

2.5 Blueberry Farm 36 Bark Hut Road Woolgoolga

The closest point of the Blueberry Farm, (Lot 1 DP808207, No 36 Bark Hut Road) is located approximately 12m north of the subject site. A single row of Lillypillys trees to a height of 2 to 2.5m have been planted as a vegetated screen on the southern boundary of the Blueberry farm adjacent to Bark Hut Road. Blueberries are grown in tunnels under netting, principally positioned on the immediate southern and south western boundary.

Bark Hut Road runs in an east west direction along a natural ridge which forms a boundary between the subject site and the blue berry farm to the north. The subject site slopes in a southerly direction away from the boundary while the blueberry farm site slopes in a northerly direction.

Blueberries are a native fruit of North America. The species comes under the genus *Vaccinium* which includes around 450 evergreen and deciduous shrubs. Three varieties of blueberry species have been identified; Highbush, Lowbush (wild) and Rabbiteye. Highbush varieties can be broken down into either Southern Highbush or Northern Highbush. Lowbush blueberries are not generally found in Australia.

Numerous cultivars have been bred from these varieties such as Misty (Southern Highbush), Denise (Northern Highbush) and Powder Blue (Rabbiteye). These cultivars all have different characteristics, growing requirements and seasonal timing.

Blueberries were first introduced into Australia in the early 1970s. By 1978 it was recognised that the warmer climate Southern Highbush and Rabbiteye varieties (originally grown in the southern states of America) would grow on the NSW North Coast and produce high value, early season fruit. These varieties are harvested from June to February.

Blueberries belong to the Azalea family and require similar growing conditions. The spineless shrubs can be either evergreen or deciduous, vary from 1 to 3 metres in

height and are long lived (up to 30 years for certain varieties).

The development of blueberry bushes is a continuous process that includes using parent plants to provide material to cultivate new plants. To begin this process branches are taken from established bushes and cut into five centimetre stalks called cuttings. The cuttings are struck into trays and placed in fog houses.

Once cuttings have sufficient roots, they are transferred into pots. Potted plants are grown out in full sun and require daily watering and fertilizing once a week. After five months, they are ready to be planted in the field. From planting, it takes approximately 15 months the bush to begin producing fruit.

The fruit has a waxy bloom and is borne in bunches on the end of branches. Blueberries ripen from early summer to autumn depending on the location and variety. The majority of Australian blueberries are hand-picked. Workers select ripe berries, picking a bush up to six times throughout a season. This is because the individual berries on a bush ripen at different stages. A mature bush can yield between 4-7kg depending on the variety.

Blueberry production is capital intensive with high development and labour costs. In northern NSW there are 3,700 plants per hectare in mounded rows 3m apart. Plants are 0.8m apart within the row. Each mature four-year-old or greater plant produces an average of 4kg of fruit per season. Some growers will obtain yields above this figure but many plants produce less depending on the season.

Blueberries will typically require irrigation for a successful commercial crop. Water use can vary widely depending on growing methods, soil types, and weather conditions. Water should be applied in an efficient manner to minimise waste. Irrigation systems and infrastructure should be well maintained.

Chemical use is governed by the Australian Pesticides and Veterinary Medicines Authority (APVMA) and in NSW the Environmental Protection Authority (EPA). Growers must only use approved chemicals with approved methodologies. All users of chemicals must maintain the appropriate records (i.e. Material Safety Data Sheet (MSDS)) and ensure staff have appropriate training and accreditation.

Blueberries cultivation is subject to biosecurity pests (e.g. fruit fly), diseases (e.g. Blueberry Rust) and regional biosecurity risks. Systems need to be adopted to prevent on-farm entry of biosecurity risks through supply of crop and other land use inputs (e.g. nursery stock). Suitable monitoring systems should be established to identify if biosecurity risks are present and (if present) determine the level of severity.

2.6 Potential Land Use Conflicts

The following key items have been identified as potential land use conflicts as a result of the proposed development.

2.6.1 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.

Whilst no contact was made with the owners of the Blueberry Farm at 36 Bark Hut Road it is more likely that not that the farms will use agricultural sprays to help manage insects and fungi. In addition, fertilisers will be applied to assist the growth of trees.

On blue berry plantations insecticides and fungicides are commonly applied using an Air Blast Sprayer while herbicides are normally applied with a boom spray and wand. As per the Protection of the Environment Operation Regulation 2010 spraying is restricted to calm conditions to ensure that spray drift is restricted to the target trees.

No aerial agricultural spraying is known to occur in the area.

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 for setback to residential development have adopted a minimum width of 200 m where open ground conditions apply; and a minimum width of 30 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.

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.

Blueberry plants are usually fertilised via an irrigation system with liquid nutrients in a process known as fertigation. Fertigation is compulsory in northern NSW as weed matting does not allow for broadcast application of fertiliser, and high rainfall creates a significant likelihood of leaching large single fertiliser applications. (Prime Fact 1509, NSW DPI November 2016). Therefore, small, frequent fertiliser applications through the drip system are recommended.

