HYECORP Pty Ltd
ABN 51 077 702 004
AFSL 337 387

1/451 Willoughby Road
Willoughby NSW 2068

PO Box 779
Artarmon NSW 1570

Phone +61 (02) 9967 9910
Fax +61 (02) 9967 9930
Email info@hyecorp.com.au
Web www.hyecorp.com.au

HOW TO USE THIS DOCUMENT

JRPP Submission

JRPP REF:	2011SYE061
DA ref:	DA79/2011
Property:	76-82 Gordon Cres, LANE COVE
LGA:	Lane Cove Council
JRPP Meeting Date:	Thursday, 13 October 2011

We have tried to make this information as concise and as clear as possible.

It is lengthy, however important, thank you for understanding and taking the time to read it.

If you have any questions/require further clarification please contact us:

Stephen Abolakian
02 9967 9910
0405 763 125
stephen@hyecorp.com.au

CONTENTS

Submission to JRPP

HYECORP
PROPERTY GROUP

For consideration at
JRPP Meeting
13 October 2011

2011SYE061
76-82 Gordon Cres
LANE COVE
Lane Cove Council

10 October 2011

Submission 1

Executive Summary + Letter to JRPP
Hyecorp Pty Ltd
10 October 2011

Appendix A

7-part test
Keystone Ecological
7 October 2011

Appendix B

'Flora and Fauna Impact Assessment' (conclusion)
Keystone Ecological
April 2011

Appendix C

'Response to Council Matters'
Keystone Ecological
1 September 2011

Appendix D

'Memorandum'/Peer Review
GHD Ecological Services
15 August 2011

Appendix E

'Structural Report'
Demlakian Consulting Engineers
October 2011

Appendix F

'Tree Report'
Treescan – Urban Forest Management
April 2011

Appendix G

'Geotechnical Appraisal'
Asset Geotechnical
19 April 2011

HYECORP
PROPERTY GROUP

HYECORP Pty Ltd
ABN 51 077 702 004
AFSL 337 387
1/451 Willoughby Road
Willoughby NSW 2068
PO Box 779
Artarmon NSW 1570
Phone +61 (02) 9967 9910
Fax +61 (02) 9967 9930
Email info@hyecorp.com.au
Web www.hyecorp.com.au

Monday, 10 October 2011

Dr John Roseth
Chairperson
Sydney-East Joint Regional Planning Panel
Level 13
Thakral House
301 George St
SYDNEY NSW 2000

Dear Chairperson,

RE: Executive Summary of development application (tree issues)
Ppty: 76-82 Gordon Cres, LANE COVE NSW 2066
LGA: Lane Cove Council
DA#: 79/2011
JRPP Ref#: 2011SYE061

Background

Hyecorp has submitted a development application for the demolition of four residential dwellings and the construction of a residential flat building comprising of 48 apartments.

Lane Cove Council ("Council") has recommended refusal of the application to the Joint Regional Planning Panel ("JRPP") with the only reason being the proposal involves the removal of 15-17 trees on the site.

The subject trees have grown in a highly constrained, unnatural and unsafe environment and is only a small fraction of trees when put in the context of the surrounding precinct.

The Council is treating the Development Site and the nearby Batten Reserve (bushland) as one and the same. Contextually, Batten Reserve is approximately 140,000m^2 of bushland and the subject Development site, which is not part of the bushland, is separated by existing urban development, a dual carriageway road and power lines. The main cluster of trees in question are a 30m^2 (0.0213%) patch of a handful of trees grown on unstable rock outcrops exhibiting grave structural defects. It should be noted that we are not proposing any works in Batten Reserve.

Hyecorp has, throughout the entire application and assessment process, supplied various documents and reports to Council to address the Council's concerns. Our submissions have not been formally responded to, nor has there been any desire from Council's assistant open space manager to constructively resolve this issue.

Hyecorp has now had an opportunity to view the Council's assessment report to the JRPP (released only on, 6 October 2011) and hereby respectfully submits the following information and attached reports to assist the Panel Members when considering this development application.

Hyecorp's position is that there is no presence of Sydney Turpentine Ironbark Forest ("STIF"), an endangered ecological community ("EEC"), on the site. However, in the alternative, if Hyecorp was to accept that there was an EEC, the outcome of various research reports, studies and seven-part tests confirm that the application will not have a significant environmental impact and therefore development of the site should be allowed.

Additional to the outcome of ecological assessments and seven-part tests conducted by ecological consultants Keystone Ecological and GHD Ecological and further to the obvious structural/safety issues with the trees currently, retention of the trees would render the site sterile from development.

The land is zoned R4- high density residential and construction of a residential flat building is fully permissible.

No planning or design merit issues form part of the reasons for the recommendation of refusal.

Context

Figure A: 76-82 Gordon Cres in Context of precinct. The trees in question are highlighted in yellow.

Hyecorp (and Hyecorp's consultant team's) 'position

In this letter, the term Hyecorp also refers to our various consultants [see *Consultant List* for a full list of consultants referred to in this letter].

With our submission to Council, Hyecorp has provided comprehensive information to Council relating to the removal of trees on the site [the tree numbering referred to can be found on the map attached to the end of this letter (extracted from the arborist's Tree Report).

The summary of Hyecorp's position is below and each point is elaborated on in the next section of this letter.

1. ***No STIF on site, not an EEC***

Hyecorp's consultant team does not agree with Council that the trees on the site constitute an endangered ecological community (EEC). The vegetation community present on the site should be classified as Coastal Enriched Sandstone Moist Forest, not an EEC.

HYECORP
PROPERTY GROUP

2. ***If EEC, no significant impact***

In the alternative, if Hyecorp were to accept Council's position that an EEC is present, we do not believe that the application and the proposed removal of 15-17 trees will have a significant impact on this community

The result of the 7-part test undertaken to assess whether or not there would be a significant environmental impact if we were to, for arguments sake, assume an EEC existed, was that there would be no such impact.

3. ***Current tree situation is an extremely dangerous safety hazard***

The trees on the site, in their current state, pose a grave danger to the public, residents and neighbours due to the instability of ten of the current trees on the site.

Notwithstanding the ecological evidence that confirms our application presents no significant environmental impact, we have provided evidence to Council that immediate attention is required.

Evidence from Hyecorp's consulting structural engineer, arborist and geotechnical consultant necessitate the removal of most trees on the site regardless of the approval or refusal of *any* development application.

As owners of the properties at 76-82 Gordon Cres, this is an issue we have raised with Council since before the lodgement of the application. Following discussions with Council officers prior to the DA submission, Hyecorp, in an attempt to work collaboratively with Council, decided to include the application to remove the unsafe trees as part of the Development Application as opposed to a separate tree removal request. Despite these pre-lodgement discussions, the efforts of collaboration with Council have been, obviously, met with resistance.

4. ***Most trees within Asset Protection Zone***

A majority of the Turpentine trees on the site are along the street (southern) boundary of our site and are therefore within the Asset Protection Zone (APZ) required by the Rural Fire Service (RFS).

Therefore, whether the development is for one house or a RFB, the bulk of the trees are within the APZ and would be required to be removed in order to comply with the APZ requirements of the RFS.

5. ***Retention of trees would mean sterilisation of property from any form of development***

Given the highly constrained orientation of the lots, specifically No 76 Gordon Cres, if we were to retain the cluster of trees on No 76 Gordon Cres it would be impossible to develop the property.

HYECORP
PROPERTY GROUP

Below is a detailed summary of each of the above points.

1. Removal of identified trees not a significant environmental impact

As part of our application, Hyecorp has provided several reports to Council outlining the extensive studies undertaken by Hyecorp's ecological consultants.

The documents/reports provided by Hyecorp to Council included:

1. ***Flora and Fauna Impact Assessment,*** prepared by Keystone Ecological April 2011 (Appendix B)	Report submitted with development application studying the impact on ecological community. Main conclusions: 1. No STIF on site 2. 7-part test on fauna conducted with no impact found 3. Referrals to Department of Sustainability, Environment, Water, Population and Communities not required 4. Species impact statement not required
2. **Supplementary Report – *Response to Council Matters*** prepared by Keystone Ecological 1 September 2011 (Appendix C)	Submitted in response to comments by Council's open space assistant manager. Main conclusions: 1. No STIF on site 2. Area more likely Coastal Enriched Sandstone Moist Forest (not an EEC) 3. In the alternative, if Council correct and site is EEC – seven part test can be carried out to show no significant environmental impact 4. Removal of 15-17 trees not considered to be a significant environmental impact
3. ***Memorandum*** prepared by GHD Ecological Services, 15 August 2011 (Appendix D)	Hyecorp engaged GHD to give a second opinion on the issues raised by Council. Main conclusions: 1. Information + findings by Keystone are accurate and satisfactory and Council's claims of a significant impact are unfounded. 2. Most birds and bats claimed by Council to rely on the site for habitat, in fact have large home ranges of which this site would make up a minute portion [e.g. the powerful owl has a range of over 60km in one evening]. Site cannot be considered significant to local populations 3. Lack of hollows, limited foraging habitat and small site all mean trees on this specific site not important for threatened birds 4. Species impact statement not required

In addition to the comprehensive reports above, for the assistance of Panel Members and also in response to paragraphs 2(a) and (b) on the final page of Council's assessment report we have provided an additional letter by Keystone Ecological which contains the **7-part test** (See appendix A).

The outcome of the 7-part test is that there would be no significant environmental impact.

The 7-part test should (in conjunction with the other reports mentioned above) go a long way in resolving the issues raised in paragraph 2(a) and (b) in the conclusion of Council's assessment report.

No significant impact

The crux of Council's argument is found in paragraph 1(a) – (d) of the Conclusion in Councils Assessment Report on the penultimate and final pages.

These being that the removal of trees as part of the Development Application, form part of the Endangered Sydney Turpentine Ironbark Forest Ecological Community and that these trees form part of a wildlife corridor.

The position of Hyecorp's consultants is elaborated comprehensively throughout the various reports mentioned above, however we encourage Panel Members to read paragraphs (iv) & (v) of the supplementary report prepared by Keystone titled *Response to Council Matters* dated 1 September 2011 (Appendix C). This report (and the others) should be read in their entirety however key extracts from these two paragraphs are summarised below:

> ***(iv) Wildlife corridor***
>
> *The trees of the subject site are part of one of many narrow "backyard tree" links along this slope that may be used by mobile species such as birds and bats. The loss of some trees in the subject lots will not impede their movements between the patches of habitats detailed by Ms Heatley* [Council's assistant open space manager]. *Moreover, these losses will be temporary as the implementation of the landscape plan will see reinstatement of canopy and understorey as well as the enrichment of habitat by the addition of nest boxes.*
>
> ***(v) Significant impact***
>
> *The conclusion drawn by Ms Heatley that a significant impact will be wrought on threatened species or ecological communities cannot be sustained.*
>
> *The assumed impact on STIF is predicated on the presence of this community. I maintain that* ***this community does not occur on site****, but if the presence of this community is accepted for the sake of argument, the loss of 15 or 17 trees across four backyards* ***cannot be conflated into imposing a significant impact****.* [emphasis added]
>
> *Application of the seven part test shows that the proposed removal is small in extent, will not adversely modify the species composition of a local occurrence, will not isolate a remnant to the point of extinction and is unlikely to interrupt ecological processes that are important for the persistence of the community. While it contributes to the Key Threatening Process of Clearing of Native Vegetation, it is both temporary and of a small scale. Thus the mitigative actions are sufficient and consistent with the recovery of the community.*
>
> *A Species Impact Statement is therefore not required.*
>
> *Even if the subject site trees are deemed as being representative of STIF according to the NSW legislation, remnant patches that do not meet specific condition criteria are not part of the Turpentine-Ironbark Forest ecological community listed under the Commonwealth Environmental Protection and Biodiversity Conservation Act (1999). The vegetation of the subject site does not have all layers of vegetation present and is not of sufficient extent to qualify under the Commonwealth legislation.*
>
> *A referral to the Department of Sustainability, Environment, Water, Population and Communities of therefore is not required.*

The threatened species considered with the potential to use the subject site are Powerful Owl and Grey-headed Flying-fox. The potential for impact on these species were considered in the seven part tests (please see Appendix 3 of my report [***Flora and Fauna Impact Assessment*** (Appendix B)]*).*

- Supplementary Report – *Response to Council Matters* prepared by Keystone Ecological 1 September 2011 (Appendix C, page 4, section (iv) and (v))

The seven part test referred to above is found in Appendix A.

Despite STIF not being present on the site, the results of this test show that, if we were to assume the vegetation community on the site was STIF, there is no significant impact as a result of our application.

Threatened Species

Appendix 3, of the *Flaura and Fauna Impact Assessment* contain the various seven part tests that considered the various species (Grey-headed flying fox & Powerful Owl) referred to by Councils assistant open space manager in paragraphs 4-6 on page 11 of Council's assessment report. The tests concluded that there would be no significant environmental impact.

2. Seven Part Test

Ecological consultants Keystone Ecological and GHD do not believe that the trees on the site could be classified as STIF.

Not being an EEC, therefore there is no requirement to conduct any further research or 7-part tests to determine if there is a significant environmental impact.

Keystone, however, for arguments sake, explored the alternative whereby STIF existed on the site and it should therefore be classified as an EEC. In this instance, Keystone assessed the significance of any impact on STIF on the site if we were to assume it existed (again, an alternative which Keystone denies).

The results of that test are found in Keystone's report dated 7 October 2011 in Appendix A.

The seven part test on pages 4-7 concludes with the outcome that (if we assumed it existed) Council's suggestion that the Development will have a significant impact on STIF is unsustainable.

Other key findings from the 7-part test were:

- *Birds and bats may travel upwards of 50 kilometres per day during feeding, and further during migration or feeding bouts over several days … The temporary loss of the small number of trees of the subject site is inconsequential when compared with the areal extent of this community within an area of 35 to 45 kilometre radius.* [(c)(i)p5]

- *The removal and control of significant environmental weeds (e.g. Fishbone Fern) will not only improve the habitats on the subject site, but also has the potential to improve the habitat of the community downslope in Batten Reserve as it will reduce the source of seed rain and other propagules from upslope habitats…Thus the redevelopment is likely to improve the composition of the community in the local area.* [(c)(ii)p6]

- *The redevelopment of the site will not further isolate the community from other areas of habitat. The four lots are already developed with residences and are surrounded by barriers such as main roads and suburbs that intervene between existing areas of habitat.* [(d)(ii)p6]

- *The area of habitat occupied by this community on the subject site is very small and supports only canopy trees. As such, it cannot be regarded as important for the persistence of this community in the local area.* [(d)(iii)p6]

If we (and the Panel) were to assume that Council's position that the presence of STIF exists on the site, then Keystone has explored this assumption and conducted a 7-part test to assess whether or not there would be a significant impact on the community.

The result of the seven-part test is that there would not be.

3. Council incorrectly argues that trees are remnant

Council has argued that the trees are part of an original vegetation community and are therefore must be considered EEC. Council has come to this position because it has assumed that the trees pre-date the houses. This assumption has risen due to Council's reliance on a 1943 aerial photograph provided by the RTA. This photograph, taken in in 1943, was before the subdivision and development along Gordon Cres had occurred.

Figure B: 1943 aerial shot before Gordon Cres subdivision and development.

Hyecorp's has challenged this position due to the following evidence. It is not possible for the trees to pre-date the houses given the trees have grown within a highly (human) altered, unnatural and constrained environment.

This is due to the following reasons:

- Trees grown on sewer lines
- Trees grown on stormwater pipes
- Trees grown adjacent to retaining walls
- 1965 aerial photo shows no trees on 76 Gordon Cres

Trees grown on sewer line

It is not possible for the trees to pre-date the houses as the trees have grown on sewer lines and stormwater pipes. The JRPP must ask themselves how can the trees pre-date the houses if they have grown on these structures?

Figure C: Tree No 6. Grown in constrained environment around existing sewer line.

The above image shows that *clearly* the trees have grown after the original subdivision and development of the houses in circa 1960.

Figure D: Tree No 4. Grown in constrained environment around existing stormwater line.

Trees grown in fill

Figure: Tree No 2. Fill (bricks, pebbles) underneath roots.

After a rigorous clean up and root investigation it was discovered that most of the trees, especially the cluster at the front of 76 Gordon Cres has grown on back fill. The root investigations identified bricks and river pebbles around and underneath the root structures. This, again, highlights that the trees have grown *after* man has altered and developed the site.

Trees grown *after* retaining wall built

Two trees that have grown close to retaining walls on the front of no 78 and 80 Gordon Cres

Figure E: Tree No 8 and 14. Clearly grown *after* retaining wall built. .

The above figures clearly show that these two trees were planted after the retaining wall was built on the site following the original development of the site.

It is highly unlikely that, when the properties were being built in the 1960's, the retaining walls were carefully built so close to the trees – and the trees survived the construction so close to its root zone.

Aerial photograph show no 76 Gordon cres cleared of trees

Below is an aerial photograph of the site in 1965. This photograph clearly shows that the current cluster of trees at the front of 76 Gordon was not existent in 1965, in the most telling example and evidence that the trees on the site are regrowth and have grown after the site was originally cleared.

Figure F: Aerial photo 1965 showing current trees on 76 Gordon Cres did not exist in 1965.

4. Dangerous Trees

With our Development Application, Hyecorp submitted several documents relating to the critical safety issues relating to the various trees (especially the cluster of tree's on the front of 76 Gordon Cres) throughout the site.

Unfortunately the safety concerns of occupants, neighbours and residents were not considered as important by Council.

The documents submitted with the Application and throughout the Assessment were:

1. Arborist report prepared by Treescan dated April 2011, see appendix F
2. Geotechnical investigation prepared by Asset Geotechnical dated 19 April 2011, see appendix G

In addition to the above document, we have – for the assistance of the JRPP – commissioned a further report by Demlakian Consulting Engineers, titled 'Structural Report' (see Appendix E).

This report, in conjunction with the reports above, highlight the critical structural issues facing the trees on the site. The reports are consistent in their recommendation that **regardless of any development application many of the trees must be removed.**

> *"For the most part, each of the trees inspected and discussed with the exception of tree No 9 are significantly compromised by the shallow soils, the limited size of the rock outcrops which are fundamental for their support and the lack of support being provided by the damaged retaining walls. This together with the fact that the cluster of trees are interdependent in that the failure of one tree collapsing down slope will no doubt cause sufficient disturbance to the finely balanced high risk environment that it will either cause progressive failure of other trees or render the environment completely unstable and unsafe.*

Therefore and considering that the useful life of most of these trees is probably well expended, the risk associated with attempting to retain these trees would not be recommended and should not be contemplated.

Currently, Tree No's 1, 8, 14 & 10 are in serious danger of collapse without further warning in high wind or torrential rain conditions as are both retaining walls on the front boundaries of No's 78 & 80 Gordon Crescent.

Notwithstanding the outcome of the proposed development application, it would be our recommendation that all the trees described in this report as dangerous or unstable be removed *and a qualified arborist be consulted regarding the stability of the remaining trees after the removal of the above as the environment of the cluster of trees is inter-dependant"*

- *Structural Report*, Demlakian Consulting Engineers (ref Appendix E, page 7, para 3-6)

These safety issues alone confirm – in fact, they necessitate – the removal of trees. A finding that should not be taken lightly.

Council's tree officer, Mr Peter Maish, accepts that "*the arborist's assessment of each tree and its growing environment is difficult to argue on arboricultural grounds*[1]".

This is an important point as Mr Maish is acknowledging that, on arboricultural grounds, the tree removal is warranted and agrees on this point with Hyecorp's Arborist.

Mr Maish, however, goes on to dismiss the *safety* issues with the trees because "*residents have not had concerns relating to any of the trees…nor has there been any tree failure to any of these trees in the past five years*"[2]

We are not sure whether these 'residents' engaged an 1) arborist, 2) a geotechnical consultant and 3) a structural engineer to assess the trees, however Hyecorp can only rely on the expert opinions provided to us by our consultants – which unanimously acknowledge the serious safety issues on the site.

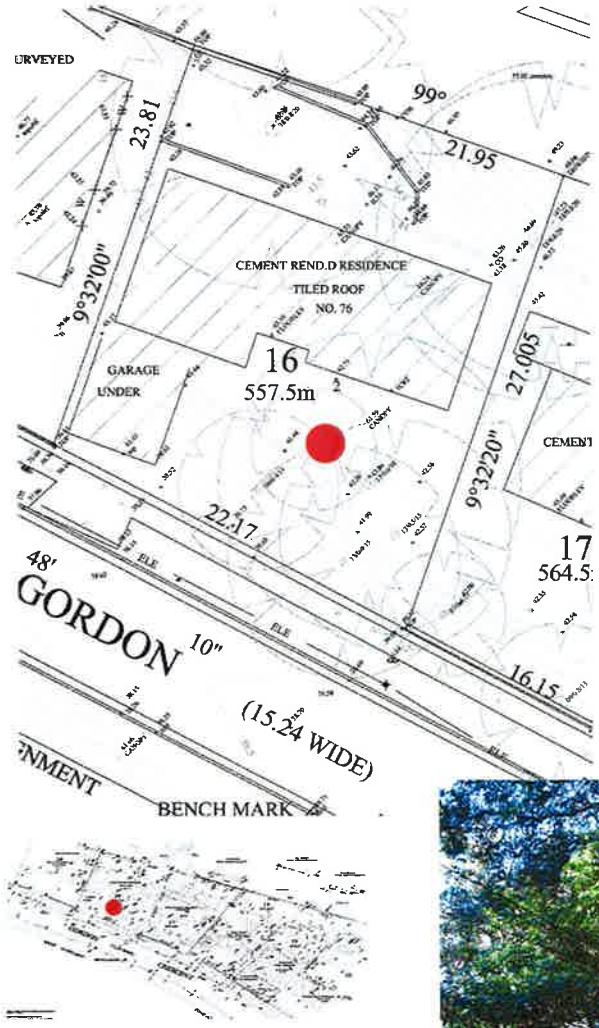
The following images are a selection of five examples of the safety issues currently on the site. For a detailed analysis of the safety and stability concerns please read the report prepared by Demlakian Consulting Engineers in Appendix E and the associated images (in Appendix C of that report) for a detailed and thorough tree-by-tree analysis.

