Agricultural & Property
Management Consultants

Allen & Associates

Allen & Associates
5 Rosedale Place
Alstonville NSW 2477

P: 0416 241 513
E: jallen@agrimac.com.au

ABN 14 625 275 025

LUCRA
(Land Use Conflict Risk Assessment)

Proposed Service Station

Part Lot 7 DP 875447
Tweed Coast Road
Kings Forest, NSW

Prepared by:

John Allen
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1 INTRODUCTION

1.1 Scope of Works

1. Allen & Associates have been requested to provide a Land Use Conflict Risk Assessment (LUCRA) in relation to Part Lot 7 DP 875447 (herein referred to as the Site) situated at Tweed Coast Road, Kings Forest. The assessment relates to a proposed development of the site for a service station.

2. A LUCRA is a system that is used to identify and assess the potential for land use conflict occurring between neighbouring land uses. The assessment is a four step process and involves:

- ***Information Gathering*** *– site description including proposed land use/s, surrounding land uses (historical and current), overview of the agricultural potential of the site and surrounding regions.*
- ***Risk Level Evaluation*** *– proposed land uses and associated risk of conflict are ranked.*
- ***Identify Risk Reduction Management Strategies*** *– according to the ranked conflicts, appropriate risk mitigation strategies are identified.*
- ***Record the results of the LUCRA*** *– a summary of the identified potential conflicts according to their risk ranking and recommended mitigation strategies is provided.*

2 STEP 1 – INFORMATION GATHERING

2.1 Property Description

3. The site is identified as Part Lot 7 DP 875447 being part of the larger Lot 7 DP 875447. It is proposed that the site be developed to a service station. The Part Lot 7 has an approximate area of 1.55 hectares. The site is classified as Vacant land – that is it is unused.

4. Part Lot 7 DP 875447 is situated directly adjacent to the eastern side of the Tweed Coast Road and is directly opposite a low density residential development that runs adjacent to Old Bogangar Road. Cudgen Creek forms the east and south eastern boundaries of the larger Lot 7.

5. The site is according to the SEPP (Major Development) 2005 zoned 2(c) Urban Expansion with incorporated agricultural buffer[1]. A narrow strip of land along the south western boundary of the larger Lot 7 is zoned 7(a) (Environmental Protection{Wetlands & Littoral Rainforests}). Refer to Appendix 2. Lands adjacent to the site are zoned according to the Tweed LEP 2014 as R2 Low Density Residential (directly adjacent to the west), UL Unzoned Land (to the west of the R2 land), RU1 Primary Production (to the north west and on the western side of the Tweed Coast Road) and RU2 Rural Landscape (to the north and north east).

6. The site is situated approximately 1.5 kilometres to the north west of Casuarina, 2.4 kilometres to the south east of Cudgen and 3.5 kilometres to the south west of Kingscliff.

2.2 Surrounding Land Uses

7. Land uses that immediately surround the site are identified as forestry, residential and environmental conservation. The site is situated below the southern limit of the more productive agricultural lands of the Cudgen Plateau. Accordingly land uses further to the north of the site and that which form part of of these plateau lands are typically utilised for more intensive agricultural pursuits such as fruit and vegetable production. At the closest point, these lands are situated at a distance of approximately 100 metres from the northern boundary of the site.

8. Existing farm forestry land (Lot 8 DP 870042) is situated immediately adjacent to the northern boundary of the site and also diagonally opposite the north western corner of the site on the western side of the Tweed Coast Road. A farm access road that is associated with this forestry operation runs

[1] NSW Dept of Planning, SEPP (Major Development) 2005 Kings Forest Land Zoning Map

along and adjacent to the site's northern boundary. The paddock adjacent to this access road has recently been logged (previously Pine trees) and regeneration of Wallum scrub has since commenced in a 10 metre wide strip running parallel to and on the northern side of the access road. Communication with the owner of this land has indicated that the purpose of this 10 metre wide zone of vegetation is to provide a fauna corridor between the Kings Forest land and the coast[2].

9. An area of residential development comprising 10 individual lots is situated adjacent to Old Bogangar Road directly to the west of the site. Refer to Appendix 3 which shows the lands which are situated nearby to the site and what their respective uses are.

10. Appendix 4, Appendix 5, Appendix 6 and Appendix 7 respectively show the site with respect to how its associated land use in addition to the neighbouring lands has evolved over time from 2000 to 1991 to 1979 to 1947. Lands of the nearby Cudgen plateau are shown to evolve from initially Sugar Cane through to more intensive mixed cropping pursuits prior to 1979.

11. Land use of the site since 1947 is seen to not have been anything more intensive than pastures for presumably livestock. The neighbouring forestry lands directly to the north and north west that exist currently are observed to have been developed some time after 1979 but before 1991. Prior to that time it is apparent that, similarly to the lands of the site, that they were not used for any agricultural purpose more intensive than pasture production.

2.3 Agricultural Capability

12. Land within the site is identified as being Class 4 land; that is it is *Land suitable for grazing but not for cultivation. Agriculture is based on native pastures or improved pastures established using minimum tillage techniques*.[3]

13. The principle land class determining factor in this case is the inherent soil type that is present and that which is identified as a Podzol. Podzols are typically coarse sandy textured soils which have extremely low fertility levels and poor water retention[4] characteristics. They are soils that generally only support plants that are suited to grazing purposes[5]. The soils have a single grained structure which means that they are extremely vulnerable to the processes of soil erosion (wind and water) when not stabilised by a suitable ground cover. Any tillage of these soils therefore for agricultural purposes would disturb any groundcover that is present resulting in a high soil erosion hazard. Refer to Appendix 8 Plate 1 which shows a photo of the Podzol soil type that exists throughout the lower lying lands of the site and neighbouring lands to the north east, south and west.