In northern NSW, the lowest rainfall and the greatest evaporation usually occur from August to December. Therefore, peak water demand for blueberries usually occurs in this period. September to October is generally recognised as the driest period and unfortunately this is often the only time effective irrigation is considered. However, floral initiation for the following season's crop occurs in February and March and inadequate irrigation at this critical time will result in wilting and dieback of tender shoots, and will lead to poor fruit set.

Blueberries, as a general rule, require 25–40 mm per week during their growing season. The demand for water is greatest from the time of fruit expansion until harvest.

Weather influences the pests and diseases that will affect berry orchards. By observing the weather, growers can predict the occurrence and severity of pest and disease outbreaks and only spray when a threat exists.

Growers are moving away from the 'sledgehammer' approach of using broad-spectrum pesticides due to environmental and occupational health problems. Over the last 5–10

years, growers have opted for a more IPDM (integrated pest and disease management) approach. Biological control plays an important role in IPDM success. Biological control agents are natural enemies of orchard pests. They include insect predators and parasites, predatory mites, isomates and bacterial pesticides.

Most pests and diseases of blueberries appear during specific growth stages of the crop. This guide lists the most common pests and diseases that growers should be on the lookout for over a typical growing season.

A variety of insecticides, herbicides, fungicides and fertilisers are used each year on commercial Blueberry plantations in Northern NSW. In addition, the average frequency and method of application for chemicals utilised on blueberry plantations is provided.

Table 2.3 lists all chemicals registered for use on Australian blueberries. This does not mean that the subject adjacent blueberry growers are using all of these chemicals or regularly. Chemical application forms only a minor part of an overall management strategy and should be used sparingly.

No information on rates (quantity of product in the spray mix) is provided. This information appears on the product label.

Guide to chemical groups

The letter in brackets which appears after a chemical name (e.g. copper hydroxide (M1)) refers to its mode of action (MOA) chemical group.

Resistance management

A fundamental aspect of any integrated pest disease management (IPDM) strategy is the pesticide or pesticides that are used. The primary consideration is to rotate chemicals so that the pest, disease or weed is not continually exposed to the same MOA group. To do this successfully, growers need to be able to identify chemical groups.

Colour coding of pesticides

Trade names (in brackets) are only included where only one product is registered for that common name (NSW DPI, 2018). Coloured dots before the chemical common name denote that chemical's compatibility with IPM.

① indicates that – when used with care – a chemical will have very little impact on beneficials and is recommended in an IPDM program.

② indicates that this pesticide can be used with caution in an IPDM program, but the beneficials present and the chemical's likely impact should be assessed before application.

③ indicates that this chemical is likely to have a long-lasting, negative off-target effect (including on beneficial arthropods) and it should only be used in an emergency where no alternative exists.

(Source: Berry Plant Protection Guide 2017-2018 DPI 2017)

Pest and disease management

Not all pesticides registered for a particular condition are necessarily mentioned. Each group of chemicals is intended to show those compounds recommended for that situation.

Table 2.3 Blueberries – chemical options for pests and diseases

Reason	Treatment	Fungicide group	WHP days	Remarks
Anthracnose	Captan PER13958 OR			Botrytis control sprays will also control Anthracnose.
	Cyprodinil + Fludioxonil (Switch) PER13630 OR	M4 9,12	1	If rain is forecast and fruit is present apply additional sprays. Captan is preferable close to harvest due to its short WHP.
	Boscalid + Pyroclostrobin (Pristine) PER82986 OR	7,11	7 (Aust. only)	
Aphids	Copper PER14132 Qld only (under direction of permit holder)		3	Do not spray more than two consecutive sprays from the same chemical group. Do not spray mineral oils if leaf temperatures are 26 °C or greater.
	Pirimicarb OR			Do not exceed a maximum number of 7 applications per crop per season with a minimum 21-day interval between application. Apply in the afternoon when bees have finished foraging. Apply at the first sign of rust to leaves, flowers or fruit, beginning in December.
	Horticultural mineral oil OR 1A 1B Dimethoate		2 1 1	
Blueberry rust	Chlorothalonil PER14309 OR			Use preventatively when conditions favour the disease.
	Propiconazole (Tilt)	M5 3	28 3	If sending fruit with ICA31, apply Pristine or Propiconazole or Dithane every 14 days from fruit set to harvest.
	PER14740 OR	M3 7,11	7 3	
	Mancozeb PER13958 OR			Additional sprays might be required to retain leaves where the disease is a problem. Make a maximum of three (3) applications per season, with minimum 21-day retreatment interval.
Botrytis flower blight Grey mould	Boscalid + Pyroclostrobin (Pristine) PER82986 OR	M9	21	
	Dithianon PER82601			Apply at early bloom or before flowers open. Additional sprays might be necessary if conditions favour the disease.
	Chlorothalonil PER14309 OR			
	Pyrimethanil (Scala)	M5 9	28 1	Scala at full strength will burn flowers and needs to be used before the early pink bud stage.
	PER13958 OR			
	Captan PER13958 OR	M4 9,12 B M	1 7 1 1	
	Switch PER13630 OR			
	Iprodione OR			