[1] Council Assessment report pp10 para 2
[2] Council Assessment report pp10 para 2

Tree No 1

'Tree Report"
by Treescan
page 9

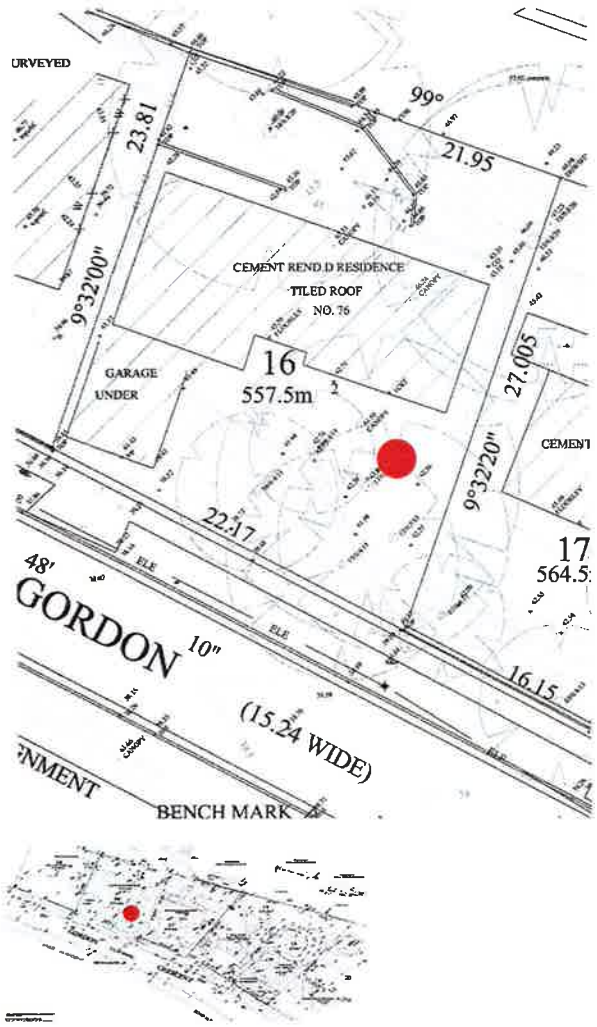
'Structural Report"
by Demlakian Consulting Engineers
page 4, 2.1



Tree No 3

'Tree Report"
by Treescan
page 9

'Structural Report"
by Demlakian Consulting Engineers
page 4, 2.3



Tree No 4

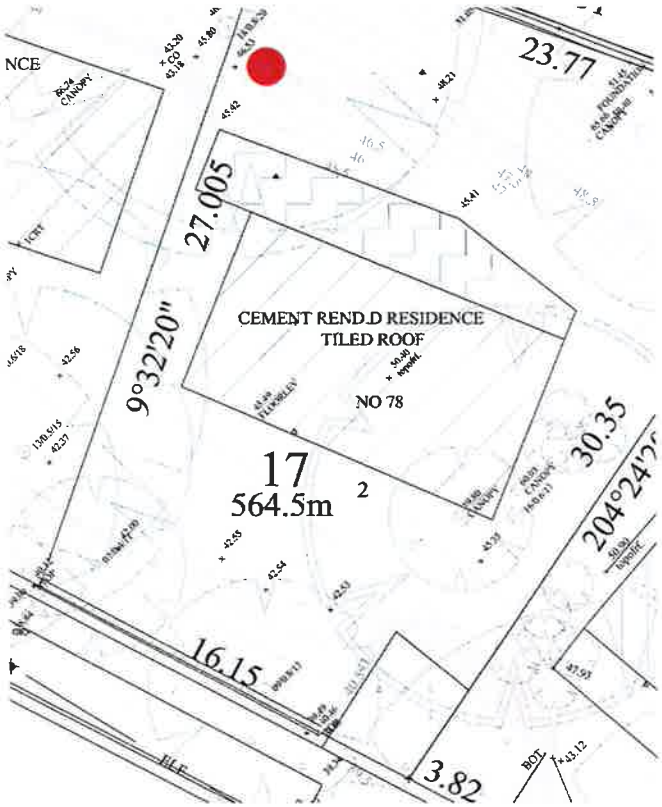
'Tree Report"
by Treescan
page 9

'Structural Report"
by Demlakian Consulting Engineers
page 4, 2.4

Tree No 6

'Tree Report"
by Treescan
page 9

'Structural Report"
by Demlakian Consulting Engineers
page 5, 2.6



Tree No 10/11

'Tree Report"
by Treescan
page 9

'Structural Report"
by Demlakian Consulting Engineers
page 6, 2.9

5. Trees within Rural Fire Service's required Asset Protection Zone

The properties that comprise the Development Site are classified as being within Bushfire Prone Land.

As part of any redevelopment of these properties – whether for a house or apartment building – the Rural Fire Service requires an 'Asset Protection Zone' to be calculated.

The Asset Protection Zone – an area in which effectively no habitable structure or trees must exist – extends into our development site.

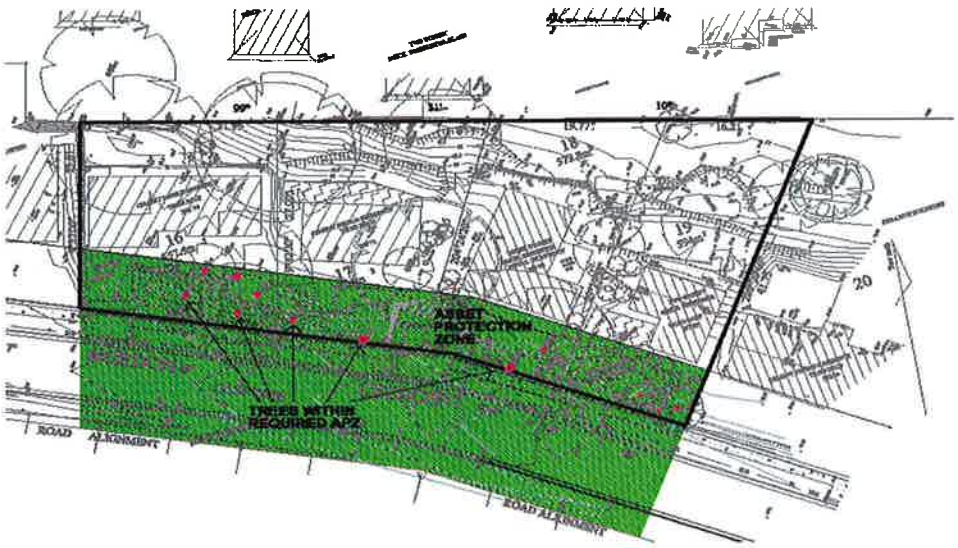


Figure G: Shows part of APZ within development site and various trees that must be removed as they are within that zone.

As identified in Figure G above, a majority of the trees referred to by Council fall within the APZ and – regardless of any ecological considerations – are therefore required to be removed to comply with the requirements of the Rural Fire Service. The same requirement for removal would occur regardless of the type and scale of any development on 76-82 Gordon Cres.

6. Tree retention = sterilisation of development

Despite the other reasons within this Submission and our Development Application identifying removal - or inhibiting retention – of the trees, a key consideration is that the retention of this cluster of four/five trees would completely and unambiguously sterilise the development potential of 76 Gordon Cres.

76 Gordon Cres is a very narrow property. It has a depth on its western boundary of only 23.81m. Once you factor in the DCP required front setback of 7.5m and rear setback of 6m (totalling 13.5m in setbacks) the total depth available for development is as little as **10.31m**. This figure is before the consideration of any tree-protection zones that would further reduce the depth of the site available for development.

If Hyecorp, as Applicant, was to retain the trees on the front of 76 Gordon Cres, it would have to ensure that any development is outside the minimum tree-protection zones required in Council's DCP and the Australian Standards. **This would make it impossible to develop *anything* on this property.**

Below is an image which shows the hypothetical developable area of 76 Gordon Cres if we were to retain the cluster of four/five trees after taking into consideration the tree-protection zones.

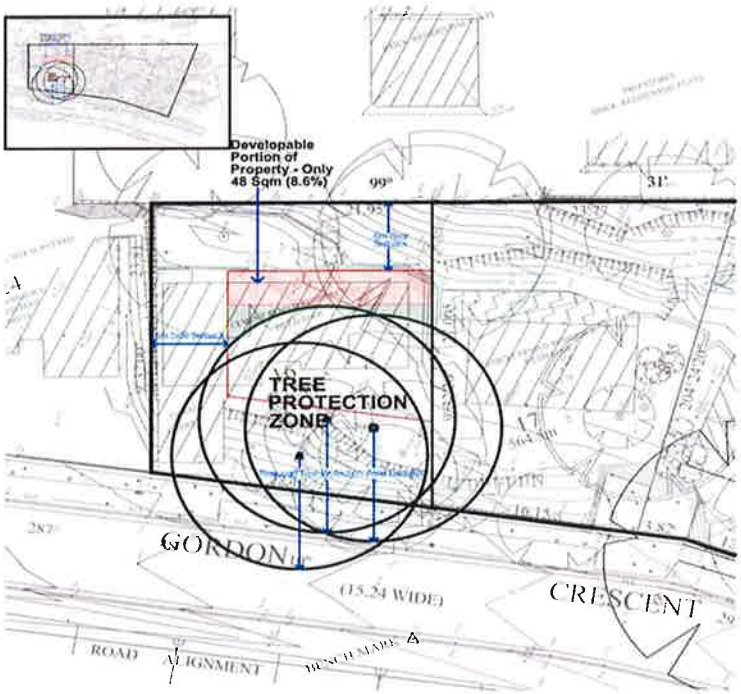


Figure H: Developable portion (footprint/site cover) of 76 Gordon Cres (shaded red) after considering Tree Protection Zones, Council's DCP relating to front, side and rear setbacks.

As you can see from Figure H above, the developable portion of the site would be only 48m^2 (footprint), **or 8.6% site coverage**.

If the retention of trees on the front of 76 Gordon Cres was required, this would mean that the property could never be developed.

The would-be sterilisation of the site is acknowledged by Council's tree officer, Mr Peter Maish, who stated:

> *"Either the trees go or the development does not move forward"*
>
> - Council Assessment report pp10 para 3

The integrity of the zoning is a critical factor and must be given significant weight, as seen in the case of *BGP Properties Pty Limited v Lake Macquarie City Council [2004] NSWLEC399* where His Honour McClelland J found that:

> In the ordinary course, where by its zoning land has been identified as generally suitable for a particular purpose, weight must be given to that zoning in the resolution of a dispute as to the appropriate development of any site...planning decisions must generally reflect an assumption that, in some form, development which is consistent with the zoning will be permitted. The more specific the zoning and the more confined the range of permissible uses, the greater the weight which must be attributed to achieving the objects of the planning instrument which the zoning reflects ...Part 3 of the *EP&A Act* provides complex provisions involving extensive public participation directed towards determining

HYECORP
PROPERTY GROUP

the nature and intensity of development which may be appropriate on any site. If the zoning is not given weight, the integrity of the planning process provided by the legislation would be seriously threatened.

- *BGP Properties Pty Limited v Lake Macquarie City Council [2004] NSWLEC399,* para 117

7. Other Matters

Tree 9 retention

Hyecorp has submitted as part of its application that one of the trees it is proposing to retain is tree 9 (Angophora) on the north-western boundary of the site. As part of our submission it is intended that the arborist will to monitor this tree closely during excavation.

Mr Maish has argued that retention of this tree would be difficult. Since the time of our application and Mr Maish's assessment of the application, Hyecorp has carried out root investigation to the south of the tree. Recent root investigations have shown that no roots protrude within the proposed excavation line adjoining the tree.

Further, we will be reducing the hard surface that surround the tree in order to provide landscaping and deep soil planting and hence will be increasing the availability of water to this tree.

Therefore, we are confident that this tree will be retained.

8. Conclusion

For the above reasons it is our opinion that the proposed development application will not result in a significant environmental impact.

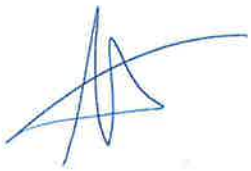
The Council is claiming that STIF exists. Hyecorp's position is that the site does not contain STIF, *but in the alternative*, if we were to assume that it did for arguments sake, then the 7-part test conducted finds that there would be no significant environmental impact caused by our development.

Also, if the trees were to be retained on the site, the potential for development is eliminated completely and the site is sterilised from development and hence questioning the integrity of the lands zoning and the planning process.

The above factors coupled with the safety issues surrounding the trees in their current form as well as the requirement of a clear APZ necessitate the removal of the trees.

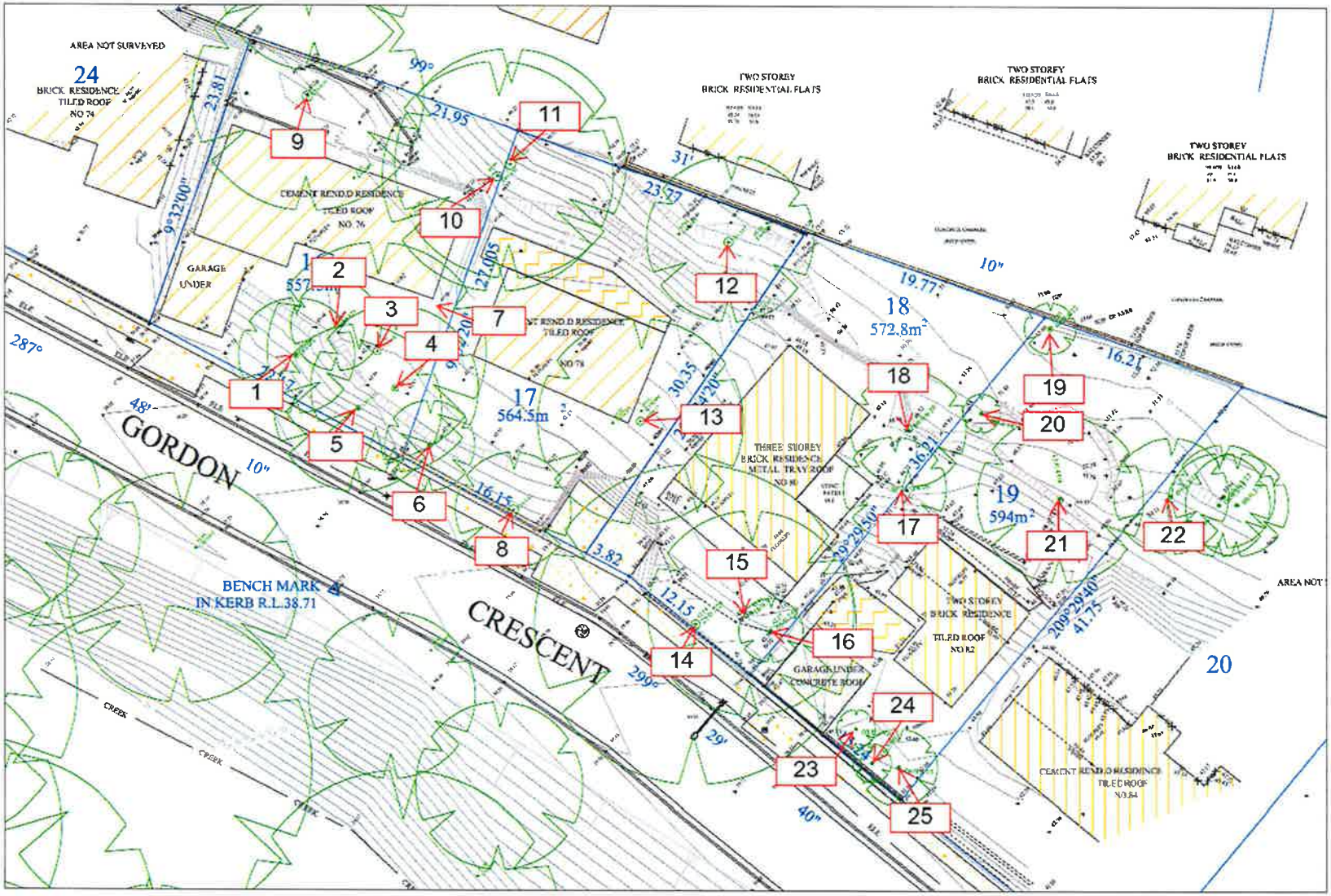
For these reasons above we ask the Panel to go against Council's recommendation and approve the application.

Kind Regards



Stephen Abolakian

Tree location plan



KEYSTONE
ECOLOGICAL
Keystone Ecological Pty Ltd
abn 13 099 456 149
PO Box 5095 Empire Bay NSW 2257
telephone 1300 651 021
facsimile 02 4368 2361
email office@keystone-ecological.com.au

Mr Stephen Abolakian
Director, Development and Funds Management
HYECORP Property Group
Level 1, 451 Willoughby Road
WILLOUGHBY, NSW 2068

By email: stephen@hyecorp.com.au

7th October 2011

RE: DA 11/79, 76-82 Gordon Crescent Lane Cove

Dear Stephen,

Thank you for the opportunity to provide further information regarding the above development proposal at 76-82 Gordon Crescent Lane Cove. I have considered the matters raised by Ms Kerry Heatley (Assistant Manager, Open Space) and Mr Peter Maish (Senior Tree Assessment Officer) in several Memoranda and in Council's final report for the Sydney East Joint Regional Planning Panel's meeting of 13th October 2011.

My analysis of the available data in the relevant scientific literature (published, unpublished and draft), in combination with my observations and data collected from the subject site and in the adjacent parts of Batten Reserve indicate that the vegetation of the south-facing slope of which the subject site is a part is most likely **not** an example of the endangered ecological community Sydney Turpentine Ironbark Forest. Instead, it is best classified as a form of moist forest that occurs in sandstone gullies and sheltered slopes that is typically enriched by some clay material. This is known by a variety of names, including Coastal Enriched Sandstone Moist Forest, and is widespread across the Sydney Metropolitan Catchment Management Area (DECCW 2009). I am also unconvinced that the vegetation mapping by Storm Consulting is correct for the part of Batten Reserve below the subject site where Sydney Turpentine Ironbark Forest is shown as occurring. This area too is, in my opinion, more appropriately described as Coastal Enriched Sandstone Moist Forest.

However, it is acknowledged that vegetation mapping is a difficult and esoteric endeavour and that subjective decisions are made even in high quality vegetation mapping projects that are underpinned by quantitative analysis and therefore professional opinions regarding the placement of a vegetation boundary may differ.

It is clear that Council's officers are intransigent in their opinion regarding the presence of Sydney Turpentine Ironbark Forest in Batten Reserve and on the subject site. Therefore, in order to progress the matter, I provide below a formal impact assessment (or "seven part test") regarding the direct and indirect impacts on Sydney Turpentine Ironbark Forest assuming, for the sake of that argument, that it occurs on both the subject site and in the adjacent part of Batten Reserve.

The potential impact on the wildlife corridor is dealt with in relation to Sydney Turpentine Ironbark Forest in the seven part test. I note that it has also been discussed in my Flora and Fauna Impact Assessment in relation to other species and entities of import.

I remind you that my conclusion was and remains that a temporary loss of the canopy trees on the subject site in such a fragmented landscape is unlikely to result in a significant adverse impact on any listed threatened species, community or endangered population. Moreover, the species likely to use such a corridor are ones that can fly and will easily be able to continue to move through the landscape in the local area and beyond during the period when the trees of the subject site have been removed as well as when their replacements have been planted.

ECOLOGICAL PROFILE OF SYDNEY TURPENTINE IRONBARK FOREST

Sydney Turpentine Ironbark Forest is listed as an endangered ecological community under Schedule 1 of the Threatened Species Conservation Act (1995). It is listed as a critically endangered ecological community under the Schedules of the Environment Protection and Biodiversity Conservation Act (1999).