14. The identification of the soil type for the site is in agreement with the Soil Landscapes of the Murwillumbah-Tweed Heads publication[6]. While this is the case the DLWC publication does indicate that the Podzol soils do not extend any further north (in this localised area) than the eastern most boundary of the site. In contrast it is the opinion of the writer that the Podzol soil type does actually continue part way further to the north east of the site into that land that is currently utilised for farm forestry; that is the eastern portion of Lot 8 DP 870042.

15. The purpose behind making the point above is that as a direct consequence of the published DLWC soils mapping of the area that the lands directly to the north east that the writer believes are

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[2] Gilbert & Sutherland (2012). *Agricultural Buffer Zone Assessment Project Application for Kings Forest Stage 1 Kings Forest New South Wales.*

[3] Hulme, T., Grosskopf, T., and Hindle, J. (2002) *Agricultural Land Classification. Agfact AC.25*. NSW Agriculture.

[4] McKenzie, N., Jacquier, D., Isbell, R., and Brown, K. (2004). Australian Soils and Landscapes. An illustrated compendium. CSIRO Publishing.

[5] Charman P.E.V., Murphy B.W. ed (1991) Soils Their Property and Management. A Soil Conservation Handbook for New South Wales, Sydney University Press, Sydney.

[6] Morand, D.T. (1996) *Soil Landscapes of the Murwillumbah-Tweed Heads 1:100000 Sheet*. Department of Conservation and Land Management.

characterised as a continuation of the poorer quality Podzol soil type have in error been mapped as State Significant Farmland. Refer to Appendix 3 that, as well as showing neighbouring land uses, also shows the extent of the mapped State Significant Farmland.

16. It is noted that the writer has not undertaken any detailed soil profile inspections through the area to the north east that is indicated above. Rather the writer is relying on the sequence of air photos attached which show that these lands have never been utilised for anything more intensive than the existing forestry operations. This is in contrast to the lands of the wider Cudgen Plateau that over time are shown to have been gradually developed to more intensive agricultural pursuits. This is presumably because the land associated with this intensification of use was and is capable of those purposes. Additionally the current Tweed LEP 2014 zones these lands directly to the north east as RU2 (Rural Landscape) as opposed to the better quality RU1 (Primary Production) lands of the Cudgen Plateau thus indicating that they are poorer quality agricultural lands.

17. Based on the identified soil type and associated agricultural land classification, the highest and best agricultural use/s of the site and lands immediately to the north and north east is grazing on native or unimproved pastures established using minimum tillage or alternatively forestry operations.

3 STEP 2 – RISK LEVEL EVALUATION

18. There are various guidelines available (Table 1) in regards to the principles and practices of landuse conflict avoidance. These guidelines have been used for the purposes of assisting with the identification, evaluation and ranking of potential conflicts and the subsequent determination of suitable mitigating or conflict avoidance measures all of which is discussed further in the following sections.

Table 1: Referenced Guidelines

- Learmonth, R., Whitehead, R., Boyd, B and Fletcher, S (2007), *Living and Working in Rural Areas*. Centre for Coastal Agricultural Landscapes
- NSW Department of Primary Industries (2011), *Land Use Conflict Risk Assessment Guide*
- NSW Government Industry & Investment (2011), *Better Site Selection for Meat Poultry Developments*
- QDNR (1997), *Separating Agricultural and Residential Landuses*.
- Whitehead, R (2000), *Agricultural Buffers in Land Use Planning*. NSW Dept of Agriculture.

3.1 Identification of Potentially Conflicting Land Uses

19. The identified forestry lands directly adjacent to the north of the site are believed to be the most conflicting in nature with the proposed service station. Existing low density residential lands directly opposite the site to the west conversely are complementary in nature.

20. More intensive agricultural operations and or better quality agricultural lands that are characteristic to the Cudgen plateau to the north and north west are situated at a distance of greater than 100 metres from the northern boundary of the proposed service station and this is considered to be an adequate zone of separation especially given that it is characterised by existing vegetation (trees) that is both commercial (forestry) and ecological (fauna corridor) in nature.

21. Potential sources of conflict from the neighbouring forestry land use include noise from associated forestry operations (e.g. logging), chemical spray drift (pesticide use) and dust generation (traffic along farm access road and logging operations).

22. Refer to Appendix 1 for the layout of the proposed service station. The layout indicates that the primary parking area of the service station is situated at a distance of approximately 40 metres from potential forestry land within the adjacent Lot 8. In the north western corner of the service station

development is a conceptual car and or dog wash facility. The car parking area/s associated with this facility are situated approximately 30 metres from the forestry utilised land to the north and are located on the southern side of a fully enclosed building. Note that these distances of separation given allow for the 3 metre wide access road that runs along the southern boundary of Lot 8 and also the 10 metre wide zone of Wallum scrub regeneration that has been undertaken directly to the north of this access road for the purpose of a fauna corridor between the Kings Forest land and the coast.

3.2 Risk Ranking Matrix, Probability of Occurrence and Measure of Consequence/s

23. Table 2 gives a Risk Ranking for the occurrence of land use conflict between the forestry operation and the proposed service station. The risk ranking has then been determined utilising Table 3: Probability Table and Table 4: Measure of Consequence as per the NSW Department of Primary Industries *Land Use Conflict Risk Assessment Guide* publication. These referenced tables are shown in Appendix 9.

Table 2: Initial Land Use Conflict Risk Evaluation

Activity / Enterprise	**Identified Potential Conflict**	**Risk Ranking**		
		Probability	*Consequence*	*Ranking*
Forestry operations to the North of proposed service station	Dust (logging, general traffic)	B	4	12
	Noise (logging)	B	4	12
	Chemical (spray drift)	D	4	5

24. Table 2 shows that the potential for land use conflict occurring in this situation relates to adverse dust, noise and chemical spray drift as resulting from normal forestry operations impacting on the proposed service station operations.

