Appendix L

AHIMS Search Results

Department of
Environment and Conservation (NSW)

Your reference : Skinners Shoot Road
Our reference : AHIMS #18657

RECEIVED
Montgomery Watson
Date: 3/5 Our Ref: R26547
Project Ref:

Dist	I/A*	Action Complete
PF.		

* I - Information
A - Action

MWH Australia Pty Ltd
PO Box 2148
Milton QLD 4064

Friday, 27 April 2007

Attention: Paul Flint

Dear Sir or Madam:

Re: AHIMS Search for the following area at Skinners Shoot Road;Byron Bay

I am writing in response to your recent inquiry in respect to Aboriginal objects and Aboriginal places registered with the NSW Department of Environment and Conservation (DEC) at the above location.

A search of the DEC Aboriginal Heritage Information Management System (AHIMS) has shown that *5* Aboriginal objects and Aboriginal places are recorded in or near the above location. Please refer to the attached report for details.

The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not to be made available to the public.

The following qualifications apply to an AHIMS search:

- AHIMS only includes information on Aboriginal objects and Aboriginal places that have been provided to DEC;
- Large areas of New South Wales have not been the subject of systematic survey or recording of Aboriginal history. These areas may contain Aboriginal objects and other heritage values which are not recorded on AHIMS;
- Recordings are provided from a variety of sources and may be variable in their accuracy. When an AHIMS search identifies Aboriginal objects in or near the area it is recommended that the exact location of the Aboriginal object be determined by re-location on the ground; and
- The criteria used to search AHIMS are derived from the information provided by the client and DEC assumes that this information is accurate.

All Aboriginal places and Aboriginal objects are protected under the *National Parks and Wildlife Act 1974* (NPW Act) and it is an offence to destroy, damage or deface them without the prior consent of the DEC Director-General. An Aboriginal object is considered to be known if:

- It is registered on AHIMS;

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www.environment.nsw.gov.au

- It is known to the Aboriginal community; or
- It is located during an investigation of the area conducted for a development application.

If you considering undertaking a development activity in the area subject to the AHIMS search, DEC would recommend that an Aboriginal Heritage Assessment be undertaken. You should consult with the relevant consent authority to determine the necessary assessment to accompany your development application.

Yours Sincerely

Freeburn, Sharlene
Administrator
Information Systems Section
Cultural Heritage Division
Phone: (02) 9585 6471
Fax: (02) 9585 6094

Department of
Environment
& Conservation

List of Sites (List - Short)

Skinners Shoot Road.

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 557080, Easting to = 559270, Northing From = 6827881, Northing to = 6831234, Requestor like 6417%, Service ID = 18657, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Archive Box Number
04-5-0058	Byron Bay;Skinners Shoot Road;	AGD	56	557400	6829500	AFT	Open Camp Site	**Gonda**		NRS/17798/1/10
		Status Valid								
		Primary Contact						Permit(s)		
04-5-0059	Byron Bay;Skinners Shoot Road;	AGD	56	557400	6829600	AFT	Open Camp Site	**Gonda**		NRS/17798/1/10
		Status Valid								
		Primary Contact						Permit(s)		
04-5-0060	Byron Bay;Skinners shoot Road;	AGD	56	557750	6829350	AFT	Open Camp Site	**Gonda**		NRS/17798/1/10
		Status Valid								
		Primary Contact						Permit(s)		
04-5-0103	Byron Urban Areas 4;Byron Bay;	AGD	56	557700	6829280	AFT, ETM, SHL	Midden	**Collins**		NRS/17798/1/10
		Status Valid								
		Primary Contact						Permit(s)		
04-5-0104	Byron Urban Areas 3;Byron Bay;	AGD	56	557800	6831048	AFT, ETM, SHL	Midden	**Collins**		NRS/17798/1/10
		Status Valid								
		Primary Contact						Permit(s)		

Appendix M

Suffolk Park – Revised Final RSS Report, April 2008

This report has been prepared solely for the benefit of Country Energy. No liability is accepted by this company or any employee or sub-consultant of this company with respect to its use by any other person.

This disclaimer shall apply notwithstanding that the report may be made available to other persons for an application for permission or approval or to fulfil a legal requirement.

Quality Assurance Statement	
Country Energy	**Prepared by:** Paul Flint
Suffolk Park Substation and Line Route Selection – Revised Final RSS Report	**Reviewed by:** Stuart Macnish/Ian Brooks
Project Manager: Mark Hunting	**Approved for issue by:** Stuart Macnish

Revision Schedule					
Rev. No	Date	Description	Prepared by	Reviewed by	Approved by
0	17/08/06	Draft	Paul Flint	Macnish/Brooks	Stuart Macnish
1	10/06/07	Final	Paul Flint	Macnish/Brooks	Stuart Macnish
2	28/04/08	Revised Final	Paul Flint	Macnish/Brooks	Stuart Macnish

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Country Energy

Suffolk Park Substation and Line Route Selection - Final RSS Report

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Preamble

This revised final route and site selection report has been compiled following identification of an additional potential substation site outside of the original investigation area. Site 12 was identified as potentially suitable by Country Energy because of its proximity to the Suffolk Park residential area. It is preferable with electricity distribution for the substation to be located close to where the electricity is required. Permission to investigate the potential sites was granted by the respective landholders subsequent to the final report being issued. This allowed a number of the constraints identified in the initial desktop investigations to be ground-truthed. A new State Environmental Planning Policy (SEPP) for Infrastructure was introduced in January 2008 which also has major implications for the approvals approach.

This revised final report includes comparison of Site 12 with the original eleven sites. The discussion and recommendations in this report update the earlier report and include the outcomes of further investigations and workshops undertaken subsequently.

1. Executive Summary

To provide for future loads in the Byron Bay/Suffolk Park and surrounding local area, Country Energy (CE) will be constructing a new 132/11 kV zone substation. The area identified by CE for the substation is in the Skinners Shoot area, near Suffolk Park. The area of investigation is predominantly Rural 1A land, with remnant vegetation to the west, north and east.

MWH Australia was contracted to identify suitable substation sites and line route corridors (if required) within the Skinners Shoot area. Twelve potential sites were identified and ranked based on environmental, planning and constructability constraints. These rankings were further refined following access to the sites which allowed closer inspection of some of the constraints. Consequently nine of the sites had their rankings adjusted down based on ground-truthing of the desktop information. The three highest-ranking sites remaining were:

Site 7: Site 7 is located approximately 50 m from the CE 66 kV line in the east of the investigation area. It is also under an 11 kV line. Access to the site would be via Yagers Lane with a track through the former Yagers piggery site running behind the buildings. This site is hidden from Bangalow Road by a vegetated gully to the south.

Site 9: Site 9 is located half way down Yagers Lane on the west side. It is close to the road for access and close to the existing CE infrastructure. A major constraint is its high visibility in the middle of the valley.

Site 12: Site 12 is located to the south east of the original investigation area below the water reservoir at the intersection of Bangalow and Old Bangalow Road. Access to the site would be via Old Bangalow Road. The site would require some benching to level it. The site is approximately 50 m from an 11 kV line and around 1 km east of the 66 kV line.

A workshop involving CE stakeholders and MWH considered the short-listed sites and recommended Site 12 and Site 7 be investigated further. Geotechnical investigations and soil resistivity testing on both sites were undertaken to assess their suitability for construction of a substation at a higher level of confidence.

These investigations did not identify any significant constraints to constructability that would aid in preferred site selection. It is recommended that a second workshop be convened with the internal Country Energy stakeholders to make a final decision on the site selection.

2. Introduction and Brief

To provide for future loads in the Byron Bay/Suffolk Park and surrounding local area, Country Energy (CE) will be required to construct and commission a new 132/11 kV zone substation. The new substation will initially be supplied at 66 kV, but will ultimately be a 132 kV zone substation.

The new zone substation must cater for three 132 kV feeder, two 132/11 kV transformers, ten 11 kV distribution feeders, and an 11 kV capacitor bank as the ultimate development. The project involves the selection and procurement of a substation site of 130 m by 100 m (including a 15 m vegetation buffer zone and a council setback of 20 m from the road) and routes for 132 kV single circuit transmission power lines between the existing 66 kV circuit and the proposed new substation if necessary. The area of investigation supplied by CE is shown in Figure 2-1.

The following aspects have been considered for the site selection:

- Proximity to existing CE distribution infrastructure;
- Accessibility for heavy vehicles/equipment;
- Suitability for civil construction and access above 1 in 100 year AEP flood level;
- Adequate perimeter buffer space to allow residential development up to the boundary of the property;
- Minimise visual and acoustic impact;
- Minimise potential risk of substation causing environmental contamination;
- Minimise the exposure of the substation to airborne contaminants; and
- Availability of water and sewer, and where sewer unavailable, methods of effluent disposal

This report identifies twelve substation site options and line route corridors (where required). The sites were compared using a risk assessment matrix. The methodology behind this report includes the following:

- Numerous site visits to familiarise team with the investigation area;
- Desktop analysis of the investigation area through aerial photos, topography maps, Byron Shire Council mapping, GIS data mapping and local environmental studies;
- Identification of relevant planning constraints to ascertain any required approvals for the project;
- Creation of a constraints matrix to evaluate site options to help identify a preferred option hierarchy;
- Close liaison with potentially affected landholders;
- Road survey and engineering reports to determine accessibility for delivery of a transformer on a low-loader truck;
- Costing reports for building pad preparation and access road upgrades;
- Geotechnical investigations to determine ground conditions for building suitability; and

- Soil resistivity testing to determine earthing characteristics; and
- Workshops including all internal stakeholders.

Figure 2-1: Area of Investigation

2.1 Level of Certainty

This Revised Final Route and Substation Selection (RSS) Options report has been compiled based on:

- information supplied by CE in the tender documents;
- stereoscopic analysis of aerial photographs;
- information from Byron Shire Council officers and website;
- environmental planning and assessment legislation (Local, State and Federal);
- information from the CE transport department;
- engineering reports for Skinners Shoot Road and Yagers Lane;
- geotechnical and soil resistivity investigations on two sites; and
- preliminary site inspections.

The level of certainty relating to environmental planning and legislation issues is high. Following more thorough site inspections the level of certainty regarding specific onsite conditions (visibility, slope, required excavation and access) is also considered to be high.

3. Assessment of Alternative Substation and Line Routes

3.1 Site Options

Eleven site options were identified from desktop analysis. A twelfth option (Site 12) outside the original investigation area was identified later. All options are shown in Figure 3-1. Each site was selected based on its suitability for a substation and ability to interconnect with the CE network. A brief description of the constraints associated with each site is given below:

Site 1

Site 1 is located on the northern side of the Hayters Hill ridgeline, between Bangalow Road and the Casino Murwillumbah Railway easement. It is located approximately 200 m to the west of the existing 66 kV line. There is limited but adequate space for the required substation footprint. Some cut into the hill may be required. The site is zoned under the Byron Local Environmental Plan (LEP), 1988 as 7D (Scenic/Escarpment zone) which identifies various development constraints to protect and enhance the scenic quality and visual amenity of the Shire. The LEP also identifies further constraints for building adjacent to arterial roads (Bangalow Road is classified as an arterial road) and building on ridgetops (this may be relevant depending whether the substation is visible above the ridgeline). The site is located approximately 200 m east of a residence called 'Eastlands'. Existing vegetation around Eastlands provides a visual buffer from the site. Following more in depth investigation and advice from the Country Energy transport section this site was deemed to be inaccessible for the required low loader (transformer carrier). No access is possible from Bangalow Road due to the steepness down to the site and likewise for access from the former Yagers Piggery site at the southern end of Yagers Lane. This site did not warrant further examination due to the access issues.

Site 2

This site is also located between Bangalow Road and the railway easement but directly under, or immediately adjacent to, the existing 66 kV line. This option has the same constraints of footprint size and zoning (scenic, ridgetop and arterial roads) under the Byron LEP as Site 1. Site 2 may be within the buffer zone of a dip site located on the corner the Bangalow Road and Coopers Shoot Road. The site is on a level area, nevertheless access from both Bangalow Road or Yagers Lane was determined not feasible, following further investigation. This site did not warrant further examination due to the access issues.

Site 3

Site 3 is located on a small ridge below the railway easement in the south east of the investigation area. It is approximately 100 m to the east of the 66 kV line. Difficult access to the site is the main constraint. The most likely access route would be following the existing CE 66 kV line route to the east of the former piggery. The site would require some excavation to gain a level substation site.

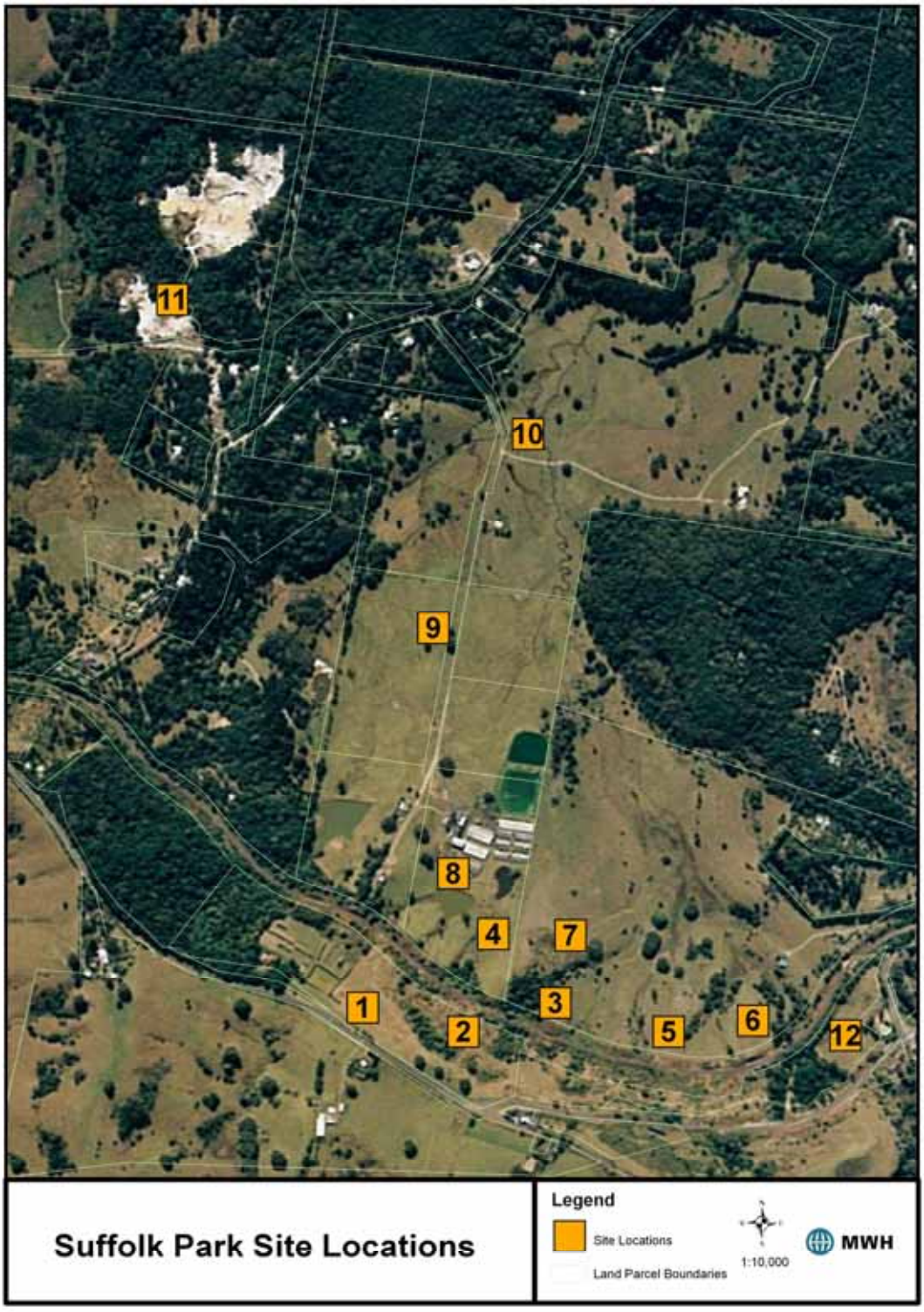


Figure 3-1: Site Option Locations

Site 4

This site is located on the southern part of the former Yagers Piggery lot. This property has an approved D.A. for a plant nursery, this will utilise the existing piggery buildings. Site 4 is on a ridge running down from the railway easement and would require excavation to level the site. An access track from the piggery driveway would be required. The site is located under, or immediately adjacent to, the existing 66 kV line.

Site 5 and Site 6

Sites 5 and 6 are located outside the investigation area to the east. Both sites are zoned under the Byron LEP 1988 as 'General Rural'. The Draft LEP (which is yet to be ratified) identifies a further small zone of EC (high environmental conservation vegetation) between the two sites. The substation should have no effect on this vegetation but a buffer distance for building may be required. Access to both sites would be difficult. A potential option could be accessing via Old Bangalow Road to the east. The sites would be highly visible from houses in the vicinity. They are approximately 350 m and 480 m respectively from the 66 kV line. Significant excavation would be required to level out both sites as they lie on ridges.

Site 7

Site 7 lies on relatively flat terrain approximately 50 m east of the 66 kV line (under an existing 11 kV line) in the east of the investigation area. Corridor options include following the 11 kV line southwest back to where it splits off the 66 kV or running it west directly to the 66 kV line. This location is visible to properties on the western side of the valley along Skinners Shoot Road. The most likely access route would extend from the end of Yagers Lane and through the Yagers Piggery property around the back of the buildings. A geotechnical investigation revealed consistent subsurface conditions (low to non-plastic sand and gravely sand for the full depth) across the proposed building area. Bedrock was not encountered (maximum depth drilled was 5 m). The bearing capacity through the profile improved with depth.

Site 8

This site is in the former Yagers Piggery environs. While the substation would be highly visible to neighbouring properties, the piggery infrastructure already has a major visual impact. Access would most likely utilise the existing piggery access from Yagers Lane. The extent of the proposed plant nursery is not known at this stage but could be a major constraint. The site is approximately 100 m from the 66 kV line.

Site 9

Site 9 is located half way down Yagers Lane on the west side. An 11 kV line runs off the 66 kV line, heading south to service the former Yagers Piggery and local residences. The substation could connect to the 66 kV line (approximately 150 m north) following Yagers Lane along the 11 kV line. There would be no access issues from Yagers Lane. The position of Site 9 in the middle of the valley would make it highly visible to a number of north facing elevated residences along Skinners Shoot Road, and those looking down the valley from Bangalow Road.

Site 10

Site 10 is located adjacent to Yagers Lane and the 66 kV line near the Belongil Creek crossing. Acid sulfate soils (ASS) are likely to be an issue here and the site could be prone to flooding given its low elevation and proximity to Belongil Creek. Access would not be a problem. The

site would be highly visible from surrounding residences. Site 10 may be within the buffer zone of a dip site located on the corner the Bangalow Road and Coopers Shoot Road.

Site 11

This site is located in the north western part of the investigation area in a quarry off Raywards Lane. Access to the site was not possible for a preliminary inspection so it can not be determined whether the quarry is still in use. The site is approximately 100 m from the 66 kV line and surrounded by dense vegetation. Access would be via Raywards Lane, off Skinners Shoot Road.

Site 12

Site 12 is located to the south east of the original investigation area below the water reservoir at the intersection of Bangalow Road and Old Bangalow Road. Access to the site would be via Old Bangalow Road. The site is zoned under the Byron Local Environmental Plan (LEP), 1988 as 7D (Scenic/Escarpment zone) which identifies various development constraints to protect and enhance the scenic quality and visual amenity of the Shire. The nearest residence is located approximately 50 m south east of the site over Bangalow Road. This site is cleared and has been previously cultivated and used for cattle grazing.

The site has a slope of approximately 1:10 which would require benching with possibly two or three benches. Drainage works would also be required to divert stormwater runoff around the site[1]. A culvert under Bangalow Road discharges onto the site. The extent of the catchment area for the culvert is unclear but may pick up runoff from Hayters Hill and Bangalow Road. Flowing water was noted on the site coming from the culvert three days after the previous rain event.

To the west of the site is the disused Casino-Murwillumbah railway line. Mature Hoop Pines are present along the railway on both sides.

The site is approximately 50 m from an 11 kV line and 1 km east of the 66 kV line. Two line easement options have been identified for connection to the 66 kV line. One option follows the northern boundary of the railway track and crosses back across the railway track to enter the site. This option may require dual circuits for security of supply. Australian Rail Track Corporation (ARTC) will need to be contacted to get 'in principle' approval to cross the railway track with overhead transmission lines, subject to final design being submitted for approval.

The second option is an underground line from Site 12 following Bangalow Road to the west where it would meet the 66 kV network. This option was not investigated further due to safety issues accessing the road verge along Bangalow Road with a geotechnical drill rig and subsequent difficulties with maintenance access under traffic.

[1] Site preparation for Site 12 is estimated at $280,000 (ex GST). See Appendix A Engineering Design Summary – Skinners Shoot Road/Yagers Lane Access

3.2 Site Photographs

Photographs of the area are shown in Figure 3-2.

View looking SE from Yagers Lane toward Hayters Hill ridge. Site 3 is located behind the vegetation. 66 kV line running through middle of the photo from right to left.

View looking N down Yagers Lane from Bangalow Road to Sites 9 and 10. The former piggery buildings are on the right.

View looking SW from Old Bangalow Road to Site 12. The fence line to the left of photo is the boundary of the water reservoir. The Casino-Murwillumbah railway track is downslope to the right of the picture.

View looking NE taken from Site 7. The 11 kV line is in the right of the photo.

Figure 3-2: Site photographs

3.3 Constraints Matrix

A matrix was developed to rank the site options based on environmental, planning and constructability constraints. Each constraint was weighted in terms of the potential impact it had on the project. Constraints were rated depending on the ease with which they could be managed. The consequences of each constraint were identified and quantified from insignificant (1) to substantial (5).

For each site the consequence rating was multiplied against the weighting to give a value. The constraint values for each site were then added to get a cumulative score. These totals were ranked in order from lowest to highest. Lower scores indicate that the site has fewer limitations for this project.

Table 3-1: Measures of Consequences of each Constraint

Constraint	Insignificant 1	Minor 2	Moderate 3	Major 4	Substantial 5
Vegetation	<5 trees affected	5-24 trees affected	25-39 trees affected	40-50 trees affected	>50 trees affected
Constructability	Easy - flat (<1% slope) topography, minimal excavation required	0-5% slope, some excavation required	Moderate 5-10% slope, moderate excavation required	15-30% slope, large amount of excavation required	Difficult - >30% slope, extreme difficulty/cost of excavation
Watertable	None	Greater than 1m deep	Less than 1m deep	Less than 25 cm to watertable	Long term or permanent ponded water
Visual amenity/view shed	No views from Bangalow Road and less than two residences impacted	Visible to 2-5 houses and not visible from Bangalow Road	Visible from 5-10 residences and visible from Bangalow Road	Visible from 11-15 houses plus from Bangalow Road	Visible from all directions, all residences affected, also visible from Bangalow Road/Hayters Hill
Proximity of Dwellings	Dwellings >1000 m away	Dwellings 500-1000 m away	Dwellings 250-500 m away	Dwellings 100-250 m away	Dwellings <100 m away
Accessibility	Adjacent to public road, no/minimal access track construction required	Adjacent to public road, <200 m access track construction required	Construction of 200-400 m access track required	Construction of 400-1000 m access track required	Construction of >1000 m access track required or steep access with difficult construction issues
CE Infrastructure proximity	Directly beneath CE infrastructure	<100 m from CE infrastructure	100-250 m from CE infrastructure	250-500 m from CE infrastructure	>500 m from CE infrastructure
Byron LEP/zoning	No zoning constraints	Within General Rural zone	Within scenic zone, not visible above ridgeline and >55 m from arterial road or within LEP ASS mapping zone	Within scenic zone and visible above ridgeline and closer than 55 m to arterial road, or existing DA on Lot	In or immediately adjacent to National Park, or Scientific zone
ASS	No ASS present	ASS maybe present greater than 1 m depth	ASS present at less than 1 m deep	ASS present at less than 25 cm to watertable	ASS present at surface
Property Impact	Powerline easement <50m required and /or negotiations with 1 landholder	Powerline easement 50-100 m required and/or negotiations with 1 to 2 landholders	Powerline easement 100-250 m required and/or negotiations with 2-4 landholders	Powerline easement 250-500 m required and/or negotiations with 4-10 landholders	Long powerline easement (>500 m) required and negotiations with than >10 landholders

Table 3-2: Analysis Matrix – Cumulative Limitations

		Site #											
Constraint	**Weighting**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Vegetation	**15**	15	15	15	15	15	15	15	15	15	15	75	30
Constructability	**10**	20	40	30	30	30	30	10	10	10	10	30	30
Watertable	**5**	5	5	5	5	5	5	5	5	10	25	5	5
Visual amenity/view shed	**15**	75	30	30	45	30	30	45	45	45	45	15	45
Proximity of Dwellings	**15**	60	60	30	45	45	60	30	60	30	60	30	30
Accessibility	**10**	10	50	50	30	40	30	40	30	10	10	40	20
CE Infrastructure Proximity	**10**	20	30	20	10	40	40	20	30	30	10	10	20
Byron LEP	**5**	20	15	10	20	10	10	10	20	10	15	10	15
ASS	**5**	5	5	5	5	5	5	5	5	5	20	5	5
Property Impact	**10**	10	10	20	10	30	30	30	30	20	10	20	40
Cumulative Score	**100**	**240**	**260**	**215**	**215**	**250**	**255**	**210**	**250**	**185**	**220**	**240**	**240**
Ranking		**6**	**12**	**3**	**3**	**9**	**11**	**2**	**9**	**1**	**5**	**6**	**6**

3.4 Results

Each site was ranked based on the desktop constraints matrix analysis to determine preferred options. According to the matrix, the highest ranked location is Site 9 with Site 7 second, and Sites 3 and 4 scoring third equal.

The rankings in Table 3-2 were calculated prior to groundtruthing the properties. When access was granted allowing further investigation, some of the sites were found to be inadequate for a substation and their rankings were re-assessed accordingly. Constraints for these sites were re-assessed and adjusted for the following reasons:

- Site 1 due to likely visibility above the ridgeline;
- Sites 2, 3, 5 and 6 due to access difficulties;
- Site 4 due to slope, proximity to the proposed artist retreat and nursery, and potential value of land to current landowners (offers views to Byron Bay);
- Site 10 due to potential for flooding; and
- Site 11 due to dense vegetation.

The three highest ranking remaining sites are Site 7, Site 9 and Site 12. Site 9 is located in the middle of the investigation area. Site 7 is located on the valley floor in the south east of the investigation area. Site 12 is located outside the initial investigation area to the southeast.

Site 9 was the preferred option due mainly to its proximity to the 66 kV line (resulting in minimal easement requirement), its proximity to the road for access and its distance from dwellings. The main constraint for this site is its position in the centre of the valley which makes it visible from a number of properties.

Site 7 was ranked second. The main constraints for this site are its distance from access roads. Access would be via Skinners Shoot Road/Yagers Lane with a further track through the former piggery. It is situated on the 11 kV route and close to the 66 kV line giving two possible corridor options.

Site 12 was ranked third. Distance from the 66 kV line and site slope are the main issues with this site. Nevertheless it is close to Suffolk Park and the 11 kV network which makes it ideal for distribution. Constructability is also an issue with excavation and benching required to create a flat building pad. It is zoned as 'Scenic Escarpment' under the Byron LEP, though the site sits well below the line of sight from Bangalow Road. The new SEPP Infrastructure overrides the LEP. The site is located next to an existing water reservoir and would have minimal to no impact on the scenic amenity of the area. There is some evidence to suggest that this area has been subject to landslip in the past.

Workshop
A workshop involving CE stakeholders and the MWH RSS team considered the short-listed sites and recommended Site 12 and Site 7 be investigated further. Geotechnical investigations and soil resistivity tests on both sites were undertaken to assess their suitability at a higher

level of confidence. The results identified both sites as suitable for a substation based on ground conditions and did not provide further clarity on a preferred option.

The major considerations for the two recommended sites are compared in Table 3-3. The costs in Table 3-3 are estimates based on the input of experienced workshop attendees. It is anticipated that remaining knowledge gaps can be resolved at a second site selection workshop.

