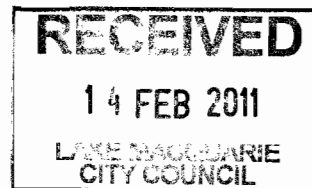


11th February 2010



David Lovell,
Senior Development Planner,
Box 1906, Hunter Region Mail Centre,
NSW, 2310

Dear David

Proposed Telecommunications Facility located at Lot 1 DP 114469, 15C Jetty Point Drive, Murrays Beach, NSW, 2281

Following your letter dated 31st December 2010 and the extension of time until 14th February 2011 to provide additional information I am able to provide you with:


- 1 x Copy of the additional information requested, including further analysis on the 3 additional candidates and the subject site under consideration in DA 1601/2010

If you require anything further to progress this application please do not hesitate to contract me.

Yours Sincerely,



Jon Mills
Urbis (on behalf of Telstra)
Planning Consultant



Planning Report

Additional Information for DA1601/2010 - Telecommunications Facility Lot 1 DP 114469. 15C Jetty Point Drive, Murrays Beach, NSW, 2281

urbis

9th February 2010

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1 Introduction

This document has been prepared in support of development application 1601/2010 for a proposed 35m Telstra telecommunications facility to be located at 15C Jetty Point Drive, Murrays Beach, NSW, 2281.

Lake Macquarie Council sent a letter dated 31st December 2010 to Urbis commenting on 3 sites that Telstra highlighted within the Statement of Environmental Effects and that these sites required further analysis by Telstra

In response, Urbis on behalf of Telstra, has prepared this document containing a detailed analysis of each site demonstrating why they are not suitable for a telecommunications facility. Further analysis has also been provided on the chosen facility, reasoning why it is the most suitable location within the area and why a variation (under State Environment Planning Policy 1 – Development Standards) is sought in respect to the height limitations. A further visual assessment of the impact on the scenic qualities on the surrounding area of the proposed Telstra facility is provided.

2 Councils Preferred Candidates

Amongst the 7 original candidates examined as a potential suitable location for the proposed telecommunications facility, Lake Macquarie Council has recommended further investigation into 3 of these sites as listed below.

- Candidate B – Swansea Quarry site, 393 Pacific Highway, Swansea – Lot 7&8 in DP 791995
- Candidate C - 394 Pacific Highway, Cams Wharf – Lot 1 on DP 189170
- Candidate E- Road Reserve, off Pacific Highway, Cams Wharf – Lot 9 & 15 on DP 791993

Candidate B

This candidate is located on the site of the old Swansea Quarry off of the Pacific Highway. The site is located at approximately 20m in elevation. The closest residential properties to this site are located from 420m north in Swansea and 600m east in Caves Beach. There is an existing telecommunications facility located at 7 Lake St, Swansea which is the closest to Candidate F, being located 1.8km to the north-north-east.

Candidate B is located within land zoned 10(a) Sustainable Mixed Use Development and has been identified as being within land designated for Development type 4 in the North Wallarah Masterplan. This candidate is located on the north-eastern edge of the target coverage area boundary.

Reasons why Telstra believe that a facility at Candidate B is not viable

- Telstra held talks with Lake Macquarie Council's property manager Eric Neville regarding ownership of this site in 2004. This was met with a less than positive response due to the imminent implementation of the North Wallarah Peninsula Master Plan and Council had plans for their own redevelopment of the site and thus Telstra was encouraged to look elsewhere. Given the planning and visual constraints, it is not considered viable to explore this

arrangement 6 years later. Appendix 3 contains a file note detailing the conversation that was held between Telstra and Lake Macquarie City Council in February 2004.

- A Telecommunications facility at candidate B will be highly visible in all directions. A facility at Candidate B will result in a far greater impact on the visual and scenic quality, not only the northern precinct, but in the precincts surrounding the site and the nearby residential areas of Pinny Beach, Caves Beach, Swansea and Murrays Beach.

This is due in part to its low elevation, in tandem with its location behind critical ridgelines that would block the facility and require it to be of a significant height to clear this ridgeline.

- The potential for visual screening at Candidate B is greatly reduced due to the notably smaller amount of mature trees and vegetation throughout the landscape of the Northern Precinct. The site of the old quarry is dominated by extensive reshaping. Re-establishment of tree cover over a large proportion of the disturbed area is proposed at this site. This candidate provides little opportunity for a facility design to be sympathetic to the surrounding landscape's character, and to maximise visual screening provided by surrounding vegetation. Candidate F, located on Jetty Point Drive is located amongst dense, well-established vegetation that provides effective visual screening up to the 17m mark with the tree line starting 10m from the proposed facility boundary.
- The proposed housing type in the Northern Precinct and site of the old Swansea Quarry will consist of diverse development types and uses. Higher density forms of development are proposed on the plateau and degraded areas. It is considered that a telecommunications facility of the required size at this location will have a far greater impact on the visual and scenic amenity of the residents in this area in comparison to the future residents in the Lakeside Ridge Precinct where lower density development is proposed. Therefore, a telecommunications facility located at Candidate B will have a greater impact on a larger amount of residents in the area surrounding the site.

This aerial map illustrates the geographical layout of the Lakeside Ridge area, including precinct boundaries and proposed candidate locations. The map features the following elements:

- Precincts:** Four precincts are outlined with red dashed lines and labeled in grey boxes:
 - Lakeshore & Slopes Precinct:** Located in the upper left, near the lake.
 - Point Morisset Precinct:** Located in the middle left, along the shoreline.
 - Rafferty's Resort:** Located in the lower left, near the water.
 - Lakeside Ridge Precinct:** A large area in the center and right, encompassing most of the land shown.
- Candidate Locations:** Six locations are marked with red pins:
 - Candidate B:** Located in the upper center, near the top of the ridge.
 - Murrays Beach:** Located below Candidate B, near a winding road.
 - Candidate F:** Located in the center, near the intersection of a road and a path.
 - Candidate E:** Located in the lower center, near a road.
 - Candidate C:** Located in the lower right, near the shoreline.
 - Caves Beach:** Located in the upper right, near the top of the ridge.
- Other Landmarks:**
 - Pinny Beach:** Located in the middle right, near the shoreline.
 - Cams Wharf:** Located in the lower left, near the water.

Figure 2 – Perspective view of North Wallarah, looking north-east from Point Morisset Precinct.

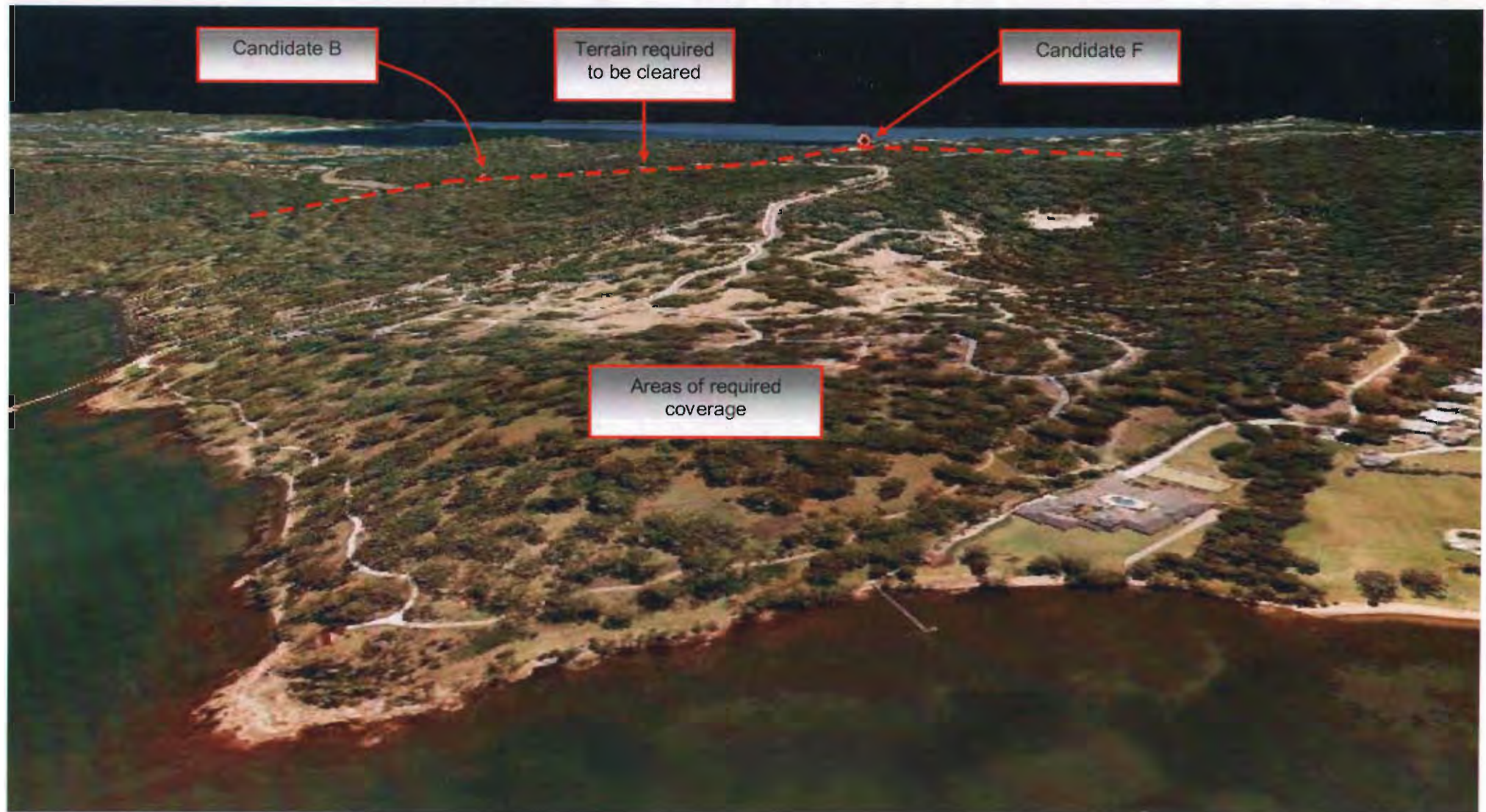


Figure 3 - Perspective view of North Wallarah, looking south west from the old Swansea Quarry located within the Northern Precinct.



Candidate C

This site occupies vacant land and is located in close proximity to an existing Telstra site along the Pacific Highway. The site is located at approximately 68m in elevation. This site is located 1.5km south east of the site, the subject of the development application and 800m north east of the proposed Optus facility located at 400 Pacific Highway, Cams Wharf.

Candidate C is located within land zoned 10(a) Sustainable Mixed Use Development and has been identified as being within land designated for Development type 4 in the North Wallarah Masterplan. This candidate is located on the south-eastern edge of the target coverage area boundary.

Reasons why Telstra believe that a facility at Candidate C is not viable

- This site will not work from a coverage perspective and will not meet network coverage requirements. If we view Figure 5 we can see the target coverage area outlined in pink. The coverage from a facility in this location is shown in blue.
- It can be clearly seen that a facility in this location will not provide the necessary coverage to satisfy demand which is the driving force behind this project.
- The lack of coverage relates to the terrain in the area, which we can see in Figure 4 rises up to the north-west, blocking signal into the north. Because of this terrain the site cannot alone fulfil coverage objectives, which means another site would be required within the target area (in the approximate location of the selected candidate), thereby causing a proliferation of towers within the general area.

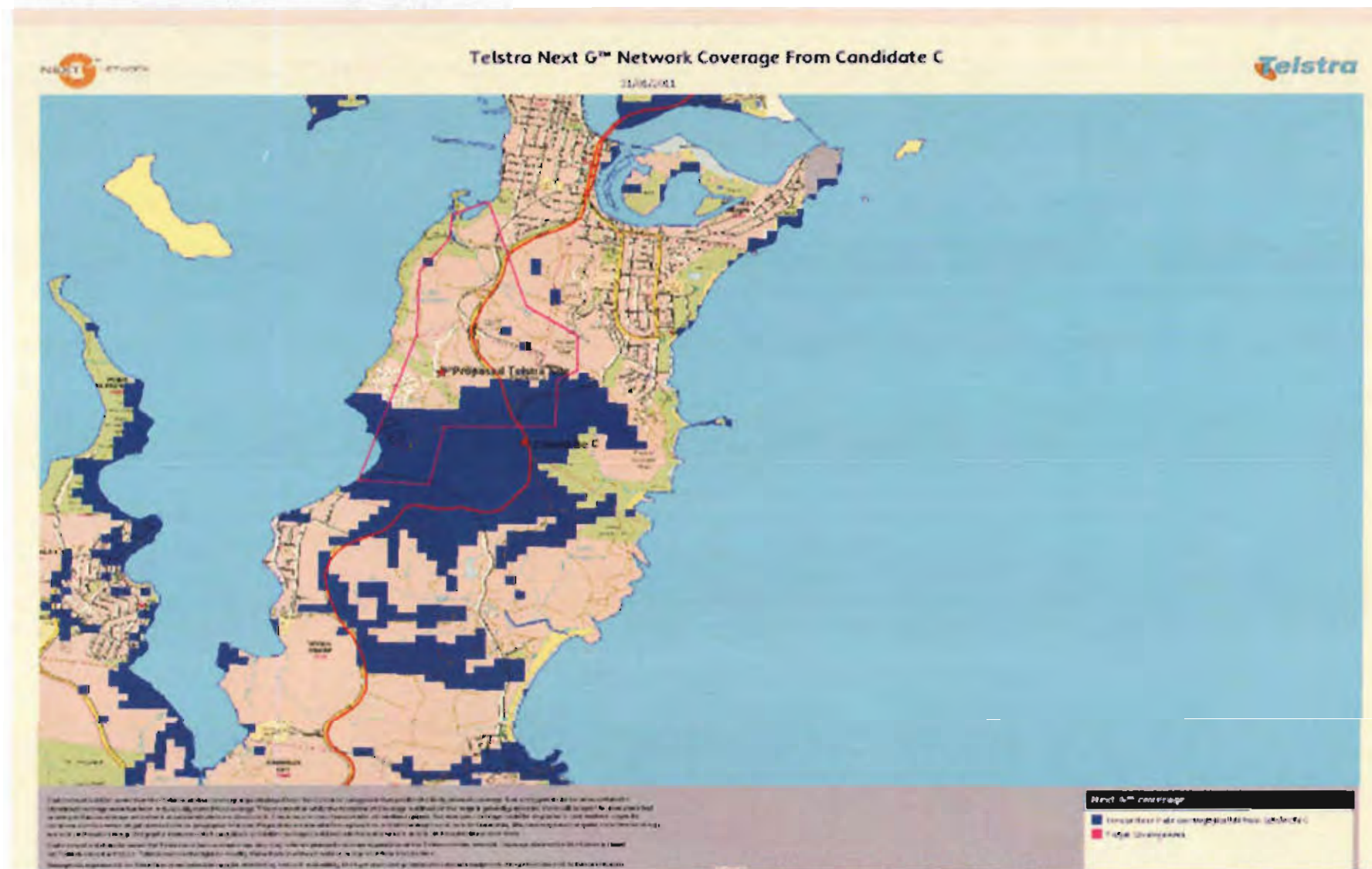
Figure 4- Google Earth image showing the terrain constraints blocking the target coverage from candidate C





Planning Report

Figure 5 - Map showing proposed Coverage from candidate C- Note the pink edged target area is not affected by the coverage from C shown in blue.