Importantly, the Turpentine-Ironbark Forest ecological community listed under the EPBC Act (1999) is narrower in scope than that listed under the TSC Act (1995) as it includes only remnant patches that meet specific condition criteria, including patch size and canopy cover (DEWA 2010). The Threatened Species Scientific Committee (2005) has determined that only high quality remnant patches which contain some characteristic native plant species present in all structural layers and that have

1. tree canopy cover of more than 10% in a patch of at least 1 hectare or
2. tree canopy of less than 10% in a patch greater than 1 hectare if the patch is located within native vegetation with an overall area of more than 5 hectares

are part of the Turpentine-Ironbark Forest ecological community listed under the EPBC Act (1999).

The type 1 patches have the greatest conservation value and their size and high quality generally make them most resilient to disturbance (Threatened Species Scientific Committee 2005). The type 2 patches enhance the potential for connectivity and the viability of the ecological community, act as a buffer against disturbance and support gene flow in the plant and animal species associated with the listed ecological community (Threatened Species Scientific Committee 2005).

This endangered ecological community now occurs predominantly as scattered remnants on shale derived soils on the rim of the Cumberland plain and in the lower Blue Mountains (Tozer et al. 2010), particularly near the shale / sandstone boundary in higher rainfall areas and on the shale ridge caps of sandstone plateaus of the Hornsby Plateau (NSW Scientific Committee 1998, NSW NPWS 2004, OEH 2011). Local concentrations remain near Thirlmere, Oakdale, Kurrajong, Dural and Pennant Hills (Tozer et al. 2010).

Given its coincidence with urbanisation, it is highly fragmented with less than 10% (or 2,300 hectares) of its original extent remaining (Tozer et al. 2010). Small areas are reserved in Wallumatta and Newington Nature Reserves (NSW NPWS 2004) with 250 hectares in total in reserves (Tozer et al. 2010). Remnants mostly occur in the Baulkham Hills, Hawkesbury, Hornsby, Ku-ring-gai, Parramatta, Ryde, Sutherland and Wollondilly local government areas (OEH 2011).

In its natural state, it is typically a diverse open eucalypt forest community with an open shrub layer and grassy ground cover (Tozer et al. 2010). It shares many species with adjoining stands of Blue Gum High Forest (another endangered ecological community) (Tozer et al. 2010), with dominant canopy trees including *Syncarpia glomulifera* Turpentine, *Eucalyptus punctata* Grey Gum, *Eucalyptus paniculata* Grey Ironbark and *Eucalyptus eugenioides* Thin-leaved Stringybark (OEH 2011). In areas of high rainfall (over 1050 mm per annum) *Eucalyptus saligna* Sydney Blue Gum is more dominant. The shrub stratum is usually sparse and may contain mesic species such as *Pittosporum undulatum* Sweet Pittosporum and *Polyscias sambucifolia* Elderberry Panax, particularly as fire is now largely excluded (NSW NPWS 2004).

Threats to this community include clearing for urban development, impacts from fragmentation, mowing (which stops regrowth), urban run-off that leads to increased nutrients and sedimentation, weed invasion and inappropriate fire regimes (OEH 2011).

It is known to support foraging resources that are exploited by the threatened fauna species *Calyptorhynchus lathami* Glossy Black-Cockatoo, *Ninox strenua* Powerful Owl and *Pteropus poliocephalus* Grey-headed Flying-fox. Hollow-bearing trees may also provide nest sites for the bird species.

OCCURRENCE, IMPACT AND AMELIORATION

Sydney Turpentine Ironbark Forest *sensu* TSC Act (1995) is interpreted here as occurring on the subject site as 17 overstorey and mid storey remnant and regrowth trees in established gardens across four suburban lots. The lack of native understorey and small size of the patch precludes it from being recognised under and protected by the EPBC Act (1999).

Many of the trees occur behind retaining walls and on outcropping rock. An assessment of the stability of the condition of the retaining walls and the structural integrity of 11 native trees was carried out recently by Demlakian Structural Engineers. That report recommended the removal of all but one of the trees inspected due to instability as a result of factors such as failing retaining walls, shallow soils, substantial disturbance to root zones during previous building work and unstable rock floaters.

This engineer's report recommended the urgent removal of the following trees due to the danger they pose (numbering follows that in previous reports):

1 *Acacia decurrens* Green Wattle
2 *Syncarpia glomulifera* Turpentine
3 *Angophora costata* Smooth-barked Apple
4 *Syncarpia glomulifera* Turpentine
6 *Pittosporum undulatum* Sweet Pittosporum
8 *Syncarpia glomulifera* Turpentine
10 *Eucalyptus piperita* Sydney Peppermint
11 *Eucalyptus piperita* Sydney Peppermint
14 *Angophora costata* Smooth-barked Apple

Only one tree of the 11 assessed was deemed to be stable - tree number 9 *Angophora costata* Smooth-barked Apple at the north western corner of the site. Together with the remainder of the locally native trees on site, this constrains the seven part test to consider the potential impact on the following 9 trees as a result of the proposed development:

*5 *Syncarpia glomulifera* Turpentine
*7 *Syncarpia glomulifera* Turpentine
9 *Angophora costata* Smooth-barked Apple
*12 *Angophora costata* Smooth-barked Apple
*13 *Angophora costata* Smooth-barked Apple
*15 *Eucalyptus piperita* Sydney Peppermint
*17 *Pittosporum undulatum* Sweet Pittosporum
*18 *Syncarpia glomulifera* Turpentine
*21 *Pittosporum undulatum* Sweet Pittosporum

The arborist's assessment nominated only trees 9 and 18 as being suitable for retention with remedial care and questioned the stability of the rocks on which the remainder are perched at precarious angles as well as the stability of the retaining walls.

Recent investigation of the condition of the root zone of tree number 9 confirms that it is likely to be retained during construction and it is outside of the footprint and its zone of influence. Tree 18 is within the proposed footprint and cannot be retained. Therefore, the scope of this impact assessment should properly be restricted to the loss of the 8 non-dangerous trees whose species are known to occur in Sydney Turpentine Ironbark Forest. These are marked by an asterisk in the above list and comprise 3 *Syncarpia glomulifera* Turpentine, 2 *Angophora costata* Smooth-barked Apple, 2 *Pittosporum undulatum* Sweet Pittosporum and 1 *Eucalyptus piperita* Sydney Peppermint. However, to provide an even more conservative and precautionary approach, the removal of the 8 dangerous trees consistent with Sydney Turpentine Ironbark Forest are also considered in the seven part test. The potential impact is therefore related to the removal of 6 *Syncarpia glomulifera* Turpentine, 4 *Angophora costata* Smooth-barked Apple, 3 *Pittosporum undulatum* Sweet Pittosporum and 3 *Eucalyptus piperita* Sydney Peppermint.

A general principle of environmental impact assessment is to, in order of preference:

1. Avoid the impacts;
2. Minimise the impacts;
3. Mitigate the impacts; and
4. Compensate for residual impacts once all of the above options have been exhausted.

The opportunities for avoiding and minimising the impacts are severely limited by the fact that the site is very steep and narrow. The footprint is severely constrained by the site's shape and the application of the required development setbacks. In order to redevelop the site at all, 16 trees will need to be removed.

Mitigation opportunities are also constrained because trees cannot be planted along the Gordon Crescent frontage due to bushfire risk. However, the deep soil areas along the sides of the building may be planted with replacement trees of the species to be removed.

The landscaping will also provide the opportunity to plant locally native understorey species. This is the structural component that is most severely impacted in urban bushland and its replanting in the landscaped gardens will have a positive influence on the local dependant biota.

SEVEN PART TEST

The following seven matters are considered in order to quantify the potential impact of the proposed loss of 16 trees across 4 urban lots.

Some terms require definition and departmental guidelines have been used (*Threatened Species Assessment Guidelines – the assessment of significance* DECC 2007).

The "subject site" is defined as the area directly affected by the proposal.

The "study area" means the subject site and any additional areas which are likely to be affected by the proposal, either directly or indirectly. The study area extends as far as is necessary to take all potential impacts into account.

The "local occurrence" of a community is that which occurs in the study area or beyond to include those areas where the movement of individuals and genetic exchange can be demonstrated

The "risk of extinction" is the likelihood that the local occurrence of the community will become extinct in either the short or long term as a result of direct or indirect impacts arising from the proposal.

The "composition" of the community includes both plant and animal species as well as its physical structure.

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to an endangered ecological community.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Response:

This question is not relevant to an endangered ecological community.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

Response:

The proposed works will remove 13 canopy trees and 3 mid storey trees from the subject site. These will be replaced on the subject site by plantings of canopy and mid storey trees of the same species. It will also be ameliorated by the reinstatement of understorey and ground cover species – a missing component of the community in its existing form.

The local occurrence of the community includes the trees of the subject site and those beyond the site that probably exchange genetic material. This includes native canopy trees within the flying distances of known pollinators that are likely to visit the trees of the subject site, including pollen and nectar feeders such as the Grey-headed Flying Fox and many birds such as Rainbow Lorikeets.

Southerton et al. (2004) demonstrated that pollen- and / or nectar-feeding lorikeets and bats make a unique contribution to eucalypt population structure because of their capacity to move viable pollen large distances. Birds and bats may travel upwards of 50 kilometres per day during feeding, and further during migration or feeding bouts over several days.

For example, Rainbow Lorikeet roosts are frequently 35 kilometres distant from their feeding areas, particularly during their non-breeding phase over summer and autumn when most of the tree species of the subject site are in flower. Scouting parties frequently move distances of 5–10 kilometres and feeding flocks may travel up to 10 kilometres between feeding and mid-day rest areas (Southerton et al. 2004).

Radio-tracking studies have revealed that Grey-headed Flying-foxes may travel more than 45 kilometres to feeding areas and over 80 kilometres during the night whilst foraging for nectar. They are highly mobile during the night, moving between several trees within a stand, and between flowering stands separated by many kilometres (Southerton et al. 2004).

The effect of pollen transfer by birds and bats on the genetic structure of widespread eucalypt species is potentially greatest in fragmented forests where these animals can traverse gaps of several kilometres between discontinuous stands (Southerton et al. 2004). In the fragmented urban landscape, this means that all patches across these large distances are functionally connected and form part of the local occurrence of the vegetation community.

The temporary loss of the small number of trees of the subject site is inconsequential when compared with the areal extent of this community within an area of 35 to 45 kilometre radius. Much bushland within that area is conserved in National Parks (e.g. Lane Cove National Park) and Council reserves (e.g. Batten Reserve).

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Response:

The redevelopment of the site will result in replacement plantings of the canopy and mid storey trees lost in the footprint in addition to the planting of other structural components and a more diverse range of species that are typical of Sydney Turpentine Ironbark Forest. These resources will replace the habitats removed during construction and the installation of nest boxes will augment habitats for many fauna species such as hollow dependant micro bats, small birds and arboreal mammals.

The removal and control of significant environmental weeds (e.g. Fishbone Fern) will not only improve the habitats on the subject site, but also has the potential to improve the habitat of the community downslope in Batten Reserve as it will reduce the source of seed rain and other propagules from upslope habitats.

Thus the redevelopment is likely to improve the composition of the community in the local area.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

Response:

The temporary adverse modification to the community is restricted to the loss of 16 canopy and mid storey trees. Further positive modification will apply to the deep soil landscaped areas across a large part of the site.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

Response:

The redevelopment of the site will not further isolate the community from other areas of habitat. The four lots are already developed with residences and are surrounded by barriers such as main roads and suburbs that intervene between existing areas of habitat. These areas are, however, functionally connected by highly mobile keystone species such as bird and bat pollinators and will remain so in the post development landscape.

The implementation of the landscape plan will also improve the habitats available for other species of flora (such as ground covers) and fauna (such as small birds) and thus re-introduce missing elements in the urban landscape for expansion of species currently restricted to Batten Reserve

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

Response:

The area of habitat occupied by this community on the subject site is very small and supports only canopy trees. As such, it cannot be regarded as important for the persistence of this community in the local area.

The subject site is not strategically located so that its contribution to local connectivity is critical for any plant or animal species; its connectivity will remain or be enhanced in the long term once the replacement plantings are in place.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

Response:

No critical habitat has been declared for this endangered ecological community.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

Response:

There is no recovery plan or threat abatement plan for this community. However, a number of recovery strategies have been identified (OEH 2011). Of relevance are the following:

1. Promote public involvement in restoration activities;
2. Apply necessary fire regimes to maintain appropriate floristic and structural diversity;
3. Protect habitat by minimising further clearing of the community. This requires recognition of the values of all remnants of the community in the land use planning process, particularly development consents, rezonings and regional planning;
4. Promote regrowth by avoiding unnecessary mowing;
5. Protect habitat by controlling run-off entering the site if it would change water, nutrient or sediment levels or cause erosion;
6. Control weeds; and
7. Undertake restoration including bush regeneration and revegetation.

Restoration activities are already occurring in the adjacent reserve and the sympathetic landscape plan will aid in that program's continued success. The application of ecological fire regimes is not possible in urban areas. The value of the habitats in this community is recognised in this survey and assessment process and acknowledged by the habitat enrichment that will result from the implementation of the landscape plan. Hydrological processes will be protected and most likely improved in the post development landscape and weed sources will be removed.

Therefore, the proposal is largely consistent with these recovery strategies.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

Response:

The proposed works for the building envelope and bushfire protection requirements contributes to the Key Threatening Process "Clearing of Native Vegetation". However, this is at a very small scale and the losses will be replaced and the community enhanced by an expanded species composition and more natural structure.

CONCLUSION

The conclusion drawn by Ms Heatley that a significant impact will be wrought on Sydney Turpentine Ironbark Forest cannot be sustained.

Application of the seven part test shows that the proposed removal is small in extent, will not adversely modify the species composition of a local occurrence of this community, will not isolate a remnant to the point of extinction and is unlikely to interrupt ecological processes that are important for the persistence of the community. While it contributes to the Key Threatening Process of Clearing of Native Vegetation, it is both temporary and of a small scale. Thus the mitigative actions are judged to be sufficient and consistent with the recovery of the community. Therefore, a Species Impact Statement is not required.

Even if the subject site trees are deemed as being representative of STIF according to the NSW legislation, such remnant patches do not meet the specific condition criteria required by the Commonwealth Environmental Protection and Biodiversity Conservation Act (1999). Therefore a referral to the Department of Sustainability, Environment, Water, Population and Communities is not required.

Yours sincerely,

Elizabeth Ashby

Elizabeth Ashby

REFERENCES

Benson, D.H. and Howell, J. (1990) *Taken for Granted: The Bushland of Sydney and Its Suburbs*. Kangaroo Press, Sydney

Benson, D.H. and Howell, J. (2000) *Sydney's Bushland — More than Meets the Eye*. Royal Botanic Gardens, Sydney

Office of Environment and Heritage (2011) Threatened Species Profiles (http://www.threatenedspecies.environment.nsw.gov.au)

DECCW (2009) The Native Vegetation of the Sydney Metropolitan Catchment Management Authority Area. Department of Environment and Climate Change NSW, Hurstville

Department of the Environment, Water, Heritage and the Arts (2009) Turpentine-Ironbark Forest in the Sydney Basin Bioregion in Community and Species Profile and Threats Database, Department of the Environment, Water, Heritage and the Arts, Canberra. Available from: http://www.environment.gov.au/sprat

Department of the Environment, Water, Heritage and the Arts (2010) Turpentine-Ironbark Forest in the Sydney Basin Bioregion in Community and Species Profile and Threats Database, Department of the Environment, Water, Heritage and the Arts, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed 2010-10-10T10:11:23

James, T. McDougall, L. and Benson, D.H. (1999) *Rare Bushland Plants of Western Sydney*, second edition, Royal Botanic Gardens, Sydney

NSW National Parks and Wildlife Service (2002) Native Vegetation of the Cumberland Plain - Final Edition. NPWS, Sydney

NSW National Parks and Wildlife Service (2004) Endangered Ecological Community Information – Sydney Turpentine Ironbark Forest.

NSW Scientific Committee (1998) Sydney turpentine-ironbark forest - Endangered ecological community listing. Final Determination

Southerton, S.G., Birt, P., Porter, J. and Ford, H.A. (2004) Review of gene movement by bats and birds and its potential significance for eucalypt plantation forestry. *Australian Forestry* 67(1): 44–53

Threatened Species Scientific Committee (2005) Turpentine-Ironbark Forest of the Sydney Basin Bioregion. Advice to the Minister for the Environment and Heritage on amendments to the List of Ecological Communities under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act), viewed 30 May 2007, http://www.environment.gov.au/biodiversity/threatened/communities/sydney-turpentine-ironbark.html

Tozer, M.G. (2003) Native vegetation of the Cumberland Plain, western Sydney: systematic classification and field identification of communities. *Cunninghamia* 8(1):1-75

Tozer, M.G., Turner, K., Keith, D.A., Tindall, D., Pennay, C., Simpson, C., MacKenzie, B., Beukers, P. and Cox, S. (2010) Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands *Cunninghamia* 11(3):359–406

HYECORP
PROPERTY GROUP

Appendix B – Flaura and Fauna Impact Assessment (Conclusion only)

The full report (95 pages) was submitted with the Statement of Environmental Effects. Attached is a copy of the conclusion.

The various seven part tests can be found in Appendix 3 of the full report

7 CONCLUSIONS AND RECOMMENDATIONS

Keystone Ecological has been contracted by Hyecorp Property Group to prepare an assessment of the likely impact of a proposed development upon nationally and state listed threatened flora and fauna and their habitats. It is proposed to construct a new residential flat building on Lots 16 to 19 in DP 27911, 76 to 82 Gordon Crescent, Lane Cove North in the Lane Cove Local Government Area (LGA).

The site is developed with four dwellings. It is proposed to demolish the houses and construct a residential flat building with an excavated basement for parking. Up to 17 native trees may need to be removed. A large bushland reserve – Batten Reserve – is located across the road from the site and the potential for the proposal to impact on the biodiversity of the reserve was also considered.

The impact of this proposal on threatened species and endangered ecological communities of interest is likely to be minimal as it is located at the interface between bush and houses and is relatively small in scale.

The assessment of the criteria under the Commonwealth EPBC Act (1999) concluded that a referral to the Department of Sustainability, Environment, Water, Population and Communities is not required.

The assessment of likely impact under the New South Wales TSC Act (1995) concluded that a significant impact is not likely to occur upon any state listed threatened species, populations or endangered ecological communities. Therefore a Species Impact Statement is not recommended to be prepared for the proposal.

While it is judged that there will be no significant impact wrought by the proposed development on any species of conservation significance, the following recommendations are provided in order to ameliorate any impacts in relation to the proposal, particularly in regard to resident fauna and protection of downslope environments:

1. All recommendation of the consulting arborist are to be observed.

2. Plant species used for landscaping should be restricted to locally-native species and / or those introduced species that do not have the potential to become environmental weeds.

3. Garden refuse is not to be dumped in or near the forest boundary. It should be composted and used appropriately in the landscaped areas or disposed of via Council's green waste program.

4. Species used for landscaping should not be dominated by nectar-producing plants (e.g. Grevilleas) as they have the potential to favour large aggressive honeyeaters (e.g. Noisy Miners) that deter other species of birds.

5. Unless it poses a safety hazard, fallen timber should be used as a feature in the landscaped gardens as terrestrial habitat.

6. Sediment controls should be put in place prior to any works and be maintained throughout the construction phase. This shall include such measures directly around stockpiles of spoil or soil.

7. Maintenance of all erosion and sediment control measures shall be conducted throughout the construction phase and checked regularly as well as after each rainfall event.

KEYSTONE
ECOLOGICAL
Keystone Ecological Pty Ltd
abn 13 099 456 149
PO Box 5095 Empire Bay NSW 2257
telephone 1300 651 021
facsimile 02 4368 2361
email office@keystone-ecological.com.au

Mr Stephen Abolakian
Director, Development and Funds Management
HYECORP Property Group
Level 1, 451 Willoughby Road
WILLOUGHBY, NSW 2068

By email: stephen@hyecorp.com.au

1st September 2011

RE: Response to Council matters,
DA 11/79, 76-82 Gordon Crescent Lane Cove

Dear Stephen,

This letter is written in reply to some of Council's response to your development application for the above address. In particular, I write in response to:

1. Written comments by Ms Kerry Heatley (Assistant Manager, Open Space) at Points 1 and 6 in a Memorandum dated 28th June 2011; and
2. Ms Heatley's verbal comments regarding the ecological impact of your proposed development at our meeting of 4th August 2011.

In summary, Ms Heatley's analysis has criticised Keystone Ecological's Flora and Fauna Impact Assessment (dated April 2011) report on the following grounds:

1. The value of Batten Reserve has been ignored or underestimated;
2. Threatened species issues have been ignored;
3. The survey was inadequate;
4. Assumptions relied upon had no scientific merit; and
5. The conclusions arising from the seven part tests are incorrect.

Ms Heatley also relied on a vegetation mapping report prepared for Council by Storm Consulting (dated September 2010) that was not available to Keystone Ecological at the time of preparation of the impact assessment. The Storm report was focused on providing Council with a vegetation map of the bushland reserves to aid in their management.

Each point of criticism by Ms Heatley is dealt with in turn. Direct quotes are indicated by the use of italics.

1. Removal of Trees – Endangered Ecological Community, Wildlife Corridor

The development will result in the loss of significant trees, including numerous Angophoras and Turpentines. ... These trees are very significant as they provide a key link in the wildlife corridor from Lane Cove National Park, through Mowbray Park ... to Batten Reserve ...