25. In terms of dust and noise a "Likely" probability of occurrence is given. However because operations associated with forestry and in particular logging are very infrequent events (greater than 10 years for logging for instance) they are given a "Minor" level of consequence due to the short term impact to the community. The use of the access road adjacent to the southern boundary of the forestry enterprise, while potentially resulting in the generation of dust, would again occur very infrequently due to the low intensive nature of operations as undertaken within the forestry paddocks. A calculated risk ranking of 12 is given then for both dust and noise.

26. Similarly chemical spray drift from for instance the application of herbicides is given a lower risk ranking of 5 due to an anticipated "Unlikely" probability and "Negligible" consequence. That is, herbicide applications would be applied by hand (back pack) which in themselves have a minimal chance of spray drift due to the nature of the application technique in comparison to more mechanised methods such as air blast spray technology as utilised in horticultural tree crops.

27. The calculated initial land use conflict risk ranking as per the above has also taken into account the presence of the 10 metre wide vegetative zone or Wallum scrub that the owner of Lot 8 (Forestry enterprise) has planted directly adjacent to and parallel to the farm service road that runs along the southern boundary of this land. This vegetative strip was planted by the owner for the purposes of providing a fauna corridor between the Kings Forest land to the west and the coast to the east. An added and obvious advantage of this fauna corridor is that it will act as a natural vegetative buffer zone between the forestry enterprise and the proposed service station.

4 STEP 3 - RISK MANAGEMENT STRATEGIES

4.1 Buffers

28. The Living and Working in Rural Areas handbook[7] indicates the type (e.g. spatial, vegetative etc.) and design specifications of suitable buffer zones between various agricultural enterprises and potentially incompatible land uses. In regard to forestry operations no specifications or type of recommended buffer is given. What is given is that recommended buffer zones should be based on SSD or Site Specific Determination[8].

4.1.1 Fencing

29. For the purposes of further reducing the possibility of adverse dust, noise and chemical spray drift been experienced at the service station it is intended that the developer will erect a 2.5 metre high colourbond fence along the northern boundary of the site. At its north west limit this fence will extend to grid reference A4 as per the attached site plan (Appendix 1).

4.1.2 Vegetative Buffer

30. As per Section 3.2 a vegetative buffer zone in the form of a 10 metre width area of Wallum scrub has already been planted in between the forestry operations and the farm access road adjacent to the southern boundary of the Lot 8. This will provide a natural barrier for the capture of air borne dust particles and potential spray drift that may potentially move towards the site.

4.1.3 Spatial Buffer

31. As per Section 3.1 the conceptual layout of the service station in addition to the farm access road and 10 metre zone of vegetation within the forestry land provide for a spatial zone of separation of between 30 metres and 40 metres from the forestry land to car parking zones.

4.2 Mitigated Risk Ratings

32. Applying the risk management strategies as per Section 4.1 to the identified potential conflicts gives a revised risk ranking of 8 for dust and noise and 1 for chemical spray drift. Refer to Table 3.

Table 3: Risk Management Strategy

Activity / Enterprise	**Identified Potential Conflict**	**Management Strategy**	**Revised Risk Ranking**		
			Probability	*Consequence*	*Ranking*
Forestry operations to the North of proposed service station	Dust (logging, general traffic)	Colourbond Fence	C	4	8
	Noise (logging)	10 metre zone of Wallum scrub	C	4	8
	Chemical (spray drift)	Spatial buffers as per the design concept of the service station	E	5	1

33. The highest revised risk ranking in this instance is quantified as 8. It is stated that the objective of a risk management strategy is to identify and define controls that lower the risk ranking to a score of 10 or less[9]. Given this it is believed that the risk management strategies as outlined are sufficient for the purposes of conflict avoidance between the forestry operation and the proposed service station.

[7] Learmonth, R., Whitehead, R., Boyd, B and Fletcher, S (2007), *Living and Working in Rural Areas*. Centre for Coastal Agricultural Landscapes

[8] *ibid*

[9] NSW Department of Primary Industries (2011), *opcit*

5 STEP 4 – SUMMARISED RESULTS OF THE LUCRA

34. A LUCRA has been undertaken in relation to a proposed service station to be situated on Part Lot 7 DP 875447 situated on the Tweed Coast Road opposite Old Bogangar Road at Kings Forest NSW.

35. The greatest potential for the occurrence of land use conflict with the proposed service station has been identified as the neighbouring forestry lands directly to the north.

36. As per the nature of forestry operations, any conflict arising and potentially impacting on the proposed service station development is dust, noise and chemical spray drift. An initial ranking system of evaluation has been undertaken (as per published guidelines) and determined that the greatest risk ranking was as a result of both dust and noise generation.

37. Forestry operations have a low level of operational intensity in comparison to more intensive horticultural or agricultural pursuits. Dust and noise generation is more commonly associated with harvesting or logging operations. The forestry paddock that is directly adjacent to the site has only recently been harvested and so future harvesting will not occur for at least ten years or greater.

38. Recommended risk mitigation strategies have been identified as buffer zones in the form of vegetative zones, physical fencing and spatial zones of separation.

- The owner of the forestry operation has already planted a zone of vegetation adjacent to the farm access road that runs along the southern boundary of the site. This 10 metre zone while planted for the purposes of providing a fauna corridor will also add a natural vegetative buffer zone between the two operations.
- It is the intent of the developer to construct a 2.5 metre high colourbond fence along the boundary of the development and the forestry land (Lot 8). This will provide a further barrier to the movement of dust and spray drift from the forestry operation. It will also lessen the noise impact from forestry operations, although it is acknowledged that such operations (logging) are irregular.
- The design concept of the service station provides for adequate spatial zones of separation from sensitive receptor points (e.g. parking) which will add to the degree of risk reduction achieved.

39. The proposed mitigation strategies as discussed are very specific and easy to implement. Furthermore as the proposed strategies have achieved the stated objective of achieving a revised risk ranking of 10 or less it is therefore believed that when implemented that the potential for land use conflict occurring between the land uses will be minimal.