Candidate E

This site comprises vacant land, located along an access easement from the Pacific Highway. Telstra considered this as a viable candidate in 2004, and initial investigations were undertaken at this site. This included a Geotechnical study as there were major concerns over mine subsidence issues within the area.

Reasons why Telstra believe that a facility at Candidate E is not viable

- A Geotechnical Report showed that a facility here would be problematic in the extreme, due to mine subsidence within the chosen area.
- Two Recommendations were put forward to enable the construction of a facility in this location. These were:
 - 1) Design for pothole subsidence and allow provision for re-levelling if adverse tilt occurs.
 - 2) Grout the voids under and within 7m of the boundary of the site to eliminate subsidence risk.
- The two options above are discussed in more detail in the Geotechnical Report and in further investigations by GHD Group, who were responsible for construction. The costs involved in either option offset against the other costs of the project meant that this was not a financially viable option.
- Another major factor was that each option is only speculative. That is, there is a significant risk that neither of these options would work. They were certainly not guaranteed to be structurally viable. This large element of uncertainty and risk attached to the candidate means that this could not be considered a viable option. This site therefore is not suitable to warrant further discussion as a viable candidate.

3 Telstra's selected candidate subject of DA 1601/2010

The selected candidate subject of the development application has been initially assessed by Lake Macquarie City Council as not being consistent with the specific based planning controls and master planning of the North Wallarah Peninsula and would likely have a visual and scenic quality impact on the North Wallarah Peninsula, mainly the Lake Sector of North Wallarah Peninsula, inclusive of the existing and planned Lakeside Ridge Precinct.

The main issue is that the planning controls specifically state that development should not penetrate the tree canopy of the locality especially on ridge lines as is the case here. There is also specific concern over the visual impact on the scenic quality of the future development of the Lakeside Ridge Precinct and Lake Sector of the North Wallarah Peninsula and the newly developed areas South of Jetty Point Drive where it is speculated that there are clear sight lines to the proposal.

To address these matters is:

- A statement detailing the reason why this type of development should be excluded from the tree canopy height controls
- A further visual impact assessment in regard to above mentioned viewing corridors.

3.1 SEPP 1 – Objection in regard to the development height

SEPP 1 was introduced to allow flexibility in the application of development standards. Clause 3 of the SEPP 1 states:

"This Policy provides flexibility in the application of planning controls operating by virtue of development standards in circumstances where strict compliance with those standards would, in any particular case, be unreasonable or unnecessary or tend to hinder the attainment of the objects specified in section 5 (a) (i) and (ii) of the Environmental Planning Assessment Act 1979."

Section 5 (a) (i) and (ii) of the Environmental Planning and Assessment Act 1979 states:

"The objects of this Act are:

(a) to encourage:

(i) the proper management, development and conservation of natural resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment,

(ii) the promotion and co-ordination of the orderly and economic use and development of land".

Clause 8 of the SEPP sets out criteria for assessing SEPP 1 objections where it states:

"The matters which shall be taken into consideration in deciding whether circumstances should be granted are:

- a) Whether non-compliance with the development standard raises any matter of significance for State or regional environmental planning, and*
- b) The public benefit of maintaining the planning controls adopted by the environmental planning instrument.*

In considering whether to grant at its discretion under SEPP 1, consent to vary a development standard, the consent authority must also give consideration to the objective of the zoning and the purpose of the relevant development standard.

These guidelines are consistent with the Land and Environment Court guidelines for the drafting of SEPP 1 objections from the Land and Environment Case, *Winten Property v North Sydney (2001)* 130 LGERA 79, being:

"SEPP 1 Objections must address the following at a minimum:

- a) Is the planning control in question a development standard?*

b) *What is the underlying object or purpose of the standard?*

c) *Is compliance with the development standard consistent with the aims of the Policy (SEPP 1), and in particular does compliance with the development standard tend to hinder the attainment of the objects specified in Section 5(a)(i) and (ii) of the Environmental Planning and Assessment Act?*

d) *Is compliance with the development standard unreasonable or unnecessary in the circumstances of the case?*

e) *Is the objection well founded?"*

- The Development Standard to which the SEPP 1 objection applies

The North Wallarah Masterplan – Visual Integration Masterplan – 4.3 Lake Sector Integration states that the overall height of development should be restricted to maintain the natural character of the hillsides of the Lake Sector, by keeping built form within the tree canopy.

- The objectives of the development standard

The objectives of the development standard is to control development within the North Wallarah Peninsula so that it can be visually integrated within the existing vegetation and retains the visual characteristics that have been designated with this style of eco development.

- Reason behind the SEPP 1 objection to vary applicable Development Standard

This objection requests a variation in development standards for the height restriction placed upon the proposed telecommunications facility within this location specified in the Masterplan that development should not penetrate the tree canopy of the locality, especially in regard to ridgelines. This variation is requested for the following reason;

In order to provide sufficient network performance for the areas surrounding the site, the telecommunications facility will require a height above the tree

canopy to avoid signal interference between obstacles such as trees, buildings and terrain.

If Telstra were to construct a tower within the tree canopy, the signal would be blocked by the surrounding trees and the facility would have no use or purpose in its function. Therefore it is not logical or reasonable to impose the height limit policy on a telecommunications facility, which the policy clearly does not account for; is not designed to administer to, and is not applicable to this development.

This of course means that the site selected has to be the correct site and is expressed in the submitted Statement of Environmental Effects and this document, the selected site is the only available site that can meet Telstra's coverage objectives provided it can penetrate the tree canopy.

3.2 Visual Impact Assessment on Existing Viewing Corridors

Two view corridors have been identified by Council, which have sight lines south and west of the proposed development located at Candidate F. These encompass the Lakeside Ridge Precinct, Lakeshore & Slopes Precinct, Point Morisset Precinct and Rafferty's Resort to the south. The telecommunications facility has been proposed on a site with the objective of minimizing the overall impacts on the areas surrounding the development. The location of the facility utilises tree cover and terrain on a site with existing infrastructure to reduce the impacts. The design of the facility includes a slimline monopole, collar mounted antennas. It will also be constructed using non-reflective material, which will be colour matched to be as inconspicuous as possible.



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Developing Housing Area South of Jetty Point Drive

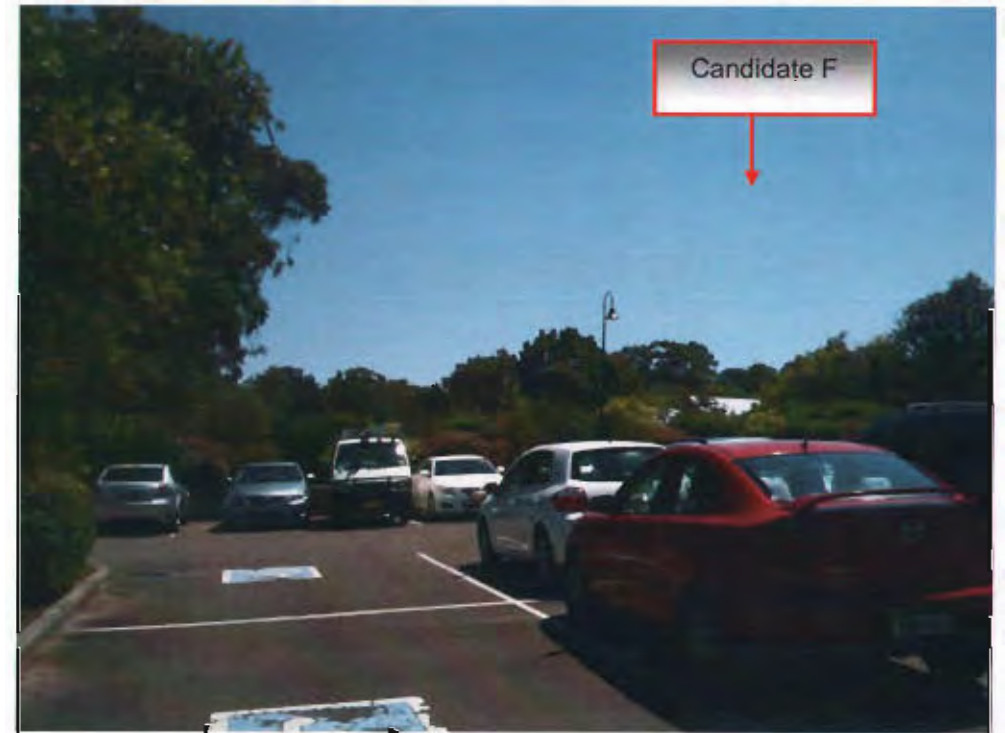
Figures 6 and 7 demonstrate the view obtained from within Rafferty's Resort looking north-east towards Candidate F. Figure 6 was taken approximately 850m south-west of the site. The photograph is of an existing view corridor between two dwellings within the Resort. The terrain and vegetation in the areas between these two points obscure views of Candidate F. The mature tree line surrounding the Resort provides effective visual screening of the facility.

Figure 6 – Photograph looking north-east towards Candidate F taken from within Rafferty's resort



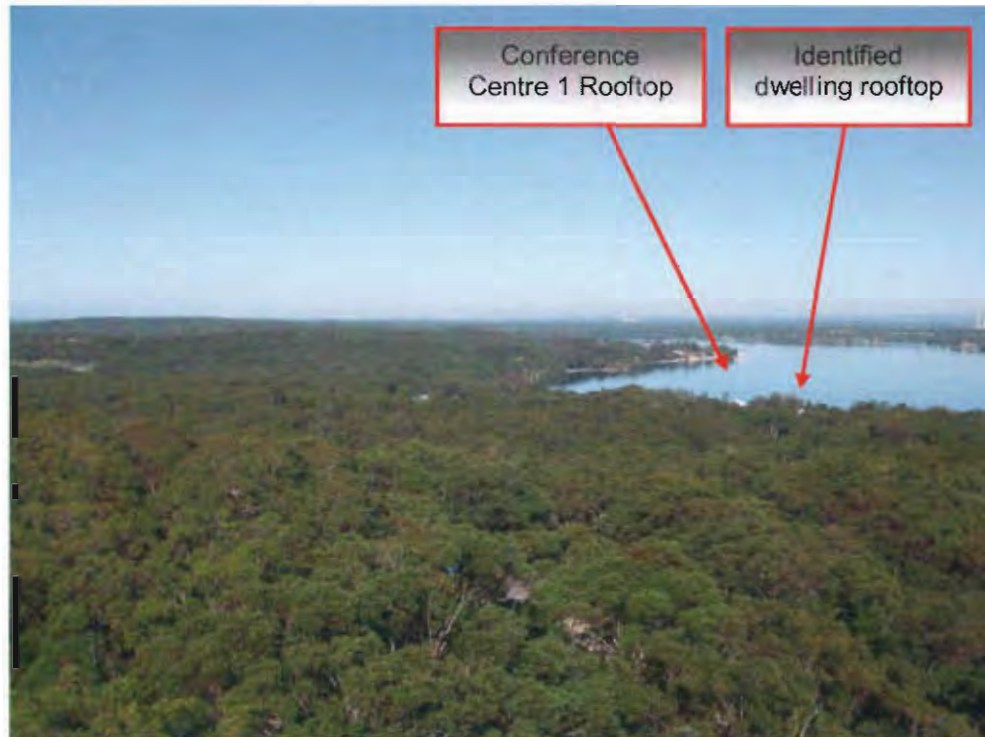
Figure 7 below was taken further south, approximately 950m from Candidate F within the Resort's car park on the eastern side of The Rafferty's Resort Convention Centre 1. From this position there are no views of the ridgeline or bushland located at Candidate F. The mature vegetation surrounding and located throughout the Resort provide effective visual screening from the north and north-eastern direction.

Figure 7 – Photograph of looking north-east towards Candidate F taken from the resort car park.



The visual impact of the proposed telecommunications facility at Candidate F in the areas to the south of Jetty Point Drive is minimal. A balloon was raised to the height of the proposed facility (35m) and photos of the surrounding area were taken. Figure 8 below displays the view to the south of Candidate F looking towards Rafferty's Resort, Lakeside Ridge Precinct and parts of the Lakeshore & Slopes Precinct. As seen in Figure 8, the facility, at its highest point will have little visual impact on the Resort and surrounding area. The Convention Centre and dwelling are labelled within the image, with only the tips of the buildings being visible from this height. The facility will not be visible from street level. This is due to the terrain and the mature vegetation that covers the area.

Figure 8 – Photograph looking south-west from 35m in height above Candidate F.



Point Morisset Precinct and the areas to the west of Candidate F will experience minimal loss of visual amenity. With the balloon elevated to 35m in height above Candidate F, images were taken from the along the shore line and throughout Point Morisset Precinct to assess the visual impact a telecommunications facility at Candidate F may have. As seen below in Figure 9, the balloon at 35m in height is not visible in the eastern skyline. The dense and mature tree line throughout the precinct provides effective screening of the slimline monopole from this location.

Figure 9 – Photograph looking east from the Jetty looking towards Candidate F.



Moving a further 200m north-east from the jetty, there is no detrimental impact on the scenic quality obtained from this area. The mature trees visible in Figure 10 below provide screening from Candidate F. The balloon at 35m in height is not visible from this viewpoint. The dense tree canopy aids greatly in reducing the visual impact a facility may have. There are some small pockets where parts of the proposed facility at Candidate F will be partially visible. However, due to the colour, design and distance from the development, the slimline monopole will have a minimal detrimental impact of the visual quality of the area.

Figure 10 – Photograph taken from approximately 630m west-nor-west of Candidate F looking east.



Figure 11 below is a photograph taken looking west from 35m in height above Candidate F. The shoreline, jetty, dwellings and other features of the built environment throughout the precinct are not visible from this vantage point. The terrain and dense tree canopy assist in screening the facility from the view corridors and lines of sight identified in these areas. It is expected that the visual and scenic impact of the proposed telecommunications facility at Candidate F will be minimal.

Figure 11 – Photograph looking west towards Point Morisset Precinct and the shoreline. Taken from 35m in height above Candidate F.



The Lakeside Ridge Precinct is located along the ridgeline stretching north-south through the North Wallarah area. Candidate F is located within the northern section of this precinct.

The proposed Telstra facility has been sited on land with an existing water reservoir. In an attempt to minimise the impact on the surrounding area, the facility has been located amongst existing infrastructure. Figure 12 demonstrates views obtained from the 35m mark looking south along the Lakeside Ridge Precinct and parts of the Lakeshore & Slopes Precinct. The land is currently undeveloped and is covered with mature trees consisting of dense canopies which will provide visual screening for the facility. There are pockets of no vegetation which will be developed. Here, parts of the proposed facility will be visible, particularly in the areas in close proximity to the facility and reservoir; and the southern side of the precinct will experience a small loss of visual amenity. Overall though, it is considered that a telecommunications facility at Candidate F will have a small visual impact on the Lakeside Ridge Precinct, and only on properties immediately adjacent to its location, with terrain and vegetation screening it from afar.

Figure 12 – Photograph looking south from 35m in elevation above Candidate F.



4 Conclusion

The proposed telecommunications facility designated as Candidate F located at Lot 1 DP114469, 15c Jetty Point Drive, Murrays Beach, the subject of Telstra's submitted development application as demonstrated, is the only viable candidate amongst those Telstra investigated.

The three candidates that warranted extra analysis have been thoroughly discounted for the following reasons:

Candidate B – Not suitable from a perspective of coverage, planning and property requirements.