The ecological significance of trees is determined by a number of considerations including (i) the provision of limited resources to fauna such as winter forage or hollows, (ii) their contribution to the functioning of wildlife corridors by their physical location and (iii) their membership of recognised endangered communities.

The trees on the subject site were investigated in regards to these features and I refer particularly to Table 1.3 on page 42 of the Impact Assessment. None of the native trees on the subject site contained hollows. None of the native trees on site provide critical winter forage. They do not qualify as significant on these grounds.

The trees are located in one of a number of narrow bands of backyard trees that spread up the hill from the reserved gully below to a narrow finger of backyard trees that run along the ridgetop above. They are not a "key link" but one of many such links and stepping stones. Corridors of this type would be used principally by highly mobile species such as birds and bats and a temporary break in this area would not impede their movement through the landscape.

Efforts are being made to retain two of the largest trees at the rear of the properties and the landscape plan will reinstate and augment the existing link with native species of the canopy and the understorey, a habitat element that is currently missing in these residential areas.

The Turpentines and Angophoras are an essential part of the Endangered Sydney Turpentine Ironbark Forest Ecological Community of Batten Reserve

The Storm report relied up on by Ms Heatley states that none of the survey plots that contained *Syncarpia glomulifera* were part of the Sydney Turpentine Ironbark Forest (STIF). Their analysis supports the mapping of Tozer et al (2010) and other work such as Benson and Howell (1994) that show most of the habitat for this endangered community has been cleared and only small remnants remain on the fringes.

Angophora costata and *Syncarpia glomulifera* are both characteristic elements of a number of different vegetation types. In this situation I believe that they are likely to represent components of a vegetation type that is dominant on the sheltered sandstone slopes in this area. This vegetation type has been assigned a number of names by different workers – the one I favour is Coastal Enriched Sandstone Moist Forest - but essentially it is widespread and is not an Endangered Ecological Community (EEC).

While the trees of the subject site have a functional relationship to the remnant bushland nearby, they are not part of the reserve. These functional links are not critical to important flora and fauna; will be temporarily disrupted; and eventually reinstated and improved with the addition of nesting boxes and understorey habitat.

6. Comments on Flora and Fauna Impact Assessment (Keystone 2011)

In summary, Ms Heatley criticises my report based on my conclusion that (i) the subject site and the reserve below is probably not representative of an EEC, (ii) the survey was inadequate, (iii) threatened species use of the subject site is underestimated, (iv) the site is part of an important wildlife corridor and (v) my conclusions regarding the likelihood of a significant impact are incorrect and that Species Impact Statement is required along with a referral to the Commonwealth.

(i) Presence of EEC

In my report I stated that the vegetation below the subject site in Batten Reserve was not representative

of an endangered ecological community. I based this on observations of the canopy trees on the south-facing slope within the reserve directly below the subject site along with vegetation maps and descriptions in the published scientific literature. Tozer et al (2010) and Benson and Howell (1994) both show this area as supporting a sandstone-based gully vegetation that is not equivalent to the Sydney Turpentine Ironbark Forest EEC.

Ms Heatley relied up on an unpublished internal report produced by Storm Consulting that was not available to me at the time of writing. However, after consideration of this work and the broader unpublished draft work that it relies upon (The Native Vegetation of the Sydney Metropolitan Catchment Management Authority Area, DECCW 2009), I am still of the firm opinion that there is not compelling evidence to assign the vegetation of the site or that immediately below it in the reserve to the STIF EEC.

Ms Heatley also refers to the Final Determination by the NSW Scientific Committee for STIF that states that *"the structure of the Community was originally forest, but now may exist as woodland or remnant trees"* and uses this to discredit my statement that the highly modified nature of the subject site has interfered with the ability to reliably assign the native trees to a vegetation community.

I have produced and co-authored many vegetation maps and scientific papers regarding vegetation patterns across the landscape when working for both the NSW National Parks and Wildlife Service and the Royal Botanic Gardens. I was an integral part of the scientific team that developed the vegetation mapping rules that are now standard best practice. I have an expert understanding of the ambiguities and pitfalls in classifying and mapping native vegetation and the most challenging situation of all is in areas where only some of the canopy trees remain.

While *Angophora costata* and *Syncarpia glomulifera* are components of STIF where STIF exists and despite the caveat in the Final Determination regarding isolated trees, the mere presence of these species alone does not make them representative of the STIF EEC. This fact was also emphasised in the Storm report where it was noted that not a single plot with *Syncarpia glomulifera* in it was classified as the EEC.

(ii) Adequacy of survey

It is important to remember that the survey and assessment report is on the subject lots and not Batten Reserve. The techniques and survey effort employed are sufficient and comply with best practice according to guidelines issued by the relevant authorities such as (the then) Department of Environment and Conservation and various local councils. Lane Cove Council does not have a specific set of survey and assessment guidelines so I have relied upon my professional judgement.

(iii) Threatened species

Ms Heatley maintains that the likelihood of the presence of the Powerful Owl, Grey-headed Flying-fox and Red-crowned Toadlet were not addressed adequately.

It is incorrect to suggest that I ignored the known local records of threatened species. The presence of threatened species in Batten Reserve and the local area was acknowledged and repeated often in my report and the potential impact on these features was a major focus of the assessment. I refer you specifically to sections 3.3, 3.6, 6.1, Table 2.4 in Appendix 2 and Appendix 3.

I expanded the list of species of interest as well by adding species that may also potentially occur, including Gang-gang Cockatoo, Barking Owl, Yellow-bellied Sheathtail-bat, Eastern Freetail-bat and Eastern Bent-wing Bat.

It is important to note that the survey undertaken by Keystone Ecological and the resultant report was centred on the subject site, not Batten Reserve. The subject site provides very limited habitat to a limited range of species.

The failure to locate threatened species during survey is not a demonstration of inadequate survey work

but instead is a demonstration of the way animals move through the landscape in time and space and the quality of the habitats available on the subject site. That is why it is important to consider the potential of the site to provide habitat for these significant species along with the potential for indirect impacts on adjacent habitats that are known to support these species. My report has done both of these things.

(iv) Wildlife corridor

The trees of the subject site are part of one of many narrow "backyard tree" links along this slope that may be used by mobile species such as birds and bats. The loss of some trees in the subject lots will not impede their movements between the patches of habitats detailed by Ms Heatley. Moreover, these losses will be temporary as the implementation of the landscape plan will see reinstatement of canopy and understorey as well as the enrichment of habitat by the addition of nest boxes.

(v) Significant impact

The conclusion drawn by Ms Heatley that a significant impact will be wrought on threatened species or ecological communities cannot be sustained.

The assumed impact on STIF is predicated on the presence of this community. I maintain that this community does not occur on site, but if the presence of this community is accepted for the sake of argument, the loss of 15 or 17 trees across four backyards cannot be conflated into imposing a significant impact. Application of the seven part test shows that the proposed removal is small in extent, will not adversely modify the species composition of a local occurrence, will not isolate a remnant to the point of extinction and is unlikely to interrupt ecological processes that are important for the persistence of the community. While it contributes to the Key Threatening Process of Clearing of Native Vegetation, it is both temporary and of a small scale. Thus the mitigative actions are sufficient and consistent with the recovery of the community.

A Species Impact Statement is therefore not required.

Even if the subject site trees are deemed as being representative of STIF according to the NSW legislation, remnant patches that do not meet specific condition criteria are not part of the Turpentine-Ironbark Forest ecological community listed under the Commonwealth Environmental Protection and Biodiversity Conservation Act (1999). The vegetation of the subject site does not have all layers of vegetation present and is not of sufficient extent to qualify under the Commonwealth legislation.

A referral to the Department of Sustainability, Environment, Water, Population and Communities of therefore is not required.

The threatened species considered with the potential to use the subject site are Powerful Owl and Grey-headed Flying-fox. The potential for impact on these species were considered in the seven part tests (please see Appendix 3 of my report).

The Powerful Owl has a home range of up to 1,000 hectares. The contribution of the subject site's trees to such a large home range is very small. They do not provide potential breeding sites for this species or its prey due to the lack of hollows. The temporary gap created by the loss of canopy trees will not impede this animal's movements. Although residents have noted this owl sitting in garden trees along the edge of the reserve, the loss of the native trees in the subject lots will not impose a significant loss of critical habitat for this species and so a significant impact is unlikely to occur.

A Species Impact Statement is therefore not required.

The Grey-headed Flying-fox is reliant on native blossom and fruit. It occupies large camps and a breeding colony occurs at nearby Gordon. An individual may fly up to 60 kilometres in a single night from a camp to a preferred feeding tree. This species is highly mobile and individuals use habitat throughout its range in coastal eastern Australia. Of critical importance to this species are the availability of foraging

resources in the winter when such resources are scarce; these are usually provided by swamp forests. The spring and summer-flowering species of the sandstone gully and slopes of the subject site and the reserve are not critical resources. This is reflected in the relative absence of records of this species in this area, with only one record dating from 1998. The temporary loss of 15 or 17 summer-flowering native trees will not impose a significant impact on this species.

A Species Impact Statement is therefore not required.

The potential impact on habitat for the Red-crowned Toadlet was also considered. Although this species is highly unlikely to occur on the subject site, the potential for indirect impacts was considered, particularly in regards to interruption of hydrological processes. The mitigative actions to be imposed will not interfere with the offsite hydrological processes in habitat for this species. It is in fact likely to improve as it is likely that stormwater is currently fed into the sewerage system, contributing to contaminated overflow into its habitat downstream.

A Species Impact Statement is therefore not required.

In conclusion, Council's critique in many places is unfair and misdirected. The claims that important species and communities were ignored or dismissed is untrue - they were all considered. None of the criticisms invalidate my methodology or conclusions.

Yours sincerely,

Elizabeth Ashby

Principal Consultant

Memorandum

15 August 2011

To	Stephen Abolakian and Xerxes Karai – Hyecorp Property Group		
Copy to	Dan Williams		
From	Jayne Tipping	Tel	(02) 9239 7166
Subject	76-82 Gordon Crescent Lane Cove - Response to Council Comments	Job no.	22/15603

The GHD Ecological Services Team has reviewed the following documents:

- Keystone (2011) Flora and Fauna Impact Assessment, Gordon Crescent, Lane Cove North, Lane Cove LGA. Unpublished report, Keystone Ecological
- Memo prepared by Lane Cove Council ("Council") dated 28/06/2011 and sent to HYECORP Property Group

Our responses to key comments from Council are provided below.

Council comments	GHD comments
1. Removal of Trees – Endangered Ecological Community, Wildlife Corridor	
The development will result in the loss of major trees, including numerous Angophoras and Turpentines	**What is the definition of a 'major tree'?** **Six *Syncarpia glomulifera* (Turpentine), three to five *Angophora costata* (Smooth-barked Apple), three Sydney Peppermint (*Eucalyptus piperata*), one *Acacia decurrens* (Sydney Golden Wattle) and three *Pittosporum undulatum* (Sweet Pittosporum) would be removed. In addition, seven exotic or non-locally native trees would be removed. No hollow-bearing trees would be lost. Trees to be removed are between 300mm and 730mm in diameter. While most are likely to be regrowth trees and some are likely to be remnant, there is the potential that some have also been planted.**

GHD Pty Ltd ABN 39 008 488 373
Level 1, 62 Clarence Street Port Macquarie NSW 2444 PO BOX 2875 Port Macquarie NSW 2444 Australia
T 61 2 6586 8700 **F** 61 2 6586 8701 **E** pqqmail@ghd.com **W** www.ghd.com

Council comments	GHD comments
These trees are very significant as they provide a key link in the wildlife corridor from Lane Cove National Park, through Mowbray Park (Willoughby Council) to Batten Reserve and the lower reaches of Stringybark Creek and the foreshore of the Lane Cover River. Removal of the trees will result in the fragmentation of the wildlife corridor and a reduction in important habitat trees.	**Trees at the site are part of an urban landscape with remnant trees in backyards. Most residences in the area contain native trees in gardens. The site on its own, is not a key link in a wildlife corridor, rather is part of a broad wildlife corridor that is made up by all urban gardens in the area. The trees at the site are likely to constitute 'stepping stones' through the locality, but are not considered critical for fauna movement through the locality. There would be an incremental loss of backyard trees that contribute to available stepping stones in the locality, but these are not likely to be critical for movements through the locality.** **The trees would provide some limited foraging habitat for a range and fauna. Common bird species may nest in the trees. The trees would not provide breeding habitat for any threatened fauna species, and only constitute marginal foraging habitat for these species.**
The trees form a part of the original vegetation community of the area, they actually pre-date the existing houses. The Turpentines and Angophoras are an essential part of the Endangered Sydney Turpentine Ironbark Forest Ecological Community of Batten Reserve.	**GHD would need to see evidence that trees pre-date the houses, although this does not necessarily mean that the trees are remnant. Given their size, most appear to be regrowth.** **Most recent mapping of the area by Tozer et al (2010) maps the vegetation of the area as Sydney Coastal Gully Forest or Coastal Sandstone Ridgetop Woodland. This vegetation type is not an EEC. This mapping is based on comprehensive data sets across a wide area, and is more detailed than the previous mapping undertaken by NPWS (2002) and Tozer (2003).** **In the absence of reviewing vegetation quadrat data from the Storm Consulting surveys (2009), detailed comment cannot be made on the occurrence or otherwise of the Sydney Turpentine Ironbark Forest Ecological Community in Batten Reserve.**
The Turpentine-Ironbark Forest is listed as a critically endangered ecological community under the *Environment Protection and Biodiversity*	**Noted.**

Council comments	GHD comments
Conservation Act 1999 (EPBC Act). It is also recognised as an endangered ecological community in New South Wales and listed under the *Threatened Species Conservation Act 1995*.	
2. Fire Hazard issues – building in a fire prone area	
The development will place increased pressure on the vegetation of Batten Reserve, as the Asset Protection Zone will not be fully contained within the development site. In the future it is very likely that the Rural Fire Service will instruct Council to clear an Asset Protection zone in Batten Reserve in order to protect the buildings	**GHD would need to review the Bushfire Report to comment fully.**
An Asset Protection Zone in Batten Reserve will result in the loss of native trees and shrubs, including damage to the Critically Endangered Turpentine-Ironbark Vegetation Community and the Endangered Coastal Escarpment Littoral Rainforest.	**GHD would need to review the Bushfire Report to comment fully.** **Littoral Rainforest is unlikely to be present in Batten Reserve (see discussion under 6, dot point 1), based on the distance of the reserve from the ocean, the associated lack of maritime influence, soils and geology.** **Flora quadrats are required to determine the presence/absence of this community.**
An Asset Protection Zone will also result in the loss of wildlife habitat, including habitat for Threatened Species such as the powerful owl, Grey-headed Flying-fox and Red-crowned Toadlet	**Only minimal foraging habitat might be lost for the Powerful Owl and Grey-headed Flying-fox. No breeding habitat for these species would be impacted. The loss of habitat depends on the requirements of the APZ. GHD would need to review the Bushfire Report to comment fully.** **GHD would need to review the Bushfire Report to comment fully on the impact to understorey vegetation and Red-crowned Toadlet.**
3. Riparian Land and Creekline	
An increase in population density in the area will result in additional sewage entering the pipes along Stringybark Creek (Batten Reserve)	**GHD would need to review the stormwater report to comment.**
There are already frequent sewage overflows into the creekline. Additional flows will result in greater water pollution and an increased health hazard to the	**GHD would need to review the stormwater report to comment.**

Council comments	GHD comments
community.	
Increased sewage flows will result in greatly increased stormwater flows due to a large area of non-permeable surfaces and the fact that the majority of the roof water will be directed the stormwater. Increased stormwater will lead to creekbank erosion and threatened the Endangered Coastal Littoral rainforest Community along the creekline. Note that less than half of the stormwater will be retained on-site.	**GHD would need to review the stormwater report to comment fully.** **Littoral Rainforest is unlikely to be present in Batten Reserve (see discussion under 6, dot point 1).**
The development may result in changes to the underground hydrology of the area, leading to landslips and adverse impacts on the vegetation communities.	**GHD would need to review the stormwater report to comment.**
The Threatened Red-crowned Toadlet is present in Batten Reserve. This species is vulnerable to changes in hydrology and water pollution.	**Noted. GHD would need to review the stormwater report to comment.**
The development is in conflict with The Lane Cove LEP 2009 6.3 – Riparian Land: 'The objective of this clause is to ensure that development does not adversely impact on riparian land.'	**GHD would need to review the stormwater report and the LEP to comment.**
4. Impacts on walking track - Visibility	**Not relevant to ecological issues.**
5. Solar Access, Light Pollution	
The proposed development is on the northern slope of Batten Reserve and due to the building height solar access in the reserve will be greatly reduced. A reasonable level of sun access needs to be maintained to the adjoining bushland throughout the year, in order to ensure [that] the viability of the bushland.	**Batten Reserve is surrounded by urban development. While the proposal would lead to a small area of shadowing over bushland immediately opposite the site, light levels throughout the majority of the reserve are unlikely to be impacted. Vegetation in the reserve is in a gully, and naturally has reduced sun access in some areas. The change in sunlight opposite the proposal would be highly unlikely to impact the viability of the bushland in the reserve in the long-term.**
The development will shed a considerable amount of light pollution directly onto Batten Reserve. This has direct implications for nocturnal animals which rely on the cover of darkness for their safety/hunting access. The additional light will also adversely affect	**How much of the reserve does Council believe would have considerable light pollution?** **Grey-headed Flying-foxes and Powerful Owls that occur in the Reserve are already living in**

Council comments	GHD comments
the Threatened fauna which live in the reserve, including the Powerful Owl and the Grey-headed Flying-fox.	**an urban area. Both species are very mobile and have very large home ranges. These species would forage across a large area, including urban gardens throughout the Lane Cove LGA. The additional light created by the proposal would be highly unlikely to adversely affect these species.**
6. Comments on Flora and Fauna Impact Assessment (Keystone 2011)	
In 2009 Storm Consulting undertook detailed mapping of the vegetation communities of Lane Cove Council's bushland reserves. The study indicated that two endangered ecological communities exist in Batten Reserve, immediately below the proposed development site. The two vegetation communities are Sydney Turpentine-Ironbark Forest and Coastal Escarpment Littoral Rainforest. The assumptions made in the Flora and Fauna Impact Assessment by Keystone with regard to this issue are incorrect. Keystone states that the vegetation communities in the reserve below the proposed development are not endangered ecological communities.	**In the absence of reviewing quadrat data from the Storm Consulting surveys, detailed comment cannot be made on the certainty of occurrence or otherwise of vegetation communities in Batten Reserve.** **Most recent mapping of the area by Tozer et al (2010) maps the vegetation of the area as 'Sydney Coastal Gully Forest' or 'Coastal Sandstone Ridgetop Woodland'. This mapping is based on comprehensive data sets across a wide area, and is more detailed than the previous mapping undertaken by NPWS (2002) and Tozer (2003).** **According to the Final Determination for Littoral Rainforest (NSW Scientific Committee, 2004), "*stands of Littoral Rainforest occur within 2 km of the sea, but may occasionally be found further inland, but within reach of maritime influence*". Batten Reserve is unlikely to be within reach of maritime influences.** **According to the DECC (2008) identification guidelines "*Littoral Rainforest is not restricted to sandy soils; it can also be found in protected areas around coastal estuaries where soils are derived from river sediments or on more rocky substrates close to the waters edge*". Batten Reserve is over 500 m from Lane Cove River, and is unlikely to be considered part of the estuary vegetation associated with the river.** **It is therefore uncertain that Littoral Rainforest occurs in Batten Reserve.**
The Turpentines and Angophoras on the properties are part of the original Turpentine-Ironbark Community of Batten reserve and surrounds. The trees on private property pre-date the original houses	**In the absence of reviewing vegetation quadrat data from the Storm Consulting surveys (2009), detailed comment cannot be made on the certainty of occurrence or**