	Sulphur dioxide pads PER13955				Do not spray more than two consecutive sprays from the same chemical group. Ippon Aquaflo 500 is registered for use in all states. Apply every 10–14 days from flowering in rotation with products from other chemical groups. Sulphur pads are used in packed trays to reduce the incidence of Botrytis.
	Spinetoram OR				
	Methomyl PER14134 (Methomyl is registered on label for blueberries in NSW and WA but a permit is required for QLD) OR	G5 A1	1 5		Not required when used as directed; Comments: Thorough coverage is required as product needs to be ingested to be effective. Has a short residual activity and re-treatment may be required at 2-3 day intervals.
Budworms (Heliothis, Helicoverpa)	Helicoverpa NPV OR	NA 28	3		DO NOT apply more than three (3) applications per crop, with a minimum re-treatment interval of 7 days between sprays
	Chloranthraniliprole PER84178				
Downy mildew	Mancozeb PER13958 OR Chlorothalonil PER14309	3 M5	7 28		Repeat every 14 days.
Elephant weevil borer	Bifenthrin PER14448 OR Indoxacarb PER13289	3A 22A	1 1		Spray one week after pruning early SH varieties if weevil is observed on tops of plants. A follow up spray 7–10 days later for later emerging beetles is required.
	Spinetoram OR				Isomate mating disruption lures are used in the orchard at 500/ha to confuse LBAM males. Delta traps can be used to monitor numbers. The insect is present when young leaves show folding and webbing is observed around terminal clusters.
	Methoxyfenozide (Prodigy)				
	OR				
Light brown apple moth (LBAM)	Indoxacarb PER13289 OR	G5 G18	1 7		
	<i>Bacillus thuringiensis</i> OR	22A 11 28	1 Nil 3		Do not apply Indoxacarb if bees are foraging.
	Chloranthraniliprole PER84178				DO NOT apply more than three (3) applications per crop, with a minimum re-treatment interval of 7 days between sprays

Reason	Treatment	Fungicide group	WHP days	Remarks
Monolepta beetle (red shouldered leaf beetle)	Methomyl PER14134 (Methomyl is registered on label for blueberries in NSW and WA but a permit is required for QLD) OR Pyrethrin PER80070	A 1 3A	5 Not required when used as directed	Apply to plants when swarm is present. Hatching occurs from grassed rows in spring to autumn after rains. Early detection is essential as swarms can strip leaves, fruit and buds and numbers increase quickly. Ensure adequate spray coverage and penetration to obtain effective control of the pest. Minimum re-treatment interval of 1-2 days.
Painted apple moth larvae	Yates Nature's Way Caterpillar Killer <i>Bacillus thuringiensis</i> var. <i>kurstaki</i> is the only control registered in Australia			Apply when chewing damage is first observed. Controls caterpillars on herbs, fruits, vines and ornamentals.
Phytophthora root rot	Phosphonic acid (Agrifos, Phospot) PER13958 OR Metalaxyl (Ridomil) PER13958	33 4	Not required when used as directed 48	Usually caused by poor drainage from the previous season. Plants will show stress signs when fruit flowers and leaves are demanding moisture after a wet year. Metalaxyl should be used when planting and mixed well in the planting hole. Phosphonate can also be used as a root dip when planting. Spray during flowering if thrips detected in flowers.
Plague thrips	Methomyl (Methomyl is registered on label for blueberries in NSW and WA but a permit is PER14134 required for QLD)	A 1	5	Tap 10 flowers on to white paper. If more than four thrips are detected per 10 flowers, treat plants with registered products.
Queensland fruit fly (QFF)	1. Trapping OR 2. Baiting OR Dimethoate PER84247 OR Maldison PER12940 OR Trichlorfon (Trichlorfon is registered on label for blueberries in NSW but a permit PER12486 is required for all other states) OR Spinetoram PER12927 OR Abamectin PER14423	1B 1B 1B 5G 6	1 3 2 1 7	1. Hang male lures in the orchard (16/ha) to detect fly presence. Fruit stings can start in August. 2. Start a baiting program both inside the orchard and on perimeter trees before numbers spike in traps. Repeat weekly using yeast autolysate PER13785 or acetoxypheyl-butanone (cue-lure) with either maldison, fipronil or spinosad as a contact insecticide. Dimethoate is under permit and can be used for QFF control as a cover spray from flowering to harvest. Apply a maximum of three applications /season. Apply a