Candidate C – Not suitable as it will not meet Telstra's coverage requirements.

Candidate E – Not suitable due to mine subsidence issues.

Telstra respectfully requests that Lake Macquarie City Council consider the information presented in this document with regard to Candidate F (being the subject of the submitted planning application) and make a final planning recommendation based on this supplementary information.

It is submitted that the proposal represents sound and proper town planning and it is respectfully requested that permission be granted for this application.

Appendix 1 - Geotechnical Report



Douglas Partners

Geotechnics • Environment • Groundwater

REPORT

on

GEOTECHNICAL INVESTIGATION

**PROPOSED TELECOMMUNICATIONS TOWER
AND COMPOUND**

**TELSTRA SITE 27814
PACIFIC HIGHWAY, CAMS WHARF**

**Prepared for
TELSTRA CORPORATION LTD**

**PROJECT 41441
APRIL 2008**

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Notes relating to this report

APPENDIX A	Drawings 1 to 3: Locations of Test Bores
APPENDIX B	Bore Logs, Core Photos and General Notes

DRC:GCH:JPH:kd

Project No: 41441

1 April 2008

**REPORT ON GEOTECHNICAL INVESTIGATION
PROPOSED TELECOMMUNICATIONS TOWER AND COMPOUND
TELSTRA SITE 27814, PACIFIC HIGHWAY, CAMS WHARF**

1. INTRODUCTION

This report details the results of a geotechnical investigation carried out for a proposed telecommunications tower, equipment kiosks and associated compound adjacent to the Pacific Highway at Cams Wharf. The work was requested by Mr Wayne Rose of Telstra Corporation Limited, prospective purchasers of the site.

A 28.7 m high concrete and steel telecommunications tower above is proposed to be positioned above an area that is understood to have been mined several decades ago. Geotechnical investigation was carried out to investigate the presence of coal mine workings and, where workings were found, to assess the potential for future mine subsidence.

The investigation comprised three test bores and a site walkover. Details of the fieldwork are given in this report together with comments relating to foundation conditions, mine subsidence risks and possible remedial measures. It is understood that the results of this investigation will be used to assess the feasibility of the project.

For the purposes of the investigation, a series of drawings (Reference No N27814 Sheets G1.1, G1.2, G2, G3.2, S1 – S3, S2.1, S2.2 and S3.1) were provided by the Client. These drawings were all noted as "Issue No. 1".

2. SITE DESCRIPTION

The site of the proposed telecommunications compound is located along the western side of the Pacific Highway reserve at Cams Wharf and comprises a rectangular shaped area with plan dimensions of 9.9 m by 7.9 m. It is located near a road cutting which, at its highest point on the western side, is some 10 m above the existing road. The cutting is considerably higher on the eastern side of the road.

As a result of excavations for the road, a ridge oriented parallel to the road has been formed and it is on this ridge that the proposed telecommunications compound will be positioned.

Based on a site survey plan, surface levels across the site are currently at about RL 81 (measured relative to Australian Height Datum) whilst to the north along the ridge, levels fall gradually some 8 m over a distance of about 160 m. To the west of the ridge, surface slopes fall at about 5 - 10° whilst to the east of the ridge, a former access road is present on average about 3.5 m lower than levels along the ridge, with surface slopes in the intervening area at about 22 - 25° from horizontal. The area immediately to the northwest of the site falls at similar slopes for about 2.5 m before flattening out to average slopes of about 5°. The ridge merges into the side of a hill to the south of the site and this hill has a high point a few hundred metres further to the southwest.

At the time of the field investigation, a layer of mulch covered the surface of the proposed development site, this having been due to recent clearing of vegetation. All areas to the west of the ridge and the hillside to the south were covered with mature bush. The section between the ridge and the Pacific Highway was bare with the exception of a few scattered shrubs. Rock was exposed in many areas of the latter section.

Photo 1, below, shows the site prior to clearing vegetation and carrying out the fieldwork, whilst Photo 2 is following clearing and shows the position of the site relative to other topographical features.

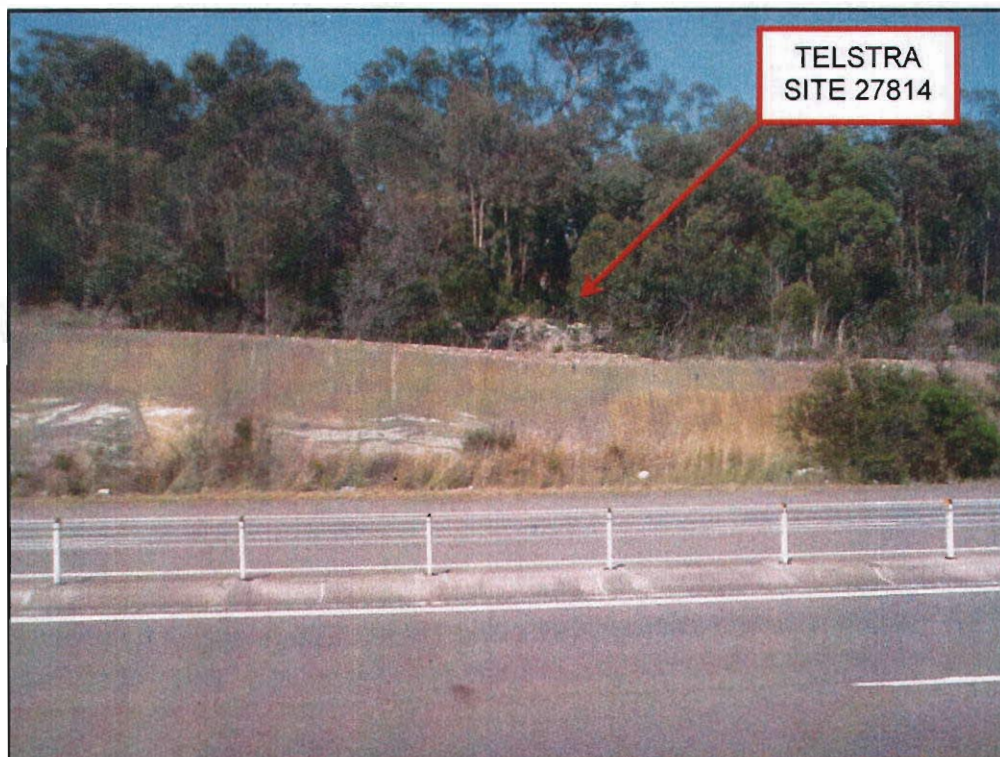


Photo 1: View of Site looking from the Eastern side of the Pacific Highway.



Photo 2 View of general site showing position of the site in relation to the road cutting and the nearby hill. The position of the proposed compound is shown.

3. REGIONAL GEOLOGY

Reference to the provisional Gosford – Lake Macquarie 1 : 100 000 scale Geological Series Sheets indicates that the site is located near the geological boundary of an area underlain by Munmorah Conglomerate within the Clifton Subgroup in Narrabeen Group, and another area underlain by the stratigraphically lower Newcastle Coal Measures.

The Munmorah Conglomerate is described as comprising conglomerate, pebbly sandstone and grey to green shale, whilst the Newcastle Coal Measures (NCM) in this area typically comprise conglomerate, tuff, siltstone, claystone and black coal.

The abandoned workings of the Wallamaine Colliery which probably worked the Wallarah Seam, underlay this site.

4. DESKTOP REVIEW

Prior to commencing the field investigations, a desktop review of information obtained from the Mine Subsidence Board (MSB) and the DPI-Minerals was undertaken. In particular, Record Trace RT633 showing the layout of the local Wallamaine Colliery was used to assess the likely presence of workings in close proximity to the proposed telecommunications tower site. Details of the workings near the site are reproduced from the RT in Figure 1.

Inspection of the scanned RT633 image indicates that the mine surveyor referenced the underground workings to surface features such as site and road reserve boundaries. This enabled the RT633 plan to be georeferenced to the modern surface cadastre on the basis of conspicuous features common on both. The location of the proposed telecommunications tower was then plotted from the co-ordinates given in Drawing N 27814, Sheet G2 provided by the client.

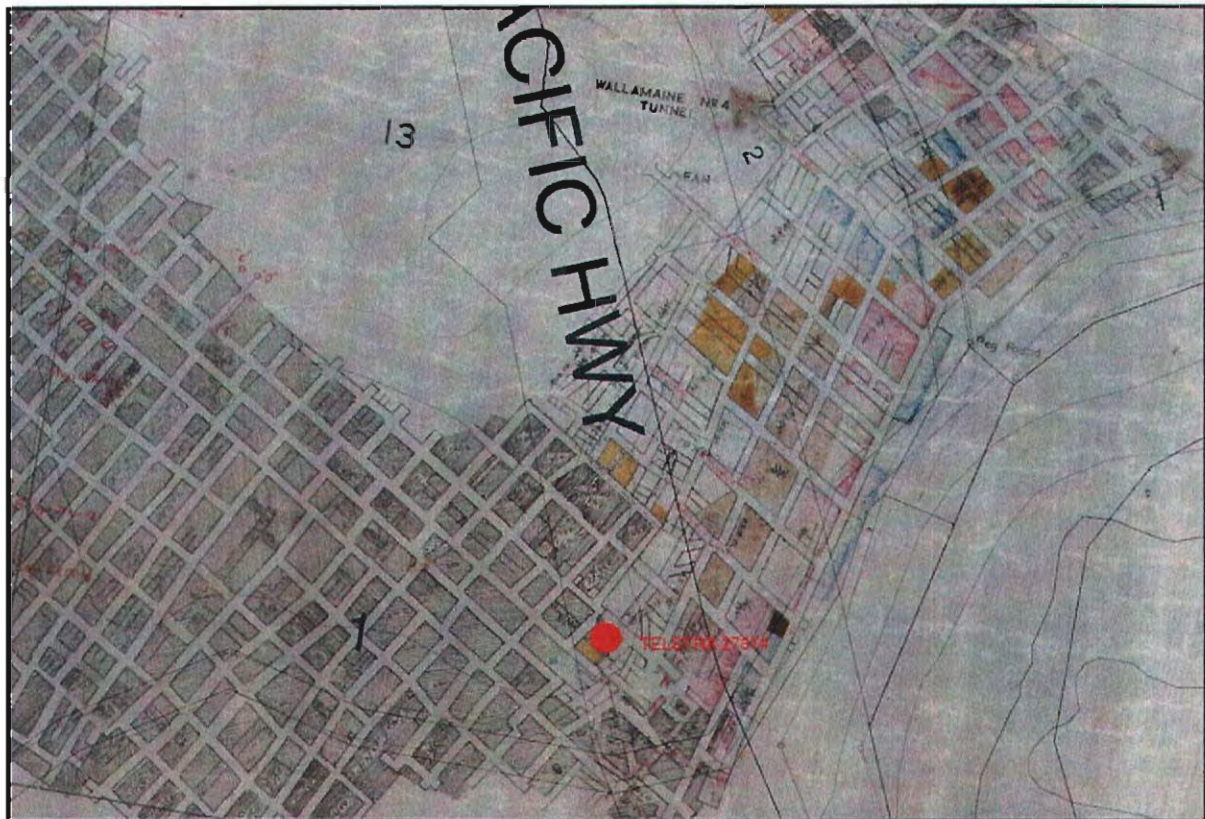


Figure 1: Location of Telstra Site 27814 in relation to recorded coal mine workings. (Details of mine workings are an extract from RT 633 and only show details near the site.)

The following information was interpreted from a review of the georeferenced image of RT633 in the DP MAPINFO GIS system prior to subsurface investigation and used to plan the drilling program:

- The Telstra Site 27814 is located near the No. 4 tunnel into the Wallamaine Colliery. The tunnel entrance is marked with the date 9/2/53 (presumably 1953). The surface level immediately outside the tunnel is noted as about RL 206.85 feet whilst the reduced level inside the tunnel near the first cross bord is RL 212.7 feet.
- The Wallamaine Colliery in the vicinity of Telstra Site 27814 occupies a crescent shaped ridge.
- The crescent shape of the mine is similar to the shape of the ground contours indicating that the mine was situated on a ridge and that the seam has a limited lateral extent at the site, probably due to sub crop and limited depth of cover. The total length of the crescent is at least 1400 m and the maximum width about 300 m as on the RT633 image.

- The 10 m interval contours available on the GIS indicated that the mine was worked below a surface level of RL 80 m at the north-eastern corner and RL 50 m below the south-western portion, suggesting a regional dip of west or southwest.
- Comparison of the level at the No. 4 tunnel entrance of RL 206.85 feet (about RL 63 m) and the first cut through of about RL 212.7 feet (about RL 65 m) with the level shown on the digital cadastre suggested that the coal seam was probably about 15 m below existing surface levels near the proposed telecommunications tower site.
- Extensive pillar extraction took place in these workings which resulted in most of the pillars being removed. However, the extraction was less extensive near the No. 3 and No. 4 tunnel entrances, possibly to protect the miner's access.
- The width of the worked area near the proposed site is about 240 m and it is likely that most of the areas of pillar extraction have already collapsed. However, the site is on the transition between a pillar extraction area, areas of split pillars and one relatively large pillar. It was therefore considered possible that a void may remain beneath the site.
- Based on the topography of the area, it is likely that the mine workings will be dry.

5. SITE WALKOVER INSPECTION

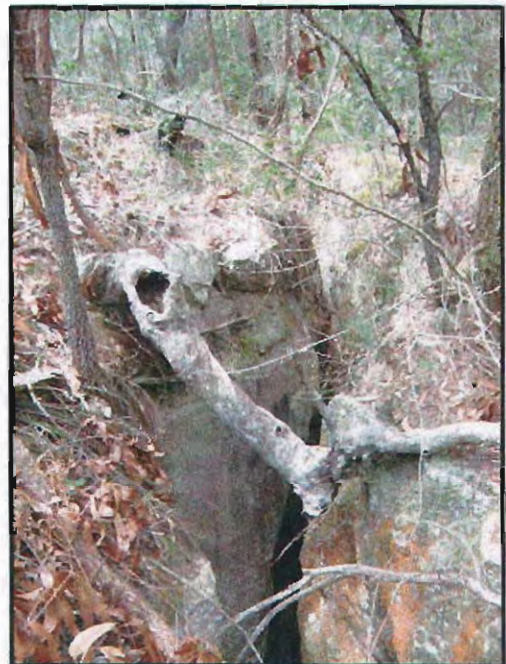
Following the desktop review, a walkover of areas within about 200 m of the site was carried out by a senior engineering geologist and a geotechnical engineer to check for any surface expression of subsidence, such as potholes, tension cracks or scarps.

No subsidence features were observed within the perimeter of the proposed telecommunications compound, however, the walkover of the nearby areas revealed several features indicating surface subsidence from the collapse of the workings. These features are detailed below together with photographs of the features.