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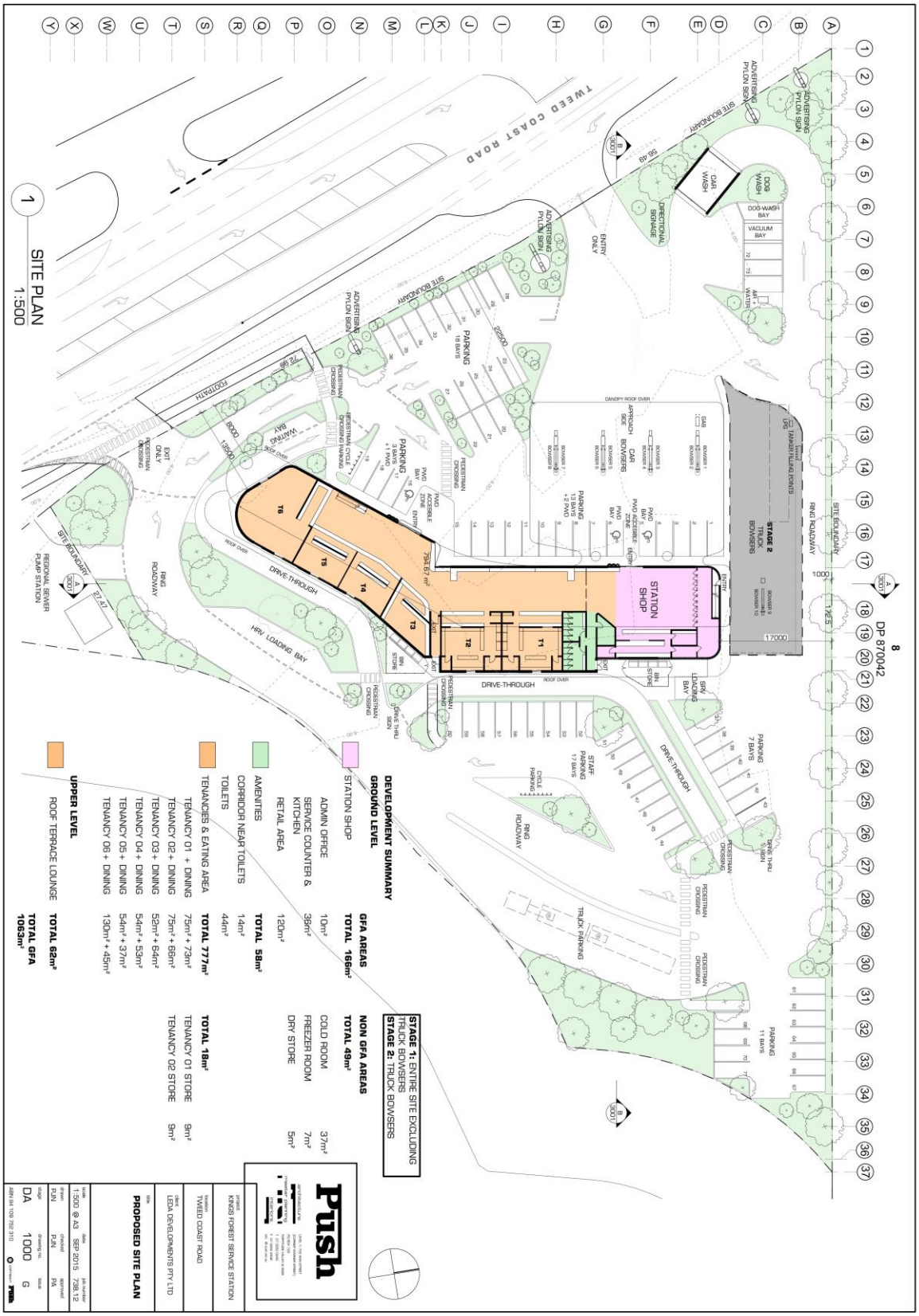
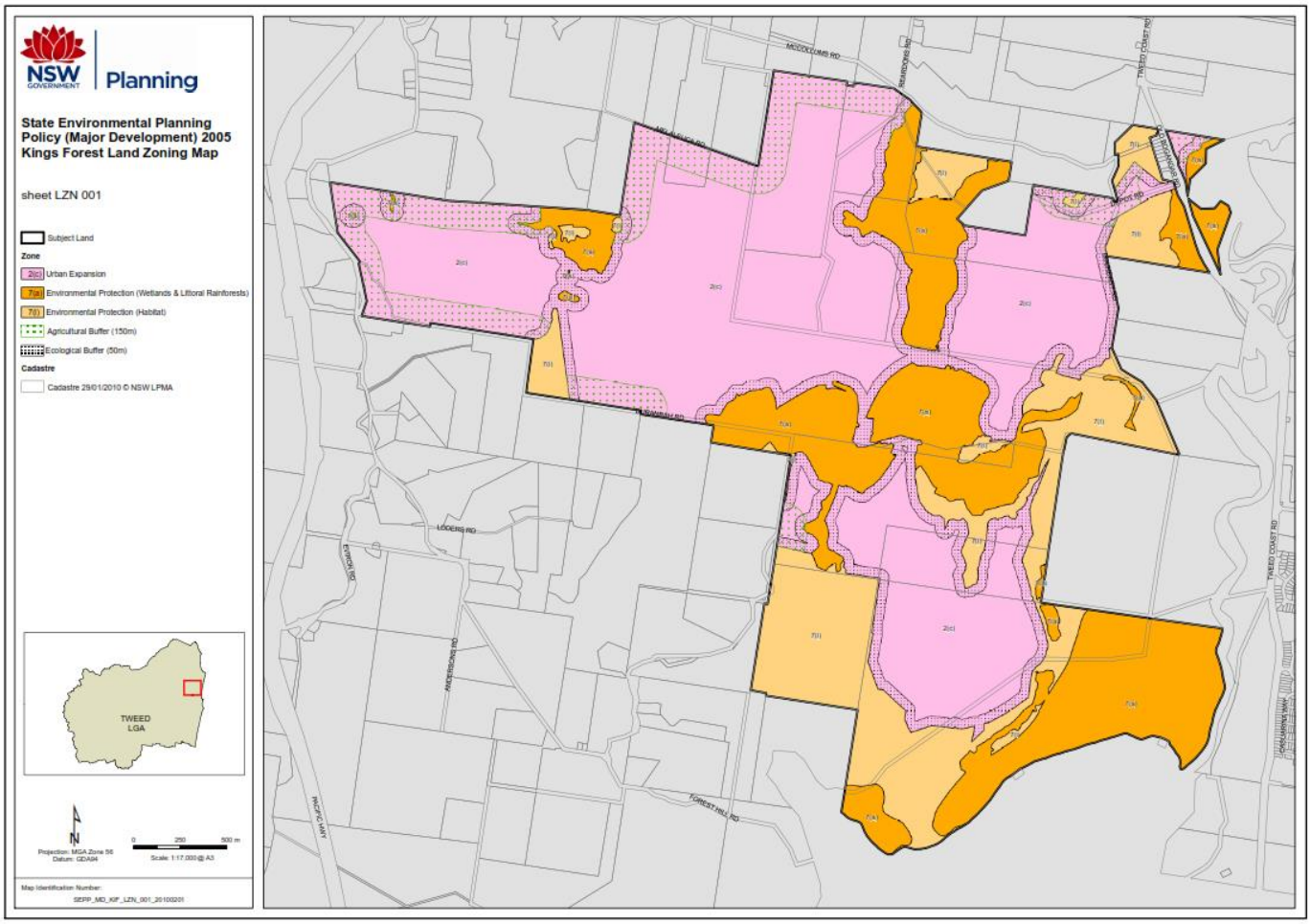
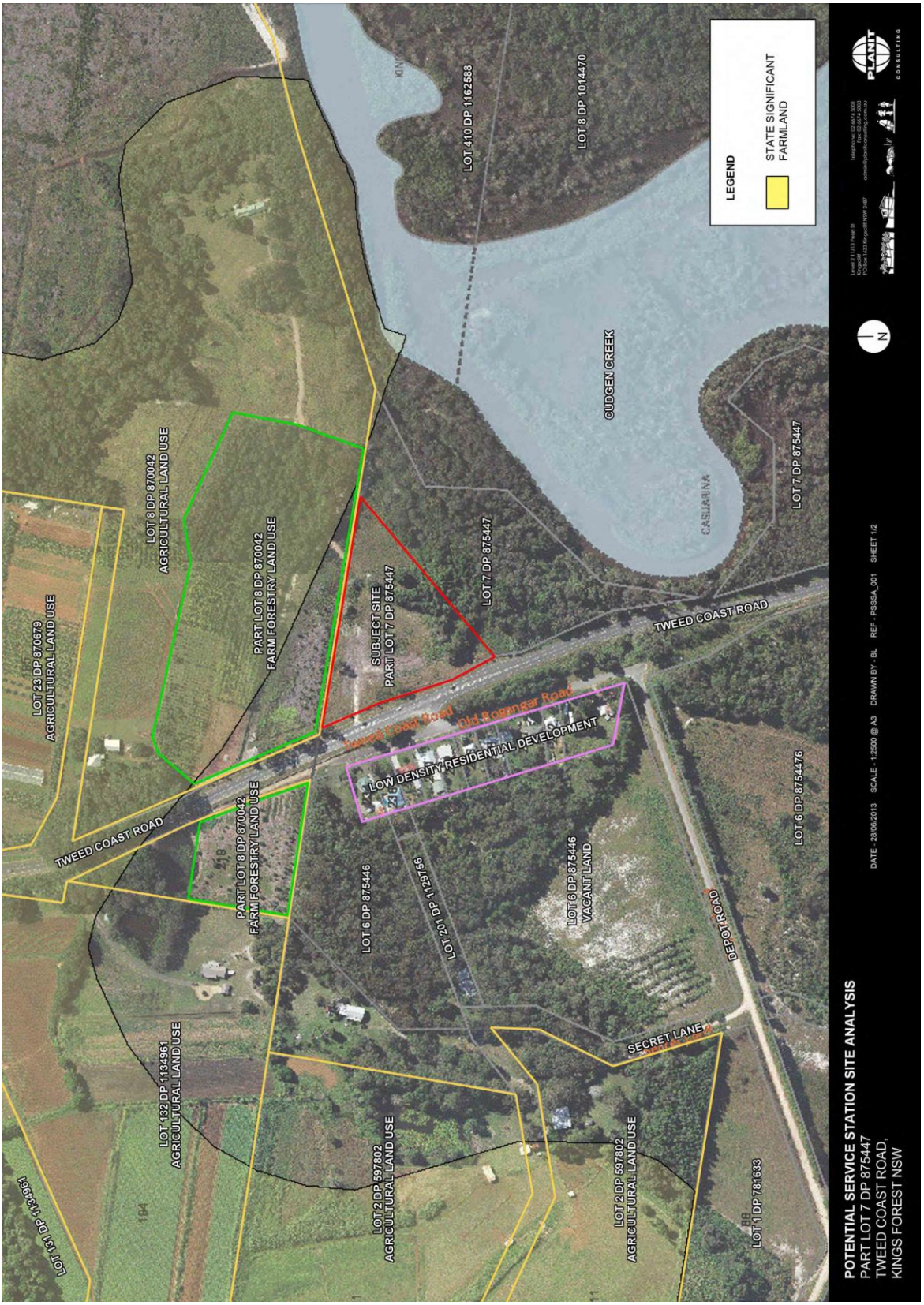
Appendix 1: Proposed Service Station - site plan



