
Sent: 21/09/2016 5:36:19 PM

Subject: Development Application Enquiry: N0279/16

Attachments: Geotech response to the JK Geo assessment.pdf; Arborist's report 12-09-2016.pdf;
Geotech response to the JK Geo assessment.pdf; Arborist's report 12-09-2016.pdf;

For the attn of M/s R Englund

Part 2 of my earlier email , the attachments to my correspondence

Regards
Denis

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41 Marine Parade, Avalon

Response to Stability Assessment

The purpose of this correspondence is to respond to the JK Geotechnics Geotechnical Stability Assessment (the JK Report) dated 15th August 2016.

Prior to the preparation of this response I carried out a further site inspection on the 24th August 2016 to reaffirm our observations and conclusions and as a consequence I can categorically state that the proposal as submitted complies with the requirements of the Pittwater Geotechnical Risk Management Policy, (2009) and upon completion the project will achieve an 'acceptable' rating subject to the works being carried out in accordance with the recommendations detailed in my report and subject to good engineering & building practice.

Response to the JK Report contentions:-

"Mapping details have not been presented on a contoured site plan"

1. The mapping details were presented on a contoured site plan. In the scanning the plan the light grey contours were not picked up by the scanner though the surveyed boulder locations below the house were. A darker copy of that plan is attached.

"Not all of the geotechnical hazards have been identified. We consider that the most significant hazards are the potential dislodgment of floaters' from the western portion of the site during bulk and trench excavation, and the potential of trees being destabilised by the above excavations and collapsing onto adjoining properties."

"We do not consider that the issue of 'floaters' dislodging and/or becoming destabilised and toppling over can be addressed by a simple condition requiring the geotechnical professional to inspect the cut face. This hazard should first be assessed in terms of establishing the risks and then specific recommendations to reduce the risks to 'acceptable' levels. Specific recommendations (aside from a geotechnical inspection of the excavation) must be provided as to how the stability of the numerous

floaters' which will be impacted by the proposed bulk and trench excavation over the northern and western portions of the site will be ensured".

2. It is our understanding that the proposed house was designed specifically to retain the outcropping joint blocks on the Western side of the development. As such the base of the proposed excavation is ~ RL 35.65 so these rocks are positioned in/or on the rock slope at a level below the base of the proposed excavation. It should also be noted that the western downhill margin requires very little excavation as viewed in plan A2.3 Section A.

The JK report appears to confuse the jointed sandstone bedrock with very large 'floaters'. These are not the same thing. The use of the term 'floaters' insinuates a stability issue that does not exist in the bedrock profile that is present on the site, where the rock beds exposed at the surface are positioned on the underlying rock beds. It should be noted that the geometry of the joint blocks on site were observed to be tabular i.e. thin in height relative to width and depth, as well as being horizontal to sub-horizontally bedded. Joint blocks of this geometry were observed outcropping below the house (western margin of the excavation) and at either side (northern margin). Joint blocks of a tabular geometry are not easily toppled and given the high friction angle of sandstone do not slide easily.

Taking these points into consideration it is apparent the outcropping bedrock on the western and northern side of the site is not a significant hazard in relation to the proposed excavation works.

However, should Council deem it necessary we are prepared to specify a site inspection/ geotechnical supervision regime during the soil clearing phase of the excavation adjacent to the western and northern boundary. Further we suggest that this could be imposed by way of a condition of consent, again should Council consider this to be necessary.

"Also in terms of zone of influence, the presence of very large floaters' means that a simple 1V in 1H (ie. 45°) within the soil profile is not appropriate. The zone of influence will be controlled by the size and location of some of the 'floaters' relative to the excavation. On this basis, it is our opinion that the zone of influence extends several metres beyond the perimeter of the excavation and will extend beyond the northern site boundary (into No 39) and the western site boundary."

3. It is our opinion that the zone of influence extends from the top of the jointed bedrock. As confirmed in the comments above that this rock is stable due its geometry, the angle of the bedding

and the high friction angle of sandstone. On this basis, and given the fact that bedrock is visible at the surface at several locations along the north boundary and extensively at the western, eastern and northern sides of the property it is apparent that the soil profile does not extend to depths sufficient for the zone of influence of the excavation to extend beyond the northern common boundary.

"Not all of the geotechnical hazards have been identified. We consider that the most significant hazards are the potential dislodgment of floaters' from the western portion of the site during bulk and trench excavation, and the potential of trees being destabilised by the above excavations and collapsing onto adjoining properties."

"The issue of the proposed sewer trench has not been addressed or assessed at all. We acknowledge that White Geotechnical Group may not have been aware of the proposed sewer. However, we consider it incumbent on the geotechnical engineer to ensure that he has all of the available information (i.e. the information submitted to Council in support of a DA) before signing off such onerous forms as Form 1 and Form 1 a."

"Similarly, the opinion that the site is considered suitable for the development is based on incomplete information. This opinion also is not in accordance with the Geotechnical Risk Management Policy which requires that an opinion be provided 'That the design can achieve the Acceptable Risk Management' criteria provided the specified conditions are achieved."

4. The JK report refers to a trench excavation in excess of 2.0m deep for the sewer. We are aware of no plans that refer to trench excavations of this depth. The only place a trench/ pit approximating this depth may be required is where the line joins the Sewer Main well below the subject property. In our experience where domestic sewer lines need to cross rocky slopes excavations through rock are minimised as a requirement of cost. Any cuts through rock are kept as close to the surface as possible and in many cases (as on nearby Northern Beaches properties) are run over the surface of the rock. Should a rock outcrop block the path of a pipe it is typically diverted around the obstacle. If this is not possible directionally drilling is commonly used to pass through the rock obstacle where necessary. Additionally the note on the architectural plan A1.1 that points to the Norfolk Pine (near the lower boundary) in the location of where the sewer line passes states 'Existing Norfolk Pine Tree to be protected'. Running a trench past this location is not an option and it would contradict the note on

the plans. As there is no evidence that a deep trench will be required it does not warrant discussion in the geotechnical report.

"The effect of the proposed bulk excavation which will extend well below the canopy, and to about 4m, of the existing Norfolk pine towards the eastern end of the northern site boundary has not been assessed by either the Geotechnical or Flora and Fauna assessment reports. In this regard, we note that the survey was carried out in 2012 and the current survey plan (Rev B) was not updated to show the subsequent notable increase in tree growth, with both Norfolk pines along the northern site boundary having a larger canopy (or spread) and trunk diameter to that shown. An arborist's report concerning the effect of the new sewer on the existing tree has not been submitted."

5. Our calculations taking into consideration the current diameter of the tree indicate a structural root zone of ~ 2.9m. At its closest point the proposed excavation is 5.1m from the centre of the tree. Additionally the excavation breaches significantly less than 10% of the tree protection zone indicating that the proposed excavation is not a hazard to the stability of the tree. We use the calculations of AS4970-2009 to ensure an excavation set back from a nearby tree is sufficient in terms of stability but we are not Arborists. Given the concern of the neighbours it is recommended an Arborists Report be obtained to confirm the excavation will not detrimentally impact the health of the tree over the medium to long term.

In order to further allay any concerns I understand that the owner of the property has commissioned an arborist's report to specifically address any potential stability issues. Again the findings and recommendations of this report could if necessary be imposed by Council by way of a condition of consent.

"Basix Certificate 3A (Drawing A1.1) states "Existing boulders and rock formations to be protected" on western side of site. Also, Section A on Drawing A2.3 shows existing ground line at lower level dotted, but no 'floaters'. We consider that such protection will not be feasible."

6. Further to my related responses to the on-going stability of the outcropping joint blocks on the western side of the development I also note that architectural Plan A1.4 confirms that the large joint blocks immediately below the house will be retained as part of the development.

Conclusion

In our opinion the following inaccuracies are present in the JK report:

- Describing the outcropping jointed sandstone bedrock below the house as very large 'floaters'.
- Assuming the joint blocks at the western side of the excavation could become destabilised by the excavation when they are seated on the rock slope at an RL level below the base excavation.
- Stating the maximum excavation depth reaches about 3.5m. From the survey and plans provided it is apparent at the perimeter of the excavation the maximum excavation height reaches 3.0m and this maximum height progressively tapers away.
- Stating the excavation will be within 4m of the Norfolk Pine near the NE corner. The measured distance from the centre of the tree to the closest point of the excavation is more than 5.1m.
- The assumption a trench excavation of in excess of 2.0m deep will be required to install the sewer. There is no evidence a trench excavation of this depth will be required.

These inaccuracies exacerbate the assessed geotechnical risk of the project suggested in the JK report.

Based on the responses in this document and the contents of our Geotechnical Report lodged for the DA it is clear that the report is in accordance with the Pittwater Geotechnical Risk Management Policy (2009).

This response systematically confirms that the alleged issues claimed in the JK Report to be "not considered in, or omitted from, the geotechnical report" were in fact considered as part of the normal process of carrying out the geotechnical report. This includes the issues raised in relation to the existing Norfolk Pines and in relation to the rock formation stability presently, during and on completion of the proposed works.

Finally we stand by the information contained in the Geotechnical Report and lodged as part of the DA for this project, particularly in regard to the risk assessment component and the assessment that the works can be carried out with an 'acceptable risk' to life and property.

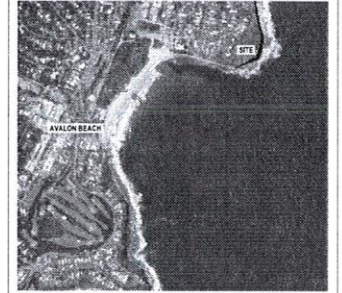
White Geotechnical Group Pty Ltd.



Ben White M.Sc. Geol.,
AusIMM., CP GEOL.
No. 222757
Engineering Geologist.

SITE PLAN – showing test locations

DP: 553660	LOT: 6
SITE AREA:	1515 m ²
SITE COVERAGE:	HARD SURFACE LANDSCAPED
PERMISSIBLE	40% (606 m ²) 60% (909 m ²) incl. 6% impervious (90.9 m ²)
EXISTING	46% (700 m ²) 54% (815 m ²) incl. 3% impervious (51 m ²)
PROPOSED	50% (758 m ²) 70% (1060 m ²) incl. 0% impervious
Note: Formal soft landscaping likely to require watering 122m ³	



Rev.	Notes	Date	Reviewed
A	Development Application	18.05.2018	RB / TD

BUILDERS/ CONTRACTORS ARE TO VERIFY ALL DIMENSIONS PRIOR TO COMMENCEMENT OF SITE WORK OR OFF-SITE FABRICATION. ALL SHOP DRAWINGS ARE TO BE SUBMITTED TO THE PROJECT MANAGER AND MANUFACTURE SHALL NOT COMMENCE UNTIL RETURN OF UNANNOUNCED SHOP DRAWINGS. FIGURED DIMENSIONS ARE TO BE READ IN PREFERENCE TO SCALED.

Planning Dennis Fish Planning Services 15 Edward Avenue Pottsville NSW 2489 P: 02 4676 2841 F: 02 9918 5785	Bushfire Building Code & Bushfire Hazard Solutions P.O. Box 124 Berrara NSW 2381 P: 02 9457 6530 F: 02 9457 6532
---	---

BASIX Consultant Victor Lin & Associates 1100 Pyrmont Business Centre Pyrmont NSW 2073 P: 02 9488 7899 F: 02 9488 7896	Land Survey Hill & Blum Consulting Surveyors 103 Crown Street Woolloomooloo NSW 2011 P: 02 9332 4886 F: 02 9331 6422
--	--

Geotechnical Engineer White Geotechnical Group Unit 5, 48 Collingwood St Manly NSW 2095 P: 02 7900 3214	Flora and Fauna NARLA Environmental 2/28-30 Trede Road Terry Hills NSW 2084 P: 02 9986 1295
--	--

Landscape Selena Hannan Landscape Design PO Box 4148 North Curl Curl NSW 2099 P: 02 8084 3531
--

Architects Casey Brown Level 1 / 63 William Street East Sydney NSW 2010 Tel: 61 2 9360 7972 Fax: 61 2 9360 2123 Email: cbb@caseybrown.com.au
--

Project
41 MARINE PARADE, AVALON

Drawing Title
SITE PLAN / DRIVEWAY SECTION

Drawing No. Scale
A1.1 1:200 (A1)

Casey Brown Architecture Pty Ltd ABN 56004010575
Nominated Architect Robert Brown 5425

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ABBREVIATIONS

BR	DOUBLE BRICK WALL
DP	DOWN PIPE
MB	METAL BALUSTRADE
MR	METAL ROOF
OFC	OFF FORM CONCRETE
PT	PAVED TERRACE
TV	TIMBER FRAME WINDOW
TD	TIMBER FRAME DOOR
TV	TIMBER FRAME VENT

ROOF/SITE/DEMOLITION PLAN LEGEND

---	STORM WATER DISCHARGE
---	SEWER CONNECTION TO MAIN
---	SEDIMENT FENCE DURING CONSTRUCTION

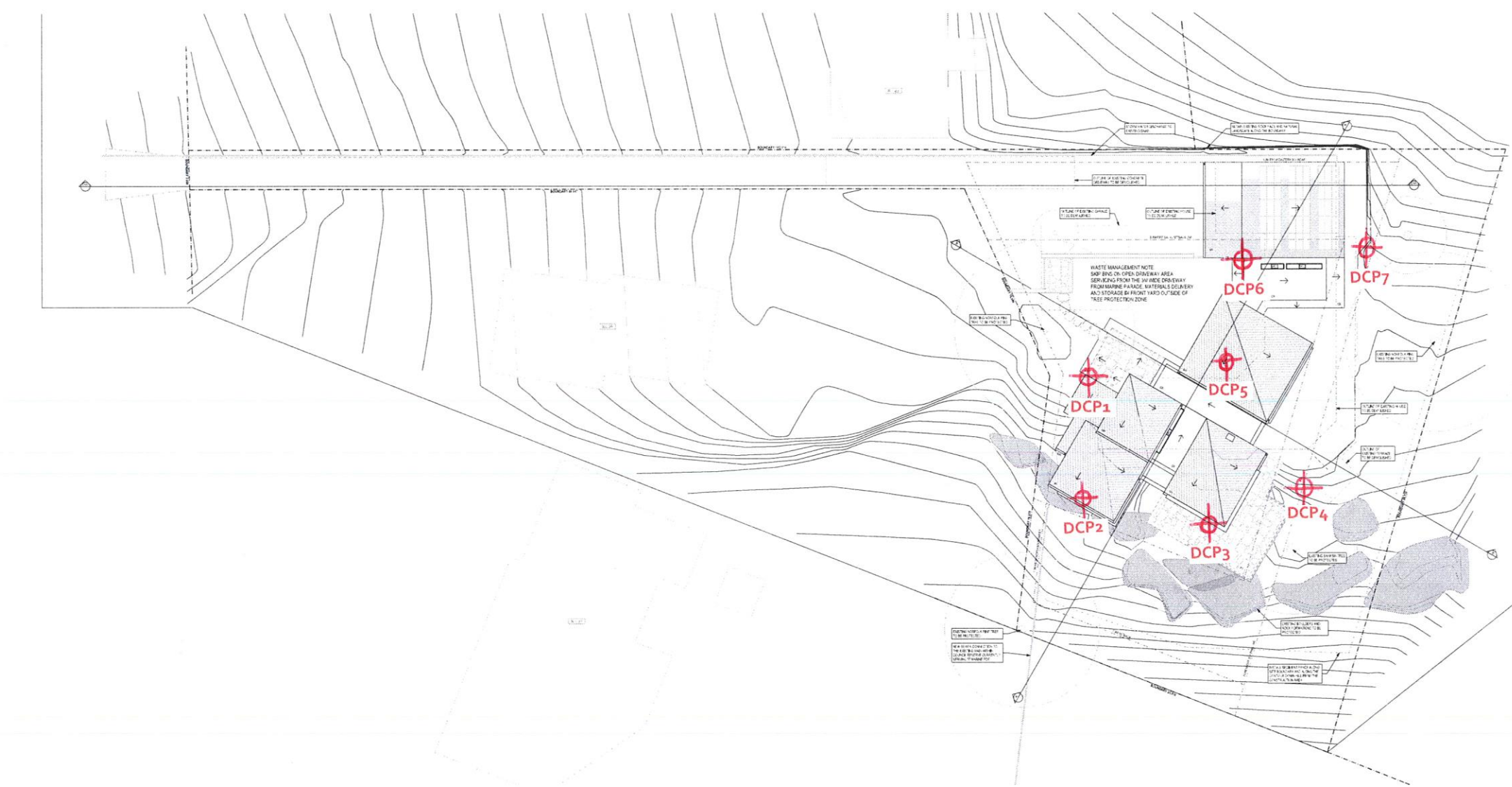
BASIX COMMITMENT

- RAIN WATER TANK MIN. CAPACITY 2000L TO BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF ALL APPLICABLE REGULATORY AUTHORITIES
- FLOOR CONSTRUCTION TO BE EITHER CONCRETE SLAB ON GROUND OR SUSPENDED FLOOR/OPEN SUBFLOOR
- HOT WATER SYSTEM TO BE GAS INSTANTANEOUS WITH A PERFORMANCE OF 3 STARS OR A SYSTEM WITH A HIGHER ENERGY RATING
- MUST INSTALL A WINDOW AND/OR SKYLIGHT IN 3 BATHROOMS/TOILETS IN THE DEVELOPMENT FOR NATURAL LIGHTING

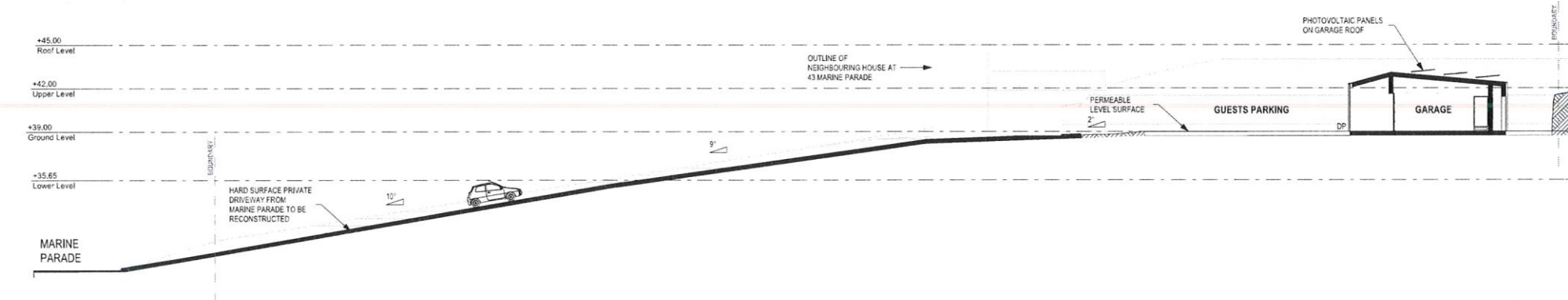
NOTE: FOR MORE DETAIL REFER TO THE BASIX REPORT

THE PROPOSED WORKS HAVE BEEN DESIGNED TO COMPLY WITH:

- NATIONAL CONSTRUCTION CODE
- STATEMENT OF ENVIRONMENTAL EFFECTS PREPARED BY DENNIS FISH
- BUSHFIRE HAZARD ASSESSMENT REPORT PREPARED BY BUILDING CODE & BUSHFIRE HAZARD SOLUTIONS
- BASIX REPORT PREPARED BY VICTOR LIN & ASSOCIATES
- GEOTECHNICAL REPORT PREPARED BY WHITE GEOTECHNICAL GROUP
- FLORA AND FAUNA REPORT PREPARED BY NARLA ENVIRONMENTAL
- LANDSCAPE DESIGN PREPARED BY SELENA HANNAN LANDSCAPE DESIGN



1 Roof / Site / Demolition Plan
1:200



2 DW Section
1:200

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ABN 97 965 355 200

TREE ASSESSMENT REPORT

September 2016

Site: Lot 6 in DP 553660
41 Marine Parade
AVALON BEACH, NSW

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Certificate of Horticulture, TAFE
Certificate Advanced Tree Care TAFE
Founder -Growing My Way Tree Services (1977)
Member of International Society of Arboriculture
Member of Arboriculture Australia

1 Summary

The site is known as 41 Marine Parade, Avalon Beach (the subject site from herein).

Casey Brown Architects on behalf of the property owner (Jane Rowe) has commissioned the *Growing My Way Tree Consultancy (GMW)* to prepare a *Tree Assessment Report* to be linked to a lodged *Development Application (DA No279/16)* submission for the demolition of existing residence & construction of a new residence.

One (1) tree has been identified as requiring discussion. The discussed tree is within the subject site.

The site is presently developed to contain a two (2) storey dwelling with metal roof. Motor vehicle access is only via Marine Parade. Pedestrian access is available via both Marine Parade & an informal pathway from the beach.

I, Kyle A Hill, as a qualified Practising & Consulting Arborist, have prepared this report based on “*Visual Tree Assessment*” (VTA) undertaken on Sunday, 4 September, 2016.

The sole consent authority is *Pittwater Council, (now Northern Beaches Council)*.

Information/data collection related to the one (1) tree was gathered & cross referenced using:

- *Site Survey by Hill & Blume Consulting Surveyors, dated 27-09 - 2012;*
- *Site Plans/Elevations by Casey Brown Architects, dated 18-05-2016, Rev A, drawings # A1.1, A1.2, A1.3, A1.4, A2.1 A2.2 & A2.3;*
- *Observations & data collection on site by Kyle Hill.*

The aim of this report is:

1. *To confirm the viability of the discussed tree, relating to its individual health, vigour & condition taking into account the as lodged DA submission.*
2. *Provide a “Site Specific Tree Management Plan” for the discussed/proposed to be retained tree.*

This document supports the as lodged proposal for development relative to management of the discussed tree.

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3 Introduction

This report contains observations & recommendations intended to assist in the management of the one (1) tree identified to be discussed.

The tree is a planted *Araucaria heterophylla* (A.h.) or colloquially a “Norfolk Island Pine”.

Reference to the Pittwater Council (from herein NBC) website confirms the subject site to NOT be within a “Heritage Conservation Area”, nor is the subject site located within any recognised “Wildlife Corridor”.

The tree discussed tree is subject to the “Tree Protection Provisions” within the PC Pittwater 21 Development Control Plan (P21 DCP). The specific Clause referred too relative to tree management is Control B4.22 Preservation of Trees or Bushland Vegetation.

The sole consent authority is NBC.

Information related to the discussed tree was collated during onsite data collection with cross referencing to:

- *Site Survey by Hill & Blume Consulting Surveyors, dated 27-09 - 2012;*
- *Site Plans/Elevations by Casey Brown Architects, dated 18-05-2016, Rev A, drawings # A1.1, A1.2, A1.3, A1.4, A2.1 A2.2 & A2.3;*
- *Observations & data collection on site by Kyle Hill.*

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1. *To confirm the viability of the discussed tree, relating to its individual health, vigour & condition taking into account the as lodged DA submission.*
2. *Provide a “Site Specific Tree Management Plan” for the discussed/proposed to be retained tree.*

This document supports the as lodged proposal for development relative to management of the discussed tree.

4 Methodology

Assessment of the tree has been from ground level by eye, using *Visual Tree Assessment (VTA)* techniques developed by Claus Mattheck. The principles of VTA are explained in his widely used reference book “*The Body Language of Trees (1994)*”.

Assessment includes:

- *Tree’s current condition & likely future health.*
- *Species tolerance to root disturbance &/or development*
- *Likely future hazard potential to persons & property*
- *Tree’s amenity value, such as significance, screening & habitat.*

No root analysis, soil testing, ‘Resistograph’® drilling or aerial canopy inspection was undertaken. See the following Appendices for further information:

- *Appendix A Glossary of Common Arboreal terms*
- *Appendix B Site Survey, Plans/Elevations with tree location plotted*
- *Appendix C Tree Management/Protection Prior to & During Determined Works*

5 Observations

5.1 The Site

The report discusses one (1) tree only. The tree is within the subject site. The site is 1515.00m² (as per site survey) in size. It is accessed via a long “battle axe” private driveway from Marine Parade.

Adjacent properties are developed & contain single dwelling residences.

The site has shallow to skeletal average topsoil depth.

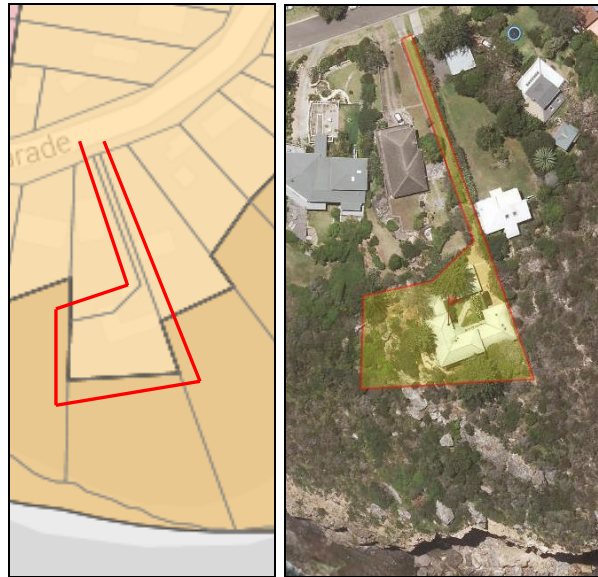


Figure 1: (Above) Map & Aerial photographs courtesy of Pittwater Council & SixMap.com

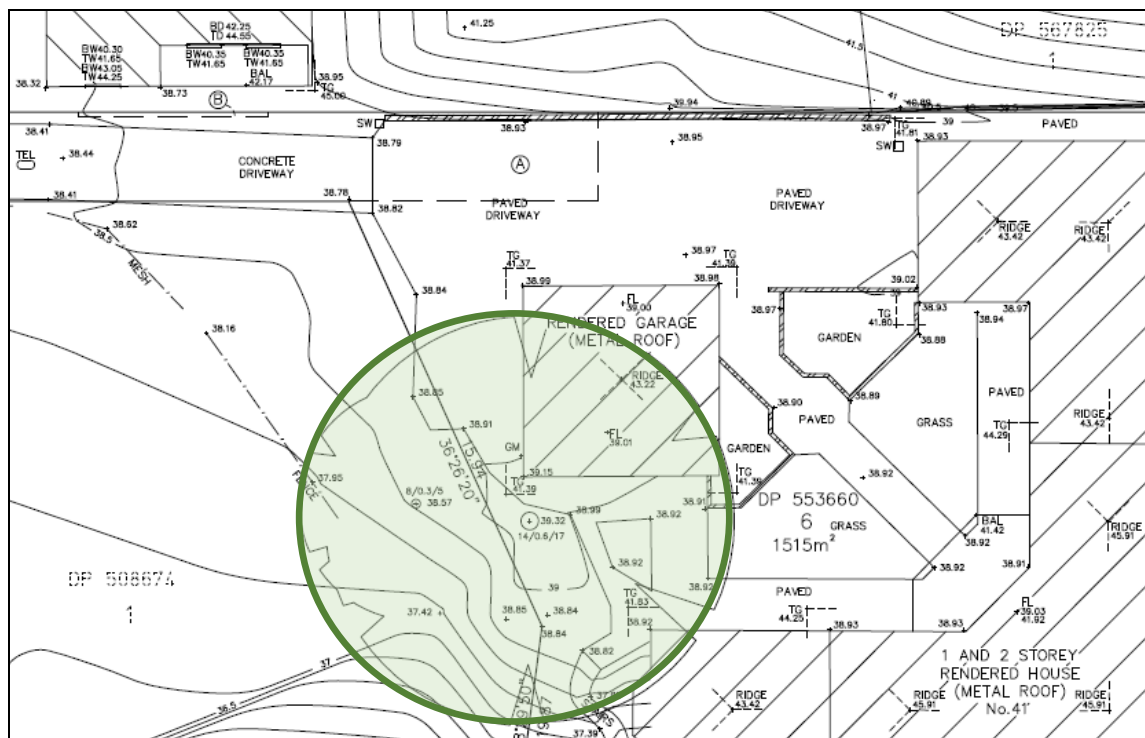


Figure 1: Portion of Site Survey illustrates location of the discussed tree.

5.2 The Proposal

The lodged *Development Application* (DA 279/16) supports:

- The retention of the discussed tree on the grounds of landscape (both private & public) amenity.