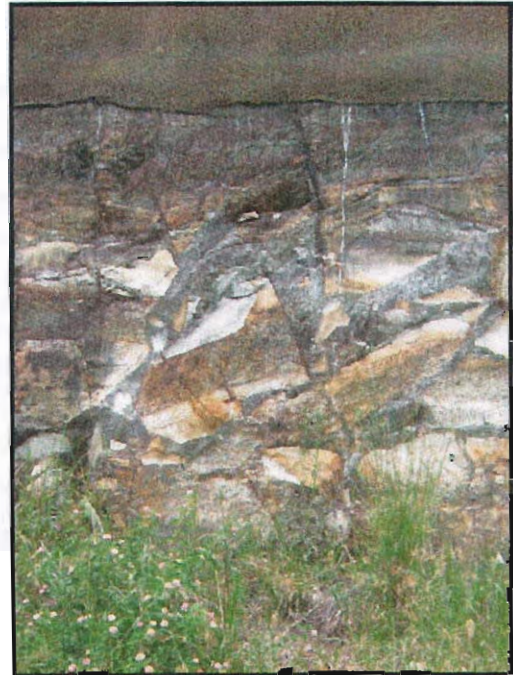
Pothole subsidence approximately 10 m to the west of Telstra Site 27814. A step indicating a relative vertical displacement of at least 0.7 m was noted at the southern end of this feature, and this is shown to the right of text.



Numerous large cracks in an area about 150 m to the north-northwest of the Telstra Site 27814. The cracks were up to 0.5 m wide and estimated to be up to 5 m deep in many parts, although it is likely that the cracks extend in an en echelon manner to an even greater depth. The rock exposed in the upper portion of the crack comprised medium strength sandstone. The extensive nature of these cracks suggests that the roof above the mine workings has completely collapsed in this area. Reference to the MAPINFO GIS model of the workings suggests that these features are close to the goaf edge of the pillar extraction area where differential subsidence and tensile strains will be concentrated.



Evidence of grouting of workings within the sides of the road cutting some 30 – 50 m to the east of Telstra Site 27814. Parts of the cutting have been protected with a covering of shotcrete. However in some areas where bare rock is exposed broken sandstone fragments that have been grouted with a cement matrix are visible. It is assumed that this grouting was undertaken to stabilise the batters prior to excavation of the cutting. The picture to the right shows part of the rock exposed on the eastern side of the road cutting.



The evidence of mine subsidence in the area is consistent with the conditions anticipated following the review of the RT633 record trace. Grouting of areas adjacent to the Pacific Highway has been undertaken some time prior to carrying out excavation associated with the road construction. The lateral extent of the stabilisation (grouting) works is not known.

6. FIELDWORK METHODS

The field investigation comprised three test bores (Bores 1 – 3) drilled using a four wheel drive utility mounted auger/rotary drilling rig. The bores were advanced using 100 mm diameter spiral flight augers until V-bit refusal on the underlying bedrock was reached. Drilling was thereafter continued using NM-LC triple tube diamond core drilling equipment until it was considered that the bores had passed through the region of the 'working seam' and onto the underlying rock. Final depths for Bores 1, 2 and 3 were 21.0 m, 19.98 m and 20.54 m, respectively.

Temporary casing was required in each of the bores to a depth of about 16 m to facilitate coring.

Detailed logs of the subsurface profile encountered in the bores were prepared by the geotechnical engineer using soil and rock samples obtained from the bores.

At the completion of the fieldwork, the surface levels at the test locations were determined by interpolation from the survey drawing provided. At this stage no detailed survey of the bores has been carried out.

The locations of the bores relative to surface features are shown on Drawings 1 and 2 which are contained in Appendix A. Bore 1 was positioned at the location of the proposed telecommunications tower, while Bore 2 was located in the vicinity of a possible intact pillar (as described in the second last point given in Section 4 of this report). Bore 3 was positioned along the western side of the proposed compound. The location of the bores relative to the mine workings are shown on Drawing 3.

7. FIELDWORK RESULTS

Details of the conditions encountered in the test bores are enclosed in Appendix B. These borehole logs should be read in conjunction with the explanatory notes, which define the descriptive terms and classification methods used.

The bores encountered relatively uniform conditions and a brief summary of the bores is as follows:

FILLING	Comprising clayey gravel and present at Bores 1 and 3 to 0.8 - 1.5 m depth.
SANDY CLAY or GRAVELLY CLAY	To 1.6 m and 2.5 m depth at Bores 1 and 3, and to 0.45 m depth at Bore 2.

**SANDSTONE, PEBBLY SANDSTONE
or CONGLOMERATE**

To about 14.5 m depth. Generally medium strength although the upper sequences are extremely and very low strength. This unit is considered to be part of the Munmorah Conglomerate Formation which overlies the Wallarah Seam of the Newcastle Coal Measures in this area. Several voids ranging from 180 – 530 mm were inferred to be present within this unit during the drilling process. In addition, zones of highly fractured rock (possibly rubble) were also present over the lower portion of this unit and significant core loss also occurred during drilling.

SILTSTONE and COAL

Generally very low strength siltstone to about 18-19 m depth then medium strength. Two approximately 0.5 m thick bands of coal were encountered these being at about 15 m and 18 m depth. This unit is considered to be part of the Newcastle Coal Measures.

Also noted was the occasional presence of grout in Bore 1. This is likely to have been injected into former voids by grouting undertaken by the New South Wales Roads and Traffic Authority (RTA) during stabilisation works prior to the re-construction of the Pacific Highway.

Photographic plates of the rock core are presented with the borehole logs in Appendix B.

Groundwater was not observed in any of the bores prior to the introduction of drilling fluid which was used for coring purposes. Due to the fractured nature of the rock, complete water loss was experienced in all three bores, resulting in the injection of several thousands of litres of water into the fractured zones. Notwithstanding this, given the elevated position of the site in conjunction with the fractured nature of the rock, it is unlikely that groundwater would be present within the depth of the bores.

8. PROPOSED DEVELOPMENT

It is understood that the proposed development included a monopole tower for telecommunications antennae and two separate equipment kiosks belonging to Telstra and Optus. These structures will be within a fenced compound.

9. COMMENTS

9.1 Assessment of Data from Test Bores

9.1.1 Working Seam

The bores penetrated two coal seams.

The upper seam was at a depth of about 15 m and was associated with extensive core loss zones, and in the case of Bore 1, a small void of about 190 mm high. The length of coal core recovered from this seam ranged from 186 mm to 610 mm.

The lower seam was present at a depth of about 18m. The length of coal recovered from this seam ranged from 0.43 m to 0.56 m. The latter thickness was measured in Bore 1, which recovered both top and bottom of the seam in a single run with 100% core recovery and is therefore an accurate measure of seam thickness.

Based on the above, the lower seam has a maximum thickness of 0.56 m and is therefore not workable. The presence of voids and high core loss associated with the upper seam confirms that this seam was worked under the site.

9.1.2 Remnant Voids

Small voids ranging from 0.16 m high to 0.53 m were encountered in all bores at various depths between the level of the working seam at about 15 m and a depth of about 8 m below the existing surface. These voids appear to be residual voids following a collapse of the strata overlying the pillar extraction area. Details of the voids encountered in each bore are given in Table 1 below.

Table 1: Depth and height of Remnant Voids Observed in Bores

Bore 1		Bore 2		Bore 3	
Depth to top (m)	Void height (m)	Depth to top (m)	Void height (m)	Depth to top (m)	Void height (m)
8.05	0.32 (grout filled no longer an open void)	9.05	0.16	11.32	0.18
11.34	0.53	11.28	0.27	13.06	0.46
15.63	0.21				
Total thickness of existing open void	0.74		0.43		0.64

9.1.3 Prior Grouting

As discussed above it is apparent that grouting was undertaken in conjunction with the excavation of the adjacent cut batters of the Pacific Highway. Grout was encountered in Bore 1 only. At a depth of 8.05 m, the grout infilled a prior void about 0.32 m in height. At 11.7 m depth grout was present as cement between fractured sandstone fragments at the base of an open void. No grout was identified in the other bores.

9.2 Condition of the Workings and Subsidence Risk

The extent of fracturing of the rock mass, the small total height of the current voids and the distribution of these voids though the rock mass indicates that the rock overlying the pillar extraction area has collapsed (goafed).

The small total height of the remaining void relative to any reasonable working section indicates that substantial surface subsidence has already occurred in this area. This is consistent with the presence of the large vertical differential settlements and tension cracks observed to the north of the site near the edge of the pillar extraction panel.

The remaining voids have been redistributed throughout the rock mass and do not form a continuous laterally extensive void and hence it is considered that there is no significant risk of trough subsidence (i.e. subsidence over a laterally extensive area).

If the remaining voids were to propagate upward through the rock mass by successive collapses of the rock overlying the void it might be possible for a small pothole to reach the ground surface. However given the medium strength rock overlying the remnant voids it is considered that such sequential roof failures are unlikely and if they did occur, bulking of the fallen rock material would be expected to choke off the remaining voids prior to reaching the surface.

A more credible scenario for potential damage of the structure as a result of the underlying mine workings might be piping failure in which the near surface soil and/or filling is eroded by water permeating through the fractured ground overlying the goafed workings. This would initially result in a narrow piping tube from the ground surface to the top of the weathered rock but if not backfilled might widen over time. Given that the residual soils in this area are derived from weathered conglomerate and therefore have a gravelly consistency, such piping is also considered unlikely.

9.3 Design for Subsidence

There are two possible approaches to the risk of mine subsidence at this site:

- Design for pothole subsidence and allow provision for re-levelling if adverse tilts occur.
- Grout the voids under and within 7 m of the boundary of the site to eliminate subsidence risk.

The options are discussed in further detail below.

9.3.1 Pothole Subsidence Design

While the risk of mine subsidence is considered very small, the consequences of pothole subsidence or tilt in relation to a tall tower founded on a single pile could be severe. An approach to this would be to found the proposed monopole on a cruciform footing designed to withstand a 5 m diameter subsidence pothole forming at any location beneath the footing.

Similarly the kiosks could be constructed using standard pothole footing designs in which the structure is founded on rigid strip footings (ground beams) which project well beyond the perimeter of the building to allow it to span future potholes. It is, however, likely that the

projection of the ground beam may exceed space available within the current licence area which may therefore need to be increased.

If this approach is adopted then the structure would not be adversely affected by either soil piping or pothole subsidence and the local tilts which are associated with the development of these features.

The structure would however be susceptible to adverse tilts in the extremely unlikely event that trough subsidence was to occur. If the ground beams and cruciform footings are designed to be sufficiently stiff then it would be possible to re-level these structures by jacking.

9.3.2 Grouting

It would be possible to eliminate all risk to the proposed development by grouting all the remaining voids with the rock mass to a depth of 15 m and for a distance of about 7 m beyond the edges of the structures. It is likely the cost of such pre-emptive grouting may be disproportionately high relative to the cost of pothole subsidence design with thick engineered ground beams capable of being re-levelled in the unlikely event that ground tilts develop at this site.

9.4 Role of Mine Subsidence Board

As the site lies within a proclaimed mine subsidence district, it is necessary to obtain MSB approval for any structures erected at this site. Notwithstanding the low risk of pothole subsidence at this site, it is likely that the MSB would require pothole subsidence design as a minimum requirement for any structures on this site. The agreement of the MSB to the proposed control measures should be obtained prior to detailed design or the placing of contracts.

9.5 Foundations

Pothole subsidence beam footings can be founded on residual soil or rock depending on the proposed foundation loads and whether the structures are sensitive to differential settlement from the shrink swell behaviour of the soil.

For ground beam and cruciform footings on weathered rock a maximum allowable bearing capacity of 400 kPa is considered appropriate. If pre-emptive grouting is undertaken to eliminate the mine subsidence risk the foundations could comprise bored piles founded on very low strength or better rock for which an allowable maximum bearing end bearing capacity of 1000 kPa is considered appropriate.

10. LIMITATIONS OF THIS REPORT

Conditions on site different to those identified during this assessment may exist. Therefore DP cannot provide unqualified warranties nor does DP assume any liability for site conditions not recorded in the data available for this assessment.

This report and associated documentation and the information herein have been prepared solely for the use of Telstra Corporation Limited. Any reliance on this report assumed by other parties shall be at such party's own risk. Any ensuing liability resulting from use of the report by other parties cannot be transferred to DP.

DOUGLAS PARTNERS PTY LTD

Reviewed by



Darryl Carson
Geotechnical Engineer / Associate



John Harvey
Principal

Greg Hawkins
Senior Engineering Geologist / Senior Associate



Douglas Partners

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NOTES RELATING TO THIS REPORT

Introduction

These notes have been provided to amplify the geotechnical report in regard to classification methods, specialist field procedures and certain matters relating to the Discussion and Comments section. Not all, of course, are necessarily relevant to all reports.

Geotechnical reports are based on information gained from limited subsurface test boring and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726, Geotechnical Site Investigations Code. In general, descriptions cover the following properties - strength or density, colour, structure, soil or rock type and inclusions.

Soil types are described according to the predominating particle size, qualified by the grading of other particles present (eg. sandy clay) on the following bases:

Soil Classification	Particle Size
Clay	less than 0.002 mm
Silt	0.002 to 0.06 mm
Sand	0.06 to 2.00 mm
Gravel	2.00 to 60.00 mm

Cohesive soils are classified on the basis of strength either by laboratory testing or engineering examination. The strength terms are defined as follows.

Classification	Undrained Shear Strength kPa
Very soft	less than 12
Soft	12—25
Firm	25—50
Stiff	50—100
Very stiff	100—200
Hard	Greater than 200

Non-cohesive soils are classified on the basis of relative density, generally from the results of standard penetration tests (SPT) or Dutch cone penetrometer tests (CPT) as below:

Relative Density	SPT "N" Value (blows/300 mm)	CPT Cone Value (q_c — MPa)
Very loose	less than 5	less than 2
Loose	5—10	2—5
Medium dense	10—30	5—15
Dense	30—50	15—25
Very dense	greater than 50	greater than 25

Rock types are classified by their geological names. Where relevant, further information regarding rock classification is given on the following sheet.

Sampling

Sampling is carried out during drilling to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing with a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling are given in the report.

Drilling Methods.

The following is a brief summary of drilling methods currently adopted by the Company and some comments on their use and application.

Test Pits — these are excavated with a backhoe or a tracked excavator, allowing close examination of the in-situ soils if it is safe to descent into the pit. The depth of penetration is limited to about 3 m for a backhoe and up to 6 m for an excavator. A potential disadvantage is the disturbance caused by the excavation.





















Large Diameter Auger (eg. Pengo) — the hole is advanced by a rotating plate or short spiral auger, generally 300 mm or larger in diameter. The cuttings are returned to the surface at intervals (generally of not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube sampling.

Continuous Sample Drilling — the hole is advanced by pushing a 100 mm diameter socket into the ground and withdrawing it at intervals to extrude the sample. This is the most reliable method of drilling in soils, since moisture content is unchanged and soil structure, strength, etc. is only marginally affected.