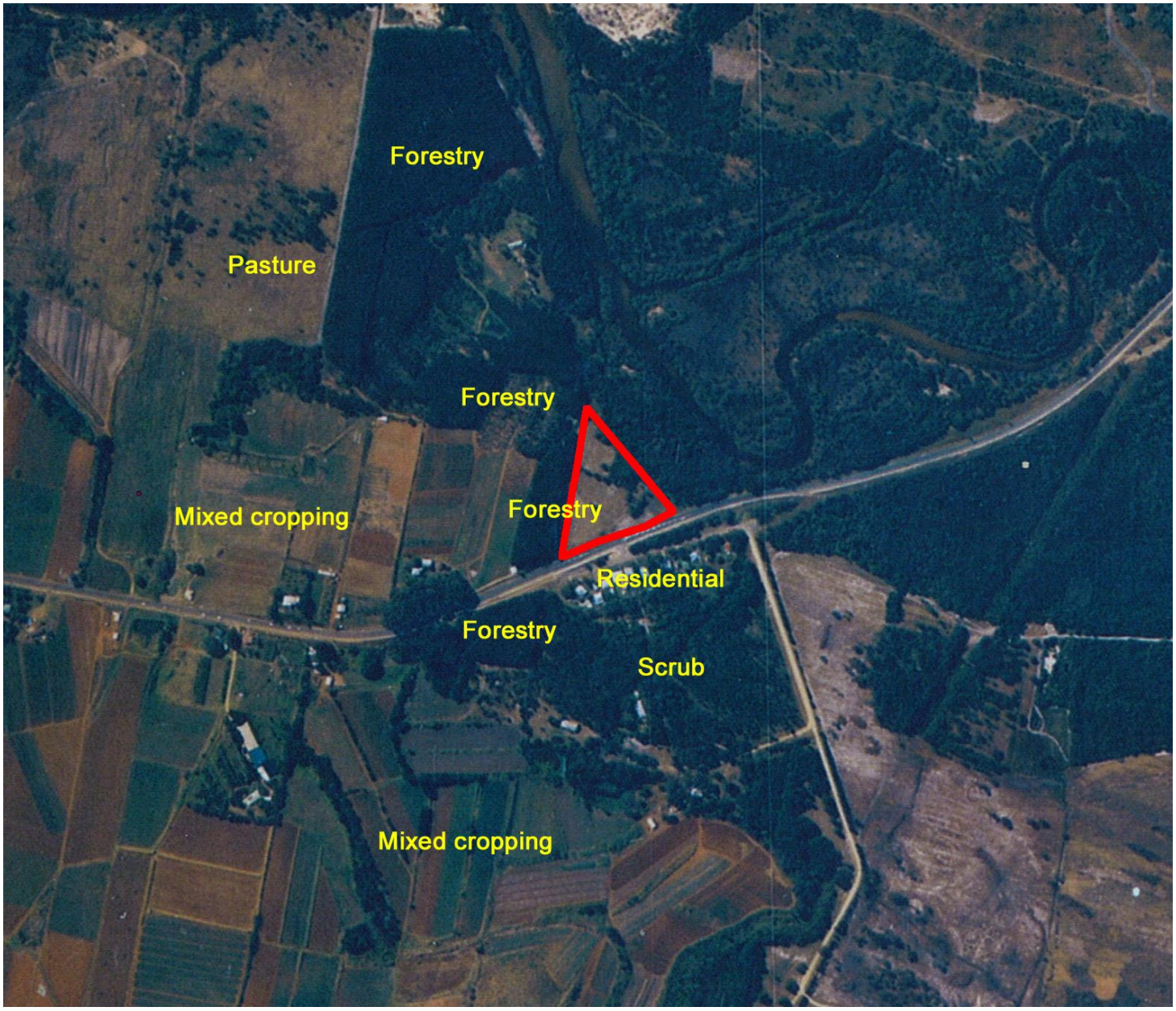
Appendix 2: SEPP (Major Development) 2005 Zoning