Table 3-3: Site 7 and Site 12 comparison

Considerations		Site 7	Site 12
Site constraints scoring matrix		210	240
Distribution Voltage Regulation		Good	Best
Geotechnical results		Marginally better than Site 12	Good
Soil resistivity results		Marginally better than Site 12	Good
Costs	• Access (estimated)	$500,000	$ 85,000
	• Site preparation (estimated)	$300,000	$ 500,000[2]
	• 66/132 kV construction[3]	$ 750,000 - $1,250,000 (1km underground) [4]	$ 450,000 (1.8 km)
	• 11 kV distribution	$?	$?
	• Site acquisition	$ 500,000	$ 500,000
	• Easement acquisition	No easement required	$ 55,000 (Approx 1km x 50m)
TOTAL ESTIMATED COSTS		**$ 2,050,000 – 2,550,000**	**$ 1,590,000**

[2] Site preparation for Site 12 was estimated at $280,000 (ex GST). See Appendix A Engineering Design Summary – Skinners Shoot Road/Yagers Lane Access. This was adjusted up to $500,000 in the workshop to take into account additional benching and drainage requirements.

[3] Estimated costs for 66 kV ~$250,000/km above ground; ~$750,000 (66kV) - $1,250,000 (132kV)/km underground

[4] It has been identified that it may be necessary to underground a section of the 66kV/132 kV line for this site

4. Recommendations

After desktop analysis, site inspections, workshops, limited engineering and geotechnical investigations, and cost estimates neither Site 7 nor Site 12 stand out as the preferred option. Both sites have associated advantages and disadvantages, none of which are considered 'showstoppers'.

Site 12 requires higher civil works for the site establishment (benching and drainage) but has minimal access issues. The site is close to Suffolk Park where the electricity is ultimately required so is better in terms of distribution voltage regulation but it requires a 1 km easement to connect to the 66/132 kV network.

Site 7 requires upgrades to Skinners Shoot Road and Yagers Lane, and construction of a shared access track through the neighbouring property. No easement would be required given the proximity to the 66/132 kV network. The site is level so construction would be relatively straight forward.

Factors not discussed in this report that should also be considered include any project timelines that may impact site selection i.e. additional time required to gain approvals to upgrade Skinners Shoot Road/Yagers Lane, and intangible inputs such as landholder/community attitudes.

It is recommended that a second workshop be held with internal Country Energy stakeholders to make a final decision on the preferred option.

5. Constraints

5.1 Statutory/Legislative Constraints

5.1.1 Environmental Planning and Assessment Act, 1979 (EP&A Act)

The *EP&A* Act sets the legal basis for planning controls in NSW. Approval under the *EP&A* Act will be required for this project. The objects of the Act, in particular, section 5(a)(i), (ii) and (vii) encourage the proper management of natural and artificial resources, including towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment; the promotion and co-ordination of the orderly and economic use and development of land and to encourage ecologically sustainable development.

5.1.2 Byron Local Environmental Plan (LEP), 1988

The aim of this plan is to promote the sustainable development in Byron by furthering the objectives of the *EP&A Act, 1979.* Land use zoning in the area of investigation under the Byron LEP 1988 is shown in Figure 5-1.

The investigation area encompasses six different land use zones. These include:

- Zone No. 1(a) - (General Rural Zone)
- Zone No 1(ah) - (General Rural Zone Hatched)
- Zone No. 5(a) - (Special Uses Zone)
- Zone No. 7(b) - (Coastal Habitat Zone)
- Zone No. 7(d) - (Scenic/Escarpment Zone)
- Zone No. 7(j) - (Scientific Zone)

The only zone that would preclude a substation under the LEP is the 7(j) Scientific Zone which only allows for bushfire hazard reduction or environmental facilities. None of the options in this report are located in this zone. In all other land use zones within the investigation area, electricity lines and a substation are permissible with consent from Council, subject to the constraints of the particular zone.

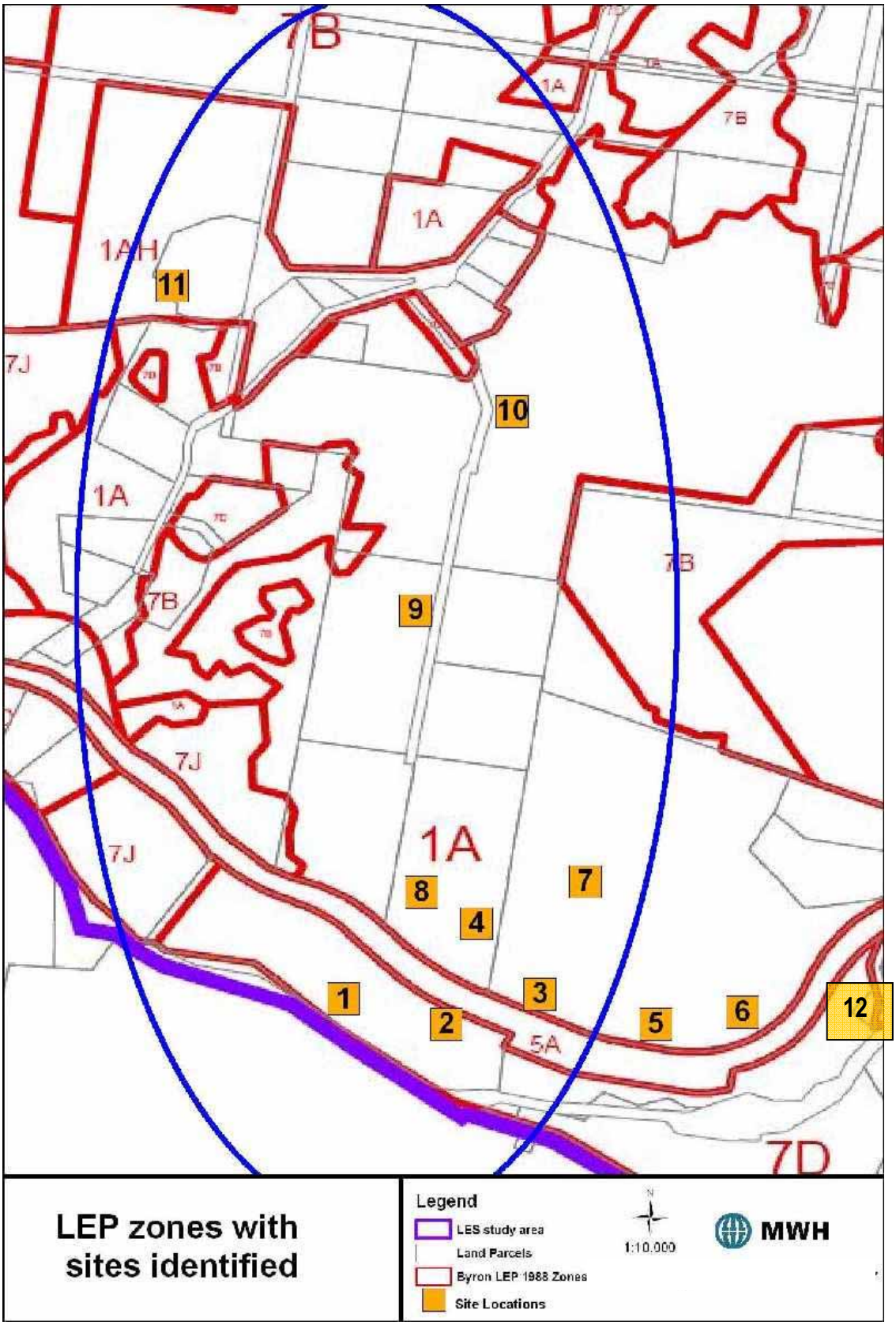


Figure 5-1 : Byron LEP Zones

Further constraints identified under Part 3, Division 3 of the LEP include:

Clause 27. Building lines along arterial roads

A building cannot be erected for any purpose closer than 55 m from the boundary of an arterial road (Bangalow Road is classed as an arterial road) unless the proponent can satisfy the Council of the following:

(a) that the allotment of land is totally contained within 55 m of the boundary of the road, or
(b) there is no alternative suitable building site due to levels, steepness, instability, flooding or other physical barrier, or
(c) the amenity of the immediate environment would be adversely affected by requiring the 55 metre setback to be maintained.

Clause 27 may affect Sites 1, 2 and 12 as they are located adjacent to Bangalow Road.

Clause 30. Development within Zone No. 7(d) (Scenic)

Clause 30 applies to all land within Zone No. 7(d). Before giving its consent to the erection of a building on this land zoned 7(d), the Council shall make an assessment as to whether it should impose conditions relating to –

(d) the use on the external surfaces of the building of prescribed materials;
(e) the number, type and location of existing trees and shrubs which are to be retained and the extent of landscaping to be carried out on the site; and
(f) the siting of the proposed buildings.

This may affect Sites 1, 2 and 12 as they are located within zone 7(d).

Clause 31. Development on ridgetops

The council will not give development consent to building on or near any ridgeline unless no alternative location for the building is available. If there were no alternative sites the following objectives to lessen the impact would need to be considered before consent is granted:

(a) whether there will be adequate existing or proposed landscaping, trees or other vegetation which assist or are likely to assist in mitigating visual impact; and
(b) whether the proposed building design elements, materials of construction and proposed colours will mitigate potential adverse visual impact, including the reflectivity of materials to be used.

Sites 1 and 2 may be affected by this clause, depending on whether the proposed built infrastructure is visible above the ridgetop.

Clause 38. Development within Zone No. 1(ah)

Clause 38 applies to land within Zone No. 1(ah). The Council will not consent to the carrying out of development for any purpose on land to which this clause applies unless the Council has made an assessment of the susceptibility of the land and the proposed development to flooding, landslip, bushfire hazard, soil erosion and the like. Site 11 is located on land zoned as 1(ah).

Notwithstanding the above clauses and land use zoning, Clause 62 of the Byron LEP states that nothing in the LEP prohibits or requires consent for the carrying out of development of any description specified in Schedule 12. Schedule 12 - Development by public authorities referred to in Clause 62 is defined as:

Schedule 12 - Water, sewerage, drainage, electricity and gas

'The carrying out by persons carrying on public utility undertakings, being water, sewerage, drainage, electricity or gas undertakings, of any of the following development, being development required for the purpose of their undertakings:

(c) the installation or erection of any plant or other structures or erections by way of addition to or replacement or extension of plant or structures or erections already installed or erected, including the installation in an electrical transmission line of substations, feeder-pillars or transformer housing, but not including the erection of overhead lines for the supply of electricity…or the installation of substations, feeder-pillars or transformer housings of stone, concrete or brickworks,
(d) the provision of overhead service lines in pursuance of any statutory power to provide a supply of electricity,…'

The outcome of Clause 62 in the Byron LEP is that Country Energy can construct a new substation within the investigation area without the need for consent (so long as it is not constructed of stone, concrete or brickworks) because it is an extension or addition to the existing line.

Paragraph (d) means that if overhead lines are necessary to connect the substation to the existing line, a development consent will not required under the Byron LEP as Country Energy has statutory powers for the supply of electricity.

5.1.3 North Coast Regional Environmental Plan 1988

This plan provides local government with State and regional policy guidelines for the preparation of local environmental plans and for certain types of development. The plan sets the basis for new urban and rural development. The emphasis is on progress coupled with careful management. This is a strategic planning document and does not influence whether this project is permitted.

5.1.4 SEPP 14 – Coastal Wetlands

No coastal wetlands are identified in the area of investigation. Cumbebin Swamp is identified as a State Environmental Planning Policy (SEPP) 14 coastal wetland area and is located immediately to the north and east of the investigation area. Access via Skinners Shoot Road may require some trimming of overhanging trees though Cumbebin Swamp area, however this is not expected to be required in the SEPP 14 zone. Therefore no further reference to this SEPP is made in this report.

5.1.5 SEPP 26 – Littoral Rainforests

No littoral rainforests are identified in the area of investigation. Therefore no further reference to this SEPP is made in this report.

5.1.6 SEPP 44 – Koala Habitat Protection

No Koala habitat areas are identified in the area of investigation. Therefore no further reference to this SEPP is made in this report.

5.1.7 SEPP 55 – Remediation of land.

This policy concerns the remediation of contaminated land. In the absence of detailed field assessment we are unable to determine if any areas outside the former piggery's ponds and immediate shed have been contaminated by the effluent disposal. Two current or former dip sites have been identified in the investigation area which may require remediation if construction occurs within these areas. Site 10 may be within the buffer zone for a dip site located near the intersection of Skinners Shoot Road and Yagers Lane. Site 2 may be within the buffer zone for a dip site located at the intersection of Bangalow Road and Coopers Shoot Road. We therefore cannot determine if SEPP 55 applies to Sites 2, 8 and 10 without detailed field assessment.

5.1.8 SEPP 71 – Coastal Protection

The coastal protection zone boundary abuts the area of investigation to the north and lies 1 km to the east but does not affect anywhere inside the study zone. Therefore no further reference to this SEPP is made in this report.

5.1.9 SEPP Infrastructure

State Environmental Planning Policy (Infrastructure) 2007 was introduced to facilitate the delivery of infrastructure across the State by improving regulatory certainty and efficiency. Prior to the SEPP being introduced, planning for infrastructure was regulated through a complex array of local, regional and State statutory planning instruments and overlapping legislation.

The following extract from the SEPP Infrastructure legislation (Clause 41(1) and (2)) deems that the establishment of a new substation is permitted without consent.

Division 5 Electricity transmission or distribution
Subdivision 1 Electricity transmission or distribution networks

Clause 41 Development permitted without consent

(1) Development for the purpose of an electricity transmission or distribution network may be carried out by or on behalf of an electricity supply authority or public authority without consent on any land….

(2) In this clause, a reference to development for the purpose of an electricity transmission or distribution network includes a reference to development for

any of the following purposes if the development is in connection with such a network:

(c) establishment of a new substation or an increase in the area of existing substation yards or the installation of equipment, plant or structures in existing substation yards or substation buildings…….

The Infrastructure SEPP provides that the establishment of a new electricity substation by Country Energy is permitted without development consent on most land (and this overrides whatever a Council's Local Environment Plan otherwise says about permissibility for that electricity substation). However, Country Energy will still be required to undertake an environmental assessment for that electricity substation under Part 5 of the EP&A Act. Also, the Infrastructure SEPP requires notification to the local Council and occupiers of adjoining land for electricity substation proposals (Clause 42(1) and (2)). Country Energy must take into consideration any response to the notice that is received within 21 days after the notice is given.

5.1.10 Other Relevant Legislation

In addition to assessment and approval under the EP&A Act, a range of other approvals are potentially necessary under other NSW legislation. Table 5-1 provides a summary of legislation that is potentially relevant to the project, either due to additional approval requirements or matters relevant to the environmental assessment of the project. Specific approval requirements under these Acts would be confirmed once a preferred substation site and line routes (if required) are selected.

Table 5-1: Summary of Relevant Legislation

Act name	Potential Approval Requirements	Project Implications
Contaminated Land Management Act, 1997 (CLM Act)	• Requires consideration of the potential risk of harm to the environment or human health arising from development or other works. • Where contaminated material is identified during construction works (e.g. if a spill occurs or if contaminated soil is excavated) there may be a duty to report to the DEC under the Act.	No specific approval requirement. Issues relating to former dip sites may apply to site options 10 and 2.
Fisheries Management Act, 1994	• Assessment required in accordance with Section 5C of the EP&A Act. • Species Impact Statement (SIS) required if preferred route is likely to significantly impact on threatened aquatic species, populations, ecological communities or critical habitat. • Approval required for blockage of waterways	Notification required for dredging and reclamation. Substations to avoid watercourses. Lines will span watercourses so approval would not be required. Access tracks may require approval where waterway crossings required.
Heritage Act, 1977	• Approval for excavation or disturbance of non-indigenous relics (more than 50 years old). • Potential requirement for preparation of	Approval likely to be required – Four identified heritage items within study area.

	heritage impact statements and/or conservation management plans to assess and manage the impacts of the project on any heritage items listed on the State Heritage Register.	
National Parks and Wildlife Act, 1974	• Excavation permit required prior to commencement of works (section 87). • Consent to destroy required for any works that impact on items of Aboriginal heritage (section 90).	Sites to be selected to avoid Aboriginal heritage items.
Native Title Act, 1993	• Currently a registered Native Title claim within the study area • Tribunal number: NC01/8 Byron Bay Bunjalung People.	No specific approval requirement.
Native Vegetation Act, 2003 (NV Act)	• Clearing remnant native vegetation or protected regrowth requires approval under NV Act unless clearing is a permitted activity. • Local Catchment Management Authority (CMA) can only approve the clearing of remnant vegetation or protected regrowth when the clearing will improve or maintain environmental outcomes.	Clearing of remnant vegetation or protected vegetation generally to be avoided. Some trimming may be required along Skinners Shoot Road.
Protection of the Environment Operations Act, 1997 (PEO Act)	• No specific requirement for an Environment Protection license. • Proposal must not cause pollution of waters.	Construction environmental management to manage potential water pollution
Rivers and Foreshores Improvement Act, 1948 (RFI Act)	• Part 3A permit not required but Country Energy must comply with the intent of the Act in relation to impacts on the flow of water in waterways.	Lines will span watercourses so RFI Act is unlikely to be relevant.
Roads Act, 1993	• Consent under section 138 for erecting a structure or carry out a work in, on or over a public road, digging up or disturbing the surface of a public road, or removing or interfering with a structure, work or tree on a public road. • Consent required from Byron Shire Council or RTA, depending on which is the relevant road authority.	Consent required where lines cross roads or located within road reserves. Consent required to build access along Skinners Shoot Rd.
Threatened Species Conservation Act, 1995	• Assessment required in accordance with Section 5A of the EP&A Act. • SIS required if preferred route is likely to significantly impact on threatened species, populations, ecological communities or critical habitat.	SIS unlikely to be required, as sites will be selected to avoid threatened species etc.
Waste Avoidance and Resource Recovery Act, 2001	• Country Energy would be required to comply with the requirements of the Act in relation to waste management during construction of the proposal.	No specific approval requirement.
Water Act, 1912	• Permit for water extraction from rivers,	Lines will span watercourses so Water Act is unlikely to be relevant.

creeks etc.
- Permit for works within waterways (bridges, culverts, etc)

5.1.11 EPBC Act

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) protects the environment and in particular, matters of National Environmental Significance.

The Act identifies seven matters of national environmental significance:
- World Heritage properties
- National heritage places (from 1 January 2004)
- Ramsar wetlands of international significance
- Threatened species and ecological communities
- Migratory species
- Commonwealth marine area
- Nuclear actions (including uranium mining)

Approval is required for actions that are likely to have a significant impact on:
- a matter of national environmental significance;
- the environment of Commonwealth land (even if taken outside Commonwealth land); and
- the environment anywhere in the world (if the action is undertaken by the Commonwealth).

Potential matters of national environmental significance as identified by an EPBC Protected Matters report are shown in Table 5-2. The full report is attached in Appendix A.

Table 5-2 : Potential Matters of National Environmental Significance

Matters of National Environmental Significance	
World Heritage Properties	None
National Heritage Places	None
Wetlands of International Significance (Ramsar Sites)	None
Commonwealth Marine Areas	None
Threatened Ecological Communities	None
Threatened Species	38
Migratory Species	24

Detailed field surveys will be undertaken on the selected substation site and line route to assess any potential impacts on these species.

5.2 Environmental and Construction Constraints

5.2.1 Fauna

Byron Shire supports amongst the highest number of threatened species of any Shire in NSW. Threatened species are those species, populations or ecological communities listed in the NSW Threatened Species Conservation Act (1995) or the Commonwealth Environment Protection and Biodiversity Conservation Act (1999). Currently, there are at least 61 threatened plant species, 83 threatened fauna species (excluding marine species) and four endangered ecological communities listed in the NSW TSC Act that are known to occur in the Shire.

Once a preferred substation site has been identified, a detailed field survey will be undertaken to determine whether any of these threatened fauna species are present, or likely to be present. The options presented in this report have been selected based on avoiding areas of likely habitat for these species i.e. avoiding vegetated and swampy areas.

There is no known koala habitat in the Draft LEP area however the NPWS Atlas identifies some records of Koalas within 5 km of the study area.

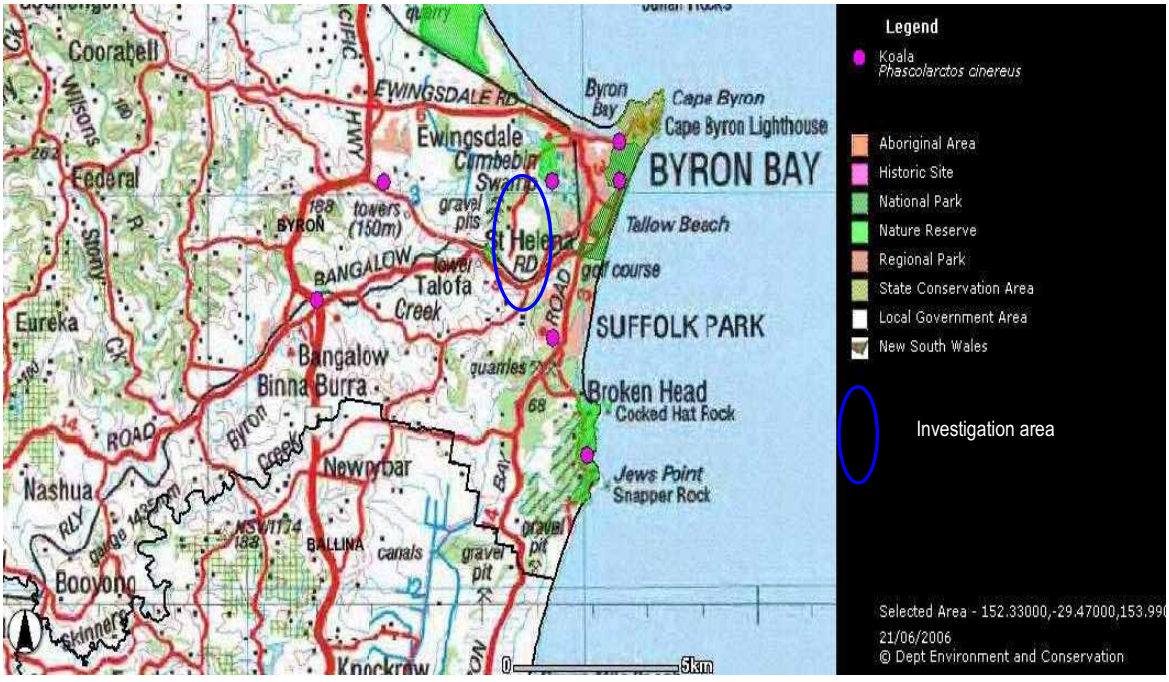


Figure 5-2: Koala Records, DEC NSW Atlas

5.2.2 Flora

Vegetation mapping from the Byron Shire Council Local Environmental Study (LES) identifies a number of different vegetation communities in the investigation area. The northern portion of the area is characterised by Blackbutt, Swamp Mahogany, Flooded Gum and Teatree, all predominantly swampy/wet ground trees. The slightly higher elevated areas towards the southern end of Skinners Shoot Road are identified as primarily rainforest. This includes the

Hayters Hill Nature Reserve in the southwestern corner of the investigation area. The eastern side of the area has a patch of Teatree and Blackbutt. To the west (near Site 12) is described as Coast Banksia and rainforest. The centre of the investigation area (around Yagers Lane) is predominantly farmland used for grazing.

5.2.3 Soils/landscape

The investigation area is characterised to the south by the ridgeline of Hayters Hill, aligned NW-SE along which Bangalow Road is sited. This is the highest point at around 100 m AHD. Hayters Hill ridge slopes steeply (greater than 20%) down to the north east past the disused Casino Murwillumbah Railway line and on to the former Yagers Piggery on the valley floor. Skinners Shoot Road follows a gently sloping ridgeline running down from Hayters Hill in a north east direction through the middle of the area. Through the centre of the area the elevation is approximately 20 m AHD. The northern section is characterised by low, flat topography that abuts Cumbebin Swamp. The central area is characterised by a small creek system, Belongil Creek, and its tributaries that flows north east to Cumbebin Swamp. This area and the northern area are predominantly below 10m AHD.

The major geological units of the site are set out in Table 5-3.

Table 5-3 : Major Geological Units

Unit Symbol	Unit Name	Location in Relation to Site	Description	Characterised by:
Qa	Quaternary Alluvium	Valley floor along Belongil Creek and into Cumbebin Swamp	River gravels, alluvium, sand and clay	Wet, flood prone, low-lying, low gradient
Tlb	Lismore Basalt from the Lamington Volcanics	Along Hayters Hill ridge crest	Basalt (agglomerate, bole)	Hard, high areas, ridgetops, good constructability
R-Jb	Bundamba Group	Mid to upper slopes of Hayters Hill to the north and along the Skinners Shoot Road ridgeline.	Triassic sandstone, siltstone, claystone, conglomerate	Steep slopes, erodible
Pzn	Neranleigh-Fernvale Group	Northern portion of the area and on low ridge to the north east of the former piggery.	Metamorphics (greywacke, slate, phyllite, quartzite)	Steep slopes, erodible

Tweed Heads, 1:250,000 Geological Series Sheet SH 56-3, NSW Department of Mines, 1972

Geotechnical investigations, ASS surveys and soil resistivity testing were undertaken at Sites 7 and 12 to establish ground conditions and earthing to determine their suitability for a substation (Appendix B).

The results of the geotechnical investigation indicated that ground conditions at both Sites 7 and 12 were suitable for construction of a substation. The findings did note that the ground surface in the proposed building area of Site 12 contained surface undulations and creep that may be indicative of previous downslope soil movement. The top of the soil profile was very wet with poor drainage particularly at the bottom of the slope. The site was assessed as a low

risk but may be potentially unstable and subject to landslide or subsidence when the substation is constructed without appropriate drainage and retaining structures and good engineering practice used to develop the substation site. As a road culvert discharges directly onto the site, capture and diversion of the flows around the site will be needed.

The Byron Shire LEP Acid Sulfate Soils (ASS) Planning Map indicates the northern and northeastern portions of the investigation area contain Class 2, 3 and 5 acid sulfate soils.

ASS typically occurs in low-lying coastal areas. Developments involving excavation or lowering of the water table may result in the oxidation of sulfur (predominantly in the form of pyrite) contained within these soils and the subsequent generation of acid discharge from the soil. The resultant discharge may find its way into the groundwater or stormwater and eventually into natural aquatic environments. The acidic run-off may lower the pH of the receiving water system, increase the concentration of metals and reduce the natural buffering capacity of the receiving waters.

ASS testing results from Site 7 and Site 12 (Appendix B) indicated that Site 12 has low to moderately acidic soils. One sample was classed as Potential ASS (PASS) although it is highly unlikely that soils found at this elevation (high on the escarpment) are derived from a remnant coastal system. The ASS testing procedure only identifies potential acidic content rather than the source or cause. Nevertheless, according to the action criteria in the ASSMAC guidelines, liming is recommended at a rate of 1-2 kg $CaC0_3$ (lime)/m^3 of soil to neutralise the acid. Acidity at this site is more likely a reflection of deep weathering of the parent materials.

On the basis of the laboratory testing Site 7 was classified as having Non-Potential Acid Sulfate Soils (Non-PASS).

The soil resistivity testing report (Appendix B) did not discriminate between the sites. Earthing system design is aided by soil structures that exhibit conductive properties at the lower layers allowing fault current to be drawn away from the surface when returning to its source. Both Site 7 and Site 12 have more conductive lower layers although each of these layers is quite resistive overall.

5.2.4 Visual Amenity

Bangalow Road offers views to the north and northeast out to Cape Byron and the coastline. Looking down the valley from Bangalow Road, the sheds of the former Yagers Piggery are the major visible manmade structures. A number of residences look southeast down into the valley from Skinners Shoot Road. Any structure that extends higher than the Bangalow Road ridgeline will be highly visible from the residences to the south along Coopers Shoot Road.

5.2.5 Access

Public road access to the investigation area is via Yagers Lane, off Skinners Shoot Road. The southeastern part of the investigation area (Sites 5 and 6) could be accessed via Old Bangalow Road which crosses the railway or from Yagers Lane. Further south east (outside the investigation area) can be accessed via Old Bangalow Road. The northern parts of the area are accessible via Skinners Shoot Road and Raywards Lane. No access is possible to options

located in the southern portion of the site between Hayters Hill ridgeline and the Casino Murwillumbah Railway from Bangalow Road. This is due to size, weight and manoeuvrability limitations of the substation transformer.

The approximate dimensions and access requirements for transporting the substation transformer are shown in Table 5-4.

Table 5-4: Transporter Dimensions

Transporter	Dimensions (approx)
Length of float	22 m
Width of float	3.5 m
Weight of transformer	approx 50 tonne
Height from ground	300 mm
Height to top of transformer	4.7 m
Turning radius - outside	19 m
- inside	12.5 m

Potential access issues from Skinners Shoot Road were highlighted in a meeting with Byron Shire Council. Council officers identified that there is strong local community resistance to any upgrading of Skinners Shoot Road that would lead to increased public use. This may be an issue for maintaining all weather rapid access to the substation site options to the north of the Casino Murwillumbah Railway line (in the valley).

An investigation was conducted to identify any engineering constraints associated with accessing the proposed substation sites along Skinners Shoot Road/Yagers Lane (Appendix C).