				<p>maximum of three cover sprays/season.</p> <p>Can be used as a cover spray with a maximum of four applications/season.</p> <p>No more than 12 applications in a season.</p> <p>A grid system of 16 Amulet® PER13785 fly lures/hectare gives good control in conjunction with monitoring traps, baiting and good crop hygiene.</p>
Scarab beetles	<p>Chlorpyrifos PER82002 OR Chloranthraniliprole</p> <p>PER81063 (NSW and TAS only) OR Clothianidin (Sumitomo Samurai) PER81063 (NSW and TAS only) OR Imidacloprid PER12534</p>	<p>1B 28</p> <p>4A 4A</p>	<p>Not required when used as directed 14</p> <p>14</p> <p>Not required when used as directed</p>	<p>Soil-borne insects that chew roots and move into mounds from the grassed inter row.</p> <p>Place pellets in bottom of planting hole and mix in well. Retreat if necessary in autumn and spring.</p>
Slugs and snails	Methiocarb			Snail and slug bait.
Western flower thrip (WFT)	Spinetoram OR	5B	1	WFT activity is more likely close to harvest than at flowering. Do not confuse WFT with other thrips.
White wax scale	<p>Diazinon OR Paraffinic oil OR</p> <p>Petroleum oil OR Spirotetramat</p>	1B 23	14 7	<p>Easy to treat early in the year around January as crawlers are small. Once the scale forms a waxy coating, it is more difficult to control.</p> <p>Do not spray petroleum spray oil (PSO) if leaf temperatures are over 26 °C.</p> <p>Make a maximum of three (3) applications per season, at a minimum 14-day retreatment interval.</p>

WHP = Withholding period

SH = Southern Highbush Blueberries – calendar Northern Highbush (late)

(Source: Berry Plant Protection Guide 2017-2018 DPI 2017)

Table 2.4 Blueberries Southern Highbush (early) – likely timing for monitoring and treatment of pests as indicated by the purple bars

	Flowering			Harvest					Post harvest			
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
African black beetle												
Anthraxnose												
Aphids												
Botrytis flower blight												
Budworms (Helicoverpa previously Heliothis)												
Caterpillars												
Common garden snail												
Corn earworm (Helicoverpa previously Heliothis)												
Downy mildew												
Dried fruit beetles (Carpophilus)												
Elephant weevil												
Grey mould (Botrytis)												
Jassids												
Lesser Queensland fruit fly												
Light brown apple moth (LBAM)												
Loopers												
Mites												
Monolepta beetle												
Phytophthora root rot												
Plague thrips												
Painted apple moth (hairy)												
Queensland fruit fly												
Rust												
Scale (wax) insects												
Scarab beetle												
Septoria leaf spot												
Slugs												
Spider (red) mites												
Spur blight												
Thrips												
Western flower thrip												

(Source: Berry Plant Protection Guide 2017-2018 DPI 2017)

Table 2.5 Pesticides Registered/Permitted for Managing Blueberries

For managing...	Pesticide common name (trade name) ²	Comment ³
African black beetle	⑤ Imidacloprid (Confidor®)	contact and stomach insecticide applied through drippers
Anthrachnose	⑦ Captan	protectant fungicide
	① Cyprodinil + fludioxonil (Switch®)	fungicide with protectant and some curative action
	① Boscalid + Pyraclostrobin (Pristine®)	fungicide with protectant and some curative action
	⑦ Copper oxychloride	protectant fungicide
Aphids	① Pirimicarb	stomach action
	② Horticultural mineral oil	insecticide and miticide
Botrytis flower blight	① Chlorothalonil	protectant fungicide
	① Pyrimethanil (Scala®)	fungicide with protectant and some curative action
	⑦ Captan	protectant fungicide
	① Cyprodinil + fludioxonil (Switch®)	fungicide with protectant and some curative action
	⑦ Iprodione	fungicide with protectant and some curative action
	⑦ Sulfur dioxide	
	① Boscalid + Pyraclostrobin (Pristine®)	fungicide with protectant and some curative action
Budworms (Heliothis, Helicoverpa)	② Spinetoram	insecticide with contact and stomach action
	⑦ Methomyl	systemic insecticide with contact and stomach action
Caterpillars	⑤ Methomyl	systemic insecticide with contact and stomach action
	① <i>Bacillus thuringiensis</i>	biological control-stomach poison
Common garden snail	① Methiocarb snail bait	molluscicide acts as a physical barrier
Corn earworm (Heliothis, Helicoverpa)	② Spinetoram	insecticide with contact action
	⑤ Methomyl	systemic insecticide with contact and stomach action
Downy mildew	① Chlorothalonil	protectant fungicide
	② Mancozeb	protectant fungicide
Dried fruit beetles (Carpophilus)	① Carpophilus lure and trap system	used as lure to attract insects to trap.
	② Mancozeb	protectant fungicide
Elephant weevil	⑤ Indoxacarb (Avatar®)	insecticide with both contact and stomach action on larvae
	② Bifenthrin	contact insecticide
European wasp	① Permethrin (bait only)	contact insecticide for use on dusted baits
Grey mould (Botrytis)	① Chlorothalonil	protectant fungicide
	① Pyrimethanil (Scala®)	fungicide with protectant and some curative action
	⑦ Captan	protectant fungicide
	① Cyprodinil + fludioxonil (Switch®)	fungicide with protectant and some curative action
	① Iprodione	fungicide with protectant and some curative action
	① Sulfur dioxide infura pads	fungicide with vapour action
	① Boscalid + Pyraclostrobin (Pristine®)	fungicide with protectant and some curative action