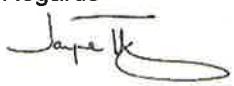
Council comments	GHD comments
and link directly to the location of the Turpentine-Ironbark community in the reserve. Keystone states that the Turpentines on private property cannot be assigned to any endangered ecological communities due to the nature of the site. This assumption is incorrect – Department of Environment and Heritage : Final Determination for Sydney Turpentine/Ironbark – 'The structure of the Community was originally forest, but may now exist as woodland or remnant trees.'	otherwise of Sydney Turpentine Ironbark Forest in Batten Reserve and the likely relationship of the trees on site with this community.
Council records show that there is a good diversity of native fauna in Batten Reserve, including 44 bird species, 4 mammals, 8 reptiles and 6 amphibian species. The survey undertaken by keystone is very limited and a poor indicator of fauna diversity in the reserve.	Keystone (2011) undertook a typical survey of a small urban site. Surveys within Batten Reserve were limited to the roadside. The aim of the report was not to assess diversity in Batten Reserve, but to assess fauna species present within the site. Provision of a comprehensive list of fauna diversity in Batten Reserve is not required as part of the assessment. It is highly unlikely that all species known to occur in Batten Reserve would also occur at the site. Only a small proportion would be expected to occur, given the limited fauna habitats present at the site. A literature review of fauna present in Batten Reserve could be added to the species list for the site to add background information for the locality.
Council records also indicate the presence of three Threatened fauna present in Batten Reserve (NSW Threatened Species Act 1995): Powerful Owl (Vulnerable) Red-crowned Toadlet (Vulnerable) Grey-headed Flying-fox (Vulnerable) also listed as Vulnerable Nationally The fact that these species were not found in the survey by Keystone merely indicated the inadequacy of the fauna survey which was undertaken.	Keystone (2011) noted the species presence in Batten Reserve, and said potential habitat for the Powerful Owl and Grey-headed Flying-fox was present at the site. It is not the role of an impact assessment to identify every species that occurs at site; it is more important that potential habitat is identified. Given the marginal habitat for the Powerful Owl and Grey-headed Flying-fox present on the site, it is not surprising that these species were not recorded. No habitat is present on site for the Red-crowned Toadlet, so it would be highly unlikely to occur at the site. Keystone (2011) undertook fauna surveys over five separate days, which is considered sufficient for the size of the subject site.
The report by Keystone states that it is very unlikely that the trees on the proposed development site would be used by species of conservation	Powerful Owls, Grey-headed Flying-foxes and other mobile threatened fauna species may forage on occasion among trees within

Council comments	GHD comments
significance. This assumption has no scientific merit. Powerful Owls and Grey-headed Flying-foxes frequently use large native trees on bushland margins for foraging/hunting. The fact that the Powerful Owls (Threatened species) have frequently been sighted in Turpentine trees on private property adjacent to the reserve highlights the need to retain significant trees on the proposed development site.	**the site, but would not be reliant on the habitat features present. All threatened birds and bats considered to have potential habitat at the site have very large home ranges, of which the site would be a minute proportion. The trees on site, while providing potential habitat for these species, could not be considered significant to the local populations.**
The NSW Scientific Committee has identified habitat loss as the primary reason for the decline of Grey-headed Flying Fox populations. The major threat to the Powerful Owl is also the loss and degradation of habitat.	**All threatened birds and bats considered to have potential habitat at the site have very large home ranges, of which the site would be a minute proportion. The trees on site, while providing a small area of potential habitat for these species, could not be considered significant to the local populations.**
The report by keystone states that 'the link that the site's trees contribute to is restricted to narrow bands of other backyard trees'. This statement is incorrect – the trees are located only 13-45 metres (approx.) from batten Reserve and provide a direct link to Coolaroo Park (300 metres) and Mowbray Park (70 metres), in Willoughby Council Area. The trees provide a wildlife corridor between Lane Cove national park, reserves in Willoughby Council and Batten Reserve – which links to lower Stringybark Creek.	**All trees within gardens in the area would provide a similar link. The trees at the site are not the only link between Batten Reserve and other nearby reserves.**
The report by keystone states 'this habitat element is used by common urban birds. Field surveys did not reveal any birds of conservation significance on or near the site'. This statement merely reflects the inadequacy of the fauna survey as Council records show that 44 species of native bird living in the reserve.	**The habitat element referred to in the report is potential roosting/perching sites. Threatened birds with the potential to occur at the site all depend on hollows for nesting, so no breeding habitat is present. Given the marginal foraging habitat present, these threatened species would only perch on occasion at the site, if at all. Due to the lack of hollows, the limited foraging habitat, and the small size of the site, the trees are not considered important for any threatened birds.** **Common urban birds include a wide range of native species. Saying the site has habitat for common urban birds does not mean it does not support more native species, although the site is highly unlikely to provide habitat for most of the 44 species recorded in the reserve. Most habitats present in the reserve are not present on site.**

Council comments	GHD comments
The report by Keystone concludes that the proposed works are 'unlikely to result in a significant impact on and listed species or communities'. This statement is incorrect as there are likely to be significant impacts on Threatened Vegetation Communities and Threatened Fauna. Therefore: Species Impact Statements, an Assessment of Significance and a referral to the Commonwealth Department of Sustainability, Environment, Water, Populations and Communities are required if this application is to proceed.	**Council does not provide any formal assessments of significance to support their counter claim that there are likely to be significant impacts on threatened vegetation communities and threatened fauna as a result of the proposal.** **Little comment can be made on the significance of impacts on Sydney Turpentine Ironbark Forest without review of the vegetation quadrat data from the Storm Consulting surveys to confirm the presence of the community (or otherwise) in Batten Reserve. The removal of a small number of native trees in a garden context is considered unlikely to significantly impact this community if it is present.** **Assessments of significance were provided by Keystone for all threatened fauna considered to have potential habitat in or near the site. GHD agrees with the conclusions provided by Keystone that no significant impacts are likely for any of the bats and birds, given the small number of trees to be lost, the lack of breeding habitat, and the large home ranges of all these species. In the case of the Red-crowned Toadlet, the lack of direct impacts means a significant impact is unlikely. GHD would need to see the stormwater report to comment fully on indirect impacts on any downslope population.** **A species impact statement for these threatened fauna is not required based on these conclusions.** **A referral to the Department of Sustainability, Environment, Water, Populations and Community (DSEWPC) for a Development Application is only required if the project has, will have or is likely to have a significant impact on a matter of national environmental significance.** **The seven part test prepared for the Grey-headed Flying Fox concluded that a significant impact was unlikely at a local scale. It is therefore highly unlikely that the proposal would significantly impact the species as a whole.**

Council comments	GHD comments
	Based on the information presented in the Keystone report, an EPBC Act assessment of significance for the Grey-headed Flying Fox in accordance with the DEWHA (2009) guidelines would also be highly likely to conclude a 'no significant impact' result based on (but not restricted to) the following key points: • **The small number of potential foraging trees located within a garden context are unlikely to comprise habitat on which a population of the species would be dependent for their conservation in the locality or region;** • **The trees on site do not represent 'critical habitat' as defined in the EPBC Act Recovery Plan for the Grey-headed Flying Fox;** • **The proposal will not impact on a known breeding camp of this species and so would be highly unlikely to adversely impact breeding success or the lifecycle of any local or regional populations;** • **The proposal will not form a barrier for the movements of this species between foraging and roosting/breeding habitat in the locality or region.** **As such an EPBC Act referral to the Commonwealth would not be considered necessary for the Grey-headed Flying Fox.**

Regards



Jayne Tipping
Principal Ecologist
Direct Phone: 9239 7166

DEMLAKIAN
ENGINEERING
Intelligent Thinking in Engineering

STRUCTURAL REPORT

Of the property at:

76 – 82 GORDON CRESCENT
LANE COVE

For the Client:

HYECORP PROPERTY GROUP PTY LIMITED
P.O.BOX 779
ARTARMON NSW 1570
Attention: Mr Michael Abolakian

By:

DEMLAKIAN ENGINEERS Pty Limited
Level 2, 5 Ridge Street (P.O. Box 6553)
NORTH SYDNEY NSW 2060

October 2011

TABLE OF CONTENTS

1.0 INTRODUCTION & BACKGROUND

Further to the request of Mr Michael Abolakian, Hyecorp Property Group Pty Limited, we confirm that the author, a suitably qualified engineer from our firm attended the above property to carry out a number of visual inspections, assess the condition of various retaining walls and the structural integrity of a number of trees throughout the property and report accordingly.

Whilst we understand that a multi-unit residential development incorporating a basement car park excavated into the existing site is proposed, it is our understanding that various concerns or questions around the condition of the surrounding trees and their impact on the proposed development or the impact of the development on the trees exists.

The property in question consists of 4 residential lots with single residential buildings to be demolished referred to as no's 76, 78, 80 & 82 Gordon Crescent, Lane Cove.

For the purpose of this report, it is assumed that the Gordon Crescent street front runs generally in an east / west direction and the front of the buildings faces due south.

The site displays a significant fall from the rear of the site on the north to the front of the site on the east. The site also displays a large number of rock outcrops over the steeply sloping site at the front of the building and at the rear of the buildings above a horizontal platform at the level of the buildings.

The site which consists of residential dwellings along the centre of each of the lots also contains a number of trees essentially located along the front of the four properties as well as a number of trees at the rear of the site.

A review of the proposed basement excavation indicates that it is proposed to extend to some 6m off the northern boundary, 4m off the western and eastern boundaries and approximately 3-6m off the southern boundary.

In the preparation of our report, we confirm that we have reviewed and considered the following documents;

a) Architectural drawings submitted to Lane Cove Council for DA approval,
b) Geotechnical Engineer's report prepared by Asset Geotechnical dated 19th April,
c) Arborist's report prepared by Treescan Urban Forest Management dated April 2011.
d) Site survey prepared by McKittrick Fry & O'Hagan dated 27th May 2010.

Whilst a geotechnical engineer's report and an arborist's report have already been prepared, the contents of this report serves to provide advice and comment on the structural integrity of the trees within its environs and associated structures such as retaining walls, buildings and paving as influenced by the underlying rock profile, rock outcrops and the natural topography of the site. Whilst we do not profess to be arborists, our knowledge of structural support systems is extremely relevant in this instance to comment on the instability of the trees as influenced by the rock outcrops or retaining walls providing lateral restraint to a number of the trees in question.

For clarity between the various reports and whilst we have not reported on every tree on the site, we have referred to each of the trees as numbered on the tree location plan on the arborist's report. A copy of this tree location plan is attached as Appendix B for ease of reference.

2.0 OBSERVATIONS

Inspection of the site as a whole revealed the presence of shelf rock in some instances and a large number of exposed rock outcrops with minimal overlying soils supporting a relatively large number of trees and wild vegetation.

A closer inspection of the trees generally revealed a number of trees displaying a significant incline to the vertical, a number of trees displaying significant impact on existing boundary retaining walls as well as a number of trees which appear to have grown in a confined root space within the joints in rock outcrops with limited overlying soils.

A more detailed description of our observations is attached below. Please note that at our request, a general clean of the over lying vegetation was undertaken without disruption to the trees themselves in order to reveal the condition of the tree support mechanisms.

2.1 TREE No 1 – IN FRONT OF 76 GORDON CRESCENT

Tree No 1 which we understand is a Green Wattle displays a significant lean down slope. This lean together with an exposed high level root structure within a shallow soil system presents as a condition of significant risk with potential failure of the tree onto underlying structures below imminent. Refer to Figures 1 & 2.

2.2 TREE No 2 IN FRONT OF 76 GORDON CRESCENT

Tree No 2 which we understand is a Turpentine consists of a deformed root structure that has obviously grown through the shallow soils inhibited by the rock outcrops. Refer to Figure 3.
Considering the size of this particular tree, the structure supporting the root system including the size of the rock outcrops restraining the root system is considered to be an inadequate and unsustainable environment. This condition is considered to be structurally inadequate presents a real risk of potential collapse without warning.

2.3 TREE No 3 IN FRONT OF 76 GORDON CRESCENT

Tree No 3 which we understand is a Sydney Red Gum is like all other trees on the properties is also founded on shallow soils and displays a substantial rotation at its base indicating previous movement of the underlying founding strata. That is, the rock outcrops. Whilst significant in size, this tree like most of the others is founded within a very unstable environment and displays significant structural concern. Refer to Figures 4 & 5. Figure 6 displays the shallow depth of founding soils supporting the Red Gum in the distance.

2.4 TREE No 4 IN FRONT OF 76 GORDON CRESCENT

Tree No 4 which we understand is a Turpentine consists of a deformed root structure supported on a number of rock outcrops on differing platforms. Refer to Figure 7. This tree is clearly unstable as its support is reliant upon the stability of rock outcrops that in size are not adequate to provide long term sustained and reliable support. This condition is considered to be high risk and the tree should be removed.

2.5 TREE No 5 IN FRONT OF 76 GORDON CRESCENT

Tree No 5 which we understand is another Turpentine displays a twisted root system within significant rock outcrops and ledges on the northern face of the tree. Whilst this tree appears to be relatively stable as compared with the other cluster of trees surrounding it to the north, disturbance caused by the movement or failure of any of the trees at a higher level will no doubt cause either significant instability or failure of this tree by the movement induced into the rock outcrop system. Refer to Figures 8 & 9.

2.6 TREE No 6 IN FRONT OF 78 GORDON CRESCENT

Tree No 6 which we understand is a Native Daphne appears to be perched on the edge of a rock boulder with a one sided root system directly aside the property sewer pipes. Refer to Figures 10 & 11.

Notwithstanding our concerns regarding the instability of support to these trees supported off rock outcrops on what appears to be a high risk condition, a closer inspection of the rock outcrop upon which this tree is braced revealed the presence of fracturing of the rock itself further increasing our concerns regarding the stability of this tree. Refer to Figure 12.

Furthermore, it should be noted that that this tree and associated rock outcrops are perched over a white brick retaining wall along the front boundary of No 78 displaying substantial rotation and cracking towards to street.

2.7 TREE No 8 IN FRONT OF 78 GORDON CRESCENT

Tree No 8 which we understand is a Turpentine is located directly above and behind the front boundary retaining wall of No 78 Gordon Crescent. The tree appears to have grown or developed behind the retaining wall which appears to pre date the tree. Refer to Figure 13.

The tree has grown to such a size in what must be from the adjoining topography shallow soils surrounded completely with high level rock outcrops and hence exerts significant forces onto the rear of the wall causing cracking and instability of the wall. Refer to Figure 14.

The extent of rotation and cracking in the brick retaining wall is such that the stability and adequacy of the retaining wall has been compromised and will require reinstatement. Considering that this wall clearly provides restraint to the support of the tree, failure or reconstruction of the wall will also compromise the structural integrity of the tree alleviating the active pressure restraint that it currently provides. This tree needs to be removed to ensure that the safety of the public is not at risk.

2.8 TREE No 9 AT THE REAR OF 76 GORDON CRESCENT

Tree No 9 which we understand is a Sydney Red Gum which is located at the rear of the building on No 76 is situated on what is a relatively level platform underlain by a rock shelf rather than smaller rock outcrops as is the case for the other trees at the front of the property inspected. Refer to Figure 15.

Inspection of the building to the south of this tree supports this observation with no settlement cracking observed in the masonry walls of the dwelling.

Furthermore and whilst this tree is also on what would be considered to be a relatively shallow soil depth, the tree is absolutely vertical and the roots appear to have anchored restraint within the joints under very large bedrock joints providing significant support and ensuring adequacy.

Therefore and considering that excavation for the proposed basement car park is intended to align approximately with the location of the existing building relative to this tree, there should be no reason why this tree should not be able to be retained if desired.

2.9 TREES No 10 & 11 AT THE REAR OF 76/78 GORDON CRESCENT

Tree No 10 & 11 which we understand is a Sydney Peppermint is located along the rear boundary of 76/78 Gordon Crescent perched up high on a number of rock outcrops with deformed bases that appear to have morphed into each other. Tree 10 displays a significant lean down slope and appears not only to be unstable but extends dangerously over the roof of the buildings below. Trees No 10 & 11 should be removed as a matter of urgency. Refer to Figure 16.

2.10 TREE No 14 AT THE FRONT OF 80 GORDON CRESCENT

Tree No 14 which we understand is a Sydney Red Gum is located directly above and behind the sandstone retaining wall along the front boundary of No 80 Gordon Crescent. The tree appears to have grown or developed behind the retaining wall which appears to pre date the tree notwithstanding signs of previous repair attempts to the tree over the years. Refer to Figure 17.

The tree is located directly behind the sandstone wall and has grown to such a size in what must be from the adjoining topography shallow soils surrounded completely with high level rock outcrops and exerts excessive pressure onto the wall.

The sandstone retaining wall displays significant cracking, outward rotation and bowing adjacent the tree and is no longer considered to be stable. Refer to Figures 18 & 19.

The structural integrity of the wall has been compromised and hence its ability to provide lateral restraint to the tree behind is also compromised. Therefore and considering that this tree is bounded by a rock shelf on its north and this retaining wall on its south, the stability of this tree will be completely compromised by the removal or failure of the retaining wall which is imminent and hence it should be removed

3.0 CONCLUSIONS AND RECOMMENDATIONS

Generally, the site which is underlain with sandstone bedrock and over laid with rock outcrops of varying size consists of a steep slope at the front of the properties with retaining walls to most of the boundary frontages. The site extends up to a relatively level platform upon which the buildings are founded together with Tree No 9. This level profile extends a short distance behind the dwellings after which the site slopes steeply up again to the rear boundary and consists of relatively loose rock outcrops.

With the exception of Tree No 9 which is one of the few trees that is situated on a level platform and whose root structure appears to be adequately secured, the remaining trees inspected and discussed within this report are considered to be of significant structural concern either in themselves or upon associated structures.

For the most part, each of the trees inspected and discussed with the exception of tree No 9 are significantly compromised by the shallow soils, the limited size of the rock outcrops which are fundamental for their support and the lack of support being provided by the damaged retaining walls. This together with the fact that the cluster of trees are interdependent in that the failure of one tree collapsing down slope will no doubt cause sufficient disturbance to the finely balanced high risk environment that it will either cause progressive failure of other trees or render the environment completely unstable and unsafe.

Therefore and considering that the useful life of most of these trees is probably well expended, the risk associated with attempting to retain these trees would not be recommended and should not be contemplated.

Currently, Tree No's 1, 8, 14 & 10 are in serious danger of collapse without further warning in high wind or torrential rain conditions as are both retaining walls on the front boundaries of No's 78 & 80 Gordon Crescent.

Notwithstanding the outcome of the proposed development application, it would be our recommendation that all the trees described in this report as dangerous or unstable be removed and a qualified arborist be consulted regarding the stability of the remaining trees after the removal of the above as the environment of the cluster of trees is inter-dependant

We trust this is sufficient for your present needs, but if you have any queries or wish us to arrange for the remedial works to be carried, please do not hesitate to contact us.

Yours Faithfully

Ken Demlakian
B.E.(Hons I), FIEAust, CPEng, NPER
CEO / Principal
DEMLAKIAN CONSULTING ENGINEERS

APPENDIX A

Conditions of Report

CONDITIONS OF REPORT

This inspection has been executed and the report compiled in accordance with the terms and conditions as listed hereunder:-

1. This report is prepared for the exclusive use of the Client and may not be copied in part or in full without the prior written consent of Demlakian Engineers Pty Limited (**DCE**).

2. The site inspection was visual in nature and therefore the observations made in this report do not include unexposed degradation of structural components due to either infestation of foreign matter or concealed corrosive attack whose damage is not visually obvious.

3. DCE shall use its best endeavours at all times but any inspection carried out by DCE is made on a visual basis only. Unless noted otherwise, the inspection generally is made without the removal of any elements of the building or its contents or the earth adjacent to the structure. Therefore, it is possible that defects or areas of distress concealed by floor coverings, furniture or other elements may not be detected. The inspection and report is limited to areas described on the title page and where reasonable access is available and does not cover damage or distress concealed by floor coverings, large furniture, features or any other elements.

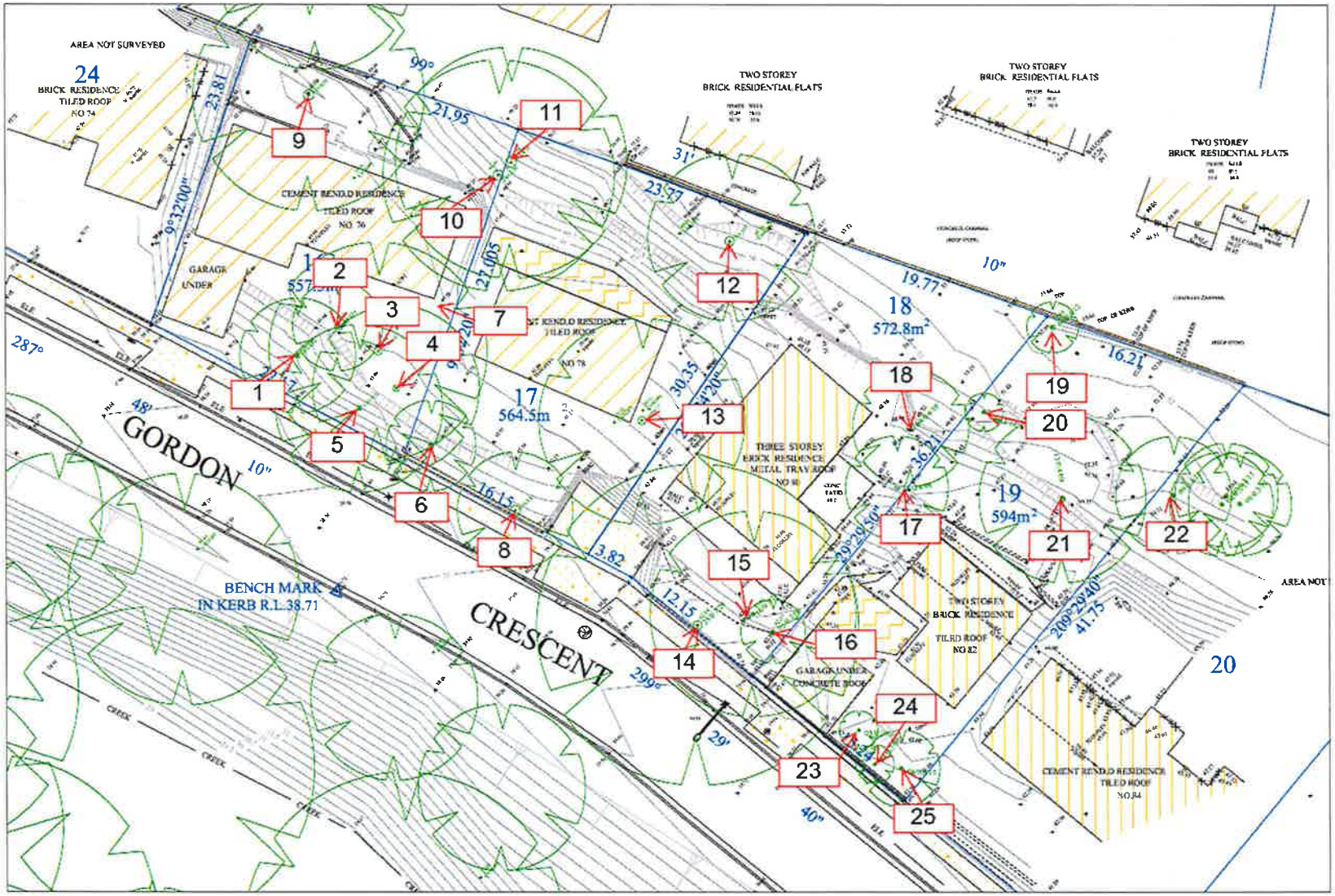
4. Any cavity-brick building structure within 1km of the coast line, and more than 30 years old, may have corroding brick ties and wind erosion of lime mortar within the cavity and/or roof spaces. These items are not readily visible and are not covered in this report, but we recommend that they be periodically inspected within an on-going maintenance program and repaired as needed.