Continuous Spiral Flight Augers — the hole is advanced using 90—115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in

GRAPHIC SYMBOLS FOR SOIL & ROCK




SOIL

	BITUMINOUS CONCRETE
	CONCRETE
	TOPSOIL
	FILLING
	PEAT
	CLAY
	SILTY CLAY
	SANDY CLAY
	GRAVELLY CLAY
	SHALY CLAY
	SILT
	CLAYEY SILT
	SANDY SILT
	SAND
	CLAYEY SAND
	SILTY SAND
	GRAVEL
	SANDY GRAVEL
	COBBLES/BOULDERS
	TALUS





SEDIMENTARY ROCK

	BOULDER CONGLOMERATE
	CONGLOMERATE
	CONGLOMERATIC SANDSTONE
	SANDSTONE FINE GRAINED
	SANDSTONE COARSE GRAINED
	SILTSTONE
	LAMINITE
	MUDSTONE, CLAYSTONE, SHALE
	COAL
	LIMESTONE

METAMORPHIC ROCK

	SLATE, PHYLLITE, SCHIST
	GNEISS
	QUARTZITE

IGNEOUS ROCK

	GRANITE
	DOLERITE, BASALT
	TUFF
	PORPHYRY

SEAMS

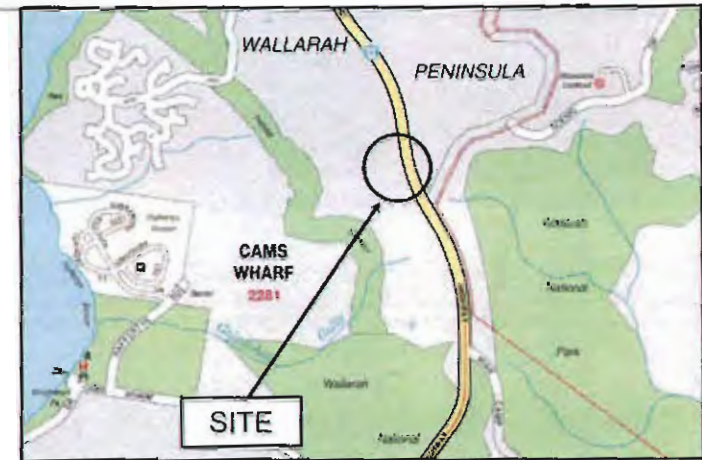
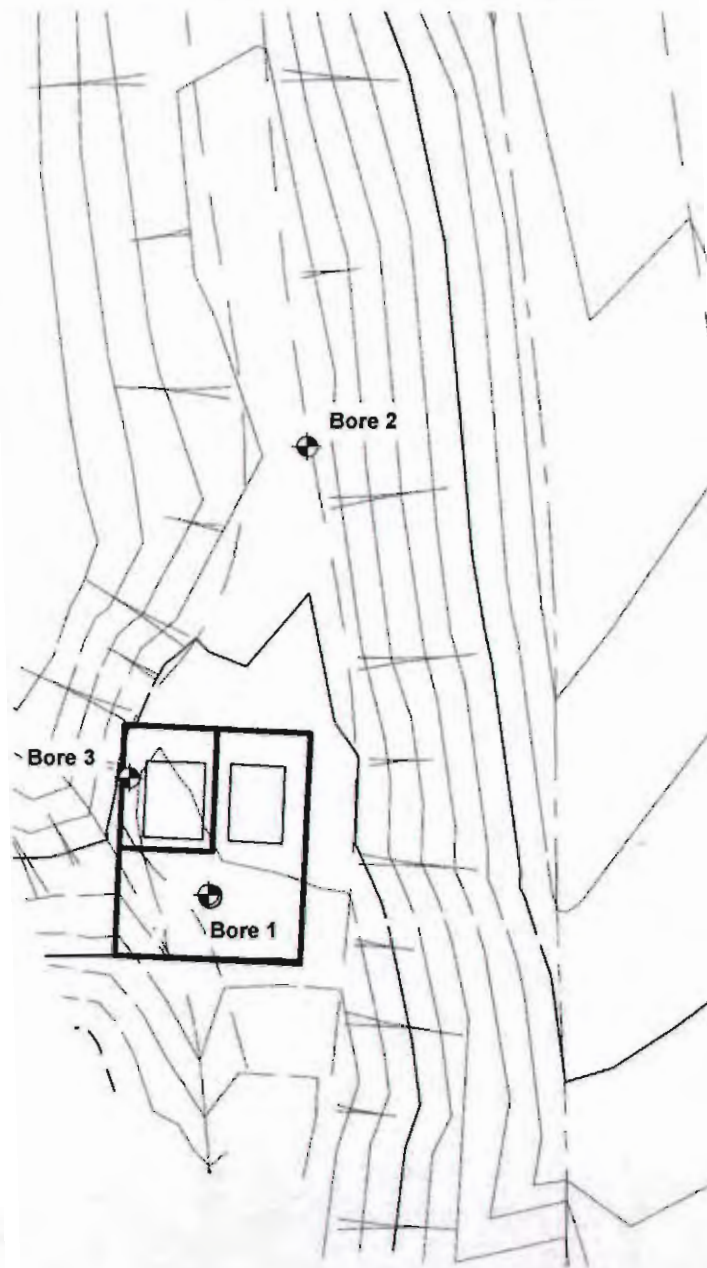
	SEAM > 10 mm
	SEAM < 10 mm



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APPENDIX A

LOCATIONS OF TEST BORES



LEGEND

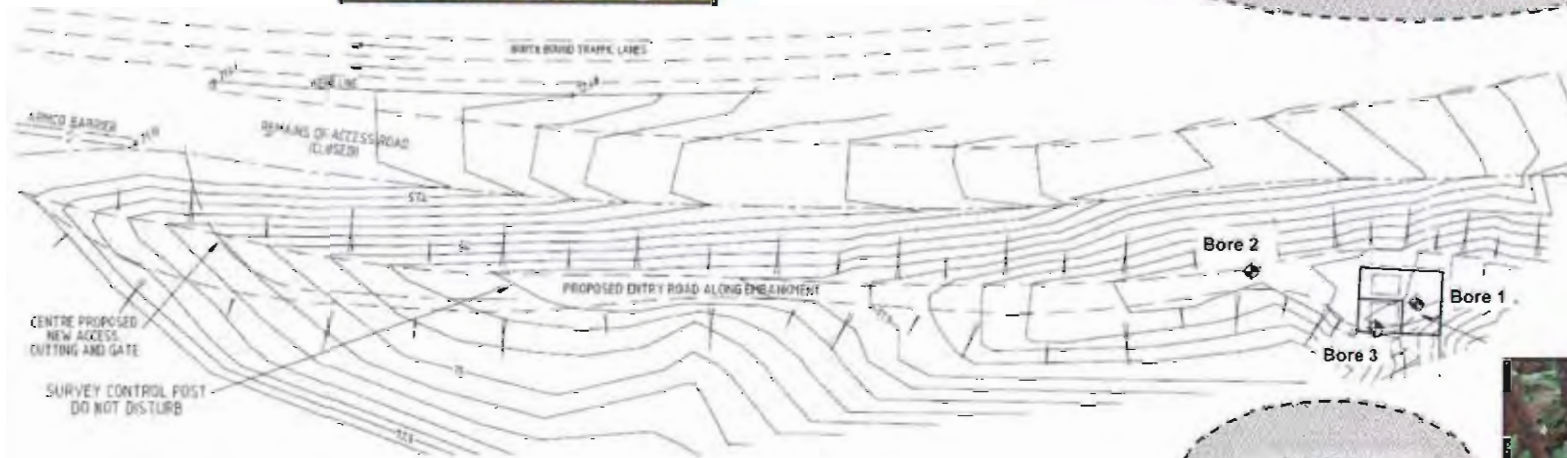
Test Bore Location

- Notes:**
1. Test locations are positioned relative to existing and proposed site features.
 2. Drawing adapted from plan provided by Telstra Corporation Ltd.

		Douglas Partners Geotechnics • Environment • Groundwater		Sydney, Newcastle, Brisbane, Melbourne, Perth, Wyoong, Canberra, Campbelltown, Townsville, Cairns, Darwin
TITLE: TEST LOCATION PLAN PROPOSED TELECOMMUNICATIONS TOWER AND COMPOUND TELSTRA SITE 27814, PACIFIC HIGHWAY, CAMS WHARF				
CLIENT: TELSTRA CORPORATION LTD				
DRAWN BY: DRC	SCALE: NTS	PROJECT No: 41441	OFFICE: WYONG	
APPROVED BY: DRC		DATE: FEBRUARY 2008	DRAWING No: 1	



Previous grouting of road cutting with fractured rock and grout exposed on both sides of the Pacific Highway



Subsidence observed at ground surface



Numerous cracks approximately 5 m deep and up to 0.5 m wide



LEGEND
 Test Bore Location
 Approximate Region of Feature

dp Douglas Partners
 Geotechnics • Environment • Groundwater

Sydney, Newcastle, Brisbane,
 Melbourne, Perth, Wyoah,
 Canberra, Campbelltown,
 Townsville, Cairns, Darwin

TITLE: LOCATIONS OF SITE FEATURES
 PROPOSED TELECOMMUNICATIONS TOWER AND COMPOUND
 TELSTRA SITE 27814, PACIFIC HIGHWAY, CAMS WHARF

CLIENT: TELSTRA CORPORATION LTD			
DRAWN BY: DRC	SCALE: NTS	PROJECT No: 41441	OFFICE: WYONG
APPROVED BY: DRC	DATE: FEBRUARY 2008	DRAWING No: 2	



WORKINGS ADAPTED FROM ITSS (WALLAMAIN COLLIERY) SUPPLIED BY DPI MINERALS AND DIGITAL CADASTRE SUPPLIED BY DEPARTMENT OF LANDS



Douglas Partners
Geotechnics • Environment • Groundwater

Sydney, Newcastle, Brisbane,
Melbourne, Perth, Mining,
Consultancies, Townsville,
Cairns, Wollongong, Darwin

TITLE:
WALLAMAIN COLLIERY WORKINGS RELATIVE TO BORE LOCATIONS
PROPOSED TELECOMMUNICATIONS TOWER AND COMPOUND
TELSTRA SITE 27134, PACIFIC HIGHWAY, CAMS WHARF

CLIENT: TELSTRA CORPORATION LTD
DRAWN BY: GCH SCALE: 1:50
APPROVED BY: *[Signature]*

PROJECT No: 41441
DATE: 2 April 2008

OFFICE: NEWCASTLE
DRAWING No: 2

APPENDIX B
RESULTS OF FIELDWORK

BOREHOLE LOG

CLIENT: Telstra Corporation Ltd
PROJECT: Proposed Telecommunications Tower
LOCATION: Telstra Site 27814 Pacific Highway, Cams Wharf

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 41441
DATE: 06 Nov 07
SHEET 1 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering				Graphic Log	Rock Strength					Water	Fracture Spacing (m)	Discontinuities		Sampling & In Situ Testing								
			EW	HW	MW	SW		FS	FR	Ex Low	Very Low	Low			Medium	High	Very High	Ex High	B - Bedding	J - Joint	S - Shear	D - Drill Break	Type	Core Rec. %	RQD %
	0.1	FILLING: Organic mulch																							
		FILLING: Grey brown slightly silty clayey gravel filling, humid																							
	0.8	SANDY CLAY: Brown and orange brown slightly gravelly sandy clay, M<Wp																				D			
1																									
	1.8	CLAYEY GRAVEL: Hard, light grey clayey gravel, M<Wp. Gravel subrounded and to 10mm																				D			
2																									
	2.2	SANDSTONE: Extremely low and very low strength, light orange brown and light grey sandstone																				S			10,14,19 N = 33
		- v-bit refusal at 2.75m																				D			
3																									
4																						C	89	38	
	4.25	PEBBLY SANDSTONE: Low to medium strength, slightly then moderately weathered, orange brown and light grey pebbly sandstone with occasional bands of medium grained sandstone																				C	100	100	

RIG: Nissan Patrol

DRILLER: Foody

LOGGED: Carson

CASING: GL to ~16m

TYPE OF BORING: 100mm SFA to 2.75m then NMLC coring to 21.0m

WATER OBSERVATIONS: No Free Groundwater Observed whilst augering

REMARKS: 100% water loss from 8.5m

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength (50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	D	Water seep
		W	Water level

CHECKED

Initials: *MLC*

Date: *1.4.08*



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BOREHOLE LOG

CLIENT: Telstra Corporation Ltd
PROJECT: Proposed Telecommunications Tower
LOCATION: Telstra Site 27814 Pacific Highway, Cam
Wharf

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 41441
DATE: 06 Nov 07
SHEET 2 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering					Graphic Log	Rock Strength	Water	Fracture Spacing (m)	Discontinuities			Sampling & In Situ Testing			Test Results & Comments
			EW	HW	MW	SW	FS					B - Bedding S - Shear	J - Joint D - Drill Break	Type	Core Rec. %	RQD %		
		PEBBLY SANDSTONE: Low to medium strength, slightly then moderately weathered, orange brown and light grey pebbly sandstone with occasional bands of medium grained sandstone (continued)																
	6																	
	6.47	CONGLOMERATE: Medium strength, slightly weathered, light green grey conglomerate. Gravel subrounded and to 10mm																
	7																	
	8																	
	8.05	GROUT: Grey, cemented grout filling																
	8.37	CORE LOSS: 410mm																
	8.78	CONGLOMERATE: Medium strength, slightly weathered, light green grey conglomerate. Gravel subrounded and to 10mm																
	9																	
	9.25																	

RIG: Nissan Patrol

DRILLER: Forty

LOGGED: C:\FS00

CASING: ① to ③m

TYPE OF BORING: 100mm ϕ SFA to 2.75m then NMLC casing to 21.0m

WATER OBSERVATIONS: No Free Groundwater Observed whilst augering

REMARKS: 100% water loss from 8.5m

SAMPLING & IN SITU TESTING LEGEND

SAMPLING & IN SITU TESTING LEGEND	
A. Auger sample	pp. Pocket penetrometer (kPa)
DI Disturbed sample	PID Photo ionisation detector
B. Bulk sample	S Standard penetration test
U. Tube sample (5 mm dia.)	PL Point load strength k(50) MPa
W. Water sample	vs Shear Vane (kPa)
C. Core drilling	W Water seep
	W Water level

CHECKED

Initials: **MC**

Date: 1-4-08



Douglas Partners
Geotechnics • Environment • Groundwater

BOREHOLE LOG

CLIENT: Telstra Corporation Ltd
PROJECT: Proposed Telecommunications Tower
LOCATION: Telstra Site 27814 Pacific Highway, Cams Wharf

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/-

BORE No: 1
PROJECT No: 41441
DATE: 06 Nov 07
SHEET 3 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering				Graphic Log	Rock Strength					Water	Fracture Spacing (m)	Discontinuities				Sampling & In Situ Testing							
			EW	HW	MW	SW		FS	FR	Ex	Low	Very Low			Low	Medium	High	Very High	Ex	High	B - Bedding	J - Joint	S - Shear	D - Drill Break	Type	Core Rec. %
		SANDSTONE: Medium strength, fresh with ironstaining around joints, light grey, medium grained sandstone and pebbly sandstone. Gravel subrounded and to 10mm (continued)																9.91m: 40mm fragmented rock					C	90	70	
																		9.95m: J20° ro, pl, Fe								
																		10.03m: J20° ro, pl, Fe								
																		10.08m: J60° ro, un								
																		10.46m: J5° ro, Fe								
	11																									
	11.34	VOID																11.11m: 100mm zone of highly fractured rock					C	67	53	
																		11.34m: Void 530mm								
	11.87																									
	12	FRACTURED SANDSTONE & GROUT: Medium strength, orange brown and light grey, medium grained, fractured sandstone and light grey to grey grout infill - core loss possibly within grouted zone																								
	12.33	CORE LOSS: 410mm																12.33m: CORE LOSS: 410mm					C	53	0	
	12.74	CORE LOSS: 180mm																12.74m: CORE LOSS: 180mm								
	12.92																									
	13.02	FRACTURED SANDSTONE & GROUT: As above (continued)																								
	13.27	SANDSTONE: Medium to high strength, light grey, fine to medium grained sandstone																								
		CORE LOSS: 820mm																13.27m: CORE LOSS: 820mm								
	14.09																									
	14.39	FRACTURED SANDSTONE & GROUT: Medium strength, light grey, fractured pebbly sandstone and grout																								
	14.49	SILTSTONE: Extremely low and very low strength, brown and grey brown siltstone with some thin coal seams																								
	14.62	CORE LOSS: 130mm																14.49m: CORE LOSS: 130mm								
		SILTSTONE: As above (continued)																								