Works proposed to the existing public roads and the unformed section of the driveway (within the former piggery property) include:

- slashing undergrowth and trimming of trees where necessary;
- light grading of the natural terrain;
- crowning with grader and medium sized excavator the road formation to establish surface and cross-fall drainage;
- establishing cross-banks and table drains to control water and sediment runoff; and
- placement of gravel, road base to stabilize the track formation and fill surface depressions such as potholes.

Costs were estimated to upgrade the road and comparitive costs were also prepared for access to Site 12 off Old Bangalow Road.

Table 5-5: Access road cost estimates (ex GST)

Substation Site	Cost Estimate for Access
Site 7	$ 505,000
Site 12	$ 85,000

Access to Site 7 would be the most expensive as an access road through the former piggery property is required in addition to the upgrade of Skinners Shoot Road and Yagers Lane. Site 12 was shown to be the least expensive to access with only a minimal access road required from Old Bangalow Road and no upgrade of public road required.

5.2.6 Proximity to Infrastructure

- *Country Energy Infrastructure*
  There is currently a 66 kV Country Energy overhead line running north-south through the middle of the investigation area. This extends from Old Bangalow Road in the south, runs adjacent to the former Yagers Piggery before joining Yagers Lane and following it to Skinners Shoot Road. The line follows Skinners Shoot Road to the southwest before heading off to the northwest and out of the area.

  On the northern side of the railway track, upslope of the piggery, an 11 kV line branches off the 66 kV to the north east to service residences in this direction. This line forks off to the south east up to the water reservoir on the intersection of Bangalow Road and Old Bangalow Road. An 11 kV line branches off the 66 kV where it meets Yagers Lane and runs south to service the former piggery and surrounding residences.

- *Other Infrastructure*
  A Dial Before You Dig search identified Telstra cables located along all roads connecting to residences. A Telstra cable extends from the southern end of Yagers Lane to feed to the piggery and houses on the property. A Telstra cable was identified running north east - south west through Site 12 below the water reservoir. Byron Shire Council provided a water pipe location map for Site 12. The map indicated three possible distribution mains running from the reservoir heading under the railway line in a north west direction. Infrastructure location maps are provided in Appendix D. Rous Water also has water mains in the vicinity of Site 12, but was unable to provide maps. All proposed sites will require methods of effluent disposal to be investigated. An approval under Section 68 of the Local Government Act 1993 for on-site effluent disposal is required from Council prior to the issue of a Construction Certificate.

5.2.7 Flooding

The northern part and to the north east of the investigation area (on either side of Skinners Shoot Road to the north of the intersection with Yagers Lane) is within the 1 in 100 year AEP flood extent zone (Willing & Partners, 2000). High water tables were observed on properties traversed by Yagers Lane in areas mapped as Qa (Quaternary Alluvium). Even though this is outside the area identified as flood prone land (subject to AEP 1 in 100 year event), the area is still subject to seasonal inundation. The area of interest occupies the upper part of the Belongil Creek catchment. Numerous tributaries and gullies from the steep upper slopes feed Belongil Creek. During large rain events Cumbebin Swamp may become inundated making access to Yagers Lane via Skinners Shoot Road difficult.

5.2.8 Bushfire

Within the study area there is a wide range of land uses, landforms and vegetation types contributing to the level of bushfire hazard. The current bushfire prone land map for the study

area from the Byron Bay, Suffolk Park and Ewingsdale Local Environmental Study shows large parts of the Cumbebin Swamp and Belongil floodplain vegetation as being in Category 1 (which is more fire prone than Category 2). Category 2 vegetation is found in the Hayters Hill Nature Reserve and extending to the north along Skinners Shoot Road. Another small patch is found at the intersection of Skinners Shoot Road and Yagers Lane. A 100 metre buffer to all Category 1 vegetation also affects a large area of land. Much of this buffer is unlikely to contain significant vegetation.

5.2.9 Dip sites

Two current or former dip sites have been identified in the investigation area which may require remediation if construction occurs within these areas. Site 10 may be within the buffer zone for a dip site located near the intersection of Skinners Shoot Road and Yagers Lane. Site 2 may be within the buffer zone for a dip site located at the intersection of Bangalow Road and Coopers Shoot Road (in the south east of the investigation area). SEPP 55 Remediation of Land sets policy guidelines for the remediation of contaminated land.

5.2.10 Heritage

A search of the DEC Aboriginal Heritage Information Management System (AHIMS Register) found that five Aboriginal objects and/or Aboriginal places are recorded in or near the area of investigation (Appendix E).

Two sites are located approximately 200 m south west of the junction of Skinners Shoot Road and Yagers Lane and approximately 450 m west of Site 10. One is an open camp site with site features described in the AHIMS report as artefacts. Just south of this camp site is a midden with site features described as artefacts, earth mound and shells. Two open camp sites are located in the north west of the investigation area near Site 11 in the quarry. There is also a midden site located approximately 1 km north of the investigation area.

There is currently an active registered Native Title claim within the study area by the Byron Bay Bunjalung People (Tribunal number: NC01/8).

There is high potential for indigenous heritage sites in the area of investigation given the search results and proximity to Belongil Creek which would have been used as a food and drinking resource. Further investigation including field survey would be necessary to confirm the presence of heritage sites when a substation site is selected.

The State Heritage Register, the North Coast REP, 1998, the Byron LEP 1988, and the RTA Heritage and Conservation Register identified no registered non-indigenous heritage sites in or near the investigation area.

5.2.11 Land Procurement

All options offered in this report would only affect one property with regards to substation footprint i.e. no options straddle more than one property. Land for a substation at Site 7 would most likely involve acquiring an area (approximately 150 m x 150 m) in the south western corner of Lot 9 DP588835. No easement would be required.

A substation at Site 12 would most likely require the purchase of a part of Lot 4 DP264161 bounded by Old Bangalow Road, Bangalow Road and the extremity of the south western boundary of the timbered area (Hoop pine). An easement along the southern boundary of Lot 9 DP588835 would be required to connect the substation feeders to the current 66/132 kV network. This easement would be approximately 30 m x 1100 m.

As Country Energy is a public authority it may use a Plan of Acquisition to acquire a portion of land or easement it requires. A Plan of Acquisition does not require approval by the local council.

Once a preferred site has been selected for further investigation, consultation with landowners and the community will take place.

6. Approvals Strategy

It is recommended that CE use the provisions of the new Infrastructure SEPP process. This process only came into legislation in January 2008 and has not been used by CE on other infrastructure jobs. Development consent is not required to construct a substation on any of the potential sites under the SEPP Infrastructure. CE will still be required to undertake an environmental assessment for the electricity substation under Part 5 of the EP&A Act. Also, the Infrastructure SEPP requires notification to the local Council and occupiers of adjoining land for electricity substation proposals (Clause 42(1) and (2)). Country Energy must take into consideration any response to the notice that is received within 21 days after the notice is given.

Consent will be required under Section 138 of the Roads Act 1993 if any road improvement work on Skinners Shoot Road is required. Approvals may be required to trim vegetation along Skinners Shoot Road to allow access for the substation. Communication with Byron Shire Council throughout the process will be maintained.

6.1 Existing Development Approvals

A search of the Byron Shire Council existing notices of determination for development approvals identified the following approvals within the investigation area:

Lot 8 DP 8385, 60 Yagers Lane, (former Yagers Piggery site) Starseed Gardens, DA granted for plant nursery.
Lot 4 DP 8385, 60 Yagers Lane, Robert Bruce & Co Ltd, DA granted for alterations to existing dwelling (house)

A development approval application has been lodged with Byron Shire Council for an 'artists retreat' at the former Yagers Piggery site.

These existing development approvals may have some influence on the siting of the substation.

7. Authority Details

Authorities contacted for this project include:

Byron Shire Council
PO Box 219
Mullumbimby NSW 2482

8. Landholder Details

Land title searches were performed on all potentially effected sites within the investigation area to determine land ownership and help identify any potential issues that may arise in the land negotiation phase. The search identified that six of the eleven site options are located on land owned by Julie Trevor-Jones (or jointly with her husband Owen Trevor-Jones) and three options are on land jointly owned by Bennie Schreiber and Robert Bruce and Co Pty Ltd. Landholder details are shown in Table 8-1 and land ownership has been mapped in Figure 8-1.

Preferred sites 7 and 12 are both located on properties owned by Mrs Julie Trevor-Jones.

Table 8-1 : Landholder Details

Lot #	Plan	Owner
Lot 4	DP 608468	12 tenants in common with varying shares
Lot 13	DP 615522	Alan Tilghman Rayward (428/1000 share) Telezi Pty Ltd (572/1000 share) as tenants in common
Lot 4	DP 8385	Bennie Schreiber (5/21 share)
Lot 5	DP 258640	Robert Bruce & Co. Pty Ltd (16/21 share) tenants in common
Lot 6	DP 8385	
Lot 7	DP 8385	
Lot 8	DP 8385	
Lot 8	DP 588885	Charles Edwin Crombie and Janelle Eileen Woolridge (Joint)
Lot 7	DP 588885	Dimitri Schaffner and Gina Schaffner (Joint)
Lot 3	DP 218145	Dion Abrahams
Lot 4	DP 258640	George Archibald Morrison Morrison G A
Lot 4	DP 600582	George Archibald Morrison and Dorothy June Morrison (Joint)
Lot 1	DP 1056283	Julie Alice Trevor-Jones
Lot 5	DP 111820	
Lot 14	DP 111820	
Lot 3	DP 584847	
Lot 4	DP 264161	
Lot 1	DP 1056283	
Lot 9	DP 588885	
Lot 1	DP 561489	Julie Alive Trevor-Jones and Owen Douglas Trevor-Jones (Joint)
Lot 2	DP 1056283	
Lot 19	DP 851632	Koreelah Pty Ltd (½ share) James McLeod Dawson Anthony Paolo Pangallo Joint tenants in ½ share as tenants in common

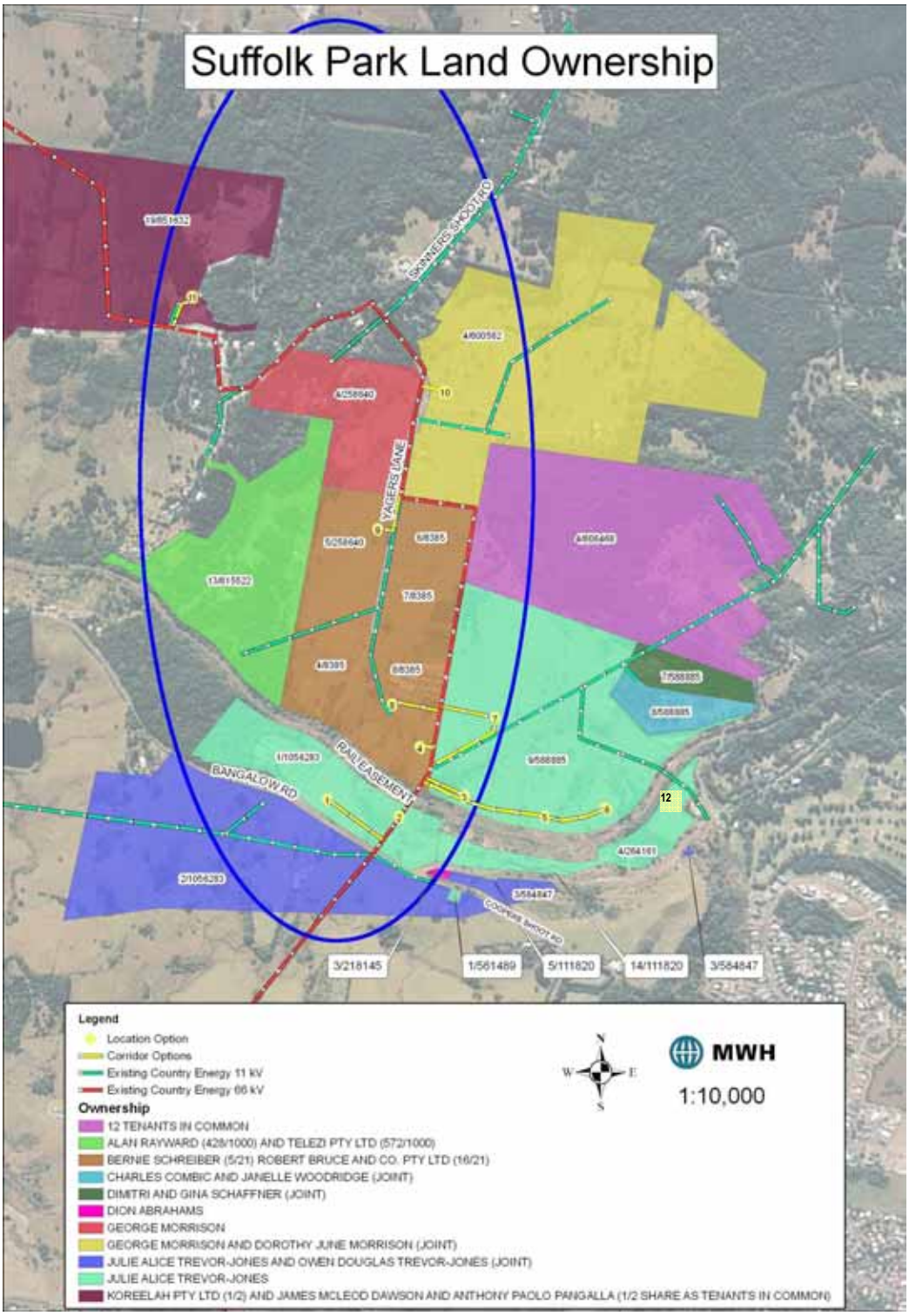
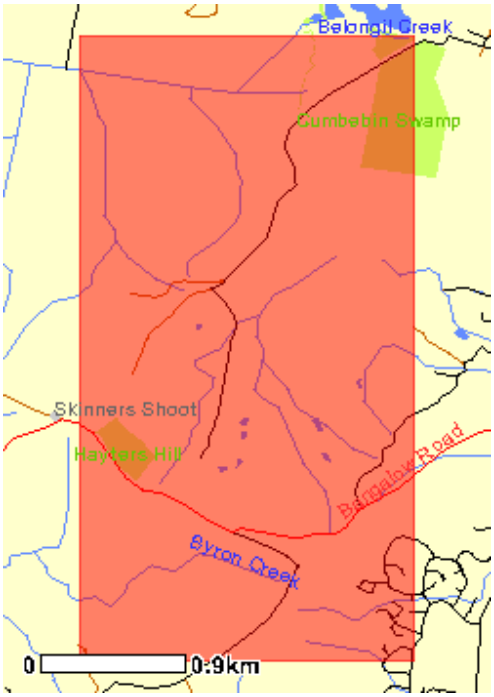


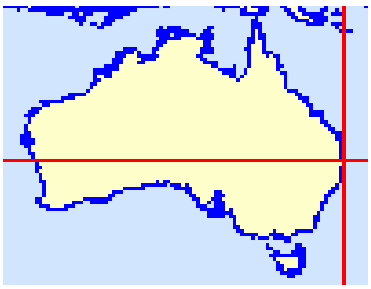
Figure 8-1: Land Ownership

Appendix A

EPBC Act Protected Matters Report

Search Type: Area
Buffer: 0 km
Coordinates: 153.57090, -28.68161, 153.61303, -28.65471





Summary
Matters of National Environmental Significance

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance: (Ramsar Sites)	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	None
Threatened Species:	38
Migratory Species:	24

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.deh.gov.au/heritage/index.html.

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.deh.gov.au/epbc/permits/index.html.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Places on the RNE:	None
Listed Marine Species:	53
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	2
Other Commonwealth Reserves:	None
Regional Forest Agreements:	1

Details

Matters of National Environmental Significance

Threatened Species	Status	Type of Presence
Birds		
*Cyclopsitta diophthalma coxeni** Coxen's Fig-Parrot	Endangered	Species or species habitat likely to occur within area
Lathamus discolor * Swift Parrot	Endangered	Species or species habitat may occur within area
Macronectes giganteus * Southern Giant-Petrel	Endangered	Species or species habitat may occur within area
Macronectes halli * Northern Giant-Petrel	Vulnerable	Species or species habitat may occur within area
*Poephila cincta cincta** Black-throated Finch (southern)	Endangered	Species or species habitat likely to occur within area
*Pterodroma neglecta neglecta** Kermadec Petrel (western)	Vulnerable	Species or species habitat may occur within area
Rostratula australis * Australian Painted Snipe	Vulnerable	Species or species habitat may occur within area
Thalassarche impavida * Campbell Albatross	Vulnerable	Species or species habitat may occur within area

Xanthomyza phrygia * Regent Honeyeater	Endangered	Species or species habitat may occur within area
Frogs		
Litoria aurea * Green and Golden Bell Frog	Vulnerable	Species or species habitat may occur within area
Litoria olongburensis * Wallum Sedge Frog	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Chalinolobus dwyeri * Large-eared Pied Bat, Large Pied Bat	Vulnerable	Species or species habitat may occur within area
*Dasyurus maculatus maculatus (SE mainland population)** Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)	Endangered	Species or species habitat likely to occur within area
*Potorous tridactylus tridactylus** Long-nosed Potoroo (SE mainland)	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus * Grey-headed Flying-fox	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Caretta caretta * Loggerhead Turtle	Endangered	Species or species habitat may occur within area
Chelonia mydas * Green Turtle	Vulnerable	Species or species habitat may occur within area
Dermochelys coriacea * Leathery Turtle, Leatherback Turtle, Luth	Vulnerable	Species or species habitat may occur within area
Snails, slugs		
Thersites mitchellae * Mitchell's Rainforest Snail	Critically Endangered	Species or species habitat likely to occur within area
Plants		
Acronychia littoralis * Scented Acronychia	Endangered	Species or species habitat likely to occur within area
Cryptocarya foetida * Stinking Cryptocarya, Stinking Laurel	Vulnerable	Species or species habitat likely to occur within area
Davidsonia sp. Mullumbimby-Currumbin Ck (A.G.Floyd 1595) *	Endangered	Species or species habitat likely to occur within area
Desmodium acanthocladum * Thorny Pea	Vulnerable	Species or species habitat likely to occur within area

Diploglottis campbellii * Small-leaved Tamarind	Endangered	Species or species habitat likely to occur within area
Endiandra floydii * Floyd's Walnut	Endangered	Species or species habitat likely to occur within area
Endiandra hayesii * Rusty Rose Walnut, Velvet Laurel	Vulnerable	Species or species habitat likely to occur within area
Floydia praealta * Ball Nut, Possum Nut, Big Nut, Beefwood	Vulnerable	Species or species habitat likely to occur within area
Owenia cepiodora * Onionwood, Bog Onion, Onion Cedar	Vulnerable	Species or species habitat likely to occur within area
Phaius australis * Lesser Swamp-orchid	Endangered	Species or species habitat likely to occur within area
Randia moorei * Spiny Gardenia	Endangered	Species or species habitat likely to occur within area
Syzygium hodgkinsoniae * Smooth-bark Rose Apple, Red Lilly Pilly	Vulnerable	Species or species habitat likely to occur within area
Syzygium moorei * Rose Apple, Coolamon, Robby, Durobby, Watermelon Tree, Coolamon Rose Apple	Vulnerable	Species or species habitat likely to occur within area
Tinospora tinosporoides * Arrow-head Vine	Vulnerable	Species or species habitat likely to occur within area

Migratory Species	**Status**	**Type of Presence**
Migratory Terrestrial Species		
Birds		
Cyclopsitta diophthalma coxeni Coxen's Fig-Parrot	Migratory	Species or species habitat likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle	Migratory	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail	Migratory	Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch	Migratory	Breeding may occur within area
Monarcha trivirgatus Spectacled Monarch	Migratory	Breeding likely to occur within area
Myiagra cyanoleuca Satin Flycatcher	Migratory	Breeding likely to occur within area
Rhipidura rufifrons Rufous Fantail	Migratory	Breeding may occur within area
Xanthomyza phrygia	Migratory	Species or species habitat may occur within

Regent Honeyeater		area

Migratory Wetland Species
Birds

Gallinago hardwickii Latham's Snipe, Japanese Snipe	Migratory	Species or species habitat may occur within area
Rostratula benghalensis s. lat. Painted Snipe	Migratory	Species or species habitat may occur within area

Migratory Marine Birds

Macronectes giganteus Southern Giant-Petrel	Migratory	Species or species habitat may occur within area
Macronectes halli Northern Giant-Petrel	Migratory	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross	Migratory	Species or species habitat may occur within area

Extra Information

State and Territory Reserves
Cumbebin Swamp Nature Reserve, NSW
Hayters Hill Nature Reserve, NSW
Regional Forest Agreements
Note that all RFA areas including those still under consideration have been included.
Upper North East NSW RFA, New South Wales

Department of the Environment and Heritage
GPO Box 787 Canberra ACT 2601 Australia
Telephone: +61 (0)2 6274 1111

Appendix B

Geotechnical Investigation, Soil Resistivity and ASS Reports

Australian Soil And Concrete Testing P/L

PO BOX 5120
Ballina Mail Centre, Ballina NSW 2478
7/17 Southern Cross Drive, Ballina
email : asct @bigpond.com
Telephone: 02-66 86 8567
Fax: 02-66 86 8396
Mobile: 0408 079 826
ABN: 49 050 539 930

REPORT ON GEOTECHNICAL INVESTIGATION PROPOSED ZONE SUBSTATION YAEGERS LANE BYRON BAY

FOR : TRICEND / MWH
BYRON BAY NSW 2481

9TH APRIL 2008
REF No : 1234-001-001

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Australian Soil And Concrete Testing P/L

PO BOX 5120
Ballina Mail Centre, Ballina NSW 2478
7/17 Southern Cross Drive, Ballina
email : asct @bigpond.com
Telephone: 02-6686 8567
Fax: 02-6686 8396
Mobile: 0408 079 826
ABN: 49 050 539 930

9th April 2008
Ref No : 1234 - 001 - 001

Country Energy.
c/- Tricend / MWH
Byron Bay NSW 2481

GEOTECHNICAL REPORT & LOT CLASSIFICATION
RE : Proposed Zone Substation - Site 7
AT : Yaegers Lane, Byron Bay

Introduction :

This report presents the results of site inspection, investigation and testing performed by Australian Soil & Concrete Testing Pty Ltd for a proposed zone substation at Site 7 Yaegers Lane, Byron Bay.

Inspection & Testing Procedure :

The proposed substation site is located in an undeveloped rural paddock. The area is situated near the top of a small ridge or spur within a much larger valley. Access to the site is through the disused piggery land then through the adjoining paddocks and up the slope to the designated site. The proposed substation site is well grassed and contains an area of ferns to the west on the upslope side. The current investigation was to ascertain the soil profile and possible depth to bedrock in the building area and to determine the suitability of the insitu soil profile for the proposed access road to the substation development

The inspection was carried out by Brian Dick, Principal Geotechnical Officer of ASCT, with the site investigation and testing performed by experienced technical staff in accordance with the Australian Standards AS 1726 Site Investigations & AS 2870 Residential Slabs & Footings - Construction.

Investigation Procedure : Lot Classification

The field work for the investigation of the area consisted of 2 boreholes to 2.0 meters and 1 borehole to 5 meters and 3 penetrometer tests to 1.8 meters or refusal. Borehole 1 & 2 were undertaken in the proposed building area and borehole 3 was done at the rear of the piggery buildings in the natural between the two dams. The Investigation was carried out in accordance with Australian Standard AS 1726-1993 Site Investigation Code.

Results of Site Investigation :

The site investigation in the proposed substation area has shown the natural soil to be low to non reactive sand and gravely sand to 5 meters deep with the bearing capacity ranging from 100Kpa at 300mm below the surface to 300Kpa or greater bearing capacity from 1.5 meters below the surface for the proposed substation development. The natural soil at borehole 3 for the access road had 100Kpa bearing capacity from 300mm below the surface to 2 meters and was in a very moist condition.

Results of Lot Classification :

The investigation revealed consistent subsurface conditions across the proposed substation building area, a low to non plastic, sand and gravely sand for the full depth across the building envelope, bedrock was not encountered. The building envelope shall be classified as :
Class S : Slightly Reactive In accordance with the guidelines of AS 2870.

The bearing capacity of the subgrade in the both proposed building area and access road is :
100 kPa from 300mm below the surface for standard footing design and 300 kPa from 1.5 meter below for the substation. The access road had 100 kPa from 300mm below for the full depth of the soil profile.

The potential hazard classification of the site is : **Class C : Minor.** In accordance with the guidelines of Appendix E, Table 1 of AS 1726 and is assessed as stable and will not be effected by landslide or subsidence when the substation is constructed.

Conclusion :

The results of the geotechnical investigation and inspection for bedrock determination and bearing capacity have provided enough soil profile information for Australian Soil & Concrete Testing to confirm that the bedrock was not encountered within the proposed substation construction development area. The bearing capacity through the profile is increasing and improving with depth in the proposed zone substation area and the access road can be developed with the use of good engineering practice, suitable drainage and an appropriate footing system implemented for the implied loads.

Should you require any further assistance or advice, please do not hesitate to call myself.