For managing...	Pesticide common name (trade name) ²	Comment ¹
Lesser Queensland fruit fly	⑤ Dimethoate	contact insecticide with larvicidal and ovicidal activity
	③ Maldison	contact insecticide with stomach and respiratory action
	③ Trichlorfon	insecticide and acaricide with contact and stomach action
	② Spinetoram	insecticide with contact action
	③ Abamectin	acaricide with stomach action and translaminar movement
Light brown apple moth (LBAM)	② Spinetoram	insecticide with contact action
	① Methoxyfenozide (Prodigy®)	insecticide with contact action
	② Indoxacarb (Avatar®)	insecticide with both contact and stomach action on larvae
	③ Azinphos methyl	insecticide with contact and stomach action, moderate persistence
	① <i>Bacillus thuringiensis</i>	biological control-stomach poison
Mites	② Bifenazate Acramite®	acaricide with contact and residual activity
Monolepta beetle	② Methomyl	systemic insecticide with contact and stomach action
	① Pyrethrin Pyganic®	contact insecticide
Phytophthora root rot	① Metalaxyl (Ridomil®)	protectant fungicide with slow release activity
	① Phosphonic acid	protectant fungicide
Plague thrips	③ Methomyl	systemic insecticide with contact and stomach action
Painted apple moth (hairy)	① <i>Bacillus thuringiensis</i>	biological control-stomach poison
Queensland fruit fly	⑤ Dimethoate	contact insecticide with larvicidal and ovicidal activity
	③ Maldison	contact insecticide with stomach and respiratory action
	③ Trichlorfon	insecticide and acaricide with contact and stomach action
	② Spinetoram	insecticide with contact action
	② Abamectin used in conjunction with protein yeast attractant	contact insecticide with stomach and respiratory action
	① Acetox-phenyl-butanone Amulet lures	contact insecticide impregnated into baits
	① Fipronil (Amulet cue lure®)	contact insecticide impregnated into baits and gel powder in yeast mixture
Rust	② Mancozeb	protectant fungicide
	③ Propiconazole (Tilt®)	systemic fungicide with protectant and curative action
	① Boscalid + Pyroclostrobin (Pristine®)	fungicide with protectant and some curative action
	② Chlorothalonil	protectant fungicide
Scale (wax)	③ Diazinon	insecticide with contact, stomach and respiratory action
	① Horticultural mineral oil	insecticide and miticide
Scarab beetles	③ Imidacloprid	systemic insecticide applied by dripper to plant root systems
	② Chlorpyrifos	contact insecticide with stomach and respiratory action
	① Chloranthraniliprole	insecticide interrupts normal muscle contraction
Septoria leaf spot	② Chlorothalonil	protectant fungicide
Slugs	③ Copper as complex Kendon Escar-Go®	protectant molluscicide
Spider (red) mites	③ Bifenazate	acaricide with contact and residual activity
Spur blight	③ Captan	protectant fungicide
Thrips	③ Methomyl	systemic insecticide with contact and stomach action
	③ Bifenthrin	contact insecticide
Western flower thrip (WFT)	② Spinosad	insecticide with contact and stomach action

¹ Source: APVMA Pubcris.

Trade names (in brackets) are only included where only one product is registered for that common name. Coloured dots before the chemical common name denote that chemical's compatibility with IPM.

① indicates that – when used with care – a chemical will have very little impact on beneficials and is recommended in an IPM program.

② indicates that this pesticide can be used with caution in an IPM program, but the beneficials present and the chemicals likely impact should be assessed prior to application.

③ indicates that this chemical is likely to have a long-lasting, negative off-target impact (including an impact on beneficial arthropods) and it should only be used in an emergency where no alternative exists.

Table adapted from *The pesticide manual*, 14th Edition, British Crop Protection Council 2006.

(Source: Berry Plant Protection Guide 2017-2018 DPI 2017)

The greatest risk of drift potential relates to the use of the Air Blast Sprayer. It is important that all protocols are maintained to minimise drift.

2.6.2 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.

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.

2.6.3 Noise

There are four types of noise associated with agricultural activity which may lead to land use conflict. These are the noises associated with intensive livestock facilities, aircraft activities, constant or long-term noise, (e.g. pumps or refrigeration plants), and intermittent noise from tractors and other machinery.

The most likely types of noise associated with agricultural activity which may lead to land use conflict in the locality would be noise from refrigeration and tractor operation.

Cool room motor noise varies on the size of the motor. Noise measurements undertaken by TFA for other Noise Impact Assessments indicates cool room noise levels at 1.15m offset as follows:

Location	Time Period	Description	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}
1	12:15pm to 12:30pm	Western boundary, 1.15m offset from cool room compressor	66.8	90.9	68.2	64.1

The cool room compressor was operating consistently and without fault during measurements.