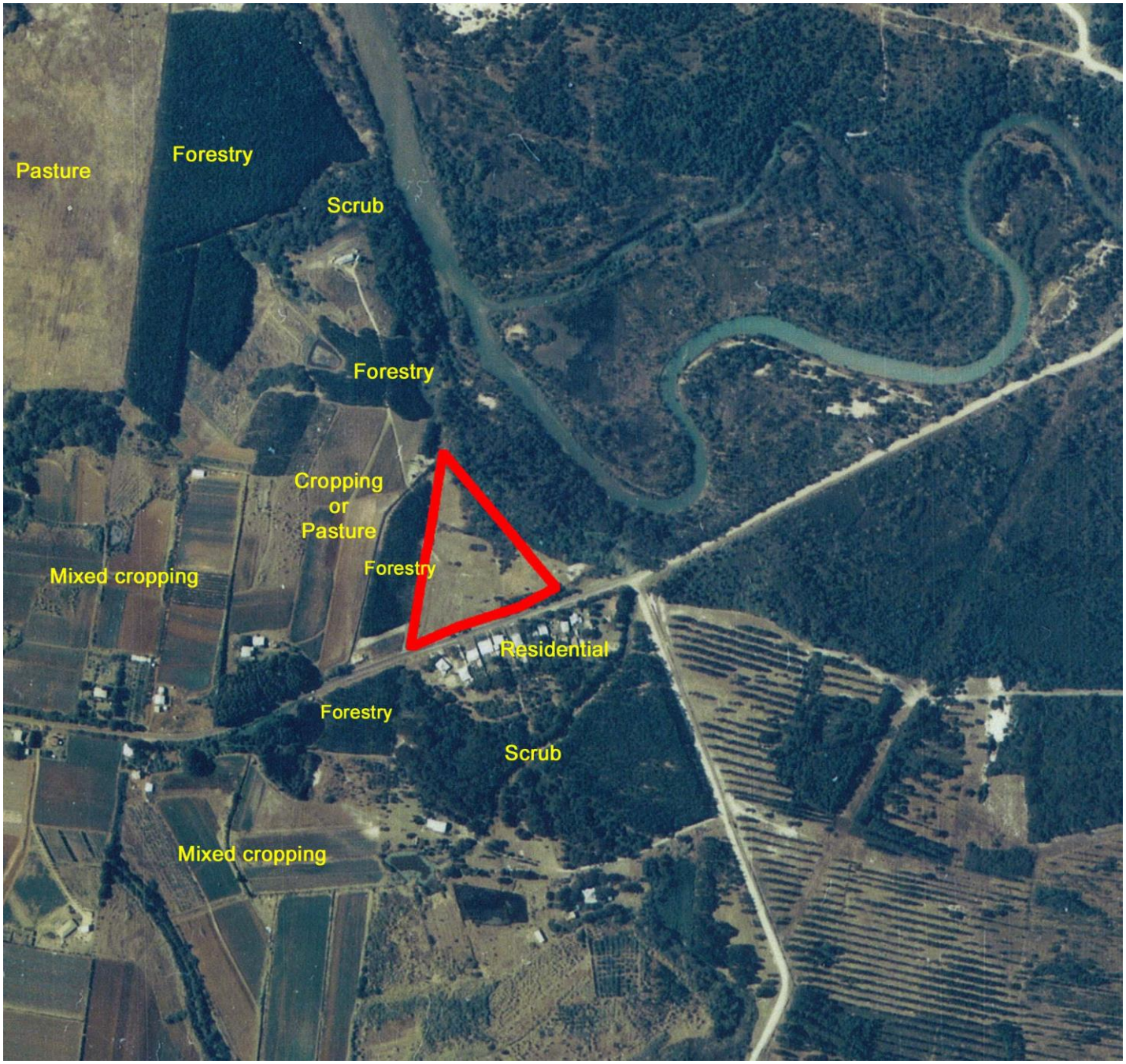
Appendix 3: 2012 - the site and surrounding lands