RIG: Nissan Patrol

DRILLER: Foody

LOGGED: Carson

CASING: GL to ~10m

TYPE OF BORING: 100mm SFA to 2.75m then NMLC casing to 21.0m

WATER OBSERVATIONS: No Free Groundwater Observed whilst augering

REMARKS: 100% water loss from 8.5m

BOREHOLE LOG

CLIENT: Telstra Corporation Ltd
PROJECT: Proposed Telecommunications Tower
LOCATION: Telstra Site 27814 Pacific Highway, Cams Wharf

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 1
PROJECT No: 41441
DATE: 06 Nov 07
SHEET 4 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Fracture Spacing (m)	Discontinuities	Sampling & in Situ Testing			
								Type	Core Rec. %	RQD %	Test Results & Comments
		SILTSTONE: As above (continued)									
	15.2	COAL: Low strength, dark grey coal with some fragmented zones									
	15.63	VOID					15.63m: Void 210mm				
	15.84	FRAGMENTED COAL & SANDSTONE: Dark grey coal and light grey sandstone									
	16.0	SANDSTONE: High strength, light brown, slightly weathered, fine grained sandstone with thin coal inclusions					16m: 16.0-16.6 DB at 50mm-120mm spacings				
	16.89	SILTSTONE: Very low strength, highly weathered, fragmented, orange brown siltstone					16.72m: J30° healed, clay infill 10mm 16.83m: J70° ro, pl 16.89m: fragmented rock from 16.89m-18.25m 16.92m: J80° ro, un 17.02m: CORE LOSS: 100mm				
	17.02	CORE LOSS: 100mm									
	17.12	SILTSTONE: As above (continued)									
	17.76	CORE LOSS: 60mm					17.76m: CORE LOSS: 60mm				
	17.82	SILTSTONE: As above (continued)									
	18	- low to medium strength from 18m									
	18.47	COAL: Medium strength, black coal with some thin siltstone bands					18.33m: J30° ro, pl, Fe 18.7m: J90° ro, un				
	19										
	19.13	SILTSTONE: Very low to low strength, light grey and dark grey siltstone									
	19.4	SILTSTONE: Medium to high strength, highly fractured, light grey and orange brown siltstone					19.44m: J5°, 10mm clay infill 19.47m: J5°, 5mm clay infill				

RIG: Nissan Patrol

DRILLER: Foody

LOGGED: Carson

CASING: GL to ~15m

TYPE OF BORING: 100mm SFA to 2.75m then NMLC coring to 21.0m

WATER OBSERVATIONS: No Free Groundwater Observed whilst augering

REMARKS: 100% water loss from 8.5m

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength (50) MPa
W	Water sample	SV	Shear Vane (kPa)
C	Core drilling	W	Water seep
		L	Water level

CHECKED	
Initials:	dlc
Date:	14.08



Douglas Partners
Geotechnics - Environment - Remediation

BOREHOLE LOG

CLIENT: Telstra Corporation Ltd
PROJECT: Proposed Telecommunications Tower
LOCATION: Telstra Site 27814 Pacific Highway, Cams Wharf

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/-

BORE No: 1
PROJECT No: 41441
DATE: 06 Nov 07
SHEET 5 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering				Graphic Log	Rock Strength						Water	Fracture Spacing (m)	Discontinuities		Sampling & In Situ Testing						
			EW	FW	MW	SW		FS	FR	Ex Low	Very Low	Low	Medium			High	Very High	Ex High	B - Bedding	J - Joint	S - Shear	D - Drill Break	Type	Core Rec. %
		SILTSTONE: Medium to high strength, highly fractured, light grey and orange brown siltstone (continued)																						
		- becoming light grey from 20.47m																		C	100	81		
																				C	100	100		
																				C	100	100		
21	21.0	Bore discontinued at 21.0m. Limit of investigation																						

RIG: Nissan Patrol

DRILLER: Foody

LOGGED: Carson

CASING: GL to ~16m

TYPE OF BORING: 100mm ϕ SFA to 2.75m then NMLC coring to 21.0m

WATER OBSERVATIONS: No Free Groundwater Observed whilst augering

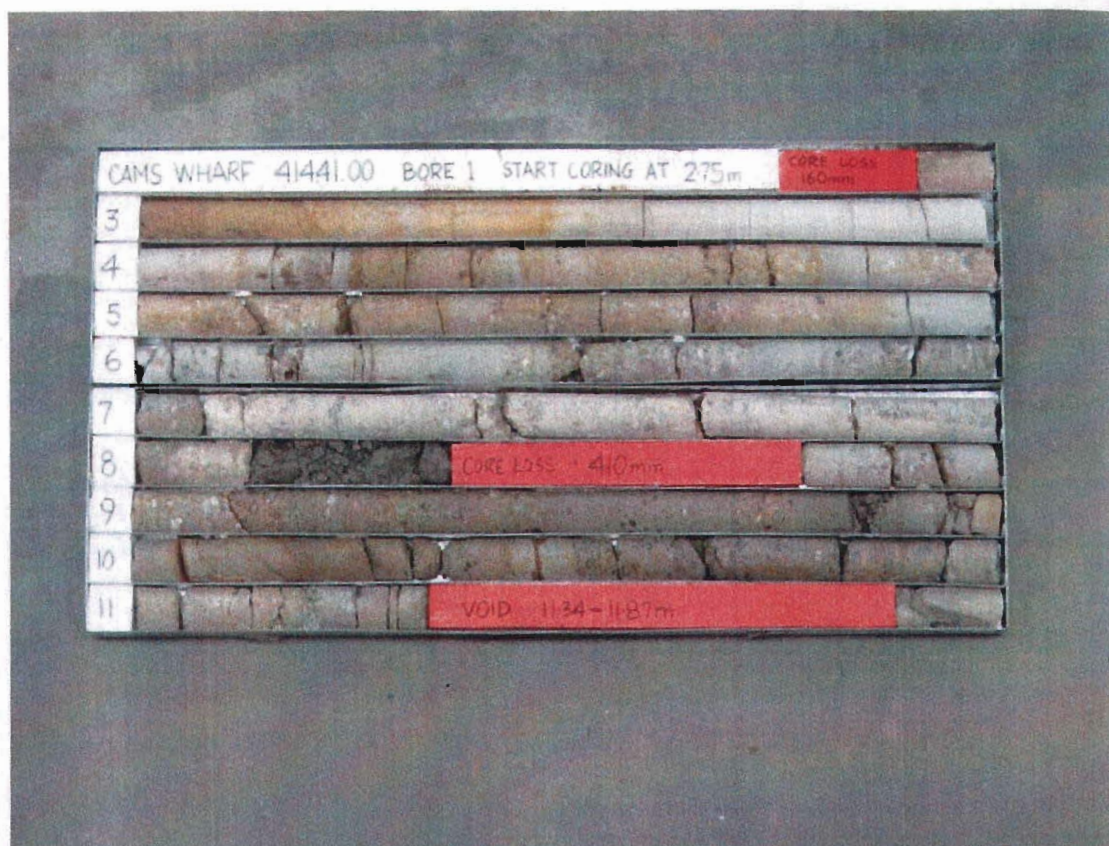
REMARKS: 100% water loss from 8.5m

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	Δ	Water seep
		■	Water level

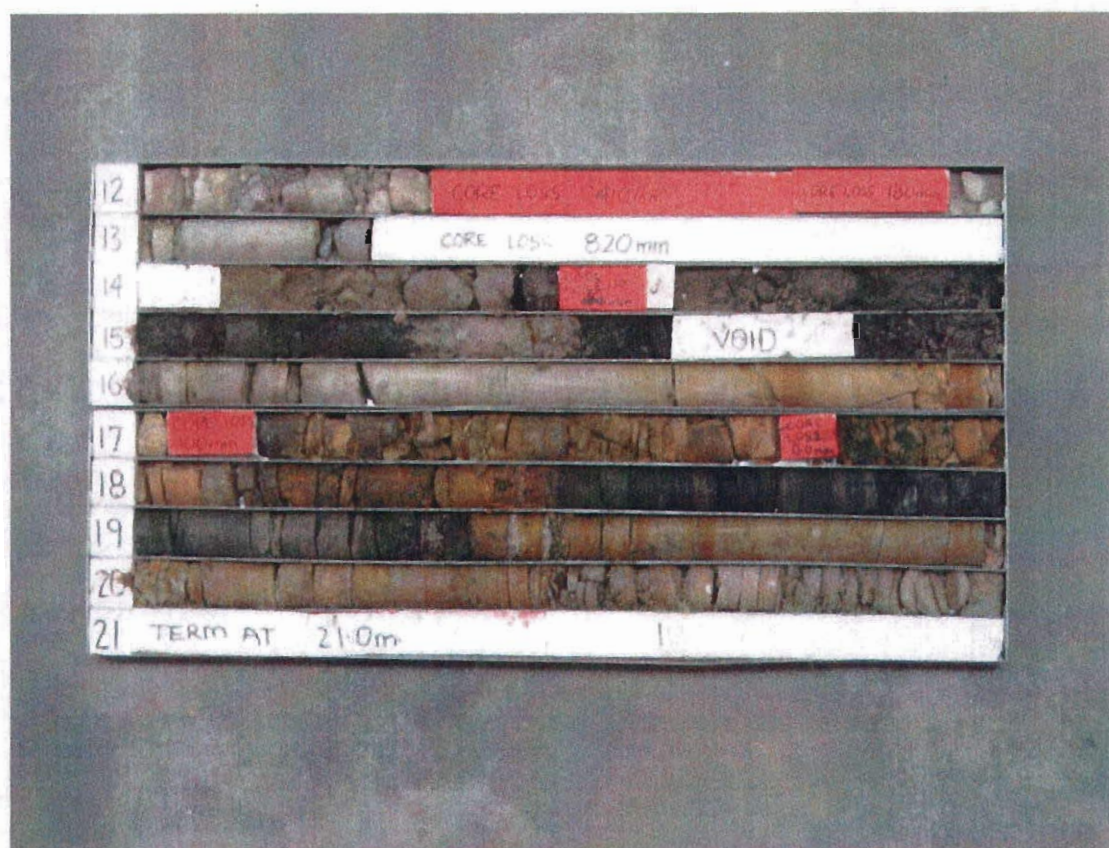
CHECKED
Initials: <i>dec</i>
Date: <i>14-08</i>



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Geotechnics • Environment • Groundwater



Bore 1 – from 2.75 m to 12 m



Bore 1 – from 12 m to 21 m

Proposed Telecommunications Tower Telstra Site 27814 Pacific Highway Cams Wharf	PROJECT: 41441	Date: November 2007	PLATE: 1
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BOREHOLE LOG

CLIENT: Telstra Corporation Ltd
PROJECT: Proposed Telecommunications Tower
LOCATION: Telstra Site 27814 Pacific Highway, Cams Wharf

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 2
PROJECT No: 41441
DATE: 08 Nov 07
SHEET 1 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Fracture Spacing (m)	Discontinuities		Sampling & In Situ Testing		
							B - Bedding S - Shear	J - Joint D - Drift Break	Type	Core Rec. %	Test Results & Comments
		GRAVELLY CLAY: Very stiff, brown gravelly clay with some fine grained sand, M<Wp									
	0.45	PEBBLY SANDSTONE: Very low and low strength, extremely weathered, light orange brown pebbly sandstone									
1											
2											
	2.26	- low strength from 2.2m CORE LOSS 660mm									
	2.59	PEBBLY SANDSTONE: As above (continued)							C	52	0
3	2.92	SANDSTONE: Medium strength, slightly then moderately weathered, light grey and orange brown fine and medium grained sandstone									
		- very low strength from 3.65m							C	100	80
	3.8	CORE LOSS 220mm									
4	4.02	SANDSTONE: As above (continued)									
	4.41	CONGLOMERATE & PEBBLY SANDSTONE: Medium to high strength, slightly weathered, light grey and orange brown conglomerate and pebbly sandstone. Gravel subrounded and to 15mm							C	80	39
									C	100	100

RIG: Nissan Patrol

DRILLER: Foody

LOGGED: Carson

CASING: GL to 16m

TYPE OF BORING: 100mm ϕ SFA to 2.26m then NMLC coring to 19.98m

WATER OBSERVATIONS: No Free Groundwater Observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength (50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	W	Water seep
		WL	Water level

CHECKED	
Initials:	MC
Date:	14-08



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BOREHOLE LOG

CLIENT: Telstra Corporation Ltd
PROJECT: Proposed Telecommunications Tower
LOCATION: Telstra Site 27814 Pacific Highway, Cams
Wharf

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/-

BORE No: 2
PROJECT No: 41441
DATE: 08 Nov 07
SHEET 1 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering					Graphic Log	Rock Strength					Water	Fracture Spacing (m)	Discontinuities		Sampling & In Situ Testing			Test Results & Comments
			EW	HW	MW	SW	FS		FR	Ex Low	Very Low	Low	Medium			High	Very High	Ex High	B - Bedding	J - Joint	
	0.46	GRAVELLY CLAY: Very stiff, brown gravelly clay with some fine grained sand, M<Wp																			
		PEBBLY SANDSTONE: Very low and low strength, extremely weathered, light orange brown pebbly sandstone																			
	2.26	- low strength from 2.2m CORE LOSS 660mm																			
	2.59	PEBBLY SANDSTONE: As above (continued)																C	52	0	
	2.92	SANDSTONE: Medium strength, slightly then moderately weathered, light grey and orange brown fine and medium grained sandstone																			
	3.8	- very low strength from 3.55m CORE LOSS 220mm																			
	4.02	SANDSTONE: As above (continued)																			
	4.41	CONGLOMERATE & PEBBLY SANDSTONE: Medium to high strength, slightly weathered, light grey and orange brown conglomerate and pebbly sandstone. Gravel subrounded and to 15mm																C	80	39	
																		C	100	100	

RIG: Nissan Patrol

DRILLER: Fiddy

LOGGED: Carson

CASING: GL to 16m

TYPE OF BORING: 100mm ϕ SFA to 2.26m then NMLC coring to 19.98m

WATER OBSERVATIONS: No Free Groundwater Observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND	
A	Auger sample
D	Disturbed sample
B	Bulk sample
U	Tube sample (x mm dia.)
W	Water sample
C	Core drilling
pp	Pocket penetrometer (kPa)
PD	Photo ionisation detector
S	Standard penetration test
PL	Point load strength (s(50) MPa)
V	Shear Vane (kPa)
Δ	Water seep
W	Water level

CHECKED
Initials: <i>ARC</i>
Date: <i>1-4-08</i>



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BOREHOLE LOG

CLIENT: Telstra Corporation Ltd
PROJECT: Proposed Telecommunications Tower
LOCATION: Telstra Site 27814 Pacific Highway, Cams Wharf