Tractor noise varies depends on a number of factors (listed below) however noise levels can range from 80 decibels (dB) to 92dB at source. Noise decay over distance can be predicted on the basis of noise attenuation rates of 6 dB(A) for each doubling of distance from the noise source. This attenuation rate assumes open ground conditions. The existence of natural barriers, broken topography or other features would increase attenuation and affect the resultant noise level at the receiver.

Factors affecting noise from agricultural activities include:

- type of engine (diesel or petrol; 2- or 4-stroke);
- number of cylinders;
- cooling system (air or liquid);
- load;
- timing, frequency and duration of operations;
- geographical conditions and barriers e.g. topography and inversions;
- weather conditions e.g. wind speed and direction; and
- typical industry machinery and practices.

Given the nature of adjoining land use it is unlikely that noisy activities will occur at night. Noise from general farming operations (tractor use, spraying etc), vehicle movements, pruning of trees and general farm activities is a normal part of farming.

There was no evidence of noise impacts from blueberry production onsite at Lot 1 DP808207 during our site inspection on 9 November 2018.

A number of routine blueberry farm operations generate noise. These noises are common to blueberry plantations.

The activities are summarised below:

- Mowing (all year round)

Mowing around the farm throughout the year. Mowing machinery generally includes either small tyre mowers or tractor with slasher.

- Spraying of Insecticides/fungicides (can occur several times a year during the flowering, harvest and post-harvest)

An Air Blast sprayer may be utilised to apply insecticides to trees. The initial application each year usually occurs at daytime at pre flowering stage to ensure that non-target species (i.e. bees) are not impacted.

- Spraying of Herbicides (can occur several times a year)

A hand wand (low to ground) or wand is used to apply herbicides.

- Pruning

Trees (depending on their age) are generally pruned on an occasional basis (not regularly).

- Mulching (Once a year (September))

- Cool room

- Blue berries are normally housed in cool room prior to distribution. Noise associated with cool room motors, especially during the evening at night-time can be a source of concern to sensitive receivers depending on the setback distance

- Truck and Vehicle Movements

Harvested berries will be collected for offsite distribution from June to February. TFA do not have details on the number of truck movements from the subject blue berry farm.

Estimated noise emissions from external plant will be compared with:

- Noise Policy for Industry – NSW EPA 2017
Recommends acceptable amenity noise level from industrial sources at a residential receiver are to be below 55 dB (A), 45 dB (A) and 40 dB (A) for the day, evening and night periods at the boundary of any adjacent suburban lot.

***Note:** No onsite noise monitoring has been undertaken

Estimate of Noise Decay from Cool room Condensers by Distance Attenuation only

Sound power levels reduce logarithmically with distance away from the noise source. A 6 dB (A) reduction for every doubling of distance from the source in a free field environment is an accepted method for noise attenuation through distance.

Given that the existing cool room/s are assumed to be located approximately 25 metres from the northern boundary of the subject site the resultant noise levels will be in the order of 40dB(A) at the closest point on the subject site.

The estimated noise levels from the existing cool room condensers are therefore predicted to be in compliance with the recommended noise criteria with no additional mitigation measures in place.

2.6.4 Dust

The main sources of dust from cropping include cultivation prior to planting, tractor 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 onsite 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.

2.6.5 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.

2.6.6 Operating Times

General farm operations are usually during daylight hours. The blueberry harvest period generally runs from the end of July to the end of November however the duration is subject to changeable weather conditions.

2.6.7 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.

2.6.8 Surface Water and Sediment Runoff

The blue berry farm and proposed future residential land release are located in separate catchments. Runoff from the blue berry farm heads in a northerly direction whilst surface water flow from the subject site will eventually drain into Woolgoolga Lake. The subject site drains to the south and south east. The proposed rezoning will not result in any additional surface runoff impacting on the adjoining blueberry farm.

Given the drainage towards Woolgoolga Lake measures to protect and engage with the waterway are important to minimise sedimentation and erosion and the runoff of pollutant.

2.6.9 Traffic and Access

According to discussions with Clyde Treadwell, Resource Design and Management (RDM) (pers.com 21 November 2018) access for the future proposed residential will occur off Solitary Islands Way in conjunction with the proposed recreational sports fields to the south of the subject site. There is not envisaged to be any significant land use conflicts with respect to the traffic and access between the proposed rezoning of the subject site for residential use and the existing blue berry farm operation.

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.