Yours faithfully,
Australian Soil & Concrete Testing Pty Ltd

Brian Dick
Managing Director

Report on Soil Penetration Resistance

Client : Tricend / MWH	**Project no** : 1234 - 001	**Project:** Yaegers Lane, Byron Bay
Test methods: AS 1289 6.3.2	**Report no** : 1234 - 001- 001	**Date Tested :** 28/3/08
Lab No : 8782	**Layer:** Subgrade – Natural	**Test location:** Proposed Zone Substation

Test 1

Depth below surface at commencement of test: 0 **mm**

Graduation Interval mm	Cumulative depth m	No. of Blows Required	Soil Description	Moisture Condition
300	0.30	4	Sand : dark brown grey Topsoil / Sand : pale grey	Moist
300	0.60	17	Sand : pale grey white	"
300	0.90	16	"	"
300	1.20	23	"	"
300	1.50	45/100	Gravely Sand : brown	"
300	1.80	Refusal	"	"
300	2.10			

Test 2

Depth below surface at commencement of test: 0 **mm**

Graduation Interval Mm	Cumulative depth m	No. of Blows Required	Soil Description	Moisture Condition
300	0.30	6	Sand : dark grey brown Topsoil / Sand : pale grey white	Moist
300	0.60	18	Sand : pale grey white	"
300	0.90	28	"	"
300	1.20	34	"	"
300	1.50	23	Gravely Sand : brown	"
300	1.80	21	"	"
300	2.10			"

Test 3

Depth below surface at commencement of test: 0 **mm**

Graduation Interval Mm	Cumulative depth m	No. of Blows Required	Soil Description	Moisture Condition
300	0.30	9	Sandy Clayey Silt : brown Topsoil / Sandy Silty Clay : brown	Moist
300	0.60	11	Sandy Silty Clay : brown	V. Moist
300	0.90	6	"	"
300	1.20	6	"	"
300	1.50	7	"	"
300	1.80	8	"	"
300	2.10			

Test

Depth below surface at commencement of test: 0 **mm**

Graduation Interval mm	Cumulative depth m	No. of Blows Required	Soil Description	Moisture Condition
300	0.30			
300	0.60			
300	0.90			
300	1.20			
300	1.50			
300	1.80			
300	2.10			

NATA ACCREDITED FOR TECHNICAL COMPETENCE

This document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025

Signed: _____ Date 30/04/2008

Brian Dick

(Approved Signatory)

BOREHOLE LOG REPORT

Client : Tricend / MWH	**Project No :** 1234- 001	**Project :** Yaegers Lane, Byron Bay
Lab No : 8782	**Report No :** 1234-001-001	**Borehole No:** 1

Borehole Inclination :90º	**Borehole Direction :** Vertical	**Date drilled :** 28/3/08
Surface Elevation : NA	**Borehole location :** Proposed Substation Area - Site 7	**Drill type :**Yanmar Drill Rig
Drilling Method : 90mm Auger		

TEST DATA

Soil Description	Depth (M)	Slope %	Graphic Symbol	Group Symbol	Consistency /Strength	Sample
SAND TOPSOIL : dark brown grey, non plastic, low dry strength, some medium to fine sand poorly graded, very loose, some organic matter, moist.	0.2			SP	VL	
SAND : pale grey white, non plastic, low dry strength, fine grained poorly graded, some fine gravel, medium dense, moist.	1.2			SP	MD	
GRAVELY SAND : brown, non plastic, low dry strength, coarse to fine sand well graded, fine gravel, medium dense to dense, moist.	2.0			SW	MD/D	
Stopped No Change						

BOREHOLE LOG REPORT

Client : Tricend / MWH	**Project No :** 1234- 001	**Project :** Yaegers Lane, Byron Bay
Lab No : 8782	**Report No :** 1234-001-001	**Borehole No:** 2

Borehole Inclination :90º	**Borehole Direction :** Vertical	**Date drilled :** 28/3/08
Surface Elevation : NA	**Borehole location :** Proposed Substation Area - Site 7	**Drill type :**Yanmar Drill Rig
Drilling Method : 90mm Auger		

TEST DATA

Soil Description	Depth (M)	Slope %	Graphic Symbol	Group Symbol	Consistency /Strength	Sample
SAND TOPSOIL : dark brown grey, non plastic, low dry strength, some medium to fine sand poorly graded, loose, some organic matter, moist.	0.15			SP	L	
SAND : pale grey white, non plastic, low dry strength, fine grained poorly graded, some fine gravel, medium dense, dry to moist.	1.2			SP	MD	
GRAVELY SAND : brown, non plastic, low dry strength, coarse to fine sand well graded, fine gravel, medium dense to dense, moist.	2.0			SW	MD/D	
	4.0					
Stopped No Change	5.0					

BOREHOLE LOG REPORT

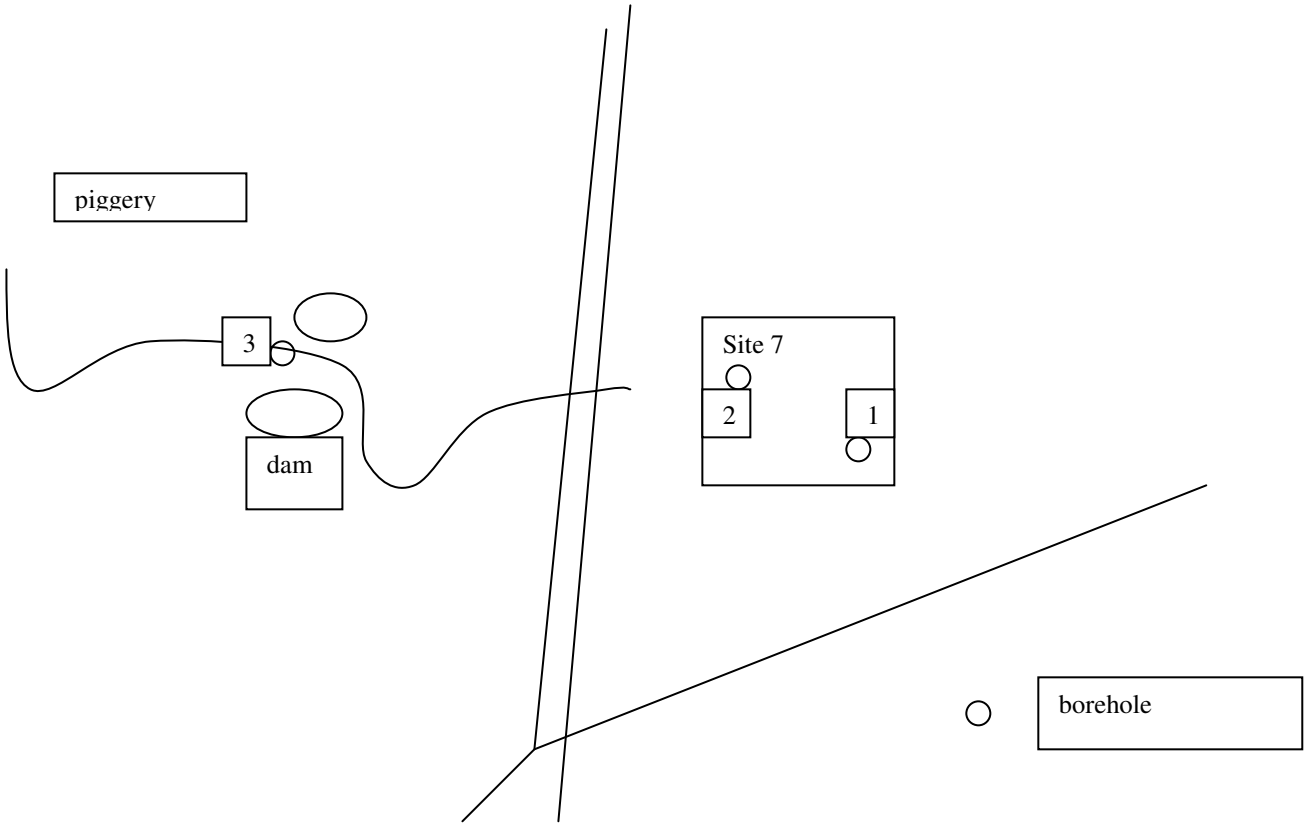
Client : Tricend / MWH	**Project No :** 1234- 001	**Project :** Yaegers Lane, Byron Bay
Lab No : 8782	**Report No :** 1234-001-001	**Borehole No:** 3

Borehole Inclination :90º	**Borehole Direction :** Vertical	**Date drilled :** 28/3/08
Surface Elevation : NA	**Borehole location :** Proposed Access Road - Site 7	**Drill type :**Yanmar Drill Rig
Drilling Method : 90mm Auger		

TEST DATA

Soil Description	Depth (M)	Slope %	Graphic Symbol	Group Symbol	Consistency /Strength	Sample
SAND CLAYEY SILT TOPSOIL : brown, low plastic, low dry strength, fine sand, firm, some organic matter, moist to very moist.	0.15			ML	F	
SAND SILTY CLAY : brown, medium plastic, medium dry strength, coarse to fine sand, some fine gravel, firm, very moist.				CL	F	
	1.0					
Stopped No Change	2.0					

PLAN OF TEST LOCATIONS



Acid Sulfate Soil Investigation

For

Proposed Power Substation Site
Yagers Lane (site 7),
Byron Bay, NSW

Prepared for: **Tricend**

Prepared by: **Australian Soil and Concrete Testing P/L**
7/17 Southern Cross Drive, Ballina, NSW, 2478

A.B.N. **49 050 539 930**

Email: asct@bigpond.com.

Reference: **1234 – 001**

Date: **10th April, 2008**

Table of Contents

1 Introduction

Australian Soil and Concrete Testing Pty Ltd (ASCT) have undertaken an Acid Sulfate Soil Investigation for a proposed power substation development site located at Yagers Lane (site 7), Byron Bay, NSW.

The broad aim of the Acid Sulfate Soil Investigation is to determine whether acid sulfate soil (ASS) is present at the site. If so, the extent, severity and type of ASS would also need to be determined. Furthermore, the investigation aims to determine the liming rate required to neutralise ASS should it be present at the site.

2 Acid Sulfate Soil

2.1 Background

ASS typically occurs in low-lying coastal areas. Developments involving excavation or lowering of the water table may result in the oxidation of sulfur (predominately in the form of pyrite) contained within these soils and the subsequent generation of acid discharge from the soil. The resultant discharge may find its way into the groundwater or stormwater and eventually into natural aquatic environments. The acidic run-off may lower the pH of the receiving water system, increase the concentration of metals and reduce the natural buffering capacity of the receiving waters.

There are two basic types of ASS. Actual Acid Sulfate Soils (AASS) are soils where the pyrites have been oxidised and sulfuric acid is present. Potential Acid Sulfate Soils (PASS) have not been oxidised and sulfuric acid has not yet been generated.

PASS in anaerobic conditions such as below the water table do not present an environmental hazard. However, if conditions change from anaerobic to aerobic, the pyrite in PASS will oxidise to form sulfuric acid. Oxidation can occur by either lowering the water table or removing the soil from below the water table, such as excavation.

2.2 ASS Management Principles and Guidelines

The following principles are in accordance with the ASSMAC Management Guidelines (1998) and are the fundamental strategies that underpin the management of ASS.

2.2.1 Avoidance

This is the soundest strategy and the proposed works should always attempt to modify work practices in order to avoid unnecessarily exposing or disturbing ASS. The proposed works should also where possible avoid activities that result in the fluctuation of the groundwater, in particular the lowering of groundwater.

2.2.2 Minimisation

Appropriate handling techniques and treatment of excavated soil are to be used to minimise and or prevent the disturbance of ASS. Furthermore, earthworks activities should be managed to minimise or mitigate the potential of ASS to impact on the surrounding environment.

2.2.3 Neutralisation

Sufficient neutralising agent should be incorporated into excavated soils in order to neutralise acid that is generated over time due to the gradual oxidation of ASS. Neutralising agent should also be applied to acidified water run-off and any remaining water ‘in-situ’ (within the pore spaces of the material being excavated) that has become acidified.

The management and remediation of the excavated soil for earth works will usually be achieved using a combination of the management strategies outlined above.

3 The Site

3.1 Site Description

The site is located near the top of a knoll in an undeveloped coastal/rural area. The site is currently accessed via cleared, well grassed grazing paddocks that adjoin Yagers Lane. There are no established tracks and the ground surface contains minor undulations. The proposed building area is well grassed and contains some small shrubs, principally ferns. The ground surface slopes approximately 7 % north-north east.

3.2 Soils

The soil at the site generally consists of non-reactive sand and gravely sand. The watertable was also found to exist from 1.9 m below the ground surface. The complete geotechnical borehole logs have been included in the geotechnical report compiled by ASCT (reference number: 1234 – 001).

4 The Investigation

4.1 Scope of Work

The scope of work for the Acid Sulfate Soil Investigation included:

- Drilling of three boreholes at the proposed development site.
- Collection of soil samples from the boreholes at 0.5 m intervals to a depth of 1.5 m.
- Analysis of all samples for field pH (pH_f) and field peroxide pH (pH_{fox}) to provide initial indication of PASS/AASS.
- Laboratory analysis of soil to determine % chromium reducible sulfur ($\%S_{cr}$), total actual acidity (TAA), net acidity and liming rates.
- Summary of ASS Analysis results.

4.2 Soil Sampling

Soil Sampling was conducted in accordance with the ASSMAC guidelines (1998) and included:

- The drilling of two boreholes in the building area of the proposed development site and one borehole in the location of the access road to the proposed development site. The borehole locations are displayed in figure 1.
- Sampling was undertaken by staff of ASCT, namely by Ben Hart (B. App. Sc.) and Matthew Hart (Geotechnician).
- Three soil samples were collected from each borehole at 0.5 m, 1.0 m and 1.5 m below the ground surface. Therefore, a total of nine soil samples were collected from the site.
- The drilling was conducted with a truck mounted drill rig (Yanmar 35) using solid flight augers and the samples were collected directly from the augers. The sampling augers were washed with clean water between each sample and sampling location.
- Samples were placed in zip lock plastic bags and transferred immediately to an esky with ice for storage. Samples were stored on ice before being tested the same day for field pH (pH_f) and field peroxide pH (pH_{fox}) in accordance with ASSMAC test method codes 21Af and 21Bf respectively. Furthermore, pH_{fox} testing was carried out using 30 % hydrogen peroxide adjusted to pH 5.5.
- On the basis of field testing, one sample was selected to be tested for % chromium reducible sulfur ($\%S_{cr}$ – Method 22B), total actual acidity (TAA), net acidity and liming requirements. These samples were transferred under ASCT's chain of custody conditions to the Environmental Analysis Laboratory (EAL), Lismore for analysis. The chain of custody documentation has been included in Appendix B of this report.

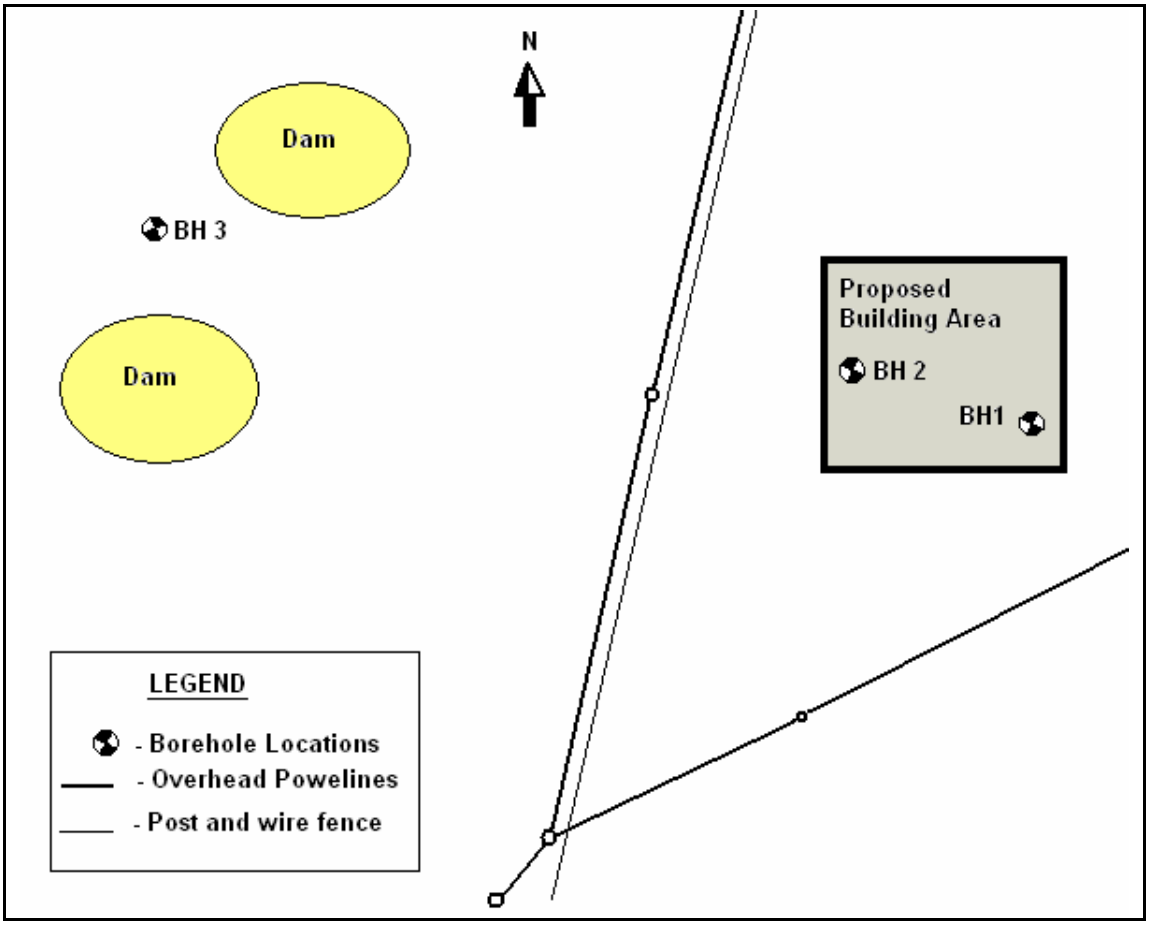


Figure 1: Plan of the proposed substation site at Yagers Lane, Byron Bay, showing the borehole locations.

5 Results

5.1 Field Testing

A summary of the field testing results is displayed in table 1. The field testing results indicate that the site may contain PASS, with samples from borehole 2 showing significant reactions with hydrogen peroxide. Furthermore, the results indicate that AASS is not present at the site. On the basis of the field testing results, sample number 6 was submitted for full laboratory analysis.

Table 1: Field testing summary.

Sample Number	Sample Source	Sample Depth (m)	pH_f	pH_{fox}	$pH_f - pH_{fox}$	PASS/AASS Indication*
1	**BH 1**	0.5	4.51	4.03	0.48	PASS unlikely
2	**"**	1.0	5.13	4.50	0.63	PASS unlikely
3	**"**	1.5	4.86	4.16	0.70	PASS unlikely
4	**BH2**	0.5	5.73	4.31	**1.42**	Possible PASS
5	**"**	1.0	5.80	4.24	**1.56**	Possible PASS
6	**"**	1.5	4.70	**3.45**	**1.25**	Possible PASS
7	**BH3**	0.5	6.06	5.40	0.66	PASS unlikely
8	**"**	1.0	5.80	5.32	0.48	PASS unlikely
9	**"**	1.5	5.49	5.11	0.38	PASS unlikely

* Indications are based on the ASSMAC guidelines and are determined as follows:

- PASS unlikely if → $pH_f - pH_{fox} < 1.0$
- Possible PASS if → $5 < pH_{fox} > 3$, or $pH_f - pH_{fox} > 1.0$
- PASS very likely if → $pH_{fox} < 3.0$, or $pH_f - pH_{fox} > 1.5$
- AASS present if → $pH_f < 4.0$

The field peroxide test is only an indicative test that is used to guide the selection of laboratory test samples. Furthermore, the test is least reliable in the sandy soil types that were encountered at the Yagers Lane site. Care must be taken when interpreting the reaction in these soils types as organic matter and other constituents such as manganese oxide can also cause a reaction.

5.2 Laboratory Testing

A summary of the laboratory results is displayed in table 2 and the complete results have been included in Appendix A. The laboratory testing provides more reliable results than the field testing and the ASS classifications of the laboratory samples are based on the following:

- Non-Potential Acid Sulfate Soils (Non PASS/AASS) – Laboratory testing indicates these soils have a net acidity below the ASSMAC action criteria and are not considered to present an environmental hazard.
- Potential Acid Sulfate Soils (PASS) – Laboratory testing indicates these soils have net acidity above the ASSMAC action criteria they may generate sulfuric acid and may present an environmental hazard. Management of these soils will be required.
- Actual Acid Sulfate Soils (AASS) – Laboratory testing indicates that these soils are actual acid sulfate when total actual acidity (TAA) is $pH_{KCl} < 4.0$. These soils may leach acid and will require management.

Table 2: Summary of laboratory test results

Sample Location	Depth (m)	TAA (pH_{KCl})	% Chromium Reducible Sulfur ($\%S_{cr}$)	Net Acidity mole H^+/tonne	Action Criteria* mole H^+/tonne	Acid Sulfate Potential	Lime Rate $kgCaCo_3/m^3$
BH2	1.5	5.38	<0.005	8	18	Non PASS/ASS	1

* Action criteria taken from the ASSMAC guidelines and is based on more than1000 tonnes of soil to be disturbed.

Laboratory analysis showed that the test sample had a net acidity below the ASSMAC action criteria. Therefore, on the basis of the laboratory testing the site can be classified as having Non-Potential Acid Sulfate Soils (Non-PASS). Laboratory testing also confirms there is no AASS at the site.

The laboratory analysis has also determined a liming application rate (with a safety factor of 1.5) based on the results of testing. The recommended liming rate is 1 kg $CaCo_3$ (lime)/m^3 of soil.

6 Acid Sulfate Soil Summary

The field and laboratory testing together with the general site information have enabled the following conclusions to be made:

- Soil from the site was found to have a net acidity below the ASSMAC action criteria and can be classified as Non-PASS/AASS. Non-PASS/AASS are not considered to present an environmental hazard.
- Laboratory testing has determined a recommended liming rate of 1 kg $CaCo_3$ (lime)/m^3 of soil, however this may be considered optional given that the net acidity of the soil is below the ASSMAC action criteria.

7 Limitations

This report relies on information supplied by the client and the results of investigations conducted in accordance with accepted practices and standards. The report is intended to represent a reasonable interpretation of the appropriate legislation and the condition of the site at the time of the investigation. However, due to these elements being subject to change over time the report under no circumstances can be considered to represent the definitive state of the site at all times.

Finally, should any problem or concern arise that needs clarification or assistance the client should not hesitate to contact this office.

Yours Faithfully,
Australian Soil and Concrete Testing Pty. Ltd.

Ben Hart
Environmental Officer
B. App. Sc

Brian Dick
Managing Director

8 References

DPI Qld, 2003. *Acid Sulfate Soils Laboratory Methods Guidelines*.

Stone, Y, Ahern C R, and Blunden B (1998). *Acid Sulfate Soils Manual 1998. Acid Sulfate Soil Management Advisory Committee* (ASSMAC), Wollongbar, NSW, Australia.

RESULTS OF ACID SULFATE SOIL ANALYSIS (Page 1 of 1)

1 sample supplied by Australian Soil and Concrete Testing on 31st March 2008 - Lab. Job No. E9062
Analysis requested by Brian. - Your Project: Substations, Yaegers Lane, Byron Bay (PRO#1234-001)

Sample Site	EAL lab code	Texture (note 6)	Moisture Content (% moisture)	Lab. Bulk Density tonne DW/m^3	TAA pH_{kcl}	Titratable Actual Acidity (TAA) mole H^+/tonne (to pH 6.5)	Reduced Inorganic Sulfur (% chromium reducible S) (%Scr) (note 2)	Reduced Inorganic Sulfur (Scr) mole H^+/tonne	NET ACIDITY Chromium Suite mole H^+/tonne (based on %Scrs)	LIME CALCULATION Chromium Suite kg $CaCO_3/m^3$ (includes 1.5 safety Factor)
Method No.					*23A*	*23F*	*22B*	*a- 22B*	*note 5*	*note 5*
BH2	*E9062/1*	Coarse	7.3	2.0	5.38	8	<0.005	0	8	1

NOTE:
1 - All analysis is Dry Weight (DW) - samples dried and ground immediately upon arrival (unless supplied dried and ground)
2 - Samples analysed by SPOCAS method 23 (ie Suspension Peroxide Oxidation Combined Acidity & sulfate) and 'Chromium Reducible Sulfur' technique (Scr - Method 22B)
3 - Methods from Ahern, CR, McElnea AE , Sullivan LA (2004). *Acid Sulfate Soils Laboratory Methods Guidelines*. QLD DNRME.
4 - Bulk density was determined immediately on arrival to laboratory (insitu bulk density is preferred)
5 - ABA Equation: Net Acidity = Potential Sulfidic Acidity (ie. Scrs or Sox) + Actual Acidity + Retained Acidity - measured ANC/FF
6 - For Texture: coarse = sands to loamy sands; medium = sandy loams to light clays; fine = medium to heavy clays and silty clays
7 - .. Denotes not requested or required
8 - CRS, TAA and ANC are NATA certified but other SPOCAS segments are currently not NATA certification
9- Results at of below detection limits are replaced with '0' for calculation purposes. CRS detection limit is 0.005%S.
10 - Projects that disturb >1000 tonnes of soil, the ≥0.03% S classification guideline would apply.

NATA
Lab Accred No: 14949
This Document is issued in accordance with NATA's accreditation requirements. Accredited for compliance with ISO/IEC 17025

(Classification of potential acid sulfate material if: coarse Scr≥0.03%S or 19mole H+/t; medium Scr≥0.06%S or 37mole H+/t; fine Scr≥0.1%S or 62mole H+/t)

Report Page 2 of 2

checked: .....

APPENDIX B – Chain of Custody

AUSTRALIAN SOIL AND CONCRETE TESTING P/L A.B.N.49 050 539 930
Unit 7/17 Southern Cross Drive, P.O. Box 5120 Ballina NSW 2478. Telephone: 02 6686 8567, Fax: 02 6686 8396

E9062

ASCT Doc. No. A18 Rev. 03- 3/7/07 - CC

Laboratory Test Program

Client : TRICEND.	Project no : 1234 – 001	Project : SUBSTATIONS, YAEGERS LN, BYRON BAY
Location : PROPOSED SUBSTATION	Requested By: ASCT	Test methods :
Sampled By : BH / MH	Sample Type : SAND	Date Sampled : 28.3.08

Lab Sample No	Sample Source	Sample Description	Depth of Sample (m)	CRS SCREEN	LIMS RAPS														
8782	BH2	GRAVELLY SAND/BROWN	1.5																

Comments

Signed: _____ Date: 31/3/08
(Approved Signatory)

Signed: _____ Date:
(Receiving Authority)

Sampling performed at ASCT P/L Ballina
NATA Accredited Laboratory Number 3229

Page of

countryenergy

Suffolk Park
Soil Resistivity

Site 7
&
Site 12

31st January 2008

Conclusion:

Site 7. The first soil analysis was conducted in a North South traverse across the site indicating a multilayer soil structure when resolved to a three layer provided a match of measured to calculated results within a 10% accuracy. The soil structure for this traverse is a 340 Ω-m layer 5.5 metres thick with a middle layer of 120 Ω-m soil for 7 metres before becoming increasingly resistive to 600 Ω-m infinitely.

Traverse two conducted East West across the site indicated quite different results with quite high resistance upper layers of 736 Ω-m for the 5.7 metre top layer with a 3142 Ω-m, 7 metre thick middle layer before decreasing to an infinite layer of 373 Ω-m. This second traverse intersected the ridge where traverse 1. was conducted extending down through quite swampy wet ground approximately 5 metes lower than the ridge line. The different results would indicate vertical stratification of the soil requiring further soil resistance testing to create a composite model for earthing system design. For the purpose of site selection this second traverse would provide a better indication of soil composition as earthworks would be expected to level the site removing the ridge to some extent.

Site 12. Due to the limited area only a 60 metre analysis could be performed across this site exhibiting a multilayer soil composition which resolved well to a three layer soil model. A 713 Ω-m 2.25 metre thick top layer with a 1305 Ω-m middle layer 8 metres thick before decreasing to an infinite thickness layer of 618 Ω-m soil provided a good match of results.

Earthing system design is aided by soil structures that exhibit conductive properties at the lower layers allowing fault current to be drawn away from the surface when returning to its source. Both site 7. (traverse 2) and site 12 have more conductive lower layers although each of these layers is quite resistive overall. Site 7. (traverse 2) is slightly more preferable from an earthing perspective as the lower layer appears to be a better conductive medium but considerable area may need to be secured for auxiliary earthing such as counterpoising if required on a solidly earthed system. Usually the distribution phase to earth fault level is the limiting design parameter which can be alleviated by neutral earthing reactors if site area is insufficient.

Comparing the soil composition characteristics of both sites a definitive influence on the selection decision isn't identified.

Site 7.

Suffolk Park Site 7. Soil Resistivity Traverses.