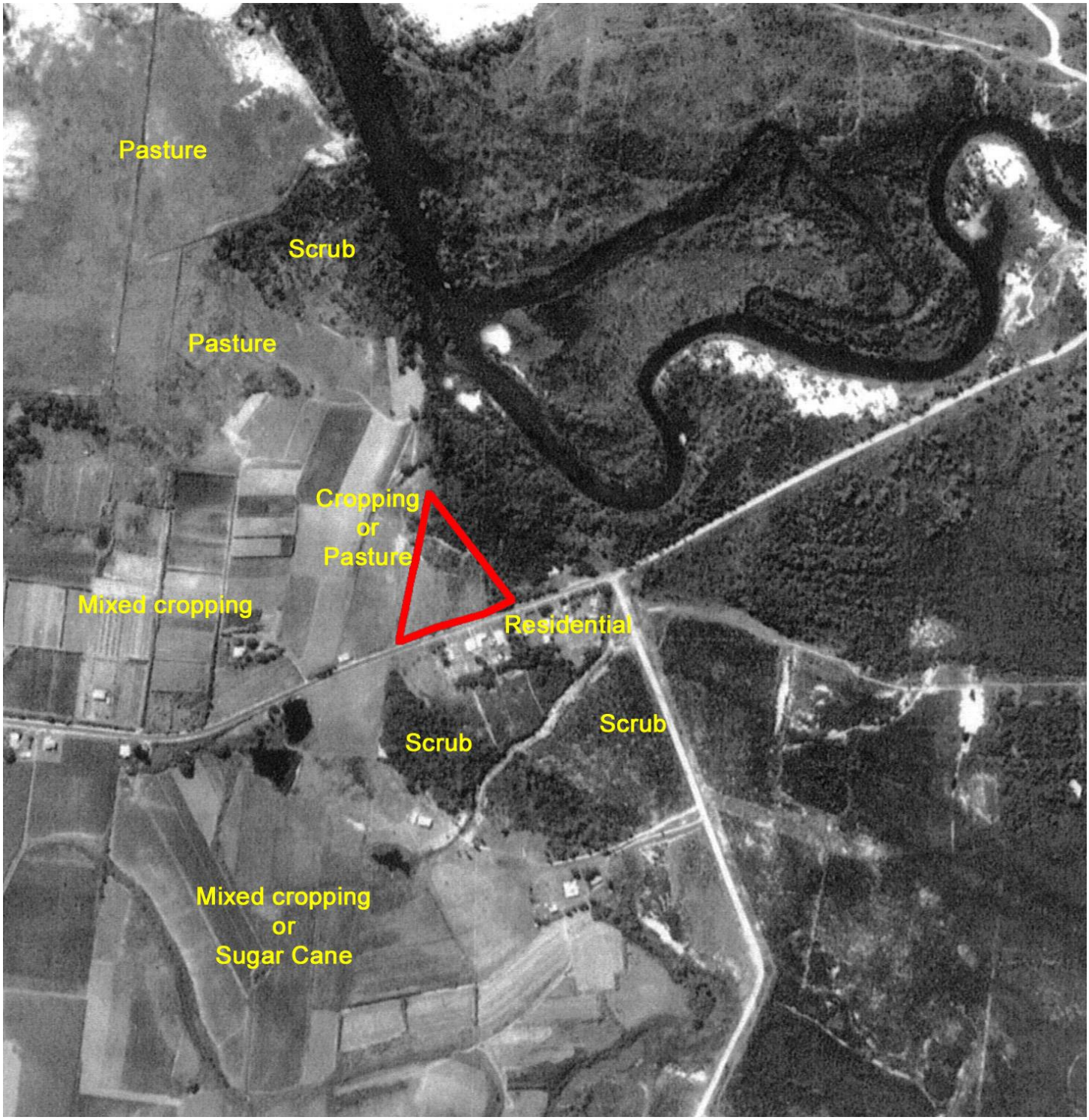
Appendix 4: 2000 - the site and surrounding lands