The procedure of environmental/public health & amenity hazard identification and risk control are 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	<ul style="list-style-type: none"> Severe and/or permanent damage to the environment Irreversible with management 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Serious and/or long-term impact to the environment Long-term management implications 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Moderate and/or medium-term impact to the environment Some ongoing management implications 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Minor and/or short-term impact to the environment Can be effectively managed as part of normal operations 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Very minor impact to the environment Can be effectively managed as part of normal operations 	<ul style="list-style-type: none"> No measurable or identifiable impact on the environment

This report utilises an enhanced measure of likelihood of risk approach 1 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 an 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
Residential Development/ Buffer Distances	<p>The closest point of the subject site is approximately</p> <ul style="list-style-type: none"> 12m to the blueberry farm on Lot 1 DP808207 to the north <p>Default Buffer distances to Residential development:</p> <ul style="list-style-type: none"> 200 metres to greenhouse and controlled environment horticulture. 	Major
Site Location: Vehicular Access	According to discussions with Clyde Treadwell (pers.com RDM, 21 November 2018), access for the future proposed residential will occur off Solitary Islands Way in conjunction with the proposed recreational sports fields to the south of the subject site. There is not envisaged to be any significant land use conflicts with respect to the traffic and access between the proposed rezoning of the subject site for residential use and the existing blue berry farm operation	Minor
Aspect	South, facing away from the Blue beery farm to the north	Low

Exposure	<p>At 9am the dominant wind is from the south west (32%), while at 3pm the dominant wind direction is mixed between north east (29%) and southerly (21%) (BOM 2018)</p> <p>The annual wind roses indicate that light to moderate winds are generally experienced from all directions. The wind roses also indicate the following:</p> <ul style="list-style-type: none"> winds in the mornings are typically light to moderate to heavy winds from the south west, with lighter winds from the south, north and west; winds in the afternoon are typically more moderate winds from the north-east, south, south east and east; and Calm conditions are experienced 15% of the time at 9am in the morning and only 3% of the time at 3pm in the afternoons. 	Low - Moderate
Run-on and Upslope Seepage Site Drainage and Water pollution	<p>Run-on or seepage on adjoining farmland will not occur as the catchments as the subject site generally slopes in a southerly direction. The adjoining farmland drains in a northerly direction.</p> <p>The catchments are separated by Bart Hart Road.</p> <p>The soils within the Project Site are generally consist of duplex soil comprising light to medium clay. The site is located on the southern side of an east west trending ridge surrounded by undulating terrain. The site ranges from approximately RL 30m to RL 10m.</p>	Negligible
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.	Major
Odour	Odour from greenhouse 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.	Major
Noise	Given the proposed setbacks, resultant noise decay by distance attenuation and the intermittent use of tractors and delivery vehicles the likelihood of noise impacts from the existing blueberry farm activities are deemed to be low to negligible.	Low to negligible
Dust	<p>The main sources of dust from a blueberry farm include cultivation prior to planting, tractor and transport movements.</p> <p>Wind speed in excess of 30 km/hr from the north have the potential to generate airborne particulate matter (dust) from the adjoining farm to the north of the Project Site</p>	Low to Moderate

The areas of moderate potential conflict outlined in Table 3.4 will be addressed through the following **Risk Reduction Controls** outlined in Table 3.5.

Table 3.5 Hazard Identification and Risk Control Sheet

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	<p>Based on the proximity of the existing Blueberry farm to the north (Lot 1 DP808207) of the subject site (northern portion of Lot 202 DP874273) we recommend a vegetated buffer be installed to provide an effective safeguard to spray drift.</p> <p>A vegetated buffer based on the following criteria is to be installed on the Project Site along the northern boundary:</p> <ul style="list-style-type: none"> ▪ 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 30 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; and ▪ have a mature tree height at least 4m <p>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.</p>	C4 = 8 Acceptable

Odour	Chemical sprays, fertilisers (inorganic and organic), effluent disposal and composting	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	Tractor operations, mowers, cool room condensers	B4 = 12 Unacceptable	<p>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 cool room operation, tractors and other machinery.</p> <p>Given the proposed setbacks, resultant noise decay by distance attenuation and the intermittent use of tractors and delivery vehicles the likelihood of noise impacts from the existing blueberry farm activities are deemed to be low to negligible.</p>	D4 = 5 Acceptable
Dust	Cultivation prior to planting, tractor and transport movements	B3 = 17 Unacceptable	The nominated vegetated buffer designed to capture chemical spray drift will also be effective in reducing conflict resulting from dust.	D4 = 5 Acceptable
Residential Development/ Buffer Distances	<p>The closest point of the subject site is approximately</p> <ul style="list-style-type: none"> 12m to the blueberry farm on Lot 1 DP808207 to the north 	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

4. Discussion

While a default buffer area of 200m width is recommended between *greenhouse and controlled environment horticulture* and residential development 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.

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 accordance with the Protection of the Environment Operations Act (POEO) 2010 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.

4.3 Noise Impacts

There are four types of noise associated with agricultural activity which may lead to land use conflict. These are the noises associated with intensive livestock facilities, aircraft activities, constant or long-term noise, (e.g. pumps or refrigeration plants), and intermittent noise from tractors and other machinery.

The most likely types of noise associated with agricultural activity which may lead to land use conflict in the locality would be noise from refrigeration and tractor operation.

Cool room motor noise varies on the size of the motor. Noise measurements undertaken by TFA for other Noise Impact Assessments indicates cool room noise levels at 1.15m offset as follows:

Location	Time Period	Description	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}
1	12:15pm to 12:30pm	Western boundary, 1.15m offset from cool room compressor	66.8	90.9	68.2	64.1

The cool room compressor was operating consistently and without fault during measurements.