Spacing Metres	Apparent Resistivity Traverse 1.
0.5	386.74
1	347.81
2	293.11
4	306.41
6	319.69
8	273.88
10	219.78
20	254.76
30	299.66
40	419.02
60	449.24
80	447.58
100	484.76

Metric/Logarithmic X and Y

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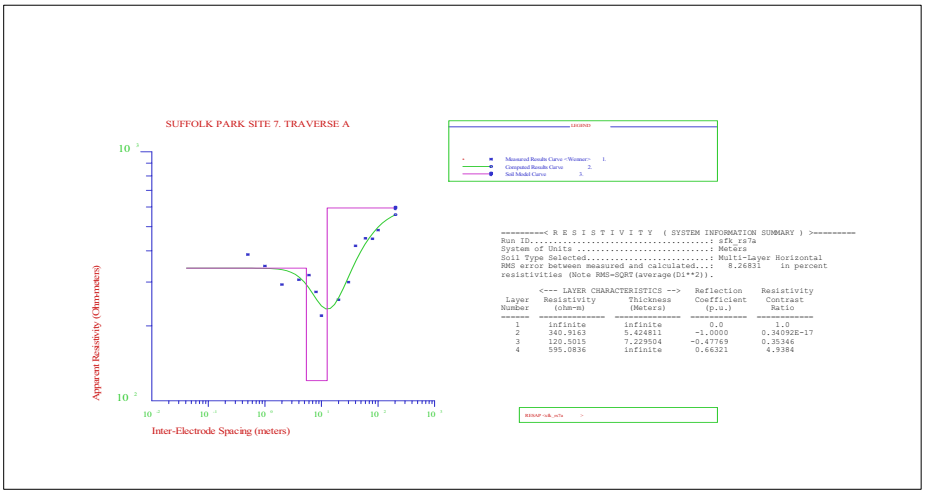

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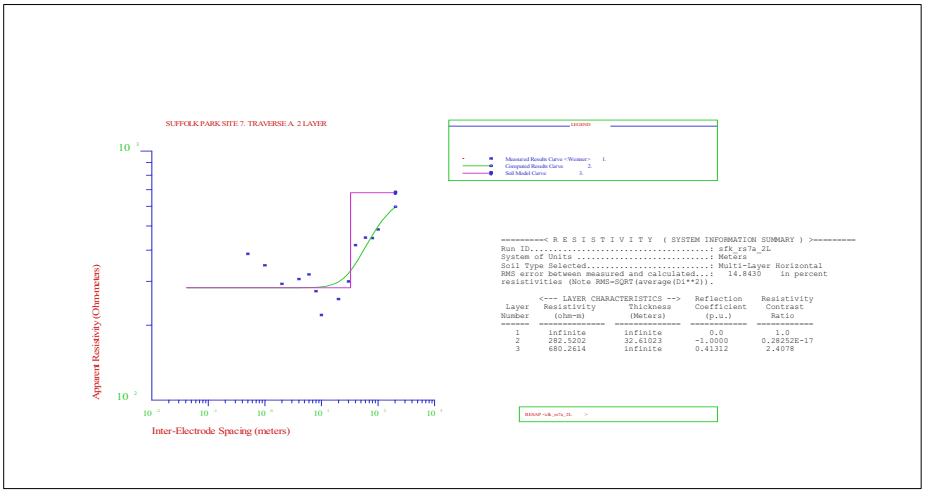

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Spacing Metres	Apparent Resistivity Traverse 2.
0.5	692.8
1	801.04
2	782.77
4	785.11
6	885.48
8	981.56
10	1065.69
20	1258.57
30	1052.43
40	830.88
60	474.19
80	470.45
100	462.2

Metric/Logarithmic X and Y

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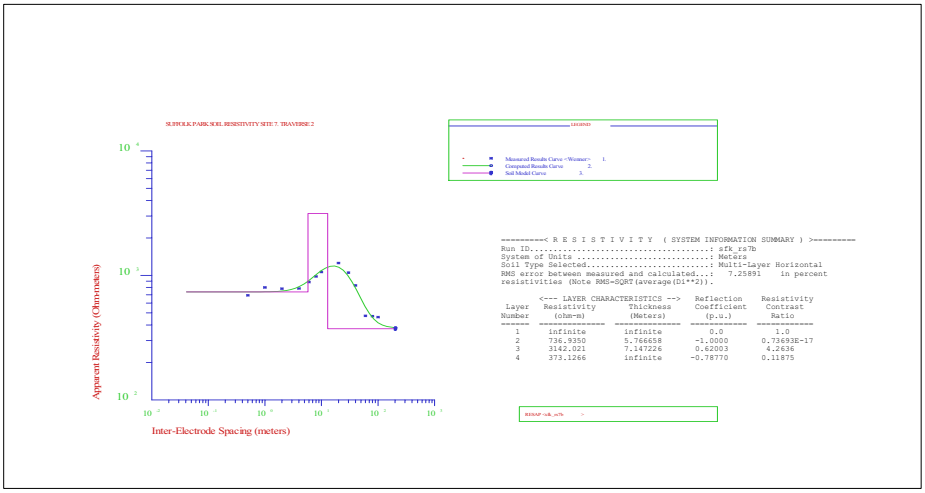

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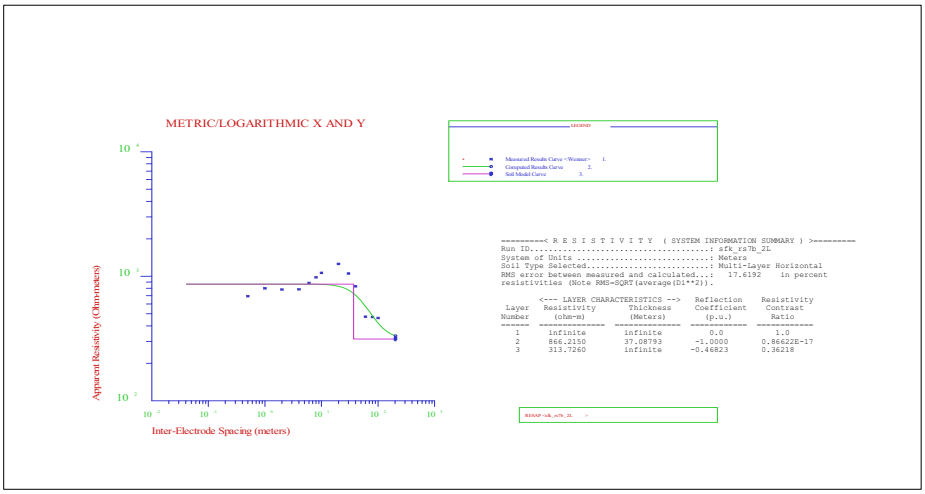

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Site 12.

Spacing Metres	Apparent Resistivity
0.5	687.32
1	775.84
2	761.24
4	903.48
6	1019.59
8	1049.36
10	995.21
20	929.1
30	774.25
40	667.77
60	681.33

Metric/Logarithmic X and Y

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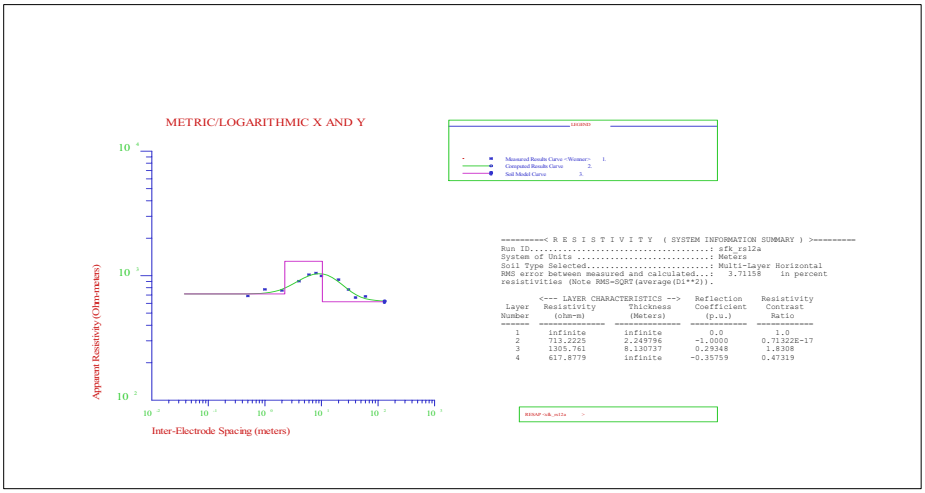

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Metric/Logarithmic X and Y

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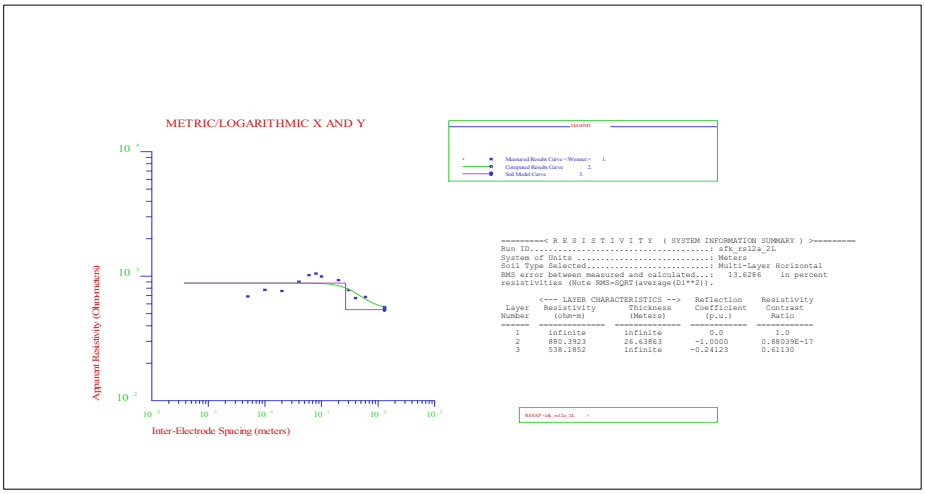

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Report #1:

=========< R E S I S T I V I T Y (SYSTEM INFORMATION SUMMARY) >=========

Run ID.....: sfk_rs7a
System of Units .....: Metres
Soil Type Selected.....: Multi-Layer Horizontal
RMS error between measured and calculated...: 8.26831 in percent
resistivities (Note RMS=SQRT(average(Di**2)).

<--- LAYER CHARACTERISTICS --> Layer Number	Resistivity (ohm-m)	Thickness (Metres)	Reflection Coefficient (p.u.)	Resistivity Contrast Ratio
1	infinite	infinite	0.0	1.0
2	340.9163	5.424811	-1.0000	0.34092E-17
3	120.5015	7.229504	-0.47769	0.35346
4	595.0836	infinite	0.66321	4.9384

End of Report #1

Report #2:

=========< R E S I S T I V I T Y (SYSTEM INFORMATION SUMMARY) >=========

Run ID.....: sfk_rs7a_2L
System of Units .....: Metres
Soil Type Selected.....: Multi-Layer Horizontal
RMS error between measured and calculated...: 14.8430 in percent
resistivities (Note RMS=SQRT(average(Di**2)).

<--- LAYER CHARACTERISTICS --> Layer Number	Resistivity (ohm-m)	Thickness (Metres)	Reflection Coefficient (p.u.)	Resistivity Contrast Ratio
1	infinite	infinite	0.0	1.0
2	282.5202	32.61023	-1.0000	0.28252E-17
3	680.2614	infinite	0.41312	2.4078

End of Report #2

Report #3:

=========< R E S I S T I V I T Y (SYSTEM INFORMATION SUMMARY) >=========

Run ID.....: sfk_rs7b
System of Units .....: Metres
Soil Type Selected.....: Multi-Layer Horizontal
RMS error between measured and calculated...: 7.25891 in percent
resistivities (Note RMS=SQRT(average(Di**2)).

<--- LAYER CHARACTERISTICS --> Reflection Resistivity

Layer Number	Resistivity (ohm-m)	Thickness (Metres)	Coefficient (p.u.)	Contrast Ratio
1	infinite	infinite	0.0	1.0
2	736.9350	5.766658	-1.0000	0.73693E-17
3	3142.021	7.147226	0.62003	4.2636
4	373.1266	infinite	-0.78770	0.11875

End of Report #3

Report #4:

==========< R E S I S T I V I T Y (SYSTEM INFORMATION SUMMARY) >==========

Run ID.....: sfk_rs7b_2L
System of Units .....: Metres
Soil Type Selected.....: Multi-Layer Horizontal
RMS error between measured and calculated...: 17.6192 in percent
resistivities (Note RMS=SQRT(average(Di**2)).

<--- LAYER CHARACTERISTICS --> Reflection Resistivity

Layer Number	Resistivity (ohm-m)	Thickness (Metres)	Coefficient (p.u.)	Contrast Ratio
1	infinite	infinite	0.0	1.0
2	866.2150	37.08793	-1.0000	0.86622E-17
3	313.7260	infinite	-0.46823	0.36218

Report #12:

==========< R E S I S T I V I T Y (SYSTEM INFORMATION SUMMARY) >==========

Run ID.....: sfk_rs12a_2L
System of Units .....: Metres
Soil Type Selected.....: Multi-Layer Horizontal
RMS error between measured and calculated...: 13.6286 in percent
resistivities (Note RMS=SQRT(average(Di**2)).

<--- LAYER CHARACTERISTICS --> Reflection Resistivity

Layer Number	Resistivity (ohm-m)	Thickness (Metres)	Coefficient (p.u.)	Contrast Ratio
1	infinite	infinite	0.0	1.0
2	880.3923	26.63863	-1.0000	0.88039E-17
3	538.1852	infinite	-0.24123	0.61130

End of Report #13

Report #14:

==========< R E S I S T I V I T Y (SYSTEM INFORMATION SUMMARY) >==========

Run ID.....: sfk_rs12a_3L

System of Units .....: Metres
Soil Type Selected.....: Multi-Layer Horizontal
RMS error between measured and calculated...: 3.71158 in percent
resistivities (Note RMS=SQRT(average(Di**2)).

Layer Number	<--- LAYER CHARACTERISTICS --> Resistivity (ohm-m)	Thickness (Metres)	Reflection Coefficient (p.u.)	Resistivity Contrast Ratio
1	infinite	infinite	0.0	1.0
2	713.2225	2.249796	-1.0000	0.71322E-17
3	1305.761	8.130737	0.29348	1.8308
4	617.8779	infinite	-0.35759	0.47319

WARNING MORE THAN ONE SOIL MODEL CAN PRODUCE SIMILAR APPARENT RESISTIVITY MEASUREMENT CURVES. IF YOU USE THE DEFAULT STEEPEST-DESCENT METHOD, THEN YOU WILL MOST OFTEN OBTAIN DECENT AGREEMENT BETWEEN MEASURED VALUES AND THE COMPUTED CURVE, WITH A REALISTIC SOIL MODEL; HOWEVER, THE FIT MAY OCCASIONALLY BE SUB-OPTIMAL. IN SUCH CASES, THE MARQUARDT METHOD WILL USUALLY YIELD AN EXCELLENT FIT, BUT MAY SOMETIMES SUGGEST EXTREME RESISTIVITY VALUES. NOTE THAT DIFFERENT SOIL MODELS WILL USUALLY YIELD SIMILAR RESULTS FOR YOUR GROUNDING SYSTEM MODELS (I.E., GPR, TOUCH & STEP VOLTAGES), PROVIDED THAT THE GROUNDING SYSTEM IS LOCATED CLOSE TO THE EARTH SURFACE. IF IN DOUBT, CHECK YOUR RESULTS WITH BOTH SOIL MODELS.

End of Report #14

Appendix C

Engineering Design Summary – Skinners Shoot Road/Yagers Lane Access

Engineering Design Compliance Summary

Proposed Upgrade to Skinners Shoot Road, Yagers Lane & Construction of new Driveway to provide access to proposed transformer site No.7, Suffolk Park/Skinners Shoot

Tricend Design & Engineering
P.O. Box 14, Suffolk Park NSW 2481
1 Carlyle Street, Byron Bay NSW 2481
Ph: 02 - 66872699
Fax: 02 - 66872588
Email: tricend@nrg.com.au

Introduction

This report has been prepared at the request of Ian Brooks of Right Of Way Services on behalf of Country Energy to assist in the decision process involved with identifying the best option for a new 66 kV sub station at Suffolk Park.

The preferred site for the substation has been narrowed down to 2 options, reduced from 11 possible sites after extensive investigation over the last 12 – 18 months. The attached aerial photo prepared by MWH shows these 11 proposed sites.

The scope of works requested to be undertaken by Tricend was in relation to sub station site No 7 which involved determining the engineering constraints associated with accessing this proposed substation site via Skinners Shoot Road & Yagers Lane.

The **scope of works** was;

"To assess the quality, curvature, width and gradient of Skinners Shoot Road and Yagers Lane, Suffolk Park to access a 50 tonne low loader truck. Determine what further work is required on the roads to get them to a standard to handle the load/width and any tree clearing requirements. Provide written report with findings and recommendations.

The following should be allowed for:

Length of float	22 metres approx.	
Width of float	3.5 metres	
Weight of transformer	50 tonne approx.	
Height from ground	300 mm max.	
Height to top of transformer	(from ground level)	4.7 metres
Turning radius	To be confirmed	

Note:- The crucial point with ground clearance is the part of the float near the goose neck is the problem area. If the site is above the level of the road we need to ensure the entrance driveway is gently curved otherwise the float will bottom out at this point."

Skinners Shoot Road & Yagers Lane are currently typical minor rural type roads which have relatively low traffic usage. It was determined that they will require civil works to enable them to be used now and in the future for delivery of the proposed 66kV / 132 kV transformer and its ongoing maintenance.

Once a decision has been made as to the viability of this option (No 7) an approval for a section 138 application would need to be obtained prior to commencement of construction works from Byron Shire Council for the proposed upgrade works within the road reserves known as Skinners Shoot Road & Yagers Lane. A development application to locate the sub station and construct new access driveway would be required from Byron Shire Council over the property owned by Mr. R Bruce & Bernie Schreiber known

as Yagers farm (lot 5 DP 258640, Lots 4, 6, 7 & 8 DP 8385) and Julie Trevor-Jones (Lot 9 DP 588885). It should be noted that the site No 7 is actually located on the Trevor Jones property but that access to the subject site is only possible via the Bruce/Schrieber property due to certain physical constraints as detailed in this report.

Skinners Shoot Road extends from the southern edge of Byron Bay to the suburb of Byron Bay known as Suffolk Park. It runs generally in a north south direction where it intersects Yagers Lane near the end of its current formation. Yagers Lane runs in a generally east west direction before leading onto a property previously operated as a commercial piggery known as Yagers farm which is currently going through the process of being converted to a large plant nursery. The current owners of this site (which contains the proposed substation site No 7) also have plans in the future to create a community title subdivision for between 8 – 12 dwellings. Whilst there is driveways and infrastructure in place at the old piggery site new access driveway will need to be constructed to enable the delivery of the proposed substation once it reaches the end of Yagers Lane.

One of the constraints associated with the selection of the sub station site No 7 is that parts of Skinners Shoot Road, Yagers Lane and the Old piggery are effected by periodic flooding. This has implications in relation to those times when ongoing maintenance requirements to the substation site are necessary. The substation site itself is considered to be well above the 1/100 year flood level but the same situation of periodic flooding applies to many other parts of Byron Bay and the Suffolk Park area where from time to time due to the low lying nature of the area, access will be restricted.

Description of proposed works

Skinners Shoot Road & Yagers Lane are currently under the control and ownership of Byron Shire Council. Plans & details are attached in the appendix which shows where the proposed upgrade works are to commence and finish.

Skinners Shoot Road currently services approximately 30 dwellings (some legal others not so it is a little hard to confirm the actual number). According to current Australian Standards the width of its carriageway and capacity of its formation would not meet those Standards. The proposed civil works identified by this investigation involve amongst other things, widening of the Skinners Shoot Road in parts, and therefore it would potentially be seen as a benefit to the residents of Skinners Shoot Road for the proposed works to be undertaken.

It is understood that section 94 contributions (i.e.: contributions toward the provision or improvement of community amenities or services managed by council) have been collected by Byron Shire Council associated with development approvals in the vicinity which could assist with the costs to do the road upgrade works (subject to negotiation with BSC).

Currently Yagers Lane services the Nursery site (old piggery) with the potential to become an additional 12 dwellings. The Skinners Shoot Road & Yagers Lane section of the proposed access route is shown in the details, (including plans & photographs of the respective access conditions at the time of this report) attached in the appendix.

Skinners Shoot Road is a variable 3 – 6 meters bitumen formation with variable 0.5 – 2 m gravel sealed shoulders. The attached plans show details for a distance of 1500 metres to the corner of Yagers Lane, the distance of 629 meters to the front gate of Yagers farm and details on the section of the new driveway proposed to be constructed from the entrance to the Nursery /Yagers farm and the extent of the proposed works.

In the investigation the aspects of pavement capacity, change in longitudinal gradients and crossfalls were considered to enable a estimate of cost to be established subject to final detailed investigation. A cost estimate was then undertaken to allow the option to be considered in terms of comparison to other options available (i.e.: water tower site).

The section of Skinners Shoot Road from the start (adjacent to the Aquarius hostel) for the first 1200 meters is expected to require minimal works which include mostly overhanging vegetation and possibly CBR testing to confirm pavement adequacy.

The remaining section of Skinners Shoot Road up until where it intersect Yagers Lane will require more intensive works to provide satisfactory access to the require low loader. These works have been identified in attached plans & details and the cost estimate prepared by JM Bashforth Pty Ltd who are experienced civil works contractors established for many years in the local area. The principal John Bashforth has also worked on the site in terms of providing earthworks to the previous owners of the Option No 7 property. These works involve reconstruction of sections of the road and lane to provide better alignment in terms of mostly crossfalls where pavement super elevation exceed 3%. The cost estimate prepared includes the cost to adjust cross falls at chainages 268, 580 and intersection of Skinners Shoot Road and Yagers Lane. There will also be improvements to certain areas of pavement along both road formations to cater for the vehicle turning templates (variable widening) and finally increasing the capacity of 2 pipe culverts for additional width and strengthening in Yagers Lane.

When determining the minimum works necessary to provide the required access way we were referred to the Byron Shire Council performance criteria which is

- “Access way widths should reflect the function and volume of use.”

The width of the access way proposed is 4 metre wide seal with 1 m shoulders which is the now the minimum standard (in accordance with Byron Shire Council’s requirements per discussions with Council’s engineer on the minimum acceptable standard) for the number of daily traffic movements between 0 – 150 . The number of additional average daily traffic movements assumed after the construction period is less than 2. During its period of operation as a piggery the traffic volume would have been likely to be 15 – 20

per day, dependant upon the number and frequency of deliveries to the commercial operation.

This is less than the number of daily traffic movements attributed to the subject sites current dwelling entitlement. Once the operation of the property becomes an established plant nursery, the minimum standard of access way proposed on Yagers Lane would assist in the future operations of the Nursery.

The definition of minor works is defined by the Dept of Lands as follows:

"To establish or maintain an access track within the land corridor set aside as a public or crown road"

The extent of works required on Skinners Shoot & Yagers Lane do not fall within this definition however the attached plans and details will substantially assist in obtaining the necessary approvals to undertake the works required.

The proposed works are able to be undertaken without significant disturbance to the land form as outline in the following Photo description.

Photo 1: Start of Skinner Shoot Road adjacent to the Aquarius Hostel Intersection

Photo 2: View looking toward the south at the start of the detailed survey information of the typical existing Skinners Shoot road formation.

Photo 3: View looking north back toward the start of where the survey information was undertaken. Improvements to the pavement width will be required over this section between **CH 0 - 231**

Photo 4: View of Skinners Shoot Road looking toward the south from approximately **CH 231** showing the start of the first of the realignment works that will be required between **CH 231 – 317** involving adjustment of the pavement cross fall and horizontal road alignment. This is the steepest part of the proposed access drive being in the vicinity of 10 degrees.

Photo 5: View of Skinners Shoot Road looking north from about **CH 317** back toward **CH 231** (refer to access road plan for details).

Photo 6: View of Skinners Shoot Road looking North West from about **CH 522 back toward CH 447** of existing pavement condition required to be improved.

Photo 7: View of Skinners Shoot Road looking toward the south east from about **CH 522** showing start of the next section of realignment works which will be required between **CH 548 – 611** involving adjustment of the pavement cross fall and horizontal road alignment.

Photo 8: View of Skinners Shoot Road looking back toward the north from **CH 611 toward CH 580**

Photo 9: View of Skinners Shoot Road where it intersects with Yagers Lane, looking to the North of current access arrangements between **CH 1508 (stn 29) – CH 1444.** The formation at this section will also require adjustment of the pavement cross fall and horizontal road alignment for low loader turning arrangements.

Photo 10: View of intersection of Skinners Shoot Road & Yagers Lane looking toward the east in the direction of the entrance to the Yagers farm site. This section of road will require environmental control, repair and extension of existing pipe culverts, excavation and widening of the road shoulders and overlay of existing pavement with 100mm road base. The two coat flush seal and minor reshaping will benefit the use of the Yager's farm as a nursery and reduce maintenance in the long term associated with the substation (and to protect against scouring in larger storm events).

Photo 11: View of Yagers Lane looking back to the north along the existing formation between **CH 288 – CH 197.** There are 2 x pipe culvert crossings (comprising 2 x 600 diameter RC pipes) which need to be upgraded.

Photo 12: View of Yagers Lane looking north at approximately **CH 396**

Photo 13: Once at the entrance to the Yagers farm the new access drive will need to be constructed to avoid any impacts to the large fig at the entrance which will require also the removal of an old weigh bridge adjacent to the entrance gate (see below Photo 14).

Photo 14: View of old weighbridge required to be removed at the entrance to Yagers farm.

Photo 15: View of proposed route of new access drive from the fig tree to the top side of the adjacent piggery sheds which is partially formed.

Photo 16: View of the next 200 meters (approximately) looking toward the south which will follow the natural contours and sweep round to the east on the down slope side of the dam.

Photo 17: View of the existing slope in the direction of the white car proposed for the new access route.

Photo 18: New access road is proposed to be constructed in between the concrete overflow device and the dam to the right of the photo.

Photo 19: Once past the dam the driveway will require to cross over an existing gully. The site of the option No 7 is approximately 20 meters past the post and rail fence in the background of the photo. It is intended to use box culverts to provide a suitable crossing. Other works in this section of the works is to change spillway location to existing dam. Install pipe culvert in approximate location of old spillway and provide rock scour protection to new roadwork's at existing concrete spillway and proposed box culvert. The proposed formation from the fig tree to the proposed site will be four meter wide road pavement with a 3.60 wide two coat flush seal.

Photo 20: It should be noted that at the corner of Lawson & Shirley Streets just prior to turning into Skinners Shoot Road is a recently constructed roundabout which should be able to be navigated by the low loader under the supervision of a suitable traffic management plan.

Conclusion

The proposed access upgrade of Skinners Shoot Road & Yagers Lane will allow for access by the required low loader and delivery of the 66 kV and 132 kV transformers. Where sealing of the road is to be undertaken this can occur after or toward the end of the completion of the site proposed for the sub station (building pad, drainage, etc). The road during construction will also continue to be used by cars servicing dwellings in the vicinity so a traffic management plan should be submitted with the application details to council for public comment.

The proposed works will allow access to the substation site for the low loader as well as other types of service vehicles in the future. It will improve existing access arrangements for the local community as well as Rous Water, Country Energy and Byron Shire Council.

In general the factors effecting access are site distance, speed restrictions, turning radii and vertical and horizontal gradient and alignment. It should be noted that the maximum change in vertical gradient within the proposed route for the access driveway is less than the 6%. The maximum recommended by the Australian Standard 2890 and the Byron Shire Council Specification for Engineering works is 12.5%. The average grade over the length of the existing and proposed access drive is less than 5% with 3 steeper sections occurring only for short distances that can be modified to provide the required access.

The minimum turning radii evaluated within the proposed access drive is between 15 – 30 m, which exceeds the requirements of the Australian Standard and the Byron Shire Council Specification for Engineering works. The maximum proposed **vehicle speed** is adequate for the circumstances **(20 km/hr).**

The maximum depth of cut required to construct the proposed access way is between 0.300 - 1 m and the maximum fill height is proposed to be 1.200 m.

A summary of the works proposed to the existing public roads and the unformed section of the driveway is:

- Slashing undergrowth and trimming of trees where necessary
- Light grading of the natural terrain
- Crowning with Grader and medium sized excavator the road formation to establish surface and cross fall drainage
- Establishing cross-banks and table drains to control water and sediment runoff
- And Placement of gravel, road base to stabilize the track formation and fill surface depressions such as potholes etc.

The works can be undertaken by John Bashforth Pty Ltd using a medium sized excavator, grader and roller to compact the gravel base. The summary description of the required

works based on inspections and the plans and details attached is included in the appendix. In total the **cost of construction works estimated was $505,145-00 plus GST.**

All works are proposed to be undertaken in accordance with the soil and water management details prepared for the final works to the standards such as those detailed in the NSW Dept Of Housing manual.

A surveyor will prior to commencement of works confirm the location of the works within the Road Reserves and the associated existing access track to ensure proposed works are built to the specific requirements.

There are no significant new drainage structures required to be installed other than 2 pipe crossings and the minor gully crossing to prevent water ponding against the driveway. These will be 900 mm diameter Class X type with headwalls to prevent scour These pipes crossings are to be installed to control the flow of water into the natural drainage system and mitigate impacts from stormwater runoff.

Finally there will be minimal impact during and after construction of the upgrade to Skinners Shoot Road & Yagers Lane as well as the new access drive to either the environment or amenity of the surrounding area. The Environmental Assessment of Proposal (under a format such as Part 5, Environmental Planning & Assessment Act 1979) relating to the road works should be undertaken and submitted with the section 138 application (i.e.: consent from the council/road authority required for any works within a public road reserve). Final detailed engineering design should be undertaken by suitably qualified civil engineer and approved by Byron Shire Council prior to commencement of works to confirm the cost estimate provided.

The proposed upgrade and extension of the access route can be designed and constructed in accordance with the Council Development control Plan 2002, the Council Specification for Engineering Works, Dept of Lands requirements (if applicable), the relevant Australian Standards and associated local and statutory authority requirements.

Addendum

For the purposes of comparison of the costs associated with Option No 7 to the alternative site (known as the water tower site) near the corner of Bangalow Road and Old Bangalow Road, Suffolk Park a preliminary investigation was undertaken to approximate this alternative sites associated civil works costs.

The length of the driveway access works required to be undertaken is substantially less than for Option No 7 and is approximately 200 meters. The cost is estimated to be in vicinity of **$85,000 plus GST**. There is also significant cost to prepare suitable building envelope for the substation due to the sloping nature of the land. Potentially significant retaining works will be required as well as drainage works to divert the large water catchment area of storm water runoff which effects the site. This is estimated to be **$280,000 plus GST.** If this option is of further interest as a preferred site, further detailed engineering investigation should be undertaken to confirm final costs.