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/-

BORE No: 2
PROJECT No: 41441
DATE: 08 Nov 07
SHEET 2 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering					Graphic Log	Rock Strength						Water	Fracture Spacing (m)	Discontinuities		Sampling & In Situ Testing			Test Results & Comments																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
			FW	HW	MW	SW	FS		Ext Low	Low	Medium	High	Very High	Ext High			B - Bedding S - Shear	J - Joint D - Drill Break	Type	Core Rec. %	RQD %																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
		CONGLOMERATE & PEBBLY SANDSTONE: Medium to high strength, slightly weathered, light grey and orange brown conglomerate and pebbly sandstone. Gravel subrounded and to 15mm (continued)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															</

RIG: Nissan Patrol

DRILLER: Foody

LOGGED: Carson

CASING: GL to 16m

TYPE OF BORING: 100mm ϕ SFA to 2.26m then NMLC coring to 19.98m

WATER OBSERVATIONS: No Free Groundwater Observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	PD	Pocket penetrometer (kPa)
D	Disturbed sample	PI	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength (kN) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	D	Water seep
			Water level

CHECKED
Initials: <i>ARC</i>
Date: <i>14.08</i>



Douglas Partners
Greentech • Fruit • 1-800-333-3333

BOREHOLE LOG

CLIENT: Telstra Corporation Ltd
PROJECT: Proposed Telecommunications Tower
LOCATION: Telstra Site 27814 Pacific Highway, Cams Wharf

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/-

BORE No: 2
PROJECT No: 41441
DATE: 08 Nov 07
SHEET 3 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering	Graphic Log	Rock Strength	Fracture Spacing (m)	Discontinuities	Sampling & In Situ Testing			Test Results & Comments
								Type	Core Rec. %	RQD %	
			EW HW MW SW FS FR	Ex Low Very Low Low Medium High Very High Ex High	0.01 0.05 0.10 0.60 1.00		B - Bedding J - Joint S - Shear D - Drift Break				
	10.41	FRACTURED SANDSTONE: Medium strength, light grey and orange brown medium grained fractured sandstone					10.06m: P60°, ro, un, Fe 10.29m: P5°, ro, un, Fe 10.41m: Fragmented rock to 10.57m 10.57m: CORE LOSS: 700mm	C	100	88	
	10.57	CORE LOSS 700mm						C	43	27	
	11										
	11.27	SANDSTONE: Medium to high strength, fresh, medium grained sandstone with occasional subrounded pebbles to 5mm						C	58	58	
	12										
	12.28	VOID					12.28m: Void 270mm				
	12.65	SANDSTONE: Medium to high strength, fresh, medium grained sandstone with occasional subrounded pebbles to 5mm									
	12.68	CORE LOSS 120mm					12.68m: CORE LOSS: 120mm	C	71	0	
	12.8										
	13	FRACTURED SANDSTONE & COAL: Medium to high strength, light grey and orange brown medium grained fractured sandstone with some black coal fragments									
	13.08										
	13.43	SANDSTONE: Medium to high strength, slightly weathered, light grey and orange brown sandstone - very low strength from 13.38m					13.43m: CORE LOSS: 1390mm	C	23	19	
	13.82	CORE LOSS 1390 mm									
	14										
	14.82	COAL FRAGMENTS: Fragments of black coal						C	39	0	

RIG: Nissan Patrol

DRILLER: Foody

LOGGED: Carson

CASING: GL to 16m

TYPE OF BORING: 100mm ϕ SFA to 2.26m then NMLC coring to 19.98m

WATER OBSERVATIONS: No Free Groundwater Observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Rockal penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength ts(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	D	Water seep
		W	Water level

CHECKED
Initials: <i>SEC</i>
Date: <i>1.4.08</i>



Douglas Partners
Geotechnics • Environment • Groundwater

BOREHOLE LOG

CLIENT: Telstra Corporation Ltd
PROJECT: Proposed Telecommunications Tower
LOCATION: Telstra Site 27814 Pacific Highway, Cams Wharf

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/-

BORE No: 2
PROJECT No: 41441
DATE: 08 Nov 07
SHEET 4 OF 4

RL	Depth (m)	Description of Strata	Degree of Weathering					Graphic Log	Rock Strength					Water	Fracture Spacing (m)	Discontinuities		Sampling & In Situ Testing			Test Results & Comments	
			EW	HW	MW	FS	FR		Ex Low	Very Low	Low	Medium	High			Very High	Ex High	B - Bedding S - Shear	J - Joint D - Drill Break	Type		Core Rec. %
	15.09	SILTSTONE: Medium strength, light brown and grey siltstone																				
	15.09	CORE LOSS 350mm														15.09m: CORE LOSS: 350mm	C	36	0			
	15.44	SILTSTONE: Low strength, light brown siltstone															C	39	39			
		- very low to low strength, highly weathered and orange brown from 15.56															C	100	0			
		- medium strength, orange brown and grey from 15.87m																				
	16.0	CORE LOSS 200mm														16m: CORE LOSS: 200mm	C	53	0			
	16.2	SILTSTONE: Very low to low strength, orange brown siltstone																				
	16.36	CORE LOSS 90mm														16.36m: CORE LOSS: 90mm	C	59	0			
	16.45	SILTSTONE: Low to medium strength, orange brown siltstone														16.5m: B0°, ro, pl						
	16.58	CORE LOSS 100mm														16.58m: CORE LOSS: 100mm						
	16.68	SILTSTONE: Low strength, orange brown siltstone															C	80	46			
17																16.91m: J80°, ro, un, Fe 16.97m: B5°, ro, pl, Fe 17.04m: B5°, ro, pl, Fe						
																17.2m: J90° healed						
	17.47	- extremely low strength from 17.42m														17.32m: J5°, ro, pl, Fe 17.39m: J4°, ro, pl, Fe						
		COAL: Medium strength, black coal															C	100	89			
18	17.8	SILTSTONE: Medium strength, dark grey carbonaceous siltstone																				
	18.17	SILTSTONE: Medium strength, orange brown and light grey brown siltstone																				
19																	C	100	100			
		- fine grained sandstone band between 19.48m and 19.52m																				
	19.98																					

Bore discontinued at 19.98m. Limit

RIG: Nissar Investigation

DRILLER: Foody

LOGGED: Carson

CASING: GL to 16m

TYPE OF BORING: 100mm SFA to 2.26m then NMLC coring to 19.98m

WATER OBSERVATIONS: No Free Groundwater Observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PHD	Photo Ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength (50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	D	Water seep
		W	Water level

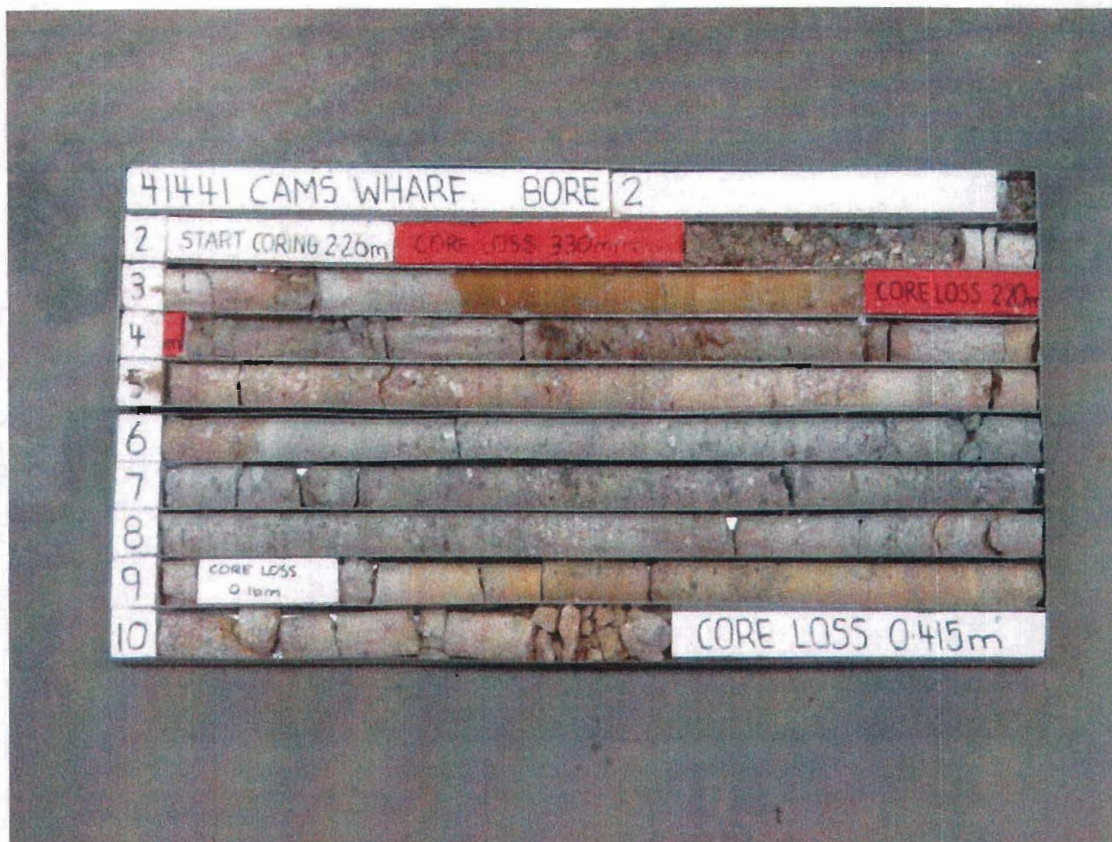
CHECKED

Initials: *ACC*

Date: 1.4.08



Douglas Partners
 Geotechnical Engineering Consultants



Bore 2 – from 2.26 m to 11 m



Bore 2 – from 11 m to 19.98 m

Proposed Telecommunications Tower
Telstra Site 27814 Pacific Highway
Cams Wharf

PROJECT:
41441

Date:
November 2007

PLATE:
2

BOREHOLE LOG

CLIENT: Telstra Corporation Ltd
PROJECT: Proposed Telecommunications Tower
LOCATION: Telstra Site 27814 Pacific Highway, Cams Wharf

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/-

BORE No: 3
PROJECT No: 41441
DATE: 08 Nov 07
SHEET 1 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering EW HW MW SW FS PR	Graphic Log	Rock Strength Ext Low Very Low Low Medium High Very High Ext High	Water	Fracture Spacing (m) 0.01 0.05 0.10 0.50 1.00	Discontinuities B - Bedding J - Joint S - Shear D - Drill Break	Sampling & In Situ Testing		
									Type	Core Rec. %	Test Results & Comments
		FILLING: Generally comprising brown clayey gravelly sand filling with cover of tree mulch									
	1								D		
	1.5	SANDY CLAY: Brown and orange brown slightly gravelly sandy clay, M<Wp							D		
	2								D		
	2.5	SANDSTONE: Extremely low and very low strength, light orange brown and light grey sandstone									
	3										
	4	PEBBLY SANDSTONE: Medium to high strength, moderately weathered, orange brown and light grey fine to medium grained sandstone and pebbly sandstone									
	4.0										
	4.41	CORE LOSS							4.2m: START CORING AT 4.41m 4.41m: CORE LOSS: 500mm		
	4.91	PEBBLY SANDSTONE: As above							C	54	54

RIG: Nissan Patrol

DRILLER: Foody

LOGGED: Carson

CASING: GL to 16m

TYPE OF BORING: 100mm ϕ SFA to 4.41m then NMLC coring to 20.54m

WATER OBSERVATIONS: No Free Groundwater Observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	D	Water seep
			Water level

CHECKED
Initials: <i>DR</i>
Date: 1-11-08



Douglas Partners
Geotechnics • Environment • Groundwater

BOREHOLE LOG

CLIENT: Telstra Corporation Ltd
PROJECT: Proposed Telecommunications Tower
LOCATION: Telstra Site 27814 Pacific Highway, Cams
Wharf

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/-

BORE No: 3
PROJECT No: 41441
DATE: 08 Nov 07
SHEET 2 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering					Graphic Log	Rock Strength						Water	Fracture Spacing (m)	Discontinuities		Sampling & In Situ Testing																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
			EW	HW	MW	SW	FS		FR	Ex Low	Very Low	Low	Medium	High			Very High	Ex High	B - Bedding	J - Joint	Type	Core Rec. %	RDP %	Test Results & Comments																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
		PEBBLY SANDSTONE: As above (continued)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

RIG: Nissan Patrol

DRILLER: Foody

LOGGED: Carson

CASING: GL to 16m

TYPE OF BORING: 100mm ϕ SFA to 4.41m then NMLC coring to 20.54m

WATER OBSERVATIONS: No Free Groundwater Observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND			
A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PD	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	d	Water seep
		W	Water level

CHECKED
Initials: <i>ORC</i>
Date: <i>1.4.06</i>



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BOREHOLE LOG

CLIENT: Telstra Corporation Ltd
PROJECT: Proposed Telecommunications Tower
LOCATION: Telstra Site 27814 Pacific Highway, Cams Wharf

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/-

BORE No: 3
PROJECT No: 41441
DATE: 08 Nov 07
SHEET 3 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering					Graphic Log	Rock Strength					Water	Fracture Spacing (m)				Discontinuities		Sampling & In Situ Testing				
			EW	HW	MW	SW	FS		FR	Ex Low	Low	Medium	High		Very High	Ex High	0.01	0.05	0.10	0.50	1.00	B - Bedding S - Shear	J - Joint D - Drill Break	Type	Core Rec. %
		SANDSTONE: Medium to high strength, unbroken, fresh, light grey fine to medium grained sandstone with some bands of pebbly sandstone/conglomerate. Slightly weathered in parts (continued)																							
	11	- with some siltstone inclusions between 10.85m and 11.07m																							
	11.32	VOID																							
	11.5	SANDSTONE: As above (continued)																							
	12																								
	13																								
	13.06	VOID																							
	13.5	SANDSTONE: As above (continued)																							
	14																								
	14.0	CORE LOSS																							
	14.56	SILTSTONE: Very low strength, slightly weathered, fragmented, light brown siltstone																							
	14.78	COAL: Fragments of black coal																							

RIG: Nissan Patrol

DRILLER: Foody

LOGGED: Carson

CASING: GL to 16m

TYPE OF BORING: 100mm ϕ SFA to 4.41m then NMLC coring to 20.54m

WATER OBSERVATIONS: No Free Groundwater Observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength Is(50) MPa
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	D	Water seep
			Water level

CHECKED

Initials: *sec*

Date: 14-08



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BOREHOLE LOG

CLIENT: Telstra Corporation Ltd
PROJECT: Proposed Telecommunications Tower
LOCATION: Telstra Site 27814 Pacific Highway, Cams Wharf