5. In the course of inspecting rendered walls or tiled areas (such as bathrooms and laundry areas), it is accepted practice to check only a sample of the wall finishes to identify areas of drumminess. The size of sample taken is then assumed to be representative of the general state and condition of the overall wall finishes. Therefore, it is anticipated that not every individual instance of drummy render or loose tiling would be identified and recorded. Therefore, in the event that this information is required, then a detailed survey would need to be commissioned.

APPENDIX B

Tree Location Plan

Tree location plan



APPENDIX C

Photographs

Photograph 1

Photograph 2

Photograph 3

Photograph 4

Photograph 5

Photograph 6

Photograph 7

Photograph 8

Photograph 9

Photograph 10

Photograph 11

Photograph 12

Photograph 13

Photograph 14

Photograph 15

Photograph 16

Photograph 17

Photograph 18

Photograph 19

TREESCAN

URBAN FOREST MANAGEMENT

Tree Report

76-82 Gordon Crescent Lane Cove
For Hyecorp Property Group Pty Ltd

April 2011

45 Glossop Road, Linden NSW 2778

Ph: 02 4753 1018, Fax: 02 4753 1167, Mobile: 0415 864 669

Email: mail@treescan.com.au Website: www.treescan.com.au

Table of Contents

Tree Report
76-82 Gordon Crescent Lane Cove
For Hyecorp Property Group Pty Ltd

April 2011

Introduction
It is proposed to demolish the existing houses on the site at 76-82 Gordon Crescent Lane Cove and to construct a residential apartment building with basement parking. Several trees are located near and within the footprint and would be affected by the proposed construction. This report assesses the trees on the site and comments on the effects of the proposal. Many of the trees on the site are proposed for removal, either being poor specimens, being close to the proposed excavation or within the building footprint.

Documents considered are:

Survey Plan prepared by McKittrick Fry & O'Hagan dated 25 May 2010
Architectural Plans prepared by Hyecorp Design dated 14 March 2011
Geotechnical Assessment Report prepared by Asset Geotechnical dated 19 April 2011

The site
The site is approximately rectangular with the long axis aligned east/west. The south boundary is to Gordon Crescent, and the other boundaries are defined by private properties. The land slopes down from north to south with steep slopes in the northern area and near the street frontage; the site has been extensively cut into bedrock for the four existing houses and for the adjacent road easement. The land is within the local government area of Lane Cove Council.

Soils are sandy loam topsoils over clay loam subsoils of the Gymea soil landscape, derived from the underlying Hawkesbury Sandstone parent rock (Chapman & Murphy 1989) but have been disturbed by previous development. Sandstone outcrops and exposed rock terraces are present throughout the site. The Geotechnical Assessment Report contains further information regarding the underlying rock structure.

Site vegetation chiefly consists of indigenous canopy trees with a few exotic species present, with a partial understorey of exotic shrubs.

Present state of the trees
The site trees are assessed in Table 1 below; tree numbers are noted on the plan attached. Trees were inspected from the ground only and no aerial or subterranean inspections were carried out.

In general the site trees are in fair to good health although many are in only fair to poor structural condition due to the confinement of the root systems by the shallow soils, the presence of exposed rock and the existing buildings and retaining walls. The larger trees are of species indigenous to the local area.

Discussion

The site is long but relatively narrow in width (for example the western boundary is 24m in length) with setbacks of 7.5m from the street and 6m from rear and side boundaries. To minimise excavation the driveway entry would be located at the lowest part of the site near the western boundary. These factors require any proposed development to make the most of the internal space. The presence of open rock and existing cut and fill throughout the site means that the theoretical tree protection zones as defined by Australian Standard AS 4970 *Protection of trees on development sites* are of little assistance.

Trees near Gordon Cres frontage

The group of indigenous trees to the front of No 76 Gordon Crescent, Tree 1 *Acacia decurrens* (Green Wattle), Trees 2, 4 and 5 *Syncarpia glomulifera* (Turpentine), Tree 3 *Angophora costata* (Sydney Red Gum) and Tree 6 *Pittosporum undulatum* (Native Daphne), would be close to or within the excavation required for the entry driveway and the carpark. Some of these trees are precariously positioned on rock ledges and floaters, particularly Trees 2, 4 and 6 (Plates 1, 2 and 3).

The root systems of the trees are intertwined with the rock within fissures and under outcrops, and the stability of several is in doubt particularly Tree 1, Tree 2, Tree 4, Tree 5 and Tree 6. Tree 3 appears stable. The trees in this group are interdependent, with their crowns forming a dense canopy. Removal of some trees and the retention of others would create hazardous conditions in high winds, as the remaining trees would be open to unaccustomed wind forces.

The Geotechnical Assessment Report notes in relation to this group of trees:

> These trees range from young to mature and are growing amongst a sloping profile of detached sandstone rock and soil cover overlying intact bedrock.
>
> ....a number of them have developed a significant downslope lean possible caused by soil movement. *There is high risk of the leaning trees falling over and we therefore recommend that these trees be removed immediately prior to development.*

Excavation for the carpark at a setback of 7.5m from the street would leave this group of trees perched on a slice of fissured rock; this would severely alter the groundwater flows from upslope and probably intersect root systems which may be present within rock fissures. The result would be instability and decline. These trees could not be retained under any similar development of the site and are proposed for removal.

Tree 8 *Syncarpia glomulifera* (Turpentine) (Plate 4) to the front of No 78 Gordon Crescent and Tree 14 *Angophora costata* (Sydney Red Gum) (Plate 9) to the front of No 80 Gordon Crescent are close to retaining walls at the street frontage; the root systems are causing

damage to the structures. The walls are cracking and bulging and appear to be in danger of falling into the street. Although these trees are not affected by the proposed development, being relatively remote from the excavation, they are proposed for removal due to their precarious locations.

The Geotechnical Assessment Report notes in relation to these two trees:

> *There is a high to very high risk of retaining wall failure and we recommend that [these] trees be removed immediately prior to development.*

Trees near northern boundary

Tree 9 *Angophora costata* (Sydney Red Gum) is a large mature specimen with a trunk diameter of 730mm located in the rear garden of No 76 Gordon Crescent. According to Australian Standard AS 4970 *Protection of trees on development sites* the theoretical tree protection zone for this trunk diameter would be nearly 9m in radius; thus the excavation to within approximately 3m to the southeast of the trunk would represent a major encroachment. However the low retaining wall to the south of the trunk and the adjacent footpath are likely to have prevented the shallow root system from extending into the area of the excavation (Plate 5). The excavation would intrude into one quadrant of the theoretical root zone, and the remainder of the root zone to north, east, southwest and west of the trunk would be unaffected. However any roots which may have extended to the southeast deeper in the rock would be severed by the excavation. The tree is proposed for retention, although this would be further assessed during excavation.

The Geotechnical Assessment Report notes in relation to this tree:

> The northern edge of the footpath corresponds to the northern extent of the basement excavation. It is most likely that the existing dwelling is founded on bedrock....
>
> The tree roots are most likely located within the soil cover overlying bedrock in the vicinity and are not anticipated to extend beneath the footpath along the northern side of the site.
>
> We consider that this tree could be retained within the proposed development and would not be adversely affected by the proposed development.

Trees 10 and 11 *Eucalyptus piperita* (Sydney Peppermint) are large mature specimens located on the boundary between Nos 76 and 78 Gordon Crescent. They are very close to each other and their root systems are likely to be grafted into a single organism (Plate 6). The trees are located on a rock shelf and their stability may be questionable; Tree 10 has a pronounced lean over the site and may be unstable. Tree 10 would be close to the excavation and would need to be removed; Tree 11 could not be retained under these circumstances.

The Geotechnical Assessment Report notes in relation to these trees:

> Whilst these trees are located outside of the proposed basement excavation footprint, due to the magnitude of lean and the anticipated shallow soil cover, we consider that there is a significant risk of these trees falling over which would damage property and cause injury. *Therefore we recommend that these trees be removed immediately prior to development.*

Tree 12 *Angophora costata* (Sydney Red Gum) is a large mature specimen located in the rear garden of No 78 Gordon Crescent. It has a theoretical tree protection zone of 7.5m radius so that the proposed excavation extending to within approximately 3m of the trunk centre would represent a major encroachment (Plate 7). The area between the trunk and the excavation appears to be rock with a shallow covering of soil and there may be no roots present (Plate 8). However any roots which may have intruded deeper in the rock would be severed by the excavation. The tree is proposed for retention although this would be further assessed during excavation.

The Geotechnical Assessment Report notes in relation to this tree:

> ....it will be necessary to carry out detailed inspection of the boulders and soil conditions along the line of the proposed basement excavation to determine if temporary or permanent support is required.

Trees within the proposed footprint

The other indigenous trees on the site would be within the excavation and would be removed. These are:

Tree 7 *Syncarpia glomulifera* (Turpentine) close to the existing house;
Tree 13 *Angophora costata* (Sydney Red Gum) close to the existing house;
Tree 15 *Eucalyptus piperita* (Sydney Peppermint) of poor form (Plate 10);
Tree 17 *Pittosporum undulatum* (Native Daphne) severely lopped;
Tree 18 *Syncarpia glomulifera* (Turpentine) with a confined root system;
Tree 21 *Pittosporum undulatum* (Native Daphne) with a confined root system.

Exotic trees on the site are proposed for removal, including Tree 16 *Chamaecyparis obtusa* (Hinoki False Cypress), Tree 19 *Cupressus torulosa* (Bhutan Cypress), Tree 20 *Cupressus sempervirens* var. *stricta* (Italian Cypress), Trees 23 and 24 *Cyathea cooperi* (Coinspot Treefern) and Tree 25 *Chamaecyparis pisifera* (Sawara Cypress). Most of these are in only fair condition and are of little value.

Tree removals would be addressed by the provision of soil volume within constructed planters which would enable the planting of indigenous trees.

Conclusions

The constricted site makes the retention of trees problematic, particularly because most of the indigenous trees are of large stature with correspondingly wide tree protection zone radii. The retention of such trees requires significant area which is difficult to provide on the site given the narrow configuration. Several of the trees are already of dubious stability due to the precarious structure of the rock at the front of the site; two

other large trees near the street, although unaffected by the excavation, are potentially unstable due to the likely failure of the retaining walls and would be removed.

At the rear of the site the excavation would be close to several large indigenous trees. Two specimens of *Eucalyptus piperita* (Sydney Peppermint) are likely to be impacted and require removal. Two major specimens of *Angophora costata* (Sydney Red Gum) are proposed for retention and although excavation would take place near the trunks it is likely that they could be retained.

Other trees within the body of the site would be removed. Trees on neighbouring properties would be unaffected. The removal of the site trees would be addressed by the provision of new plantings in the landscape plan.

David Ford, Adv Dip Land Management, Dip Horticulture (Arboriculture), Cert Horticulture, Cert Bush Regeneration, MAIH

Consulting Arborist

References

Barrell, J. 1993, 'Preplanning Tree Surveys: Safe Useful Life Expectancy (SULE) is the Natural Progression', *Arboricultural Journal* 17:1, February 1993, pp. 33-46.

Barrell, J. 1995, 'Pre-development Tree Assessments', in *Trees & Building Sites, Proceedings of an International Conference Held in the Interest of Developing a Scientific Basis for Managing Trees in Proximity to Buildings*, International Society of Arboriculture, Illinois, USA, pp. 132-142.

Chapman, G.A. & Murphy, C.L. 1989, *Soil Landscapes of the Sydney 1:100 000 Map Sheet*, Soil Conservation Service of NSW, Sydney.

Standards Australia 2009, Australian Standard AS 4970 *Protection of trees on development sites*, Standards Australia, Sydney.

Tree protection during construction

The following measures should be undertaken to reduce the possible effects of construction on the trees.

Excavation in the vicinity of trees should be done initially by hand. Any roots encountered <50mm in diameter should be cut cleanly with a hand saw. Any roots encountered >50mm in diameter should retained intact and referred to the site arborist for advice.

Prior to the start of construction trees should be fenced to a radius of 10m from each trunk except where access is required for construction, to form tree protection zones. Fences should be chainlink 1.8m high supported by steel posts.

Where access is required within these radii for building purposes, the fence should be set back 1.5m from the building face and the soil surface between the fence and the building should be protected by plywood sheets or strapped planking.

Where not otherwise protected trunks should be armoured with 2m lengths of 50x100mm hardwood timbers spaced at 150mm centres and secured by 8 gauge wires or steel strapping at 300mm spacing. The trunk protection should be maintained intact until the completion of all work on the site.

There should be no pedestrian or vehicular access to the tree protection zones. No building activities should take place within the tree protection zones, including storage or stockpiling. Runoff from the site should not be allowed to enter the tree protection zones.

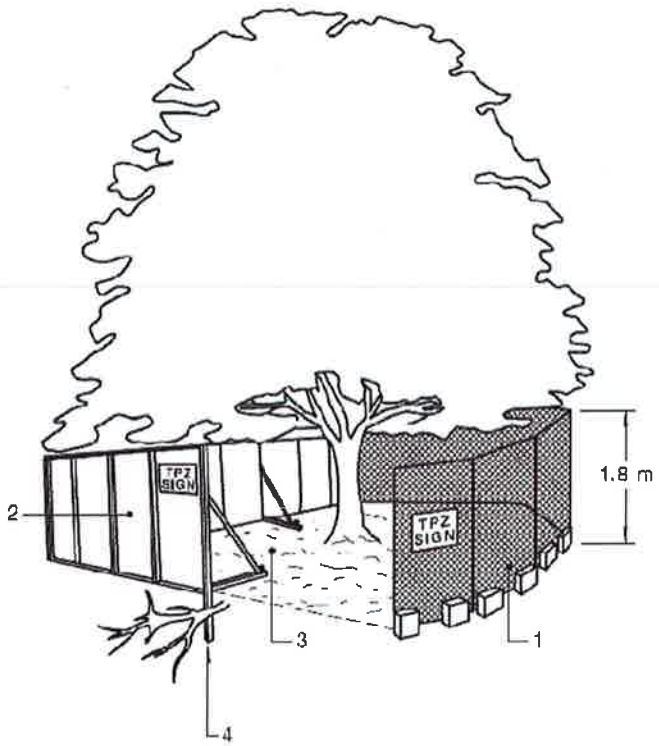
The soil surface within the tree protection zones should be mulched with a layer of composted organic material (Vitagrow Landcure or similar) to a depth of 100mm.

A site arborist should be appointed to supervise any activities in the vicinity of trees, including fencing, excavation and root pruning, and make periodic visits and reports to monitor the state of the trees. Inspection should take place after installation of the fencing, at initial hand excavation and root pruning, during any works within the tree protection zones, at completion of the construction. A photographic record should be maintained of site inspections, including the state of the trees and any injury inflicted.

In the event of any tree to be retained becoming damaged during construction, the site arborist should be informed to inspect and provide advice on remedial action.

At the end of construction all retained trees should be pruned to remove deadwood and weak branches. All pruning should be done in accordance with Australian Standard AS4373- *Pruning of Amenity Trees.*

Guidelines for tree protection are noted in Australian Standard AS4970-2009 *Protection of Trees on Development Sites.* Figures below show fencing and trunk protection measures.



LEGEND:

1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet
2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

FIGURE 3 PROTECTIVE FENCING

4.5.2 Trunk and branch protection

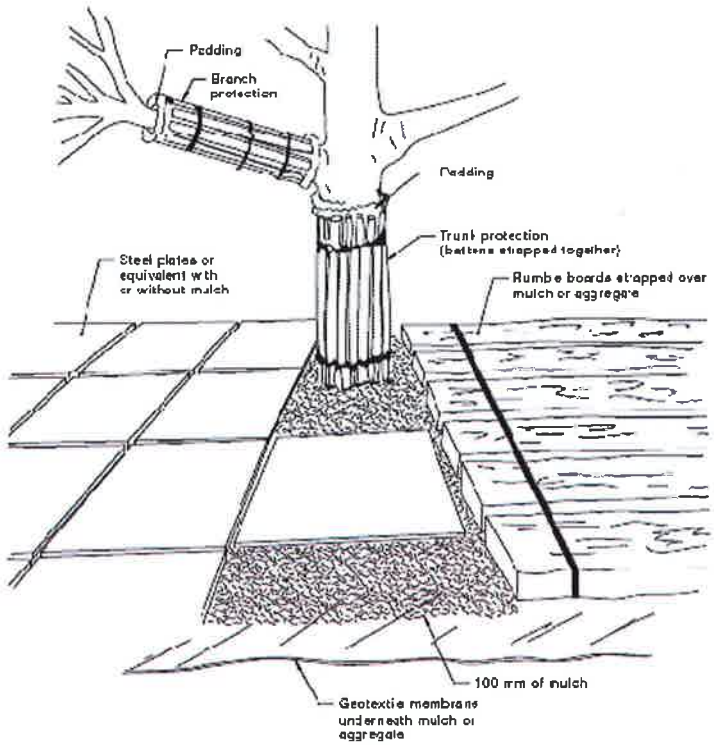
Where necessary, install protection to the trunk and branches of trees as shown in Figure 4. The materials and positioning of protection are to be specified by the project arborist. A minimum height of 2 m is recommended.

Do not attach temporary powerlines, stays, guys and the like to the tree. Do not drive nails into the trunks or branches.

4.5.3 Ground protection

If temporary access for machinery is required within the TPZ ground protection measures will be required. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Measures may include a permeable membrane such as geotextile fabric beneath a layer of mulch or crushed rock below rumble boards as per Figure 4.

These measures may be applied to root zones beyond the TPZ.



NOTES:

1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.