APPENDIX

- PRELIMINARY ESTIMATE OF COST FOR ROAD IMPROVEMENTS SKINNERS SHOOT ROAD AND YAGERS LANE TO PROPOSED SUBSTATION SITE

- SURVEY INFORMATION, PLANS & DETAILS PREPARED BY LAND PARTNERS & TRICEND DESIGN & ENGINEERING FOR THE PROPOSED ACCESS ROUTE

LANDPARTNERS
built environment consultants

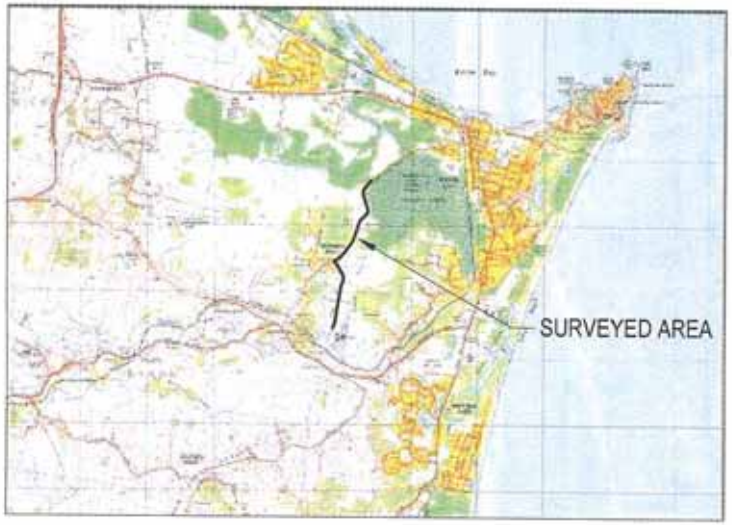
LandPartners Limited
Incorporating
ASPECT north &
KFM Partnership

DETAIL SURVEY OF SKINNERS SHOOT ROAD & YAGERS LANE. BYRON BAY

for

COUNTRY ENERGY

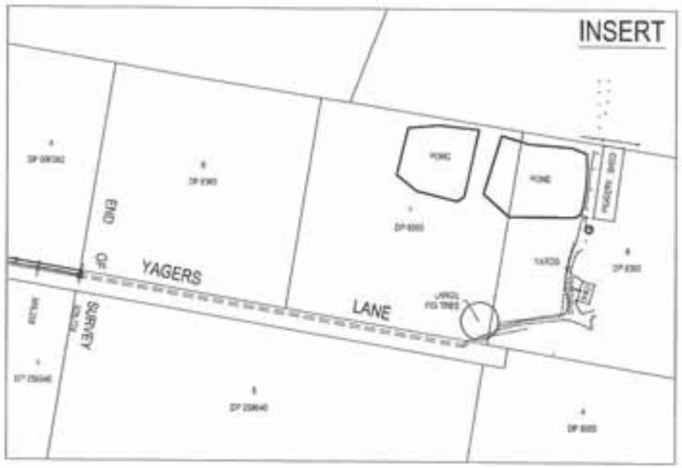
LOCALITY PLAN:



INDEX:

LM070201-SV1

October 2007



DISCLAIMER:-

THE TITLE BOUNDARIES AS SHOWN HEREON WERE NOT MARKED AT TIME OF SURVEY AND HAVE BEEN DETERMINED BY PLAN DIMENSIONS AND FIELD SURVEY.

SERVICES SHOWN HEREON HAVE BEEN LOCATED WHERE POSSIBLE BY FIELD SURVEY.

PRIOR TO DEMOLITION, EXCAVATION OR CONSTRUCTION ON THE SITE, THE RELEVANT AUTHORITIES SHOULD BE CONTACTED FOR POSSIBLE LOCATION OF UNDERGROUND SERVICES AND DETAILS OF ALL SERVICES.

ALL DIMENSIONS ARE APPROXIMATE ONLY AND ARE SUBJECT TO FINAL SURVEY.

THIS PLAN MAY NOT BE COPIED UNLESS THESE NOTES ARE INCLUDED.

50 25 0 50 100 150 200 250

SCALE 1:2500 AT A1

LEGEND

- LOT BOUNDARY
- EDGE OF FORMATION
- EDGE OF BITUMEN SEAL
- OVERHEAD ELECTRICITY
- CENTRELINE OF ROAD
- SURFACE DRAIN

COUNTRY ENERGY

DETAIL AND CONTOUR SURVEY OF SKINNERS SHOOT ROAD & YAGERS LANE BYRON BAY

SCALE 1:2500 AT A1
DATUM: A.H.D

LOCALITY: BYRON BAY
LGA: BYRON

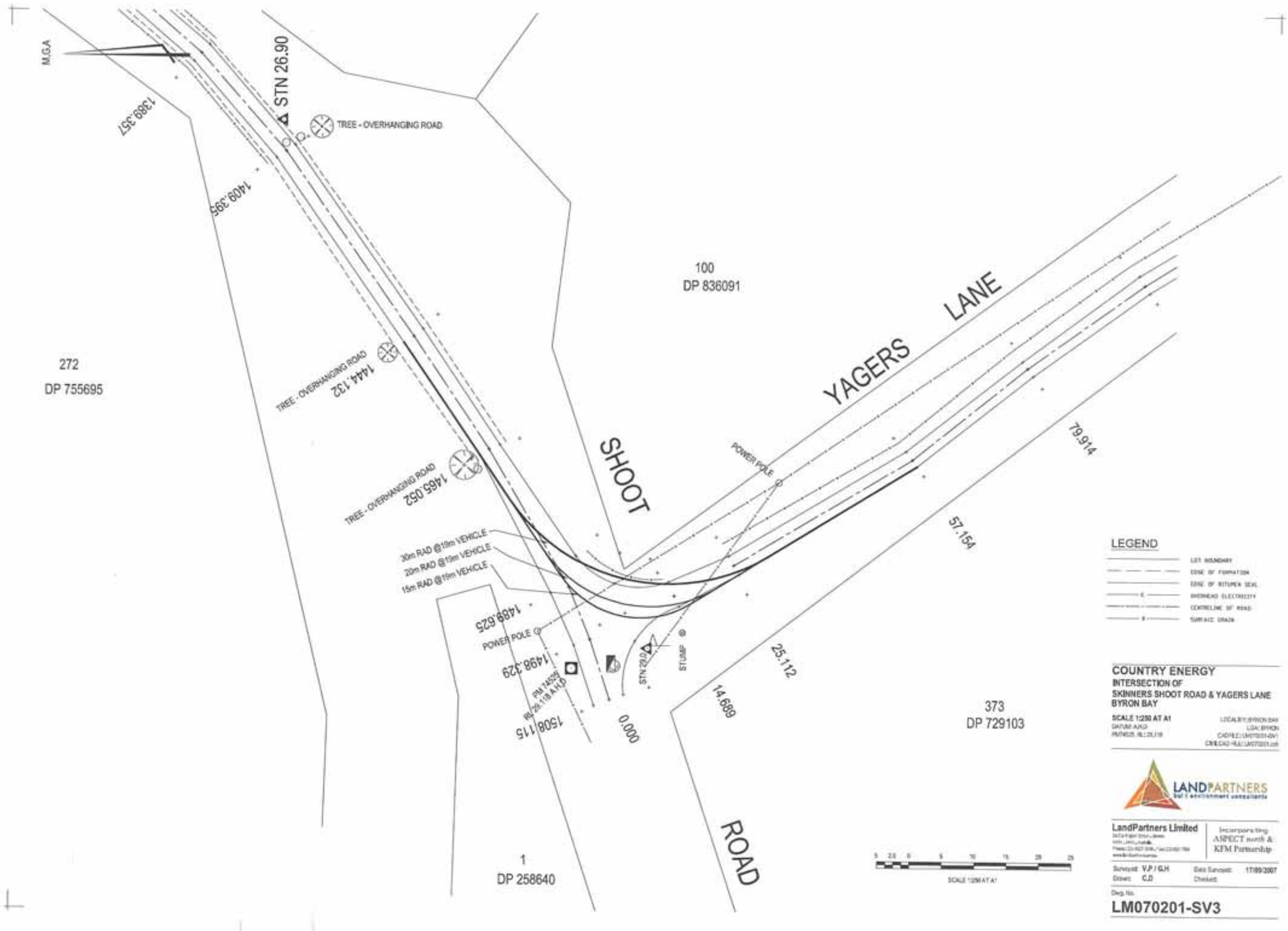
LandPartners Limited

Incorporating ASPECT north & KFM Partnership

Surveyed: V.P / G.H
Drawn: C.D
Date Surveyed: 17/09/2007
Checked:

Dwg. No.

LM070201-SV2



M.G.A
STN 26.90
TREE - OVERHANGING ROAD
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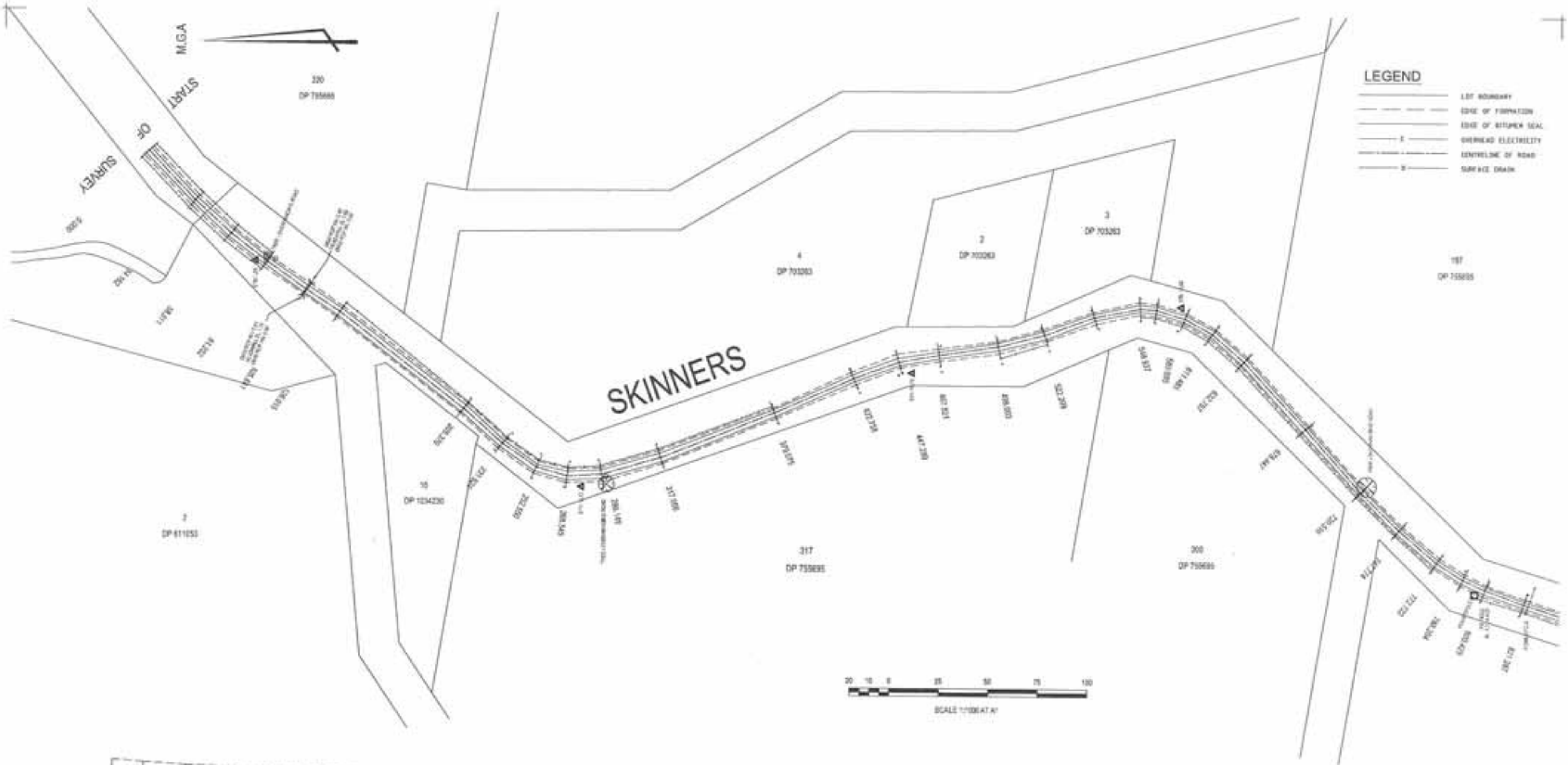
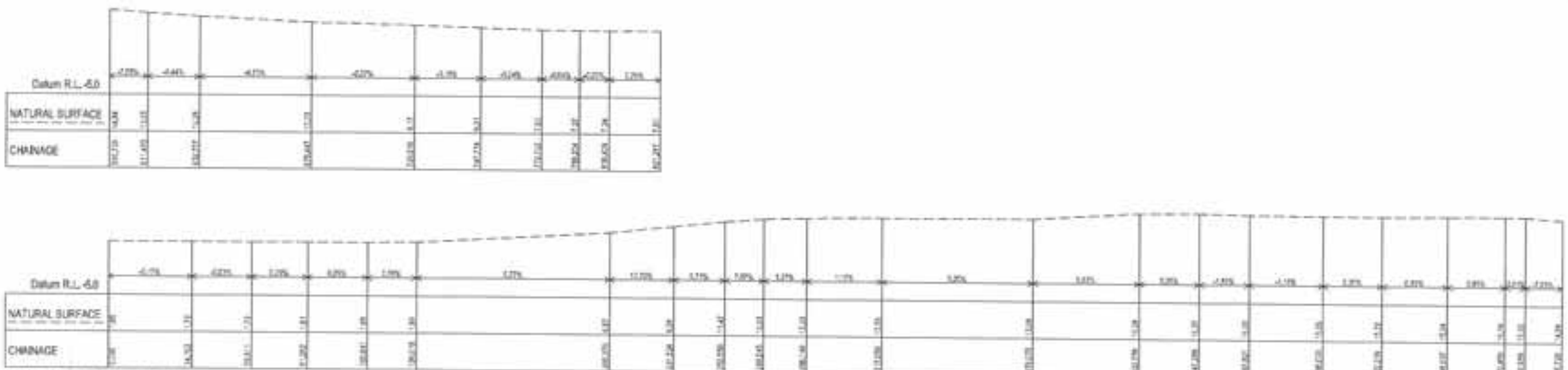
1409.395
100
DP 836091
272
DP 755695
YAGERS LANE
TREE - OVERHANGING ROAD
1444.132
TREE - OVERHANGING ROAD
1465.052
SHOOT
POWER POLE
79.914
57.154
30m RAD @19m VEHICLE
20m RAD @19m VEHICLE
15m RAD @19m VEHICLE
1488.625
POWER POLE
1498.329
PM 74525
RL 25.118 A.H.D
1508.115
0.000
STN 29.0
STUMP
25.112
14.689
373
DP 729103
1
DP 258640
ROAD
SCALE 1:250 AT A1
LEGEND
LOT BOUNDARY
EDGE OF FORMATION
EDGE OF BITUMEN SEAL
OVERHEAD ELECTRICITY
CENTRELINE OF ROAD
SURFACE DRAIN
COUNTRY ENERGY
INTERSECTION OF
SKINNERS SHOOT ROAD & YAGERS LANE
BYRON BAY
SCALE 1:250 AT A1
LANDPARTNERS
LandPartners Limited
Incorporating
ASPECT north &
KFM Partnership
Surveyed: V.P / G.H
Drawn: C.D
Date Surveyed: 17/09/2007
Checked:
Dwg. No.
LM070201-SV3





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LONGSECTION - SKINNERS SHOOT ROAD

COUNTRY ENERGY
LONGSECTION & PLAN VIEW OF SKINNERS SHOOT ROAD BYRON BAY

SCALE 1:1000 AT A1
DATUM: A.H.D
PM74525, RL: 29.118

LOCALITY: BYRON BAY
LGA: BYRON

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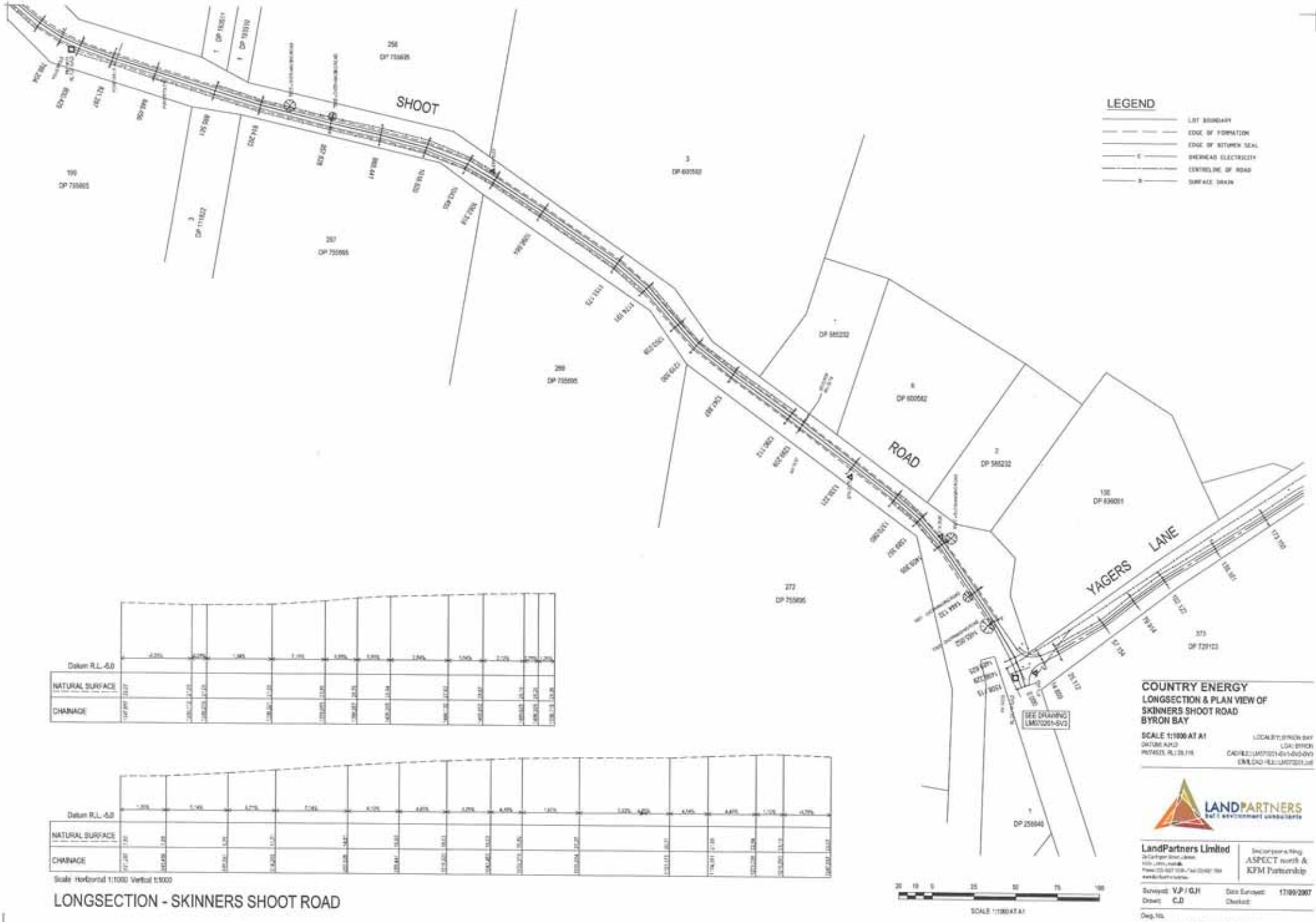
Incorporating ASPECT north & KFM Partnership

Surveyed: V.P / G.H
Drawn: C.D
Date Surveyed: 17/03/2007
Checked:

Dwg. No.
LM070201-SV4



LONGSECTION - SKINNERS SHOOT ROAD

COUNTRY ENERGY

LONGSECTION & PLAN VIEW OF SKINNERS SHOOT ROAD BYRON BAY

SCALE 1:1000 AT A1

DATUM: AHD

LOCALITY: BYRON BAY

LGA: BYRON

LandPartners Limited

Surveyed: V.P / G.H

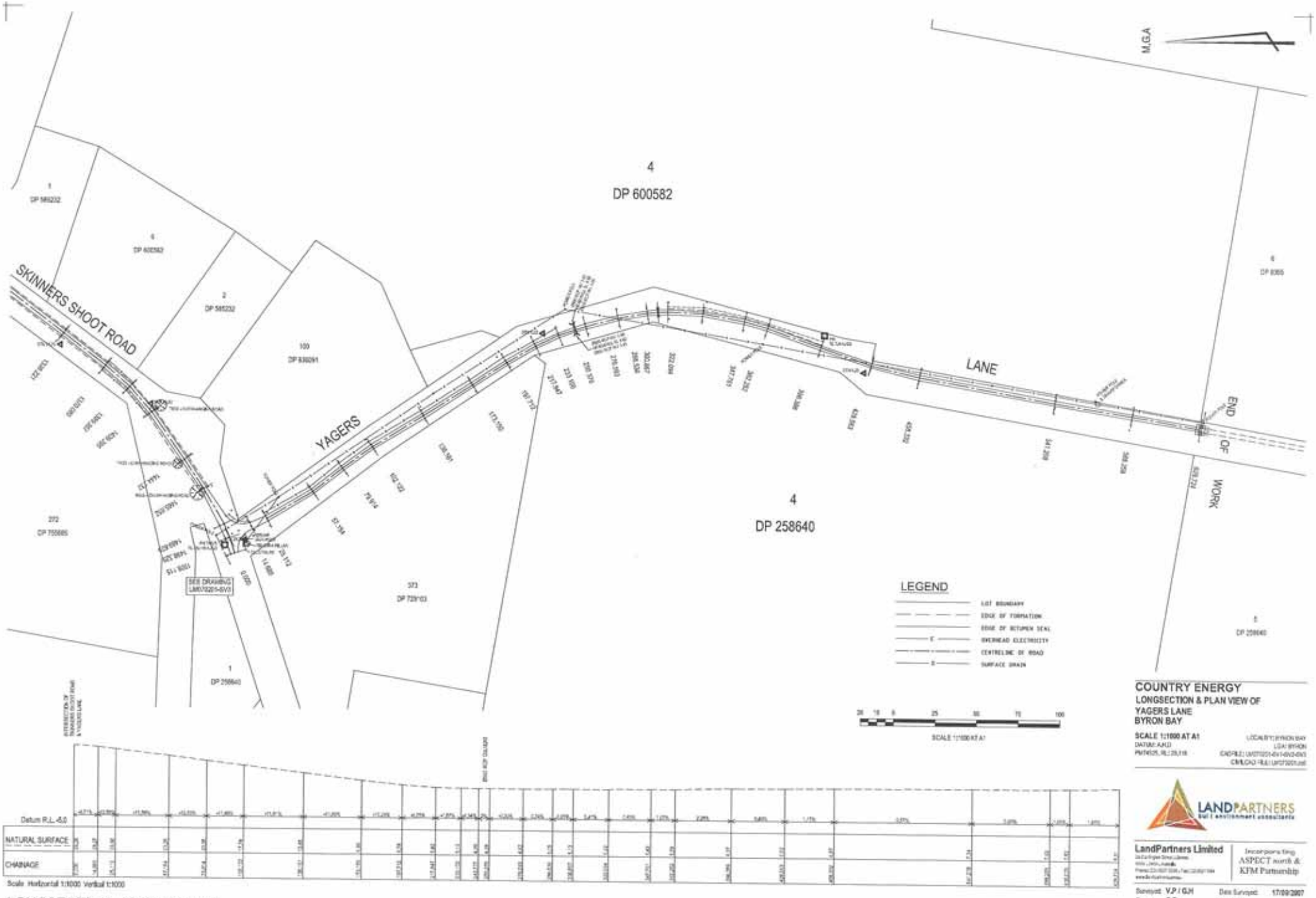
Drawn: C.D

Date Surveyed: 17/09/2007

Checked:

Dwg. No.

LM070201-SV5



LONGSECTION - YAGERS LANE

COUNTRY ENERGY

LONGSECTION & PLAN VIEW OF YAGERS LANE BYRON BAY

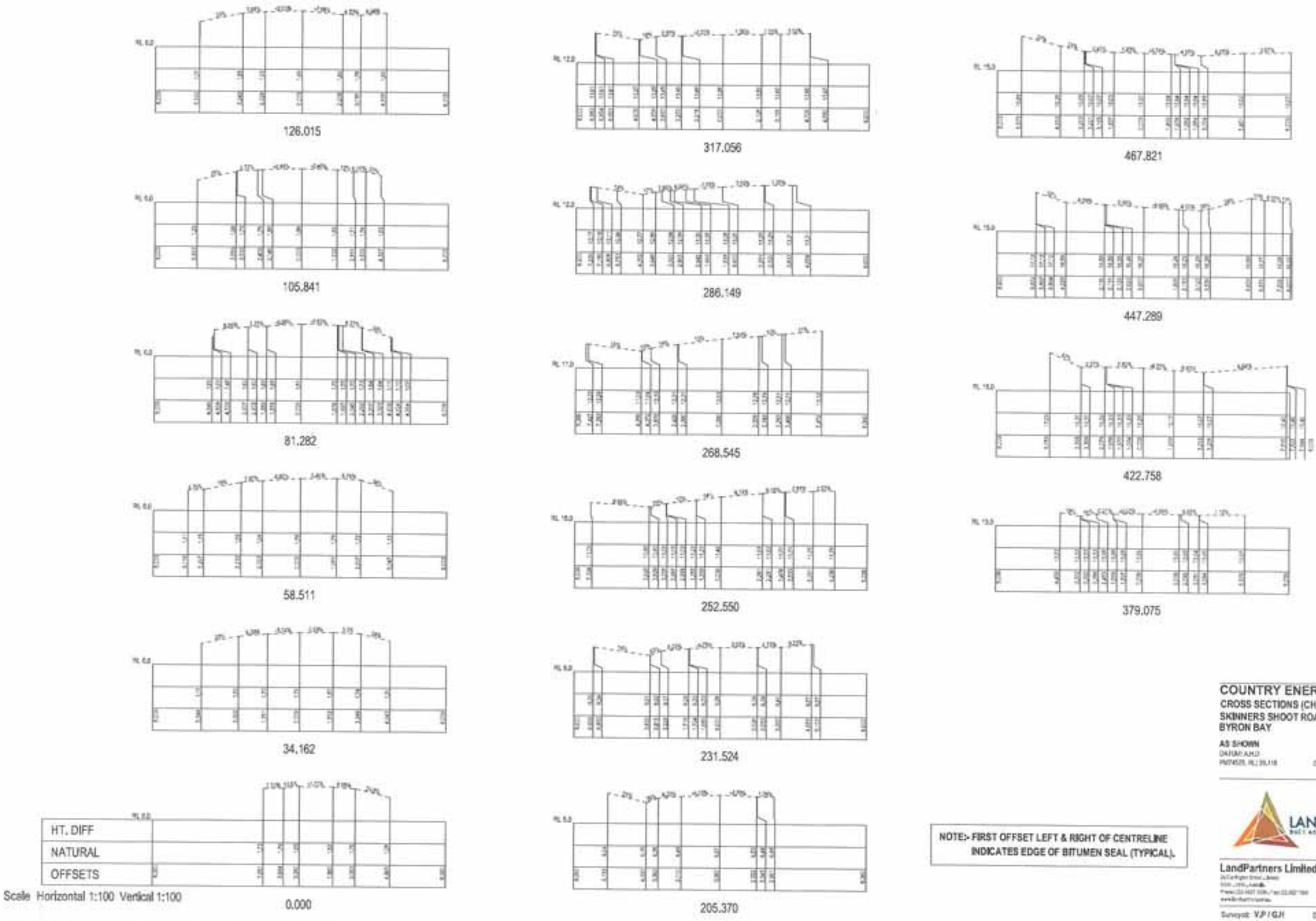
SCALE 1:1000 AT A1
DATUM: AHD
PM14525, RL 29.518

LOCALITY: BYRON BAY
LGA: BYRON
CAD FILE: LM070201-SV1-SV2-SV3
CIVILCAD FILE: LM070201.civil

LandPartners Limited
Incorporating ASPECT north & KFM Partnership

Surveyed: V.P / G.H
Drawn: C.D
Date Surveyed: 17/09/2007
Checked:

Dwg. No.
LM070201-SV6



CROSS SECTION - SKINNERS SHOOT ROAD

COUNTRY ENERGY
CROSS SECTIONS (CHN 0.000-467.821)
SKINNERS SHOOT ROAD
BYRON BAY

AS SHOWN

LandPartners Limited

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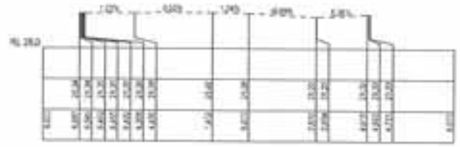
Surveyed: V.P / G.H Date Surveyed: 17/09/2007
Drawn: C.D Checked:

Dwg. No.
LM070201-SV7



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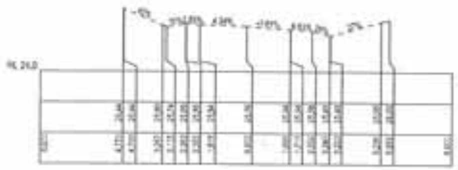

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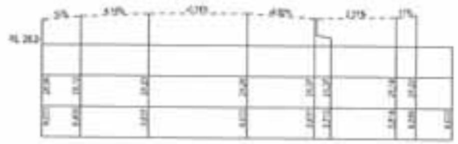

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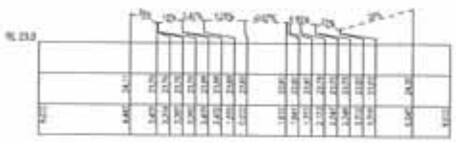

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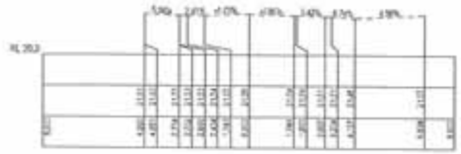

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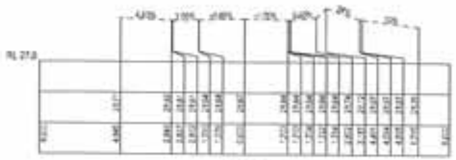

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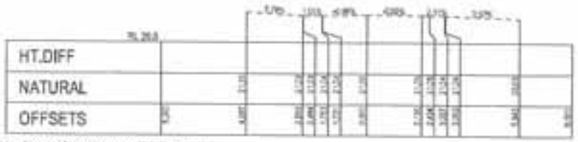

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CROSS SECTION - SKINNERS SHOOT ROAD

NOTE:- FIRST OFFSET LEFT & RIGHT OF CENTRELINE INDICATES EDGE OF BITUMEN SEAL (TYPICAL).