Tractor noise varies depends on a number of factors (listed below) however noise levels can range from 80 decibels (dB) to 92dB at source. Noise decay over distance can be predicted on the basis of noise attenuation rates of 6 dB(A) for each doubling of distance from the noise source. This attenuation rate assumes open ground conditions. The existence of natural barriers, broken topography or other features would increase attenuation and affect the resultant noise level at the receiver.

Factors affecting noise from agricultural activities include:

- type of engine (diesel or petrol; 2- or 4-stroke);
- number of cylinders;
- cooling system (air or liquid);
- load;
- timing, frequency and duration of operations;
- geographical conditions and barriers e.g. topography and inversions;
- weather conditions e.g. wind speed and direction; and
- typical industry machinery and practices.

Given the nature of adjoining land use it is unlikely that noisy activities will occur at night. Noise from general farming operations (tractor use, spraying etc), vehicle movements, pruning of trees and general farm activities is a normal part of farming.

Estimated noise emissions from external plant were compared with:

- Noise Policy for Industry – NSW EPA 2017
Recommends acceptable amenity noise level from industrial sources at a residential receiver are to be below 55 dB (A), 45 dB (A) and 40 dB (A) for the day, evening and night periods at the boundary of any adjacent suburban lot.

Estimate of Noise Decay from Cool room Condensers by Distance Attenuation only

Given that the existing cool room/s are assumed to be located approximately 25 metres from the northern boundary of the subject site the resultant noise levels will be in the order of 40dB(A) at the closest point on the subject site. As noted previously this attenuation rate assumes open ground conditions. The existence of natural barriers, broken topography or other features would increase attenuation and affect the resultant noise level at the receiver.

The estimated noise levels from the existing cool room condensers are therefore predicted to be in compliance with the recommended noise criteria with no additional mitigation measures in place.

4.4 Stormwater Management

The subject site (lot 202 DP 874273) and the adjoining Blueberry farm site (Lot 1 DP808207) are located in separate catchments which are divided along the common Boundary (Bark Hut Road).

Run-on or seepage on adjoining farmland will therefore not occur as the catchments at the subject site generally slopes in a southerly direction. The adjoining blueberry farm drains in a northerly direction.

4.5 Traffic and Access

According to discussions with Clyde Treadwell, RDM, (pers.com 21 November 2018) access for the future proposed residential will occur off Solitary Islands Way in conjunction with the proposed recreational sports fields to the south of the subject site. There is not envisaged to be any significant land use conflicts with respect to the traffic and access between the proposed rezoning of the subject site for residential use and the existing blue berry farm operation.

5 Conclusions and Recommendations

This Land Use Conflict Risk Assessment is based on:

- a review of Aerial Photography;
- discussions with Clyde Treadwell; and
- a review of surrounding landuses.

This LUCRA has concluded that the *Planning Proposal* to Coffs Harbour City Council for land located at Lot 202 DP 874273 (northern portion only) Bark Hut Road Woolgoolga to permit a residential rezoning as part of the Planning Proposal is considered suitable subject to the recommendations provided further below.

Recommendations for Vegetated Buffers

Based on the proximity of the existing blueberry farm to the north of the proposed residential rezoning we recommend a vegetated buffer be installed to provide an effective safeguard to spray drift.

1. A **vegetated buffer** based on the following criteria is to be installed on the Project Site along the northern boundary
 - 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 30 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; and
 - have a mature tree height at least 4m.

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.

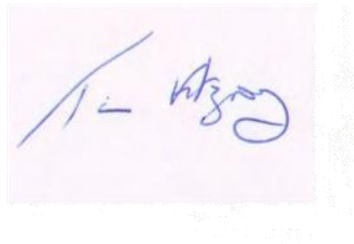
Other Considerations that have Informed this Assessment

A number of factors have led to this conclusion including:

- No aerial agricultural spraying is known to occur in the area.

- Given the proposed setbacks, resultant noise decay by distance attenuation and the intermittent use of tractors and delivery vehicles the likelihood of noise impacts from the existing blueberry farm activities are deemed to be low to negligible.

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



Tim Fitzroy
Environmental Health Scientist
Environmental Auditor

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A Concept Masterplan

Land Use Conflict Risk Assessment
Planning Proposal Residential Rezoning
Bark Hut Road Woolgoolga

tim
fitzroy & associates
environmental health · environmental education · environmental auditing



PROJECT: Bark Hut Road
DATE: 19th Mar 2019
DWG. No. 18065-06
SCALE: 1:2500
0 50 100 150 metres



CONCEPTUAL MASTER PLAN
INDICATIVE ONLY
PT.LOT 201 DP 874273
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ANNEXURE
A

B Photographs



Photo A **Subject Site Looking South**



Photo B **Blue Berry Farm looking East**



Photo C Blueberry Farm Looking North west



Photo D Subject Site Looking East