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/-

BORE No: 3
PROJECT No: 41441
DATE: 08 Nov 07
SHEET 4 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering				Graphic Log	Rock Strength					Water	Fracture Spacing (m)	Discontinuities		Sampling & In Situ Testing			Test Results & Comments
			EW	HW	MW	SW		FS	Ex Low	Very Low	Low	Medium			High	Very High	Ex High	B - Bedding S - Shear	J - Joint D - Drill Break	
	15.0	CORE LOSS														15m: CORE LOSS: 900mm				
	15.9	SILTSTONE: Medium to high strength, fresh, light brown grey siltstone															C	28	0	
16	16.22	CORE LOSS														16.22m: CORE LOSS: 220mm				
	16.44	SILTSTONE: Low strength, highly and moderately weathered, orange brown siltstone														16.44m: Partings 10-15°, ro, un at 10-50mm spacings to 16.73m				
17																17.09m: J10°, ro, pl, Fe 17.15m: J80°, sm, un with clay veneer 17.33m: J30°, ro, un, Fe and several healed subvertical joints 17.49m: J5°, ro, pl 17.54m: Partings 5-15°, ro, un at 10-40mm spacings to 17.8m	C	92	41	
18	18.15	- very low strength and fragmented from 18.04m COAL: Medium strength, black coal														17.93m: J50°, ro, un, Fe				
	18.58	SILTSTONE: Low to medium strength, moderately weathered, orange brown and light grey brown siltstone														18.64m: J30°, ro, un 18.72m: J85°, ro, un	C	100	71	
19																19.06m: J10°, ro, pl with clay coating 19.13m: J80°, ro, pl, Fe 19.3m: J80°, ro, pl, Fe, ti				
		- fragmented and thinly laminated from 19.51m to 19.69m														19.51m: 180mm thick zone of fragmented rock	C	88	27	

RIG: Nissan Patrol DRILLER: Foody LOGGED: Carson CASING: GL to 16m
TYPE OF BORING: 100mm SFA to 4.41m then NMLC coring to 20.54m
WATER OBSERVATIONS: No Free Groundwater Observed whilst augering
REMARKS:

SAMPLING & IN SITU TESTING LEGEND			
A Auger sample	pp Pocket penetrometer (kPa)		
D Disturbed sample	PID Photo ionisation detector		
B Bulk sample	S Standard penetration test		
U Tube sample (x mm dia.)	PL Point load strength ls(50) MPa		
W Water sample	V Shear Vane (kPa)		
C Core drilling	b Water seep		Water level

CHECKED
Initials: <i>DEC</i>
Date: 14/08

BOREHOLE LOG

CLIENT: Telstra Corporation Ltd
PROJECT: Proposed Telecommunications Tower
LOCATION: Telstra Site 27814 Pacific Highway, Cams Wharf

SURFACE LEVEL: --
EASTING:
NORTHING:
DIP/AZIMUTH: 90°/--

BORE No: 3
PROJECT No: 41441
DATE: 08 Nov 07
SHEET 5 OF 5

RL	Depth (m)	Description of Strata	Degree of Weathering					Graphic Log	Rock Strength					Water	Fracture Spacing (m)	Discontinuities		Sampling & In Situ Testing			
			EW	HW	MW	SW	FS	PR	Ex-Low	Very Low	Low	Medium	High	Very High	Ex-High	B - Bedding S - Shear	J - Joint D - Drill Break	Type	Core Rec. %	RQD %	Test Results & Comments
	20.09	CORE LOSS																			
	20.26	SILTSTONE: As above (continued)																C	88	27	
	20.54	- numerous healed joints at 2-10mm spacing from 20.31m to 20.49m Bore discontinued at 20.54m. Limit of investigation																			
	21																				
	22																				
	23																				
	24																				

RIG: Nissan Patrol

DRILLER: Foody

LOGGED: Carson

CASING: GL to 16m

TYPE OF BORING: 100mm ϕ SFA to 4.41m then NMLC coring to 20.54m

WATER OBSERVATIONS: No Free Groundwater Observed whilst augering

REMARKS:

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	PID	Photo ionisation detector
B	Bulk sample	S	Standard penetration test
U	Tube sample (x mm dia.)	PL	Point load strength (s(50) MPa)
W	Water sample	V	Shear Vane (kPa)
C	Core drilling	D	Water seep
		W	Water level

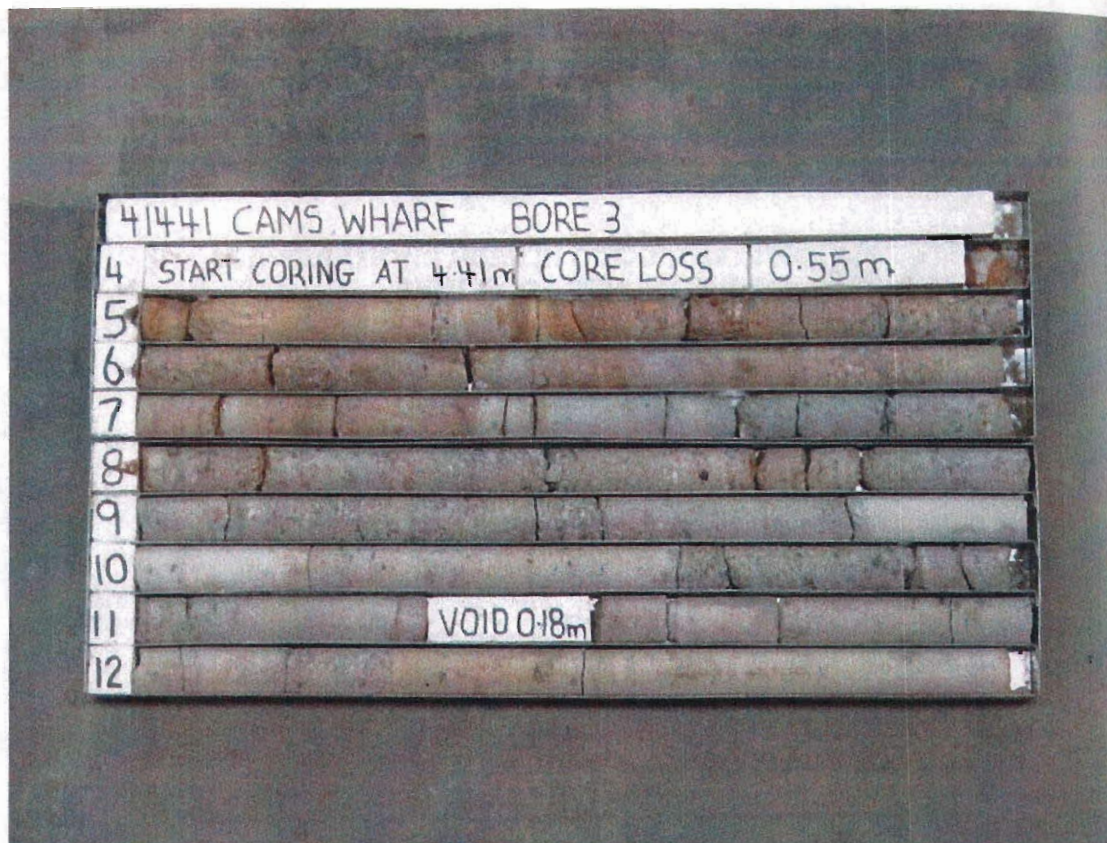
CHECKED

Initials: *002*

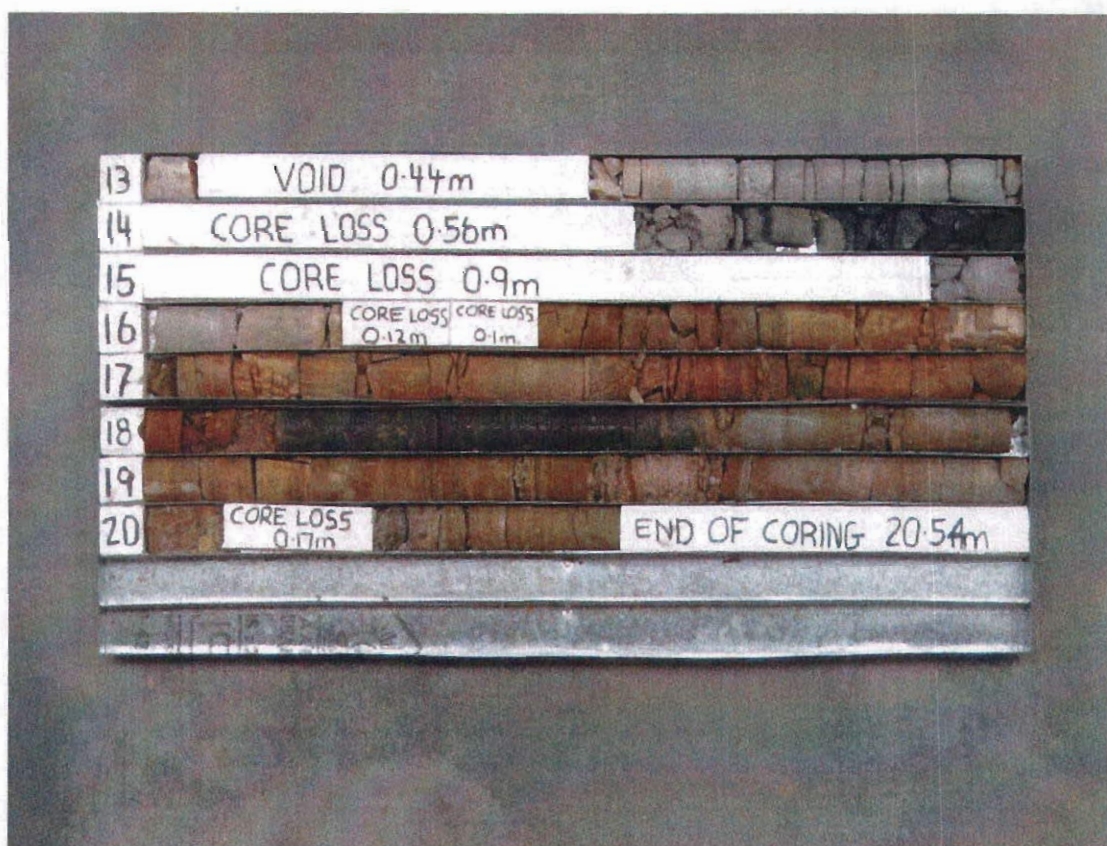
Date: *1-4-08*



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Bore 3 – from 4.41 m to 13 m



Bore 3 – from 13 m to 20.54 m

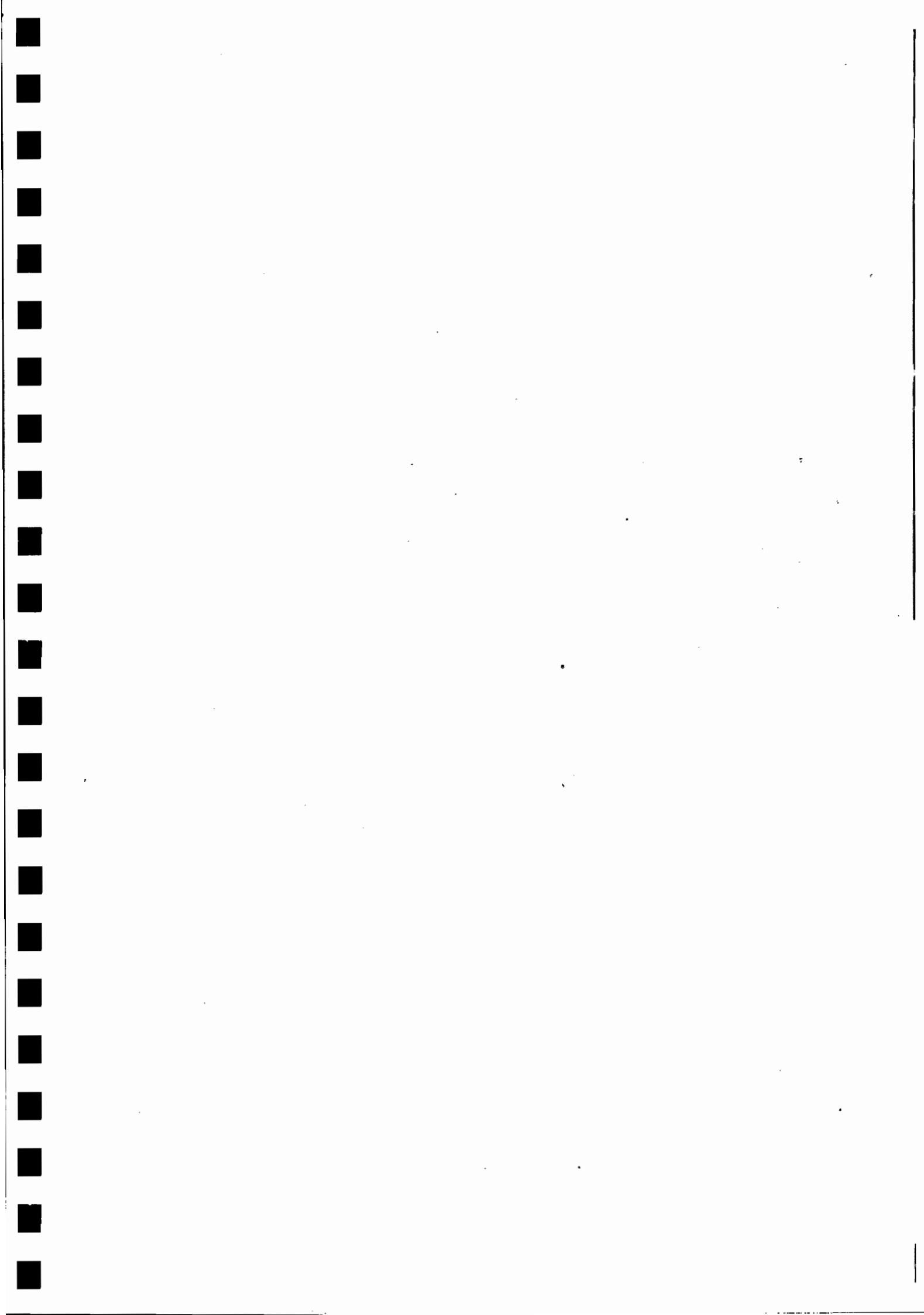
Proposed Telecommunications Tower Telstra Site 27814 Pacific Highway Cams Wharf	PROJECT: 41441	Date: November 2007	PLATE: 3
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**ABBREVIATIONS USED IN DISCONTINUITIES COLUMN OF
TEST BORE REPORT SHEETS**

Abbreviation	Meaning
DB	Drill Break
P	Parting
J	Joint
Fr	Fracture
F	Fault
Un	Undulating
ro	Rough
h	Healed
pl	Planar
fr	Fragmented
cs lam	Carbonaceous siltstone lamination
sm	Smooth
ti	Tight
di	Probably drilling induced
st	Stepped
sl	Slickensided
Fe	Ironstained
hor	Horizontal
v	Vertical
sh	Subhorizontal
sv	Subvertical

Examples:

- At 62.04 m, P, 30°, un, st, ro, cs lam
At 62.04 m Parting, 30°, undulating, stepped, rough, on carbonaceous siltstone lamination
- At 65.08 m, Fr, 70°, pl, ro, st, fr
At 65.08 m, fracture, planar, rough, stepped, fragmented.





Planning Report



Appendix 2 - Coverage Map of Candidate C

Telstra Next G™ Network Coverage From Candidate C



31/01/2011



Next G™ coverage

- Indoor Hand Held coverage plotted from Candidate C
- Target Coverage Area

are created using tools that predict the likely areas of coverage. Not every particular location within the footprint of coverage outlined on the maps is generally accurate, there will be specific areas described on characteristic of wireless systems. For example, coverage could be degraded or not existent in specific which may block or inhibit coverage could include basements, lifts, underground car parks, concrete buildings, could include formations such as hills and mountains or even trees.

planned coverage expansions of the Telstra wireless network. Coverage planned for the future is based on notice, as required from time to time.

liability, the type and configuration of customer equipment, the performance of external networks which as the type of application being used.