2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

FIGURE 4 EXAMPLES OF TRUNK, BRANCH AND GROUND PROTECTION

Table 1: Site trees

Tree no	Species	Approx trunk dbh mm	Approx height m	Approx crown spread m	Health	Condition	SULE	Comment	Effect of proposed development
1	*Acacia decurrens* (Green Wattle)	250	10	10	Good	Fair	4B	Short-lived species Acute lean	Removal
2	*Syncarpia glomulifera* (Turpentine)	400 300	15	12	Good	Fair	3B	On rock outcrop	Removal
3	*Angophora costata* (Sydney Red Gum)	560	15	12	Good	Fair	2B	Close to rock on shallow soil	Removal
4	*Syncarpia glomulifera* (Turpentine)	400	15	12	Good	Fair	3B	On rock outcrop Deformed root system	Removal
5	*Syncarpia glomulifera* (Turpentine)	400	15	12	Good	Fair	2B	Rock outcrop to north of trunk	Removal
6	*Pittosporum undulatum* (Native Daphne)	300	10	8	Good	Fair	3B	One-sided root system near sewer pipe	Removal
7	*Syncarpia glomulifera* (Turpentine)	300	15	8	Good	Good	3B	Near building	Removal
8	*Syncarpia glomulifera* (Turpentine)	400 300	12	10	Good	Poor	3B	Weak trunk junction near base Near retaining wall and causing cracking	Removal
9	*Angophora costata* (Sydney Red Gum)	730	20	12	Good	Good	2D	Root system confined by rock Crown overhanging building	Retention
10	*Eucalyptus piperita* (Sydney Peppermint)	600	15	12	Fair	Fair	3B	Poor form Crown overhanging building Leaning On rock	Removal
11	*Eucalyptus piperita* (Sydney Peppermint)	600	15	12	Fair	Fair	3B	Poor form Leaning On rock	Removal

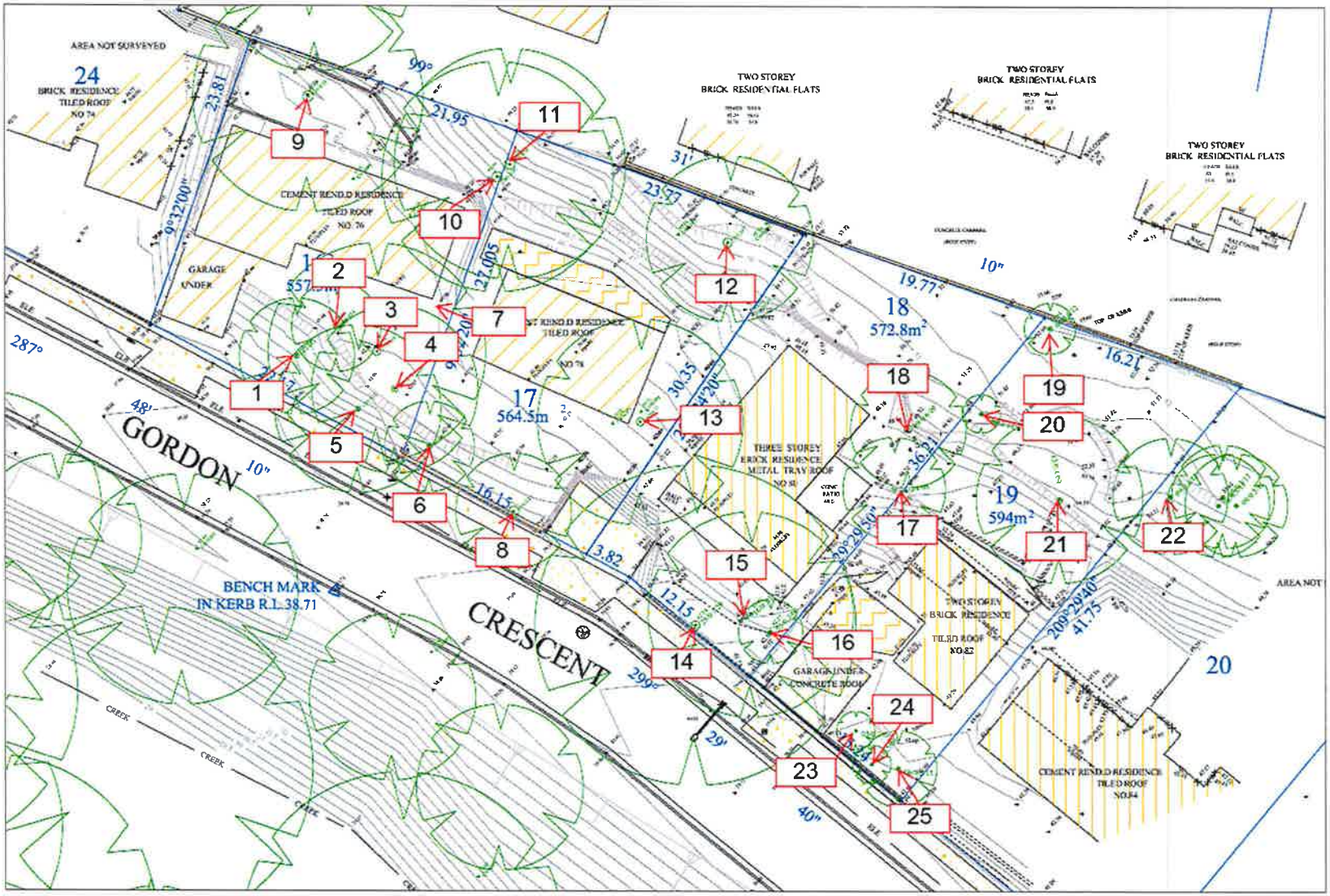
Tree no	Species	Approx trunk dbh mm	Approx height m	Approx crown spread m	Health	Condition	SULE	Comment	Effect of proposed development
12	*Angophora costata* (Sydney Red Gum)	620	15	15	Good	Fair	2B	Root system confined by retaining wall on boundary Crown overhanging both buildings	Retention
13	*Angophora costata* (Sydney Red Gum)	500	15	12	Good	Fair	3B	Crown overhanging buildings Ivy on trunk Root system confined by building footing	Removal
14	*Angophora costata* (Sydney Red Gum)	650	20	25	Good	Fair	2B	Root system confined by retaining wall Long overhanging branches	Removal
15	*Eucalyptus piperita* (Sydney Peppermint)	500	15	10	Fair	Poor	3B	Suppressed Poor form Overhanging building	Removal
16	*Chamaecyparis obtusa* (Hinoki False Cypress)	200	10	6	Good	Fair	3C	Suppressed Sparse crown	Removal
17	*Pittosporum undulatum* (Native Daphne)	250	6	8	Good	Poor	4C	Lopped at 2m height Decay in stubs	Removal
18	*Syncarpia glomulifera* (Turpentine)	600	15	8	Fair	Fair	2D	Branch breakages Retaining wall on root system	Removal
19	*Cupressus torulosa* (Bhutan Cypress)	400	10	6	Good	Fair	2A	Root system confined by retaining wall	Removal
20	*Cupressus sempervirens* var. *stricta* (Italian Cypress)	150	12	3	Good	Fair	2C	Lost lower foliage	Removal
21	*Pittosporum undulatum* (Native Daphne)	400	8	8	Good	Fair	2A	Root system confined by rock wall	Removal
22	*Jacaranda mimosifolia* (Jacaranda)	250	10	8	Good	Fair	2A	One-sided crown On neighbouring property	Removal

Tree no	Species	Approx trunk dbh mm	Approx height m	Approx crown spread m	Health	Condition	SULE	Comment	Effect of proposed development
23	*Cyathea cooperi* (Coinspot Treefern)		5		Good	Good	2A		Removal
24	*Cyathea cooperi* (Coinspot Treefern)		5		Good	Good	2A		Removal
25	*Chamaecyparis pisifera* (Sawara Cypress)	400	10	5	Fair	Fair	2A	Codominant crown Weak junction at 2m height Sparse crown	Removal

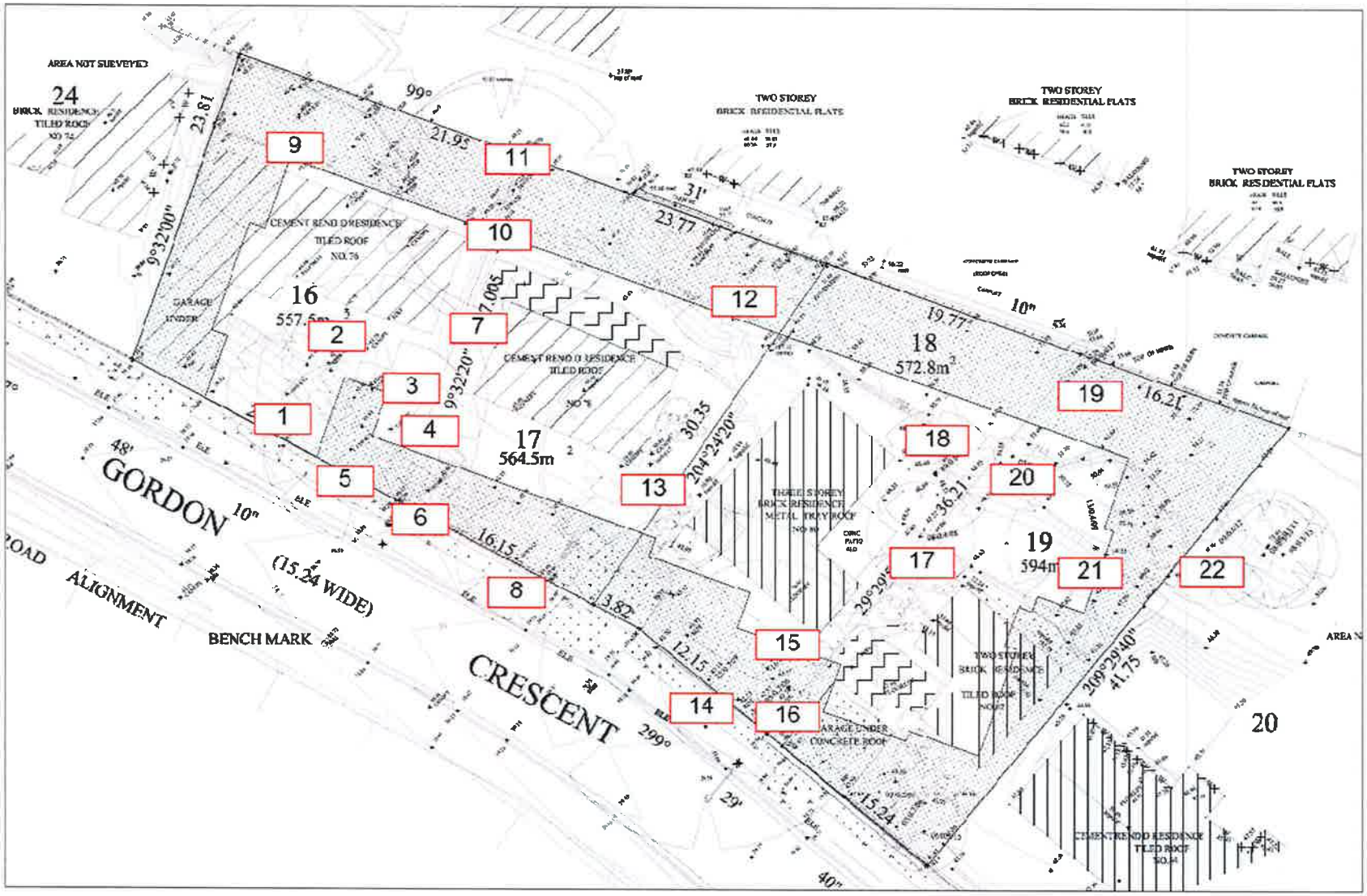
Table 2: SULE categories (after Barrell 1995)

	1	2	3	4
	Long: Appeared to be retainable at the time of assessment for over 40 years with an acceptable degree of risk, assuming reasonable maintenance.	Medium: appeared to be retainable at the time of assessment for 15 to 40 years with an acceptable degree of risk, assuming reasonable maintenance.	Short: appeared to be retainable at the time of assessment for 5 to 15 years with an acceptable degree of risk, assuming reasonable maintenance.	Transient: trees which should be removed within the next 5 years.
A	Structurally sound trees located in positions that can accommodate future growth.	Trees which may only live between 15 and 40 years.	Trees which may only live between 5 and 15 years.	Dead, dying, suppressed or declining trees.
B	Trees which could be made suitable for long-term retention by remedial care.	Trees which may live for more than 40 years but would be removed for safety or nuisance reasons.	Trees which may live for more than 15 years but would be removed for safety or nuisance reasons.	Dangerous trees through damage, structural defect, instability or recent loss of adjacent trees. Urgent removal may be required if near assets.
C	Trees of special significance which would warrant extraordinary efforts to secure their long-term retention.	Trees which may live for more than 40 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting.	Trees which may live for more than 15 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting.	Trees which may live for more than 5 years but should be removed to prevent interference with more suitable individuals or to provide space for new planting.
D		Trees which could be made suitable for retention in the medium term by remedial care.	Trees which require substantial remediation and are only suitable for retention in the short term.	Trees which are damaging or may cause damage to existing structures within the next 5 years.

Tree location plan



Basement outline plan



Plates

Plate 1: Tree group in southwest area showing left to right Tree 1 *Acacia decurrens* (Green Wattle), Tree 2 *Syncarpia glomulifera* (Turpentine), Tree 3 *Angophora costata* (Sydney Red Gum) (rear), Tree 5 *Syncarpia glomulifera* (Turpentine)

Plate 2: trunk of Tree 2 *Syncarpia glomulifera* (Turpentine) showing rock outcrop near base

Plate 3: trunk of Tree 4 *Syncarpia glomulifera* (Turpentine) showing deformed root system on and under rock

Plate 4: trunk of Tree 8 *Syncarpia glomulifera* (Turpentine) showing weak junction at base and damage to retaining wall

Plate 5: trunk of Tree 9 *Angophora costata* (Sydney Red Gum). Red lines show approximate extent of excavation

Plate 6: Tree 10 (left) and Tree 11 *Eucalyptus piperita* (Sydney Peppermint) showing codominant location and trunk lean

Plate 7: trunk of Tree 12 *Angophora costata* (Sydney Red Gum). Red line shows the approximate extent of excavation downslope of the tree

Plate 8: rock terrace downslope of Tree 12 *Angophora costata* (Sydney Red Gum) (trunk shown at arrow)

Plate 9: Tree 14 *Angophora costata* (Sydney Red Gum) showing location near unstable retaining wall

Plate 10: Tree 15 *Eucalyptus piperita* (Sydney Peppermint) showing poorly formed crown overhanging roof

Terminology used in the report

Age classes (I) *Immature* refers to a well-established but juvenile tree. (S) *Semimature* refers to a tree at growth stages between immaturity and full size. (M) *Mature* refers to a full sized tree with some capacity for further growth. (O) *Overmature* refers to a tree about to enter decline or already declining.

Health refers to the tree's vigour as exhibited by the crown density, leaf colour, presence of epicormic shoots, ability to withstand disease invasion and the degree of dieback.

Condition refers to the tree's form and growth habit, as modified by its environment (aspect, suppression by other trees, soils), and the state of the scaffold (ie trunk and major branches), including structural defects such as cavities, crooked trunks or weak trunk/branch junctions. These are not directly connected with health and it is possible for a tree to be healthy but in poor condition.

Health	
Good	In good vigour with full leaf coverage of the crown; deadwood if present is internal and a normal feature of the species
Fair	Generally vigorous but shows symptoms of stress or decline, leaf coverage thinner than normal for the species; deadwood of smaller diameter may be present
Poor	Shows symptoms of advanced stress or decline including sparse crown with twig and branch dieback, lack of response to pests or disease
Structural condition	
Good	Has well-spaced branches and strong branch collars; form and habit typical of the species; good example of the species with low probability of significant failure
Fair	Has structural defects of moderate severity with low propensity for failure which could be remediated by pruning or modification of its environment
Poor	Has structural defects which have already failed and/or have a high propensity for failing in the future

Safe Useful Life Expectancy (SULE). In a planning context, the time a tree can expect to be usefully retained is the most important long-term consideration. SULE is a system designed to classify trees into a number of defined categories so that information regarding tree retention can be concisely communicated in a non-technical manner. SULE categories are easily verifiable by experienced personnel without great disparity. A tree's SULE category is the life expectancy of the tree modified first by its age, health, condition, safety and location (to give safe life expectancy), then by economics (ie cost of maintenance; retaining trees at an excessive management cost is not normally acceptable), effects on better trees, and sustained amenity (ie establishing a range of age classes in a local population). SULE assessments are not static but may be modified as dictated by changes in tree health and environment. Trees with short SULE may at present be making a contribution to the landscape but their value to the local amenity will decrease rapidly towards the end of this period, prior to their being removed for safety or aesthetic reasons. For details of SULE categories see Table 2, adapted from Barrell (1993 and 1995).

Decline is the response of the tree to a reduction of energy levels resulting from **stress**. Recovery from a decline is difficult and slow; is usually irreversible.

Sparse crown refers to reduced leaf density, often a precursor to dieback and may imply stress or decline. Also possibly a response to drought or root damage.

Stress refers to the response of the tree to a reduction of energy levels resulting from adverse influences such as altered soil conditions (compaction, poor nutrition, reduced oxygen or moisture levels), root damage, toxicity, drought, waterlogging; may be reversible given good arboricultural practices but may lead to **decline**.

Weak junctions are points of possible failure in the scaffold. They are usually caused by the trunk or branch bark being squeezed within the junction so that the necessary interlocking of the wood fibres does not occur and the junction is forced open by the annual increments in growth. This is often a genetic problem.

Wounds are areas where the bark has been damaged by branch breakage, impact or insect attack. Some wounds decay and cause structural defects or weakness. Healthy trees are able to resist and contain infection by walling off areas within the wood. Tree wounds are often eventually covered over by new bark but the walled off or infected areas still remain internally and may lead to weakness of the heartwood.

Disclaimer

This is not a hazard assessment report and it should be noted that trees are always inherently dangerous. This assessment was carried out from the ground, and covers what was reasonably able to be assessed and available to the assessor at the time of inspection. No aerial or subterranean inspections were carried out and structural weakness may exist within roots, trunk or branches.

Any protection or preservation methods recommended are not a guarantee of tree survival or safety but are designed to improve vigour and reduce risk. Timely inspections and reports are necessary to monitor the trees' condition. No responsibility is accepted for damage or injury caused by the trees and no responsibility is accepted if the recommendations in this report are not followed.

Limitations on the use of this report

This report is to be utilised in its entirety only. Any written or verbal submission, report or presentation that includes statements taken from the findings, discussions, conclusions or recommendations made in this report, may only be used where the whole of the original report (or a copy) is referenced in, and directly attached to that submission, report or presentation.

Assumptions

Care has been taken to obtain information from reliable resources. All data have been verified insofar as possible; however, Treescan Urban Forest Management can neither guarantee nor be responsible for the accuracy of information provided by others.

Unless stated otherwise:

Information contained in this report covers only the trees that were examined and reflects the condition of the trees at the time of inspection: and

The inspection was limited to visual examination of the subject trees without dissection, excavation, probing or coring. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the subject trees may not arise in the future.

ASSET GEOTECHNICAL
geotechnical engineering consultants

Asset Geotechnical Engineering Pty Ltd
ABN 24 093 381 107

Sydney
PO Box 3385
Rouse Hill NSW 2155
Ph: 02 9011 5232
Fax: 02 8282 5011

Mid North Coast
PO Box 1430
Port Macquarie NSW 2444
Ph: 0410 32 5566
Fax: 02 6587 4416

Email
assetgeo@bigpond.com

1664-A1
19 April 2011

Hyecorp Property Group
Level 1, 451 Willoughby Road
Willoughby NSW 2068

Attention: Mr George Benlian

Dear Sir,

PROPOSED RESIDENTIAL DEVELOPMENT, 76–82 GORDON CRESCENT, LANE COVE
GEOTECHNICAL ASSESSMENT

1. INTRODUCTION

This report presents the results of a geotechnical assessment for the above project, which is required to support a Development Application for the project. The assessment was commissioned by Mr Vigen Ghevondian of Hyecorp Construction Pty Ltd.

It is understood that 4 existing residential dwellings (Nos 76, 78, 80 & 82 Gordon Crescent) are to be demolished, and a residential apartment development constructed. Excavation of up to about 6m depth is anticipated for basement level car parking, and several stories above ground are proposed. The basement excavation is to extend to within about 6m of the northern boundary, 4m of the western and southern boundaries, and 3m to 6m of the eastern boundary.

The main objective was to provide a preliminary assessment of anticipated subsurface conditions and to provide comments and preliminary recommendations relating to:

- Excavation requirements and batter slopes.
- Temporary shoring requirements.
- Suitable footing systems and geotechnical design parameters for the footing systems.
- Groundwater levels and dewatering requirements.

Comment is also made on the geotechnical aspects of retaining various trees within the site as part of the new development.

In order to achieve the project objectives, the following scope of work was carried out:

- A review of existing regional maps and reports relevant to the site, held within our files.
- Walkover observations of site conditions, carried out by the undersigned on 6 April 2011.
- Engineering assessment and reporting.

This report must be read in conjunction with the attached Information Sheets.

2. SITE CONDITIONS

The site is located on the northern side of Gordon Crescent in Lane Cove, as shown in Figure 1. The site comprises 4 residential allotments and is bounded by Gordon Crescent to the south, residential dwellings to the west and east, and two storey residential flats to the north.

Existing site development comprises one to three storey residential dwellings and associated site development.

The regional topography comprises moderately sloping terrain. The overall ground surface slopes down to the southwest towards a creek at about 5° to 10°.

Vegetation includes scattered trees and some undergrowth across the undeveloped parts of the site.

The 1:100,000 Sydney Geological Map indicates the site is underlain by Hawkesbury Sandstone. Sandstone was present at various locations across the site, in typical form associated with cliff-line development in this geological unit. This ranged from intact bedrock within cliff lines in the northern part of the site (including some near-vertical rock cutting associated with the existing developments), detached pieces of rock within the cliff line of slightly downslope of its original position, detached pieces of rock that has moved some distance downslope, and pieces of rock buried below the ground surface within a soil matrix (talus). Residual soils comprising sandy clays and clayey sands could also be expected in some areas.

The upper few metres of rock is expected to be generally highly weathered to moderately weathered and of low to medium strength. The rock quality is anticipated to improve with depth.

A regional groundwater table is not anticipated within the depths of excavation. Shallow, intermittent groundwater could occur within the soils overlying bedrock, following rainfall or due to other factors (e.g. leaking services). Persistent, slow seepage was observed over the surface of the rock cutting along the eastern side of No 76.

3. DISCUSSIONS & RECOMMENDATIONS

3.1 Earthworks

Excavation

The excavation for the proposed basement levels is anticipated to be almost wholly within bedrock. The rock is likely to be continuous across adjoining properties. Excavation requirements will be governed by the presence of the rock, and the sensitivity of nearby residential structures to vibrations caused by the rock excavation.