COUNTRY ENERGY
CROSS SECTIONS (CHN 1299.209-1508.115)
SKINNERS SHOOT ROAD
BYRON BAY

AS SHOWN
LOCALITY: BYRON BAY
LGA: BYRON

LandPartners Limited
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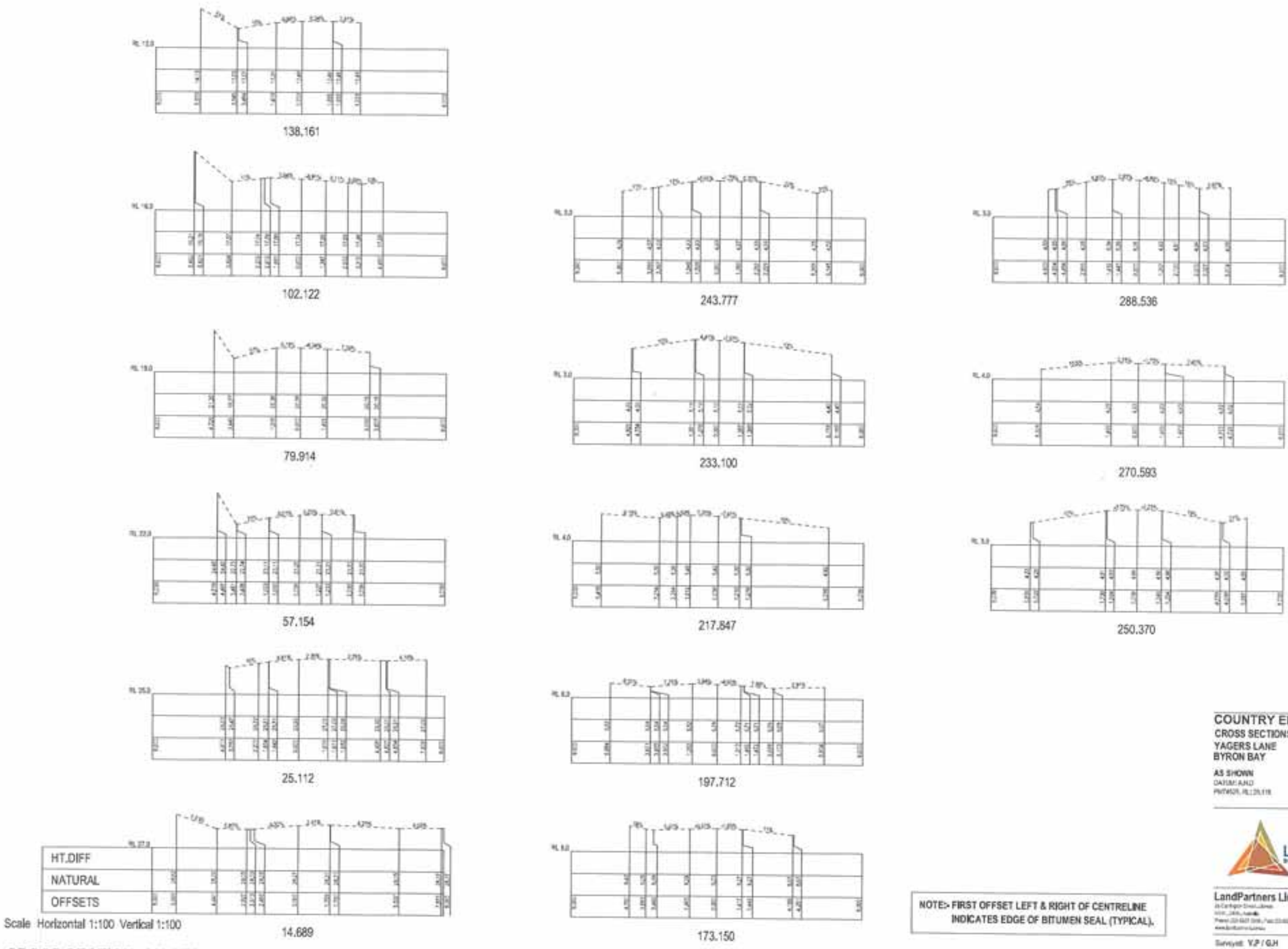
Surveyed: V.P / G.H Date Surveyed: 17/09/2007
Drawn: C.D Checked:

Dwg. No.
LM070201-SV10



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CROSS SECTION - YAGERS LANE

NOTE:- FIRST OFFSET LEFT & RIGHT OF CENTRELINE INDICATES EDGE OF BITUMEN SEAL (TYPICAL).

COUNTRY ENERGY
CROSS SECTIONS (CHN 0,000-288.536)
YAGERS LANE
BYRON BAY

AS SHOWN
DATUM: A.H.D

LOCALITY: BYRON BAY
LGA: BYRON

LandPartners Limited

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Surveyed: V.P / G.H | Date Surveyed: 17/09/2007
Drawn: C.D | Checked:

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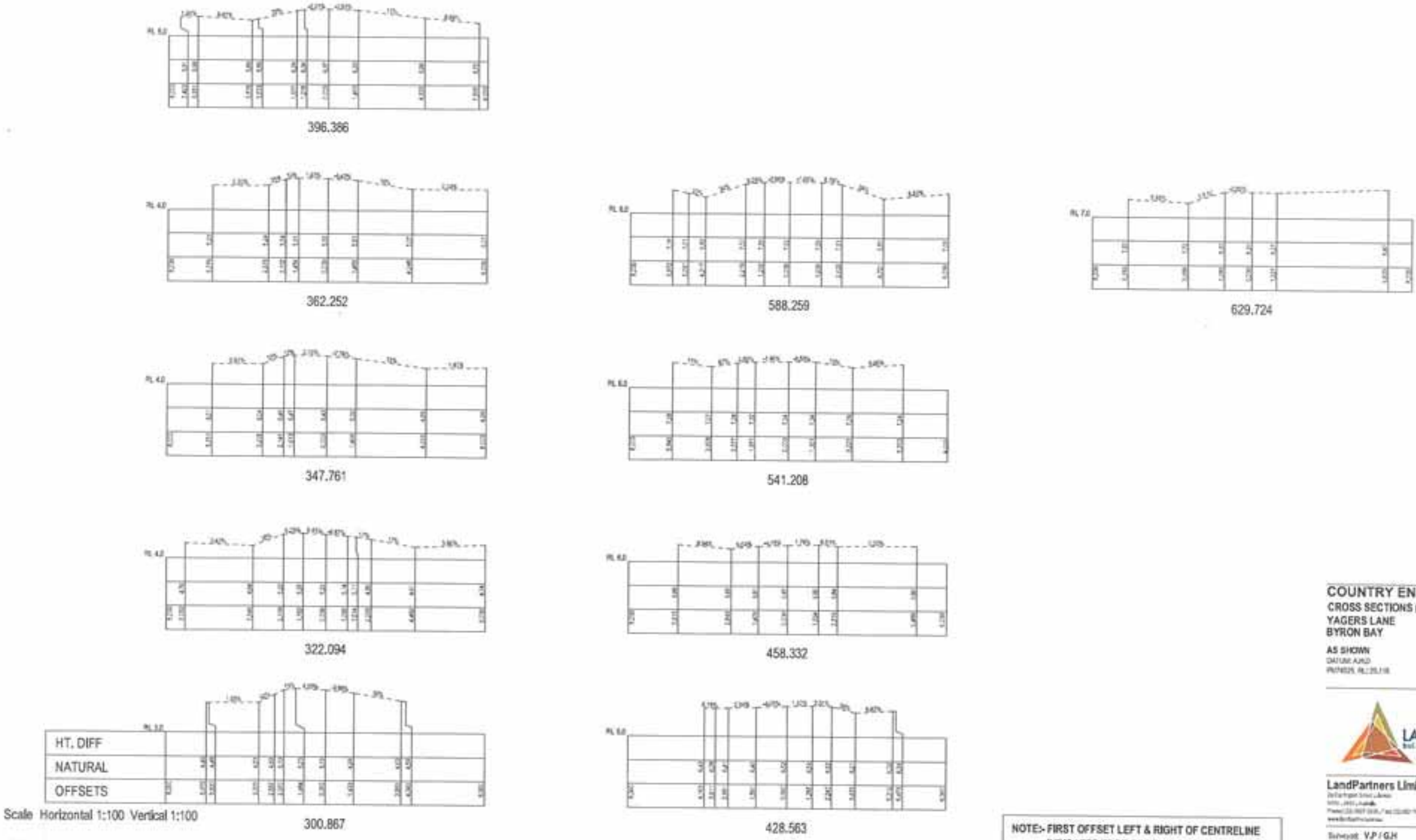

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CROSS SECTION - YAGERS LANE

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COUNTRY ENERGY
CROSS SECTIONS (CHN 295.023-629.724)
YAGERS LANE
BYRON BAY

AS SHOWN
DATUM: AHD
LOCALITY: BYRON BAY
LGA: BYRON

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Surveyed: V.P / G.H Date Surveyed: 17/09/2007
Drawn: C.D Checked:

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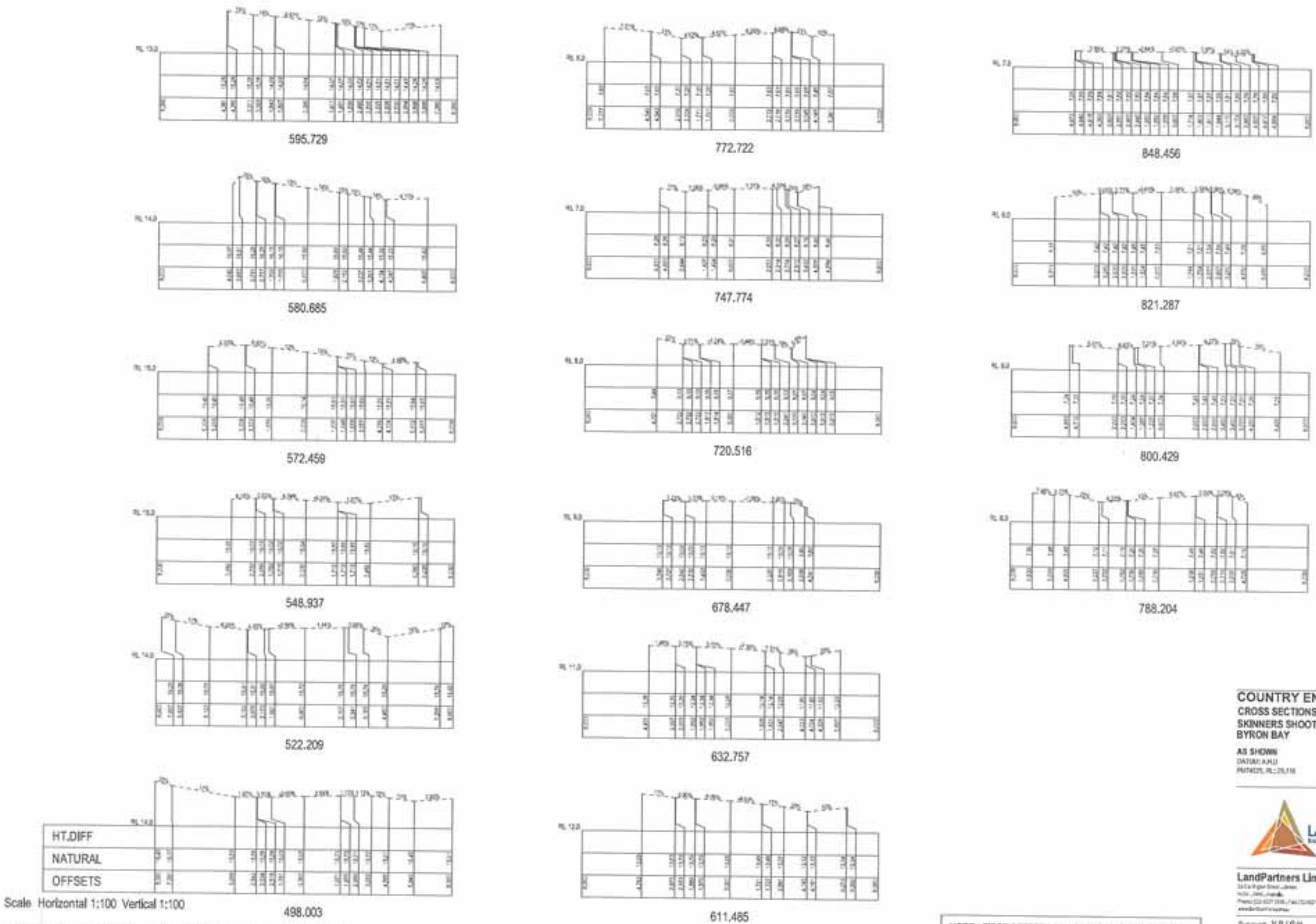

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COUNTRY ENERGY
CROSS SECTIONS (CHN 498.003-848.456)
SKINNERS SHOOT ROAD
BYRON BAY

AS SHOWN
DATUM: A.H.D
LOCALITY: BYRON BAY
LGA: BYRON

LandPartners Limited

Incorporating ASPECT north & KFM Partnership

Surveyed: V.P / G.H Date Surveyed: 17/09/2007
Drawn: C.D Checked:

Dwg. No.
LM070201-SV8

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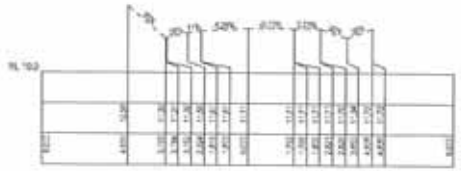

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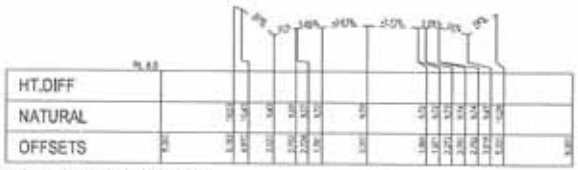

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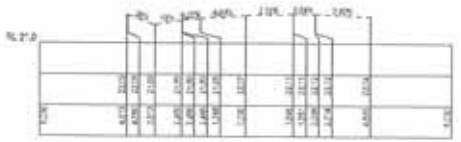

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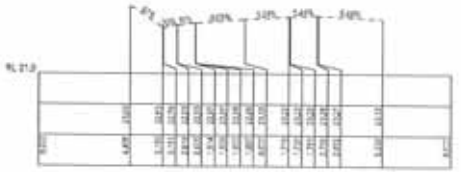

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NOTE:- FIRST OFFSET LEFT & RIGHT OF CENTRELINE INDICATES EDGE OF BITUMEN SEAL (TYPICAL).

COUNTRY ENERGY

CROSS SECTIONS (CHN 885.561-1290.112)
SKINNERS SHOOT ROAD
BYRON BAY

AS SHOWN
DATUM: AHD
PATHS: RL 28.118

LOCALITY: BYRON BAY
LGA: BYRON
CAD FILE: LM070201-SV1-4-SV2-SV3
DWG CAD FILE: LM070201.dwg

LANDPARTNERS
built environment consultants

LandPartners Limited
Incorporating
ASPECT north &
KFM Partnership

Surveyed: V.P / G.H
Drawn: C.D
Date Surveyed: 17/09/2007
Checked:

Dwg. No.
LM070201-SV9

Appendix D

Dial Before You Dig/Infrastructure Location Maps

Plant Location Details

Telstra Corporation Limited
ACN 051 775 556, ABN 33 051 775 556

To:	**Paul Flint**	From:	**Telstra, Network Integrity**
Company:	**Not Supplied**	Sequence No:	**13074405**
Address:	**Suite 5 60 Nerang St Nerang Qld, 4211**	Date:	
		District:	**NR**
Phone:	**0755969621**	Fax Number:	**0755784295**
		NIAC Alert:	
		NIAC Priority:	**No hazard identified**
Email:	**paul.flint@mwhglobal.com**		

The following sketch/plan(s) is/are provided from Telstra's records in response to your request to show the approximate location of Telstra's installations within the vicinity of:

Location:	**Lot 4 DP264161 Suffolk Park NSW, 2481**
Side of Street:	**SW**
Intersection:	**Old Bangalow RD**

IMPORTANT:

- Please read and understand all the information and disclaimers provided below.
- Sketches and Plans provided by Telstra are circuit diagrams only and indicate the presence of telecommunications plant in the general vicinity of the geographical area shown; exact ground cover and alignments cannot be given with any certainty and cover may alter over time. Telecommunications plant seldom follow straight lines and careful on site investigation is essential to uncover and reveal its exact position.
- Due to the nature of Telstra plant and the age of some cables and records, it is impossible to ascertain the location of all Telstra plant. The accuracy and/or completeness of the information can not be guaranteed and, accordingly Telstra plans are intended to be indicative only.

"DUTY OF CARE"

When working in the vicinity of telecommunications plant you have a legal "Duty of Care" that must be observed. The following points must be considered:-

1. It is the responsibility of the owner and any consultant engaged by the owner, including an architect, consulting engineer, developer, and head contractor to design for minimal impact and protection of Telstra plant. Telstra will provide free plans and sketches showing the presence of its network to assist at this design stage.
2. It is the owner's (or constructor's) responsibility to:-

a) Request plans of Telstra plant for a particular location at a reasonable time before construction begins.

b) Visually locate Telstra plant by hand digging (pot-holing) where construction activities may damage or interfere with Telstra plant (see "Essential Precautions and Approach Distances" section for more information).

c) Contact Telstra's **Network Integrity Group** (see below for details) if Telstra plant is wholly or partly located near planned construction activities.

DAMAGE:

ANY DAMAGE TO TELSTRA'S NETWORK MUST BE REPORTED TO 132203 IMMEDIATELY.

- The owner is responsible for all plant damage when works commence prior to obtaining Telstra plans, or failure to follow agreed instructions.
- Telstra reserves all rights to recover compensation for loss or damage to its cable network or other property including consequential losses.

CONCERNING TELSTRA PLANS:

- **Phone 1100 - Dial Before You Dig** for free plans of Telstra plant locations. Please give at least 2 business days notice.
- Telstra plans and information provided are **valid for 60 days** from the date of issue.
- Telstra retains copyright in all plans and details provided in conjunction with your request. These plans and or details should be disposed of by shredding or any other secure disposal method after use.
- Telstra plans or other details are provided for the use of the applicant, its servants, or agents, and shall not be used for any unauthorised purpose.
- Please contact the **Network Integrity Help Desk** (see below for details) immediately should you locate Telstra assets not indicated on these plans.

- Telstra, its servants or agents shall not be liable for any loss or damage caused or occasioned by the use of plans and or details so supplied to the applicant, its servants and agents, and the applicant agrees to indemnify Telstra against any claim or demand for any such loss or damage.
    - Please ensure Telstra plans and information provided remains on-site at all times throughout your construction phase.

ESSENTIAL PRECAUTIONS and APPROACH DISTANCES:

NOTE: If the following clearances cannot be maintained, please contact the Network Integrity Help Desk (see below for details) for adice on how best to resolve this situation.

1. On receipt of plans and sketches and before commencing excavation work or similar activities near Telstra's plant, **carefully locate this plant first** to avoid damage. Undertake prior manual exposure such as potholing when intending to excavate or work **closer** to Telstra plant than the following approach distances.

- Where Telstra's plant is in an area where road and footpaths are well defined by kerbs or other features a minimum clear distance of 600mm must be maintained from where it could be reasonably presumed that plant would reside.
- In non established or unformed reserves and terrain, this approach distance must be at least 1.5 metres.
- In country/rural areas which may have wider variations in reasonably presumed plant presence, the following minimum approach distances apply:

a) Parallel to major plant: 10 metres (for IEN, optic fibre and copper cable over 300 pairs)

b) Parallel to other plant: 5 metres

Note: Even manual pot-holing needs to be undertaken with extreme care, commonsense and employing techniques least likely to damage cables. For example, orientate shovel blades and trowels parallel to the cable rather than digging across the cable.

- If construction work is parallel to Telstra plant, then careful hand digging (pot-holing) at least every 5m is required to establish the location of all plant, hence confirming nominal locations before work can commence.

2. Maintain the following minimum clearance between construction activity and **actual location** of Telstra Plant.

Jackhammers/Pneumatic Breakers	*Not within 1.0m of **actual location.***
Vibrating Plate or Wacker Packer Compactor	*Not within 0.5m of Telstra ducts.* *300mm compact clearance cover before compactor can be used across Telstra ducts.*
Boring Equipment **(in-line, horizontal and vertical)**	*Not within 2.0m of **actual location**.* *Constructor to hand dig (pot-hole) and expose plant.*
Heavy Vehicle Traffic (over 3 tonnes)	*Not to be driven across Telstra ducts (or plant)* *with less than 600mm cover.* *Constructor to check depth via hand digging.*
Mechanical Excavators, Boring and Tree Removal	*Not within 1.0m of **actual location.*** *Constructor to hand dig (pot-hole) and expose plant.*

- All Telstra pits and manholes should be a minimum of 1.2m in from the back of kerb after the completion of your work.
- All Telstra conduit should have the following minimum depth of cover after the completion of your work:-

Footway 450mm

Roadway 450mm at drain invert and 600mm at road centre crown

- For clearance distances relating to Telstra pillars, cabinets and RIMs/RCMs please contact the Network Integrity Help Desk (see below for details).

FURTHER ASSISTANCE:

Over-the-phone assistance can be obtained by calling the **Network Integrity Help Desk** below.

Where on-site location is provided, the owner is responsible for all hand digging (pot-holing) to visually locate and expose Telstra plant.

If plant location plans or visual location of Telstra plant by digging reveals that the location of Telstra plan is situated wholly or partly where the owner plans to work, then **Telstra's Network Integrity Group** must be contacted through the **Network Integrity Help Desk** to discuss possible engineering solutions.

The contact numbers for the **Network Integrity Help Desk** are as follows:-

Phone: 1800 653 935 (7.30am to 5pm weekdays)
Fax: (02) 49613714 (24 hours per day 7 days a week)

NOTE:

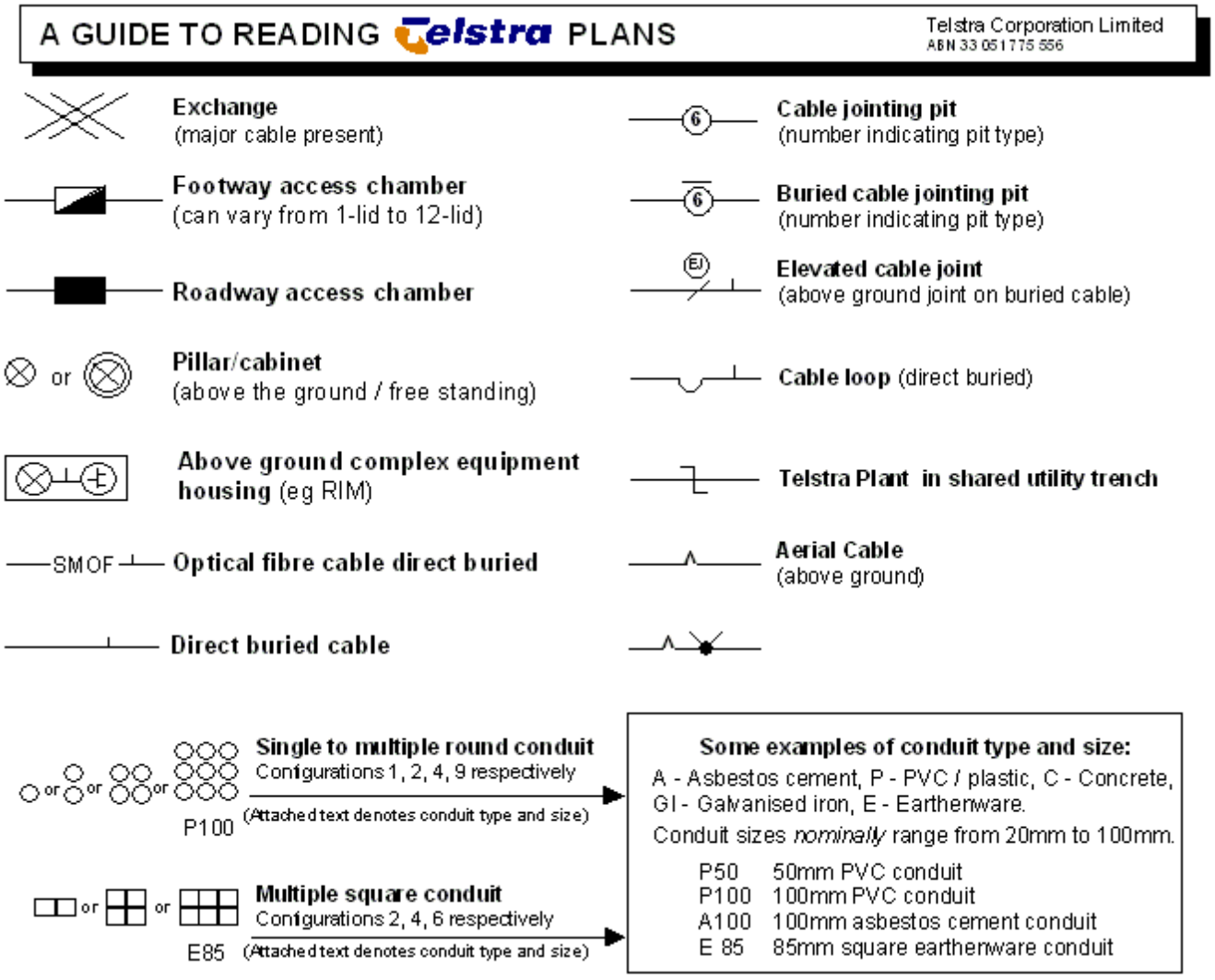
If Telstra relocation or protection works are part of the agreed solution, then payment to Telstra for the cost of this work shall be the responsibility of the principal developer or constructor. The principal developer or constructor will be required to provide Telstra with the details of their proposed work showing how Telstra's plant is to be accommodated and these details must be approved by the Regional Network Integrity Manager prior to the commencement of site works.

RURAL LANDOWNERS - IMPORTANT INFORMATION

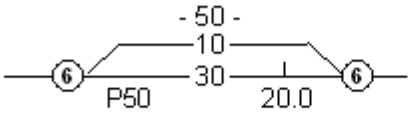
Where Telstra owned cable crosses agricultural land, Telstra will provide a one off free on-site electronic cable location. Please note that the exact location of cables can only be verified by visual proving by pot holing, which is not covered by this service. The Network Integrity Helpdesk Officer will provide assistance in determining whether a free on-site location is required. Please ring the Network Integrity Helpdesk Officer as listed above.

PRIVACY NOTE

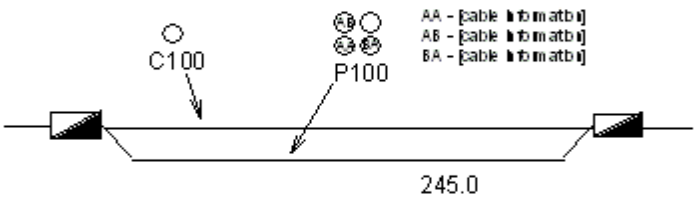
Your information has been provided to Telstra by DBYD to enable Telstra to respond to your DBYD request. Telstra keeps you information in accordance with its privacy statement entitled "Protecting Your Privacy" which can be obtained from Telstra either by calling 1800 039 059 or visiting our website at www.telstra.com.au/privacy



Some examples of how to read Telstra plans:



One 50mm PVC conduit (P50) containing a 50-pair and a 10-pair cable between two 6-pits, 20.0m apart, with a direct buried 30-pair cable along the same route.