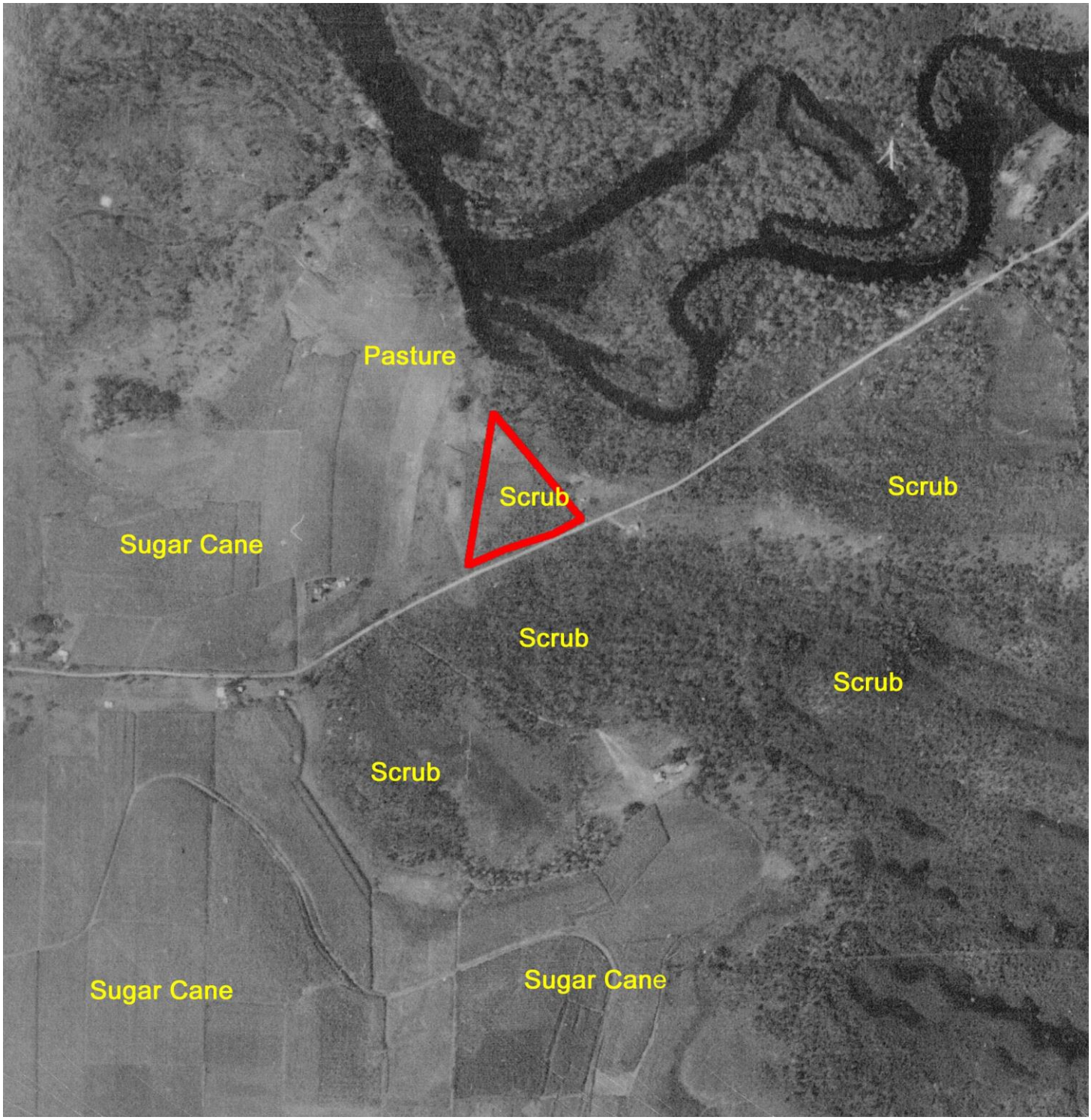
Appendix 5: 1991 - the site and surrounding lands



Appendix 6: 1979 - the site and surrounding lands



Appendix 7: 1947 - the site and surrounding land uses



Appendix 8: Photos - relevant site and surrounding lands attributes

Plate 1: Podzol soil - inherent to site and immediately adjacent lower lying lands to the north and west

Plate 2: Part Lot 8 DP 870042 directly to the north - recently cleared forestry lands in the foreground with older forestry stands in the background

Plate 3: Forestry service road with adjacent 10 metre Wallum scrub corridor

Appendix 9: Table 2, Table 3, Table 4 - LUCRA Guide

Table 2: Risk Ranking Matrix

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

Table 3: Probability Table – to score the likelihood of the consequence occurring

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

Table 4: Measure of Consequence

Level: 1	**Descriptor: Severe**
Description	• Severe and/or permanent damage to the environment • Irreversible • Severe impact on the community • Neighbours are in prolonged dispute and legal action involved
Example/ Implication	• Harm 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
Level: 2	**Descriptor: Major**
Description	• Serious and/or long-term impact to the environment • Long-term management implications • Serious impact on the community • Neighbours are in serious dispute
Example/ Implication	• Water, soil or air impacted, possibly in the long term • Harm to animals, fish or birds or plants • Public complaints. Neighbour disputes occur. Impacts pass quickly • Contravenes the conditions of Council's licences, permits and the POEO Act • Likely prosecution
Level:3	**Descriptor: Moderate**
Description	• Moderate and/or medium-term impact to the environment and community • Some ongoing management implications • Neighbour disputes occur
Example/ Implication	• Water, soil or air known to be affected, probably in the short term • No serious harm to animals, fish, birds or plants • Public largely unaware and few complaints to Council • May contravene the conditions of Council's Licences and the POEO Act • Unlikely to result in prosecution
Level: 4	**Descriptor: Minor**
Description	• Minor and/or short-term impact to the environment and community • Can be effectively managed as part of normal operations • Infrequent disputes between neighbours
Example/ Implication	• 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: 5	**Descriptor: Negligible**
Description	• Very minor impact to the environment and community • Can be effectively managed as part of normal operations • Neighbour disputes unlikely
Example/ Implication	• No measurable or identifiable impact on the environment • No measurable impact on the community or impact is generally acceptable