The building constructions on the adjacent properties are sensitive to vibrations above certain threshold levels (regarding potential for cracking). The proposed excavation is reasonably close to the nearest adjoining residences (i.e. within about 4m to 6m), and close controls by the excavation

contractor over the rock excavation are necessary, and are recommended, so that excessive vibration effects are not generated.

Excavation methods should be adopted which limit ground vibrations at the adjoining developments to not more then 10mm/sec. Vibration monitoring will be required to verify that this is achieved. However, if the contractor adopts methods and / or equipment in accordance with the recommendations in Table 1 for a ground vibration limit of 5mm/sec, vibration monitoring may not be required.

The limits of 5mm/sec and 10mm/sec are expected to be achievable if rock breaker equipment or other excavation methods are restricted as indicated in Table 1 as follows:

Table 1 – Recommendations for Rock Breaking Equipment

Distance from adjoining structure (m)	Maximum Peak Particle Velocity 5mm/sec		Maximum Peak Particle Velocity 10mm/sec*	
	Equipment	Operating Limit (% of Maximum Capacity)	Equipment	Operating Limit (% of Maximum Capacity)
1.5 to 2.5	Hand operated jackhammer only	100	300 kg rock hammer	50
2.5 to 5.0	300 kg rock hammer	50	300 kg rock hammer or 600 kg rock hammer	100 50
5.0 to 10.0	300 kg rock hammer or 600 kg rock hammer	100 50	600 kg rock hammer or 900 kg rock hammer	100 50

* Vibration monitoring is recommended for 10mm/sec vibration limit.

At all times, the excavation equipment must be operated by experienced personnel, according to the manufacturer's instructions, and in a manner consistent with minimising vibration effects.

Use of other techniques (e.g. chemical rock splitting, rock sawing), although less productive, would reduce or possibly eliminate risks of damage to adjoining property through vibration effects transmitted via the ground. Such techniques may be considered if an alternative to rock breaking is necessary. If rock sawing is carried out around excavation boundaries in not less than 1m deep lifts, a 900 kg rock hammer could be used at up to 100% maximum operating capacity with an assessed peak particle velocity not exceeding 5 mm/sec, subject to observation and confirmation by a geotechnical engineer at the commencement of excavation.

It should be noted that vibrations that are below threshold levels for building damage may be experienced at adjoining developments.

Dewatering should not be required, other than sump-and-pump control of possible seepage. Such dewatering should not adversely affect adjoining properties. Further advice should be sought if

more rapid seepage is observed during construction that cannot be controlled by such techniques.

Batter Slopes

Recommended maximum slopes for permanent and temporary batters are presented in Table 2 below:

Table 2 – Recommended Maximum Batter Slopes

Unit	Maximum Batter Slope (H : V)	
	Permanent	Temporary
Talus, residual soils and XW bedrock	2 : 1	1 : 1
HW/MW bedrock	vertical *	vertical *

* subject to inspection by a geotechnical engineer and carrying out remedial works as recommended (e.g. shotcrete, rock bolting).

3.2 Footings

It is expected that pad and strip footings on bedrock at basement excavation level would be suitable for the development. Design allowable bearing pressures will depend on the rock quality, but could range from 1,500 kPa up to say 5,000 kPa.

3.3 Temporary Shoring and Retaining Walls

Given the offset of the basement to the proposed excavation, it is likely that temporary batters could be accommodated and therefore temporary shoring would not be required. Permanent retaining would be provided by the garage substructure.

In the long–term, the ground floor slab will provide bracing at the top of the wall and the garage floor slab will provide bracing at the bottom of the wall. Therefore, the basement retaining wall should be designed as a braced wall for the long–term loading condition.

Braced retaining walls may be designed for a uniform lateral earth pressure of $0.65 * \gamma * H * K_a$ where γ = unit weight of soils and backfill (say 18kN/m^3), H = height of wall, and K_a = earth pressure coefficient (0.3).

Where adequate subsoil drainage is provided behind walls, no allowance for groundwater is considered necessary. Appropriate surcharge loading at the finished surface level should also be adopted for design of the wall.

3.4 Existing Trees

Tree in Rear Yard (Northwest Part) of No 76

This is a mature tree which is located outside of the proposed basement excavation footprint. It is noted that there is an existing dwelling and associated concrete footpath that is located to the south of the tree. The northern edge of the footpath corresponds to the northern extent of the basement excavation. It is most likely that the existing dwelling is founded on bedrock, given the extensive bedrock in the area.

The tree roots are most likely located within the soil cover overlying bedrock in the vicinity, and are not anticipated to be extend beneath the footpath along the northern side of the site. The tree appears to be near-vertical and in overall good condition.

We consider that this tree could be retained within the proposed development, and would not be adversely affected by the proposed development.

Trees in Rear Yard on Boundary Between No 76 and No 78

This is either two single trees or one tree that has branched at the base. Both growths are mature, and are exhibiting significant lean of about 63 to 66° from vertical. Their roots appear to be located within a relatively shallow soil deposit mixed with loose sandstone rock overlying the intact bedrock. The depth of soil is anticipated to be relatively shallow.

Whilst these trees are located outside of the proposed basement excavation footprint, due to the magnitude of lean and the anticipated shallow soil cover, we consider that there is an significant risk of these trees falling over which would damage property and cause injury. *Therefore, we recommend that these trees be removed immediately, prior to development.*

Tree in Rear Yard (Northeast Part) of No 78

This is a mature tree which is located outside of the proposed basement excavation footprint. The basement excavation will extend to within about 4m of the tree, and along the line of a number of detached boulders that are overlying the cliff. Some soil cover over the cliff is anticipated in this area.

We understand that an arborist has inspected this tree and advised that its roots do not extend beyond the proposed basement excavation line. The tree appears to be near-vertical and in overall good condition.

We consider that this tree could be retained within the proposed development, and would not be adversely affected by the proposed development. However, it will be necessary to carry out detailed inspection of the boulders and soil conditions along the line of the proposed basement excavation, to determine if temporary or permanent support is required.

Small Growth of Trees in Front of No 76

There is a small growth of trees located in the front yard of No 76, outside of the proposed basement footprint. These trees range from young to mature, and are growing amongst a sloping profile of detached sandstone rock and soil cover overlying intact bedrock.

The trees generally appear to be in overall good condition but a number of them have developed a significant downslope lean, possibly caused by soil movement. *There is a high risk of the leaning trees falling over, and we therefore recommend these trees be removed immediately prior to development.*

Tree in Front of No 78

A mature tree is located in the front yard of No 78, just north of the site boundary. A retaining wall is located on the boundary, and is leaning at up to about 9° from vertical where it is adjacent to the tree. *There is a high to very high risk of retaining wall failure and we recommend that this tree be removed immediately prior to development.*

Tree in Front of No 80

A mature tree is located in the front yard of No 80, just north of the site boundary. A retaining wall is located on the boundary, and is leaning at up to about 9° from vertical where it is adjacent to the tree, and significant cracking could be observed. *There is a high to very high risk of retaining wall failure and we recommend that this tree be removed immediately prior to development.*

4. STATEMENT

Based on our site assessment as described above, we consider that there are no significant geotechnical constraints to the proposed development. Detail design should be carried out in conjunction with subsurface investigation, which should include as a minimum drilling of cored boreholes to confirm the subsurface profile and to assess appropriate design parameters.

Please contact us if you have any questions regarding this report or if you require further assistance.

For and on behalf of
Asset Geotechnical Engineering Pty Ltd

Mark Bartel

Mark Bartel
BE MEngSc MIEAust CPEng
Principal Geotechnical Engineer

Encl: Information Sheets

Important Information

SCOPE OF SERVICES

The geotechnical report ("the report") has been prepared in accordance with the scope of services as set out in the contract, or as otherwise agreed, between the Client and Asset Geotechnical Engineering Pty Ltd ("Asset"). The scope of work may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

RELIANCE ON DATA

Asset has relied on data provided by the Client and other individuals and organizations, to prepare the report. Such data may include surveys, analyses, designs, maps and plans. Asset has not verified the accuracy or completeness of the data except as stated in the report. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations ("conclusions") are based in whole or part on the data, Asset will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Asset.

GEOTECHNICAL ENGINEERING

Geotechnical engineering is based extensively on judgment and opinion. It is far less exact than other engineering disciplines. Geotechnical engineering reports are prepared for a specific client, for a specific project and to meet specific needs, and may not be adequate for other clients or other purposes (e.g. a report prepared for a consulting civil engineer may not be adequate for a construction contractor). The report should not be used for other than its intended purpose without seeking additional geotechnical advice. Also, unless further geotechnical advice is obtained, the report cannot be used where the nature and/or details of the proposed development are changed.

LIMITATIONS OF SITE INVESTIGATION

The investigation programme undertaken is a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions. The data derived from the site investigation programme and subsequent laboratory testing are extrapolated across the site to form an inferred geological model, and an engineering opinion is rendered about overall subsurface conditions and their likely behaviour with regard to the proposed development. Despite investigation, the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies.

The engineering logs are the subjective interpretation of subsurface conditions at a particular location and time, made by trained personnel. The actual interface between materials may be more gradual or abrupt than a report indicates.

SUBSURFACE CONDITIONS ARE TIME DEPENDENT

Subsurface conditions can be modified by changing natural forces or man-made influences. The report is based on conditions that existed at the time of subsurface exploration. Construction operations adjacent to the site, and natural events such as floods, or ground water fluctuations, may also affect subsurface conditions, and thus the continuing adequacy of a geotechnical report. Asset should be kept appraised of any such events, and should be consulted to determine if any additional tests are necessary.

VERIFICATION OF SITE CONDITIONS

Where ground conditions encountered at the site differ significantly from those anticipated in the report, it is a condition of acceptance of the report that Asset be notified of any variations and be provided with an opportunity to review the recommendations of this report. Recognition of change of soil and rock conditions requires experience and it is recommended that a suitably experienced geotechnical engineer be engaged to visit the site with sufficient frequency to detect if conditions have changed significantly.

REPRODUCTION OF REPORTS

 Where information from the accompanying report is to be included in contract documents or engineering specification for the project, the entire report should be included in order to minimize the likelihood of misinterpretation from logs.

REPORT FOR BENEFIT OF CLIENT

The report has been prepared for the benefit of the Client and no other party. Asset assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of Asset or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own inquiries and obtain independent advice in relation to such matters.

OTHER LIMITATIONS

Asset will not be liable to update or revise the report to take into account any events or emergent circumstances or fact occurring or becoming apparent after the date of the report.

ASSET GEOTECHNICAL
geotechnical engineering consultants

Abbreviations, Notes & Symbols

METHOD

borehole logs		*excavation logs*	
AS	auger screw *	NE	natural excavation
AD	auger drill *	HE	hand excavation
RR	roller / tricone	BH	backhoe bucket
W	washbore	EX	excavator bucket
CT	cable tool	DZ	dozer blade
HA	hand auger	R	ripper tooth
D	diatube		
B	blade / blank bit		
V	V-bit		
T	TC-bit		

* bit shown by suffix e.g. ADV

coring
NMLC, NQ, PQ, HQ

SUPPORT

borehole logs		*excavation logs*	
N	nil	N	nil
M	mud	S	shoring
C	casing	B	benched
NQ	NQ rods		

CORE—LIFT

casing installed

barrel withdrawn

NOTES, SAMPLES, TESTS

D	disturbed
B	bulk disturbed
U50	thin-walled sample, 50mm diameter
HP	hand penetrometer (kPa)
SV	shear vane test (kPa)
DCP	dynamic cone penetrometer (blows per 100mm penetration)
SPT	standard penetration test
N*	SPT value (blows per 300mm)
	* denotes sample recovered
Nc	SPT with solid cone
R	refusal of DCP or SPT

USCS SYMBOLS

GW	Well graded gravels and gravel-sand mixtures, little or no fines.
GP	Poorly graded gravels and gravel-sand mixtures, little or no fines.
GM	Silty gravels, gravel-sand-silt mixtures.
GC	Clayey gravels, gravel-sand-clay mixtures.
SW	Well graded sands and gravelly sands, little or no fines.
SP	Poorly graded sands and gravelly sands, little or no fines.
SM	Silty sand, sand-silt mixtures.
SC	Clayey sand, sand-clay mixtures.
ML	Inorganic silts of low plasticity, very fine sands, rock flour, silty or clayey fine sands.
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays.
OL	Organic silts and organic silty clays of low plasticity.
MH	Inorganic silts of high plasticity.
CH	Inorganic clays of high plasticity.
OH	Organic clays of medium to high plasticity.
PT	Peat muck and other highly organic soils.

MOISTURE CONDITION

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

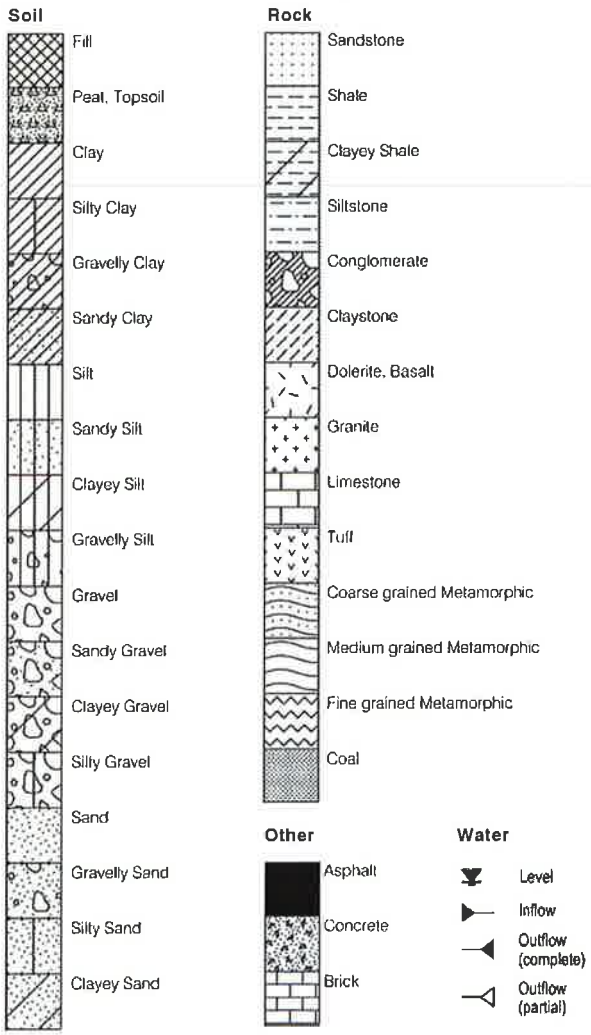
CONSISTENCY

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable

DENSITY INDEX

VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

GRAPHIC LOG



Boundaries
known ------ probable ——— possible

WEATHERING

XW	extremely weathered
HW	highly weathered
MW	moderately weathered
SW	slightly weathered
FR	fresh

STRENGTH

EL	extremely low
VL	very low
L	low
M	medium
H	high
VH	very high
EH	extremely high

RQD (%)

= $\frac{\text{sum of intact core pieces} > 2 \times \text{diameter}}{\text{total length of section being evaluated}} \times 100$

DEFECTS

type		*coating*	
JT	joint	cl	clean
PT	parting	st	stained
SZ	shear zone	ve	veneer
SM	seam	co	coating

shape		**roughness**	
pl	planar	po	polished
cu	curved	sl	slickensided
un	undulating	sm	smooth
st	stepped	ro	rough
ir	irregular	vr	very rough

inclination
measured above axis and perpendicular to core

Soil & Rock Terms

AS1726-1993

Soils and rock are described in the following terms, which are broadly in accordance with AS1726-1993.

SOIL

MOISTURE CONDITION

Term	Description
Dry	Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through the hand.
Moist	Feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
Wet	As for moist, but with free water forming on hands when handled.

Moisture content of cohesive soils may also be described in relation to plastic limit (W_P) or liquid limit (W_L) [>> much greater than, > greater than, < less than, << much less than].

CONSISTENCY OF COHESIVE SOILS

Term	Su (kPa)	Term	Su (kPa)
Very soft	< 12	Very Stiff	100 – 200
Soft	12 – 25	Hard	> 200
Firm	25 – 50	Friable	–
Stiff	50 – 100		

DENSITY OF GRANULAR SOILS

Term	Density Index(%)	Term	Density Index (%)
Very Loose	< 15	Dense	65 – 85
Loose	15 – 35	Very Dense	>85
Medium Dense	35 – 65		

PARTICLE SIZE

Name	Subdivision	Size (mm)
Boulders		> 200
Cobbles		63 – 200
Gravel	coarse	20 – 63
	medium	6 – 20
	fine	2.36 – 6
Sand	coarse	0.6 – 2.36
	medium	0.2 – 0.6
	fine	0.075 – 0.2
Silt & Clay		< 0.075

MINOR COMPONENTS

Term	Proportion by Mass	
	coarse grained	fine grained
Trace	≤ 5%	≤ 15%
Some	5 – 2%	15 – 30%

SOIL ZONING

Layers	Continuous exposures.
Lenses	Discontinuous layers of lenticular shape.
Pockets	Irregular inclusions of different material.

SOIL CEMENTING

Weakly	Easily broken up by hand.
Moderately	Effort is required to break up the soil by hand.

USCS SYMBOLS

Symbol	Description
GW	Well graded gravels and gravel-sand mixtures, little or no fines.
GP	Poorly graded gravels and gravel-sand mixtures, little or no fines.
GM	Silty gravels, gravel-sand-silt mixtures.
GC	Clayey gravels, gravel-sand-clay mixtures.
SW	Well graded sands and gravelly sands, little or no fines.
SP	Poorly graded sands and gravelly sands, little or no fines.
SM	Silty sand, sand-silt mixtures.
SC	Clayey sand, sand-clay mixtures.
ML	Inorganic silts of low plasticity, very fine sands, rock flour, silty or clayey fine sands.
CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays.
OL	Organic silts and organic silty clays of low plasticity.
MH	Inorganic silts of high plasticity.
CH	Inorganic clays of high plasticity.
OH	Organic clays of medium to high plasticity.
PT	Peat muck and other highly organic soils.

ROCK

SEDIMENTARY ROCK TYPE DEFINITIONS

Rock Type	Definition (more than 50% of rock consists of .....)
Conglomerate	... gravel sized (>2mm) fragments.
Sandstone	... sand sized (0.06 to 2mm) grains.
Siltstone	... silt sized (<0.06mm) particles, rock is not laminated.
Claystone	... clay, rock is not laminated.
Shale	... silt or clay sized particles, rock is laminated.

LAYERING

Term	Description
Massive	No layering apparent.
Poorly Developed	Layering just visible. Little effect on properties.
Well Developed	Layering distinct. Rock breaks more easily parallel to layering.

STRUCTURE

Term	Spacing (mm)	Term	Spacing
Thinly laminated	<6	Medium bedded	200 – 600
Laminated	6 – 20	Thickly bedded	600 – 2,000
Very thinly bedded	20 – 60	Very thickly bedded	> 2,000
Thinly bedded	60 – 200		

STRENGTH

Term	Is50 (MPa)	Term	Is50 (MPa)
Extremely Low	<0.03	High	1.0 – 3.0
Very low	0.03 – 0.1	Very High	3.0 – 10.0
Low	0.1 – 0.3	Extremely High	>10.0
Medium	0.3 – 1.0		

NOTE: Is50 = Point Load Strength Index

WEATHERING

Term	Description
Residual Soil	Soil derived from weathering of rock; the mass structure and substance fabric are no longer evident.
Extremely	Rock is weathered to the extent that it has soil properties (either disintegrates or can be remoulded). Fabric of original rock is still visible.
Highly	Rock strength usually highly changed by weathering; rock may be highly discoloured.
Moderately	Rock strength usually moderately changed by weathering; rock may be moderately discoloured.
Slightly	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh	Rock shows no signs of decomposition or staining.

DEFECT DESCRIPTION

Type

Joint	A surface or crack across which the rock has little or no tensile strength. May be open or closed.
Parting	A surface or crack across which the rock has little or no tensile strength. Parallel or sub-parallel to layering/ bedding. May be open or closed.
Sheared Zone	Zone of rock substance with roughly parallel, near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects.
Seam	Seam with deposited soil (infill), extremely weathered insitu rock (XW), or disoriented usually angular fragments of the host rock (crushed).

Shape

Planar	Consistent orientation.
Curved	Gradual change in orientation.
Undulating	Wavy surface.
Stepped	One or more well defined steps.
Irregular	Many sharp changes in orientation.

Roughness

Polished	Shiny smooth surface.
Slickensided	Grooved or striated surface, usually polished.
Smooth	Smooth to touch. Few or no surface irregularities.
Rough	Many small surface irregularities (amplitude generally <1mm). Feels like fine to coarse sandpaper.
Very Rough	Many large surface irregularities, amplitude generally >1mm. Feels like very coarse sandpaper.

Coating

Clean	No visible coating or discolouring.
Stained	No visible coating but surfaces are discoloured.
Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy
Coating	Visible coating ≤1mm thick. Thicker soil material described as seam.