Two separate conduit runs between two footway access chambers (manholes) 245m apart. A nest of four 100mm PVC conduits (P100) containing assorted cables in three ducts (one being empty) and one empty 100mm concrete duct (C100) along the same route.

WARNING: Telstra's plans show only the presence of cables and plant. They only show their position relative to road boundaries, property fences etc. at the time of installation and Telstra does not warrant or hold out that such plans are accurate thereafter due to changes that may occur over time.
DO NOT ASSUME DEPTH OR ALIGNMENT of cables or plant as these vary significantly.
The customer has a DUTY OF CARE when excavating near Telstra cables and plant. Before using machine excavators TELSTRA PLANT MUST FIRST BE PHYSICALLY EXPOSED BY SOFT DIG (potholing) to identify its location.
Telstra will seek compensation for damages caused to its property and losses caused to Telstra and its customers.

ACCREDITED PLANT LOCATERS (For your area)

On-site assistance should be sought from an **Accredited Plant Locater** if the telecommunications plant cannot be located within 2.5 metres of the locations indicated on the drawings provided.

On-site advice should be obtained from a suitably qualified contractor highly skilled in locating Telstra plant if there is any doubt whatsoever about the actual location of the telecommunications plant, the best method for locating the telecommunications plant or the correct interpretation of the drawings provided. In the case where Telstra plant is outside a recognised road reserve Telstra recommends that the **Network Integrity Help Desk** is contacted for assistance prior to engaging an Accredited Plant Locater.

For the assistance of customers Telstra has established strict criteria to assess the skill of contractors that may be engaged by owners requiring Telstra plan locating services to perform any of the following activities if requested to do so by the owner:

- review Telstra's plans to assess the approximate location of Telstra plant;
- advise owners of the approximate location of Telstra plant according to the plans;
- advise owners of the best method for locating Telstra plant;
- advise owners of the hazards of unqualified persons attempting to find the exact location of Telstra plant and working in the vicinity of Telstra plant without first locating its exact position.
- perform trial hole explorations by hand digging (pot-holing) to expose Telstra plant with a high degree of skill, competence and efficiency and utilising all necessary safety equipment.

Telstra has provided a number of contractors with certification as an Accredited Plant Locater. **A list of Accredited Plant Locaters operating in your area is attached. Accredited Plant Locaters are certified by Telstra to perform the tasks listed above. Owners may engage Accredited Plant Locaters to perform these services, however Telstra does not give any warranty in relation to these services that Accredited Plant Locaters are competent or experienced to perform any other services.**

The following list provides the names and contact details for Accredited Plant Locaters who service your area and can provide you with assistance in locating Telstra plant on site. These organisations have been able to satisfy Telstra that they have a sound knowledge of telecommunications plant and its sensitivity to disturbance; appropriate equipment for locating telecommunications plant and competent personnel who are able to interpret telecommunications plans and sketches and understand safety issues relevant to working around telecommunications plant. They are also able to advise you on the actions which should be taken if the work you propose will/could result in a relocation of the telecommunications plant and/or its means of support.

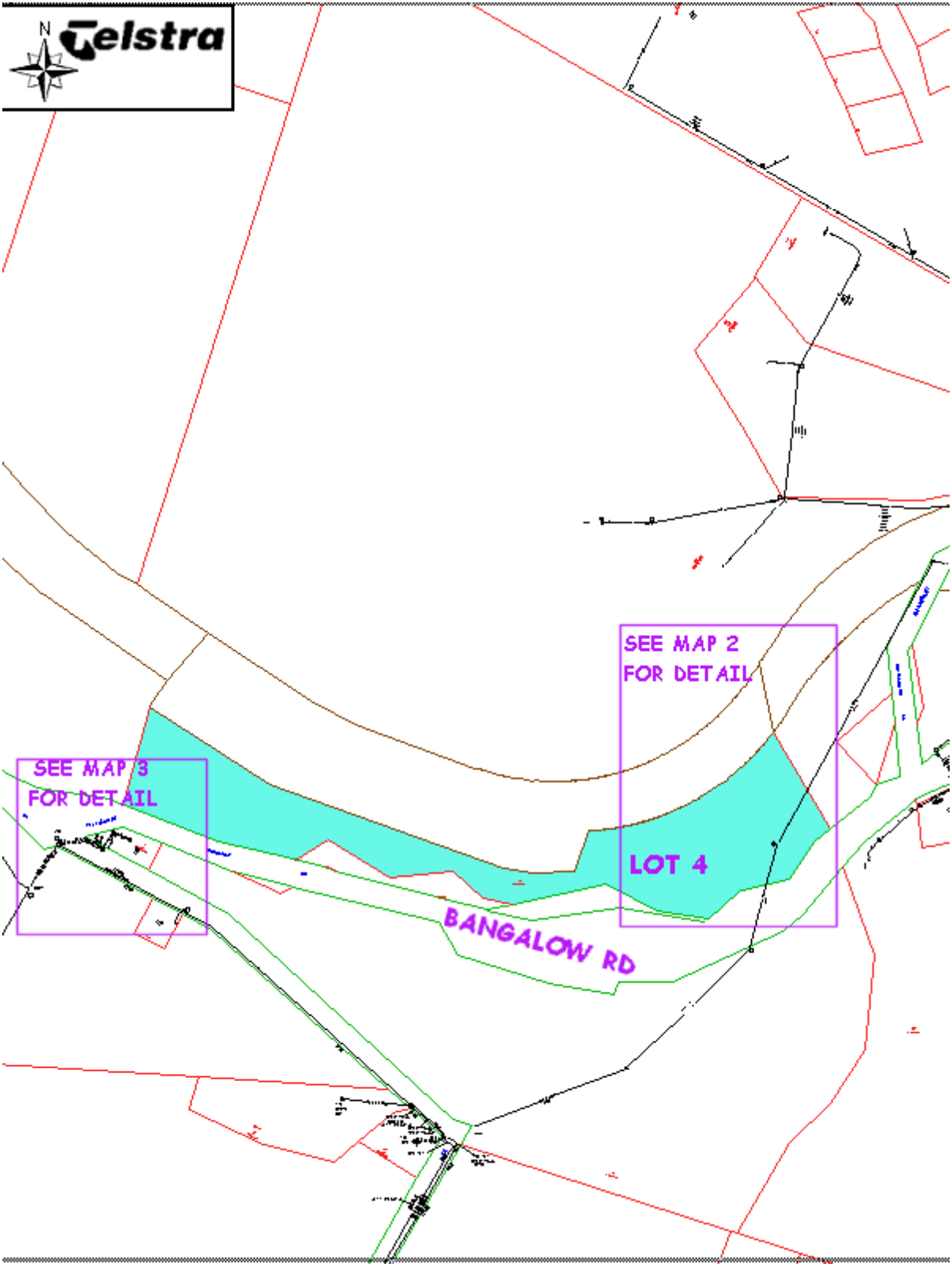
We recommend that you engage the assistance of one of these Accredited Plant Locaters as a step towards discharging your Duty of Care obligations when seeking the location of Telstra's telecommunications plant.

Please Note:

1. The details of any contract, agreement or retainer for site assistance to locate telecommunications plant shall be for you to decide and agree with the organisation engaged. Telstra is not a party to any contract entered into between an owner and an Accredited Plant Locater. The Accredited Plant Locaters are able to provide guidance concerning the extent of site investigations required.
2. Payment for the site assistance will be your responsibility and payment details should be agreed before the engagement is confirmed.
3. Telstra does not accept any liability or responsibility for the performance of or advice given by an Accredited Plant Locater. Accreditation is an initiative taken by Telstra towards the establishment and maintenance of competency standards. However, performance and the advice given will always depend on the nature of the individual engagement.
4. Each Accredited Plant Locater has been issued with a certificate which confirms the Accreditation. Each year Telstra will reassess the accreditation and where appropriate will issue a letter confirming the accreditation for the next calendar year. You have the right to request the organisation you engage to show evidence of this certificate and its currency.
5. The Accredited Plant Locater is required to service each engagement with the personal attendance of at least one accredited employee who has satisfactorily completed a Telstra approved employee accreditation training course. These people will carry a certification card issued by Telstra.
6. Neither the Accredited Plant Locater nor any of its employees are an employee or agent for Telstra and Telstra is not liable for any damage or loss caused by the Accredited Plant Locater or its employees.
7. This list contains the current names and contact details of Accredited Plant Locators who service your area, however, these details are subject to change.

Accredited Plant Locaters - NR district:

Name and Address	Phone Number	Ask for:
BOWDEN EARTHMOVING	0266 771363 or 0427 66771363	Roger Bowden
Brisbane & Coast Cable Location. PO Box843, Paradise Point. QLD 4216	Ph: 07 55773520, Fax07 55774105 Mob 0407 138 760 Mob 0418 731 191	 Greg Nunn Wayne Finch
CABLE & PIPE LOCATIONS - Coffs Harbour, Yamba, Port Macquarie, Dorrigo	02 66491234 or 0408 730 430	Shane Buckley
COOMBA EARTHMOVING - FORSTER	02 6554 2297	Darryl Jennings
DR & JE STANFORD - Mullumbimby	0418 663 324 or 02 66847017	Dean Stanford
EAST COAST CABLE & PIPE LOCATIONS - LOCATIONS FOR OCEAN SHORES, GRAFTON & TENTERFIELD	02 66803234 or 0414859830	Greg HILL
HOW DEEP WATER LEAKERS, PIPE & CABLE LOCATION SERVICE - Gold Coast	Ph 0412 214810, A/H 07 55946910	Lex Fingleton
I.R &M Johnson Pty Ltd - Mudgeeraba. Area covered: Northern NSW & South East QLD	Ph: 0755305773 Mob: 0427 305 773	Ian Johnson
LAMBERT LOCATIONS - Gold Coast QLD	Ph 0755 960248Mob: 0418 150035	Ian Lambert
LUDWIG'S TRUCK & TRENCHING - Tabulam	Ph & Fax 02 66661484 Mob: 0428 555 587	Carl Ludwig
J & R Cabler// Installer	Ph: 02 6632 1540 Fax: 02 6632 2870 Mob: 0427 321 540	John O'Reilly
JOHNS CABLE LOCATIONS - ALSTONVILLE	02 66244144 or 0415 458152	Terry Rice
MIDCOAST UNDER-ROAD BORING- STROUD	02 4994 5211	Wanda Russell
MURRAY's EARTHMOVING - TAMWORTH	02 6765 3266 0427 166 486	Col Murray Shane Murray
NETWORK PROTECTION SPECIALISTS - Tweed Heads	07 55367878 or 0418 257 527	Dean Tosh
NEVILLE FRANKLIN ELECTRICAL - Locations for Coffs Harbour,Grafton, Macksville, Nambucca Heads, Dorrigo	02 66536693 or 0418 660 823	Nev Franklin
NORTH WEST CIVIL - Tamworth	02 67628911 0438914875	Rob Terry
NORTHERN RIVERS TRENCHING SERVICE - Lismore, Ballina -Tweed Heads	02 66847200 or 0414847200	Neil Parrington
ON-SITE COMMUNICATIONS - Gold Coast, Tweed Heads, Northern Rivers	07 55226800 or 0409727134	Steve Perry
PB CIVIL - North Lismore	02 66217171 or 0412 753 002	Andrew Purtle
RUTHERFORD ELECTRICAL ENGINEERING - RUTHERFORD	02 4932 7344	Office staff
SEEK LOCATIONS PTY LTD - Taree, Forster, Port Macquaire.	02 65 591 617 02 65 558 550 or 0407 256 858	Brian Hanson Brad Rae
TRICON PLUMBING - Browns Plains.Qld	07 38001934 or 0412 593 756	Alan Pullin



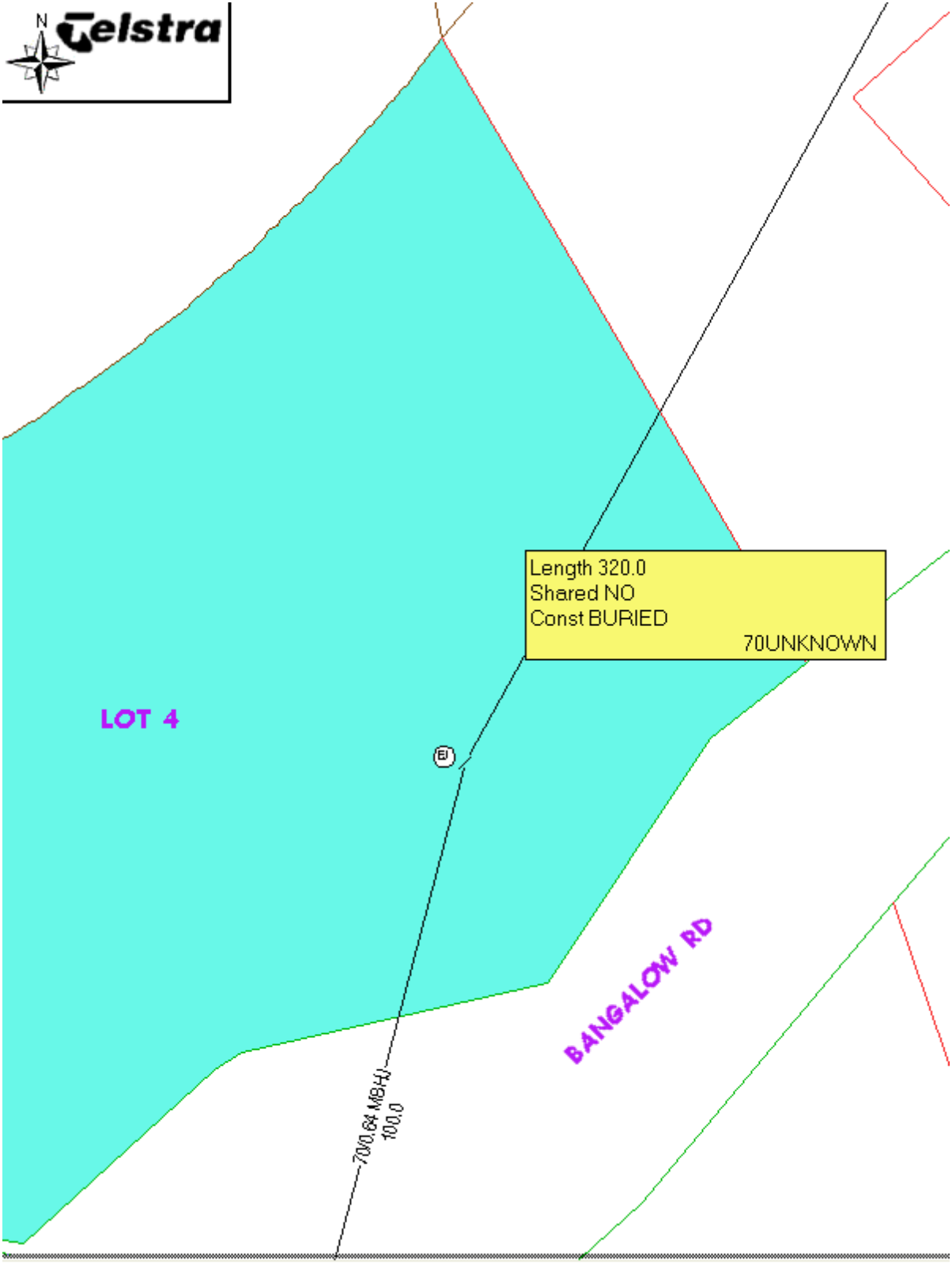
Sequence Number: 13074405; Map Number: LOCAL CABLE OVERVIEW MAP 1 OF 3; Map Reference: BYBY 19; Comment: KC 16/1/08

WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the exact location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information provided can not be guaranteed as property boundaries, depths and other natural landscape features may change over time, and accordingly the plans are indicative only. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy shown on the plans.

It is your responsibility to locate Telstra's underground plant by careful hand pot-holing prior to any excavation in the vicinity and to exercise due care during that excavation.

Please read and understand the information provided in the duty of care statement attached with the Telstra plans. TELSTRA WILL SEEK COMPENSATION FOR LOSS CAUSED BY DAMAGE TO ITS PLANT.

Telstra plans and information provided are valid for 60 days from the date of issue. If this timeframe has elapsed, please reapply for plans.



Sequence Number: 13074405; Map Number: LOCAL CABLE DETAIL MAP 2 OF 3 ; Map Reference: BYBY 19; Comment: KC 16/1/08

WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the exact location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information provided can not be guaranteed as property boundaries, depths and other natural landscape features may change over time, and accordingly the plans are indicative only. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy shown on the plans.

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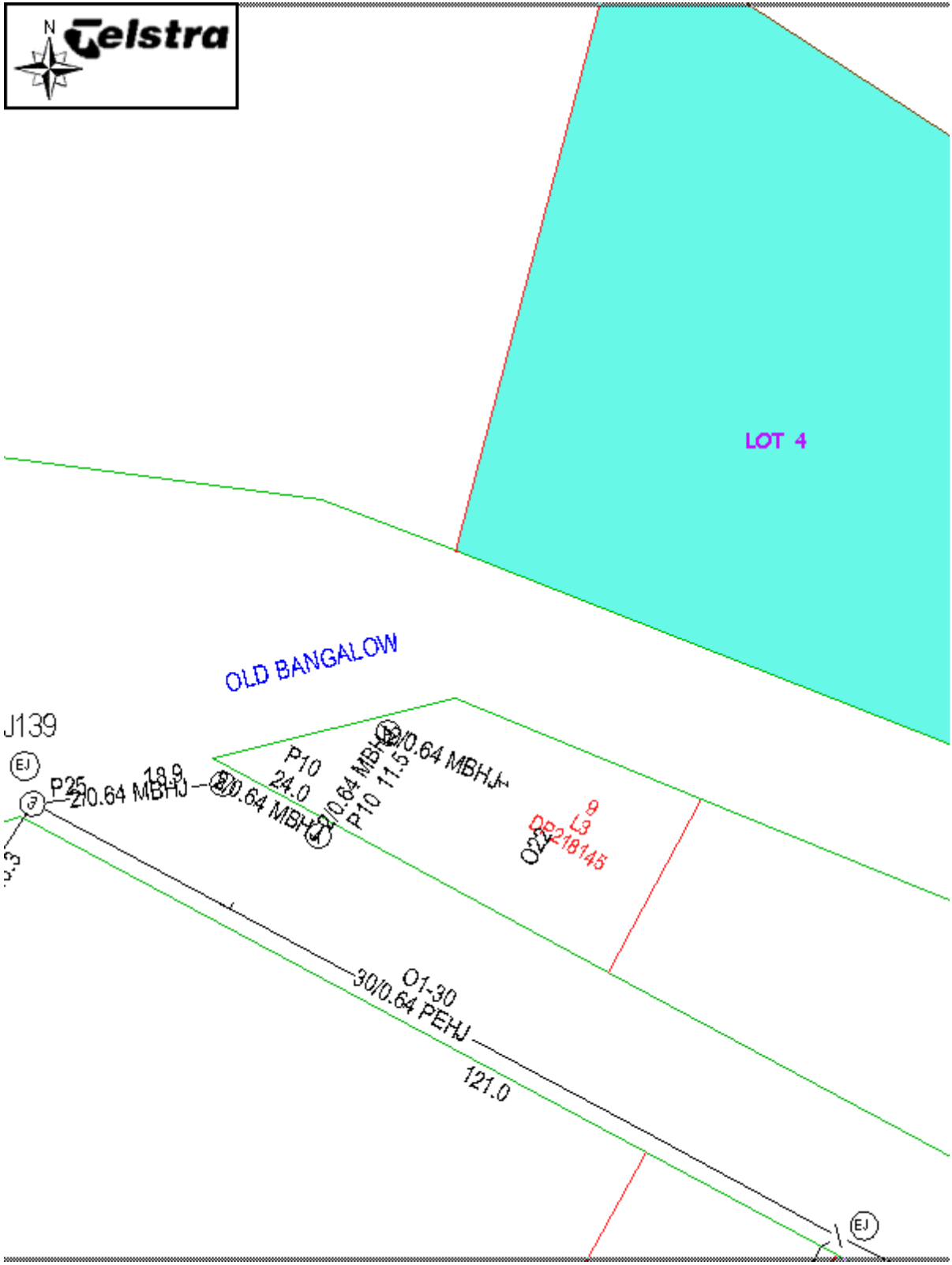
Telstra plans and information provided are valid for 60 days from the date of issue. If this timeframe has elapsed, please reapply for plans.



Sequence Number: 13074405; Map Number: LOCAL CABLE DETAIL MAP 3 OF 3 ; Map Reference: BYBY 19; Comment: KC 16/1/08

WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the exact location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information provided can not be guaranteed as property boundaries, depths and other natural landscape features may change over time, and accordingly the plans are indicative only. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy shown on the plans.

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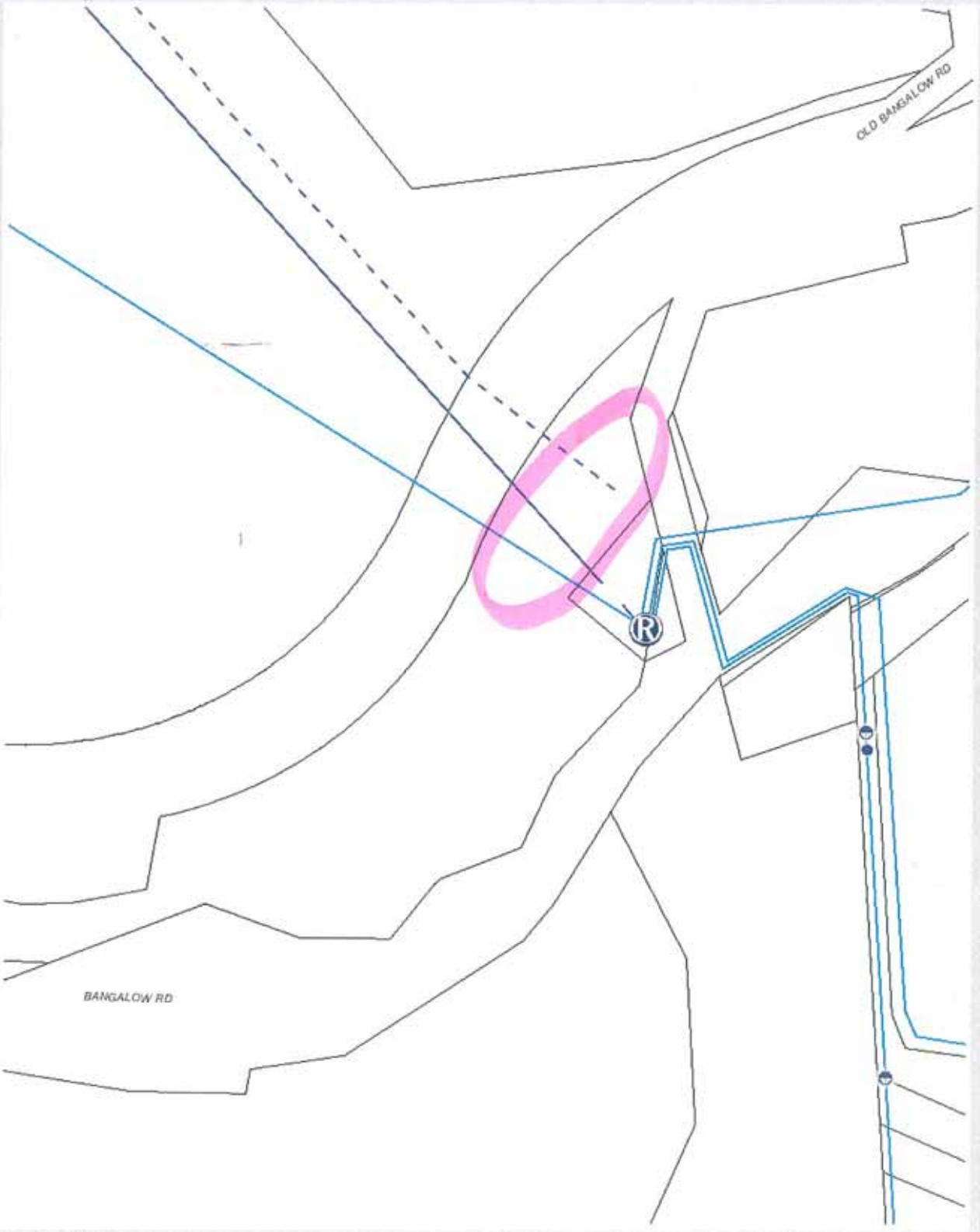

Disclaimer : While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no warranty is given that the information contained on this map is free from error or omission. Any reliance placed on such information shall be at the sole risk of the user. Please verify the accuracy of the information prior to using it.
Note : The information shown on this map is a copyright of the Byron Shire Council and the NSW Department of Lands.

Scale = 1:2,884

Metres 50 100 150

(Scale correct at A4 size)

4/03/2008

Appendix E

AHIMS Search Results

Department of
Environment and Conservation (NSW)

Your reference : Skinners Shoot Road
Our reference : AHIMS #18657

RECEIVED
Montgomery Watson
Date: 3/5 Our Ref: R26547
Project Ref:

Dist	I/A*	Action Complete
PF.		

* I - Information
A - Action

MWH Australia Pty Ltd
PO Box 2148
Milton QLD 4064

Friday, 27 April 2007

Attention: Paul Flint

Dear Sir or Madam:

Re: AHIMS Search for the following area at Skinners Shoot Road;Byron Bay

I am writing in response to your recent inquiry in respect to Aboriginal objects and Aboriginal places registered with the NSW Department of Environment and Conservation (DEC) at the above location.

A search of the DEC Aboriginal Heritage Information Management System (AHIMS) has shown that *5* Aboriginal objects and Aboriginal places are recorded in or near the above location. Please refer to the attached report for details.

The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not to be made available to the public.

The following qualifications apply to an AHIMS search:

- AHIMS only includes information on Aboriginal objects and Aboriginal places that have been provided to DEC;
- Large areas of New South Wales have not been the subject of systematic survey or recording of Aboriginal history. These areas may contain Aboriginal objects and other heritage values which are not recorded on AHIMS;
- Recordings are provided from a variety of sources and may be variable in their accuracy. When an AHIMS search identifies Aboriginal objects in or near the area it is recommended that the exact location of the Aboriginal object be determined by re-location on the ground; and
- The criteria used to search AHIMS are derived from the information provided by the client and DEC assumes that this information is accurate.

All Aboriginal places and Aboriginal objects are protected under the *National Parks and Wildlife Act 1974* (NPW Act) and it is an offence to destroy, damage or deface them without the prior consent of the DEC Director-General. An Aboriginal object is considered to be known if:

- It is registered on AHIMS;

PO Box 1967 Hurstville NSW 2220
43 Bridge Street Hurstville NSW 2220

Telephone (02) 9585 6345
Facsimile (02) 9585 6094

ABN 30 841 387 271
ahims@environment.nsw.gov.au
www.environment.nsw.gov.au

- It is known to the Aboriginal community; or
- It is located during an investigation of the area conducted for a development application.

If you considering undertaking a development activity in the area subject to the AHIMS search, DEC would recommend that an Aboriginal Heritage Assessment be undertaken. You should consult with the relevant consent authority to determine the necessary assessment to accompany your development application.

Yours Sincerely

Freeburn, Sharlene
Administrator
Information Systems Section
Cultural Heritage Division
Phone: (02) 9585 6471
Fax: (02) 9585 6094

Department of
Environment
& Conservation

List of Sites (List - Short)

Skinners Shoot Road.

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 56, Easting From = 557080, Easting to = 559270, Northing From = 6827881, Northing to = 6831234, Requestor like 6417%, Service ID = 18657, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Site Features	Site Types (recorded prior to June 2001)	Recording (Primary)	Reports (Catalogue Number)	State Archive Box Number
04-5-0058	Byron Bay;Skinners Shoot Road;	AGD	56	557400	6829500	AFT	Open Camp Site	**Gonda**		NRS/17798/1/10
		Status Valid								
		Primary Contact						Permit(s)		
04-5-0059	Byron Bay;Skinners Shoot Road;	AGD	56	557400	6829600	AFT	Open Camp Site	**Gonda**		NRS/17798/1/10
		Status Valid								
		Primary Contact						Permit(s)		
04-5-0060	Byron Bay;Skinners shoot Road;	AGD	56	557750	6829350	AFT	Open Camp Site	**Gonda**		NRS/17798/1/10
		Status Valid								
		Primary Contact						Permit(s)		
04-5-0103	Byron Urban Areas 4;Byron Bay;	AGD	56	557700	6829280	AFT, ETM, SHL	Midden	**Collins**		NRS/17798/1/10
		Status Valid								
		Primary Contact						Permit(s)		
04-5-0104	Byron Urban Areas 3;Byron Bay;	AGD	56	557800	6831048	AFT, ETM, SHL	Midden	**Collins**		NRS/17798/1/10
		Status Valid								
		Primary Contact						Permit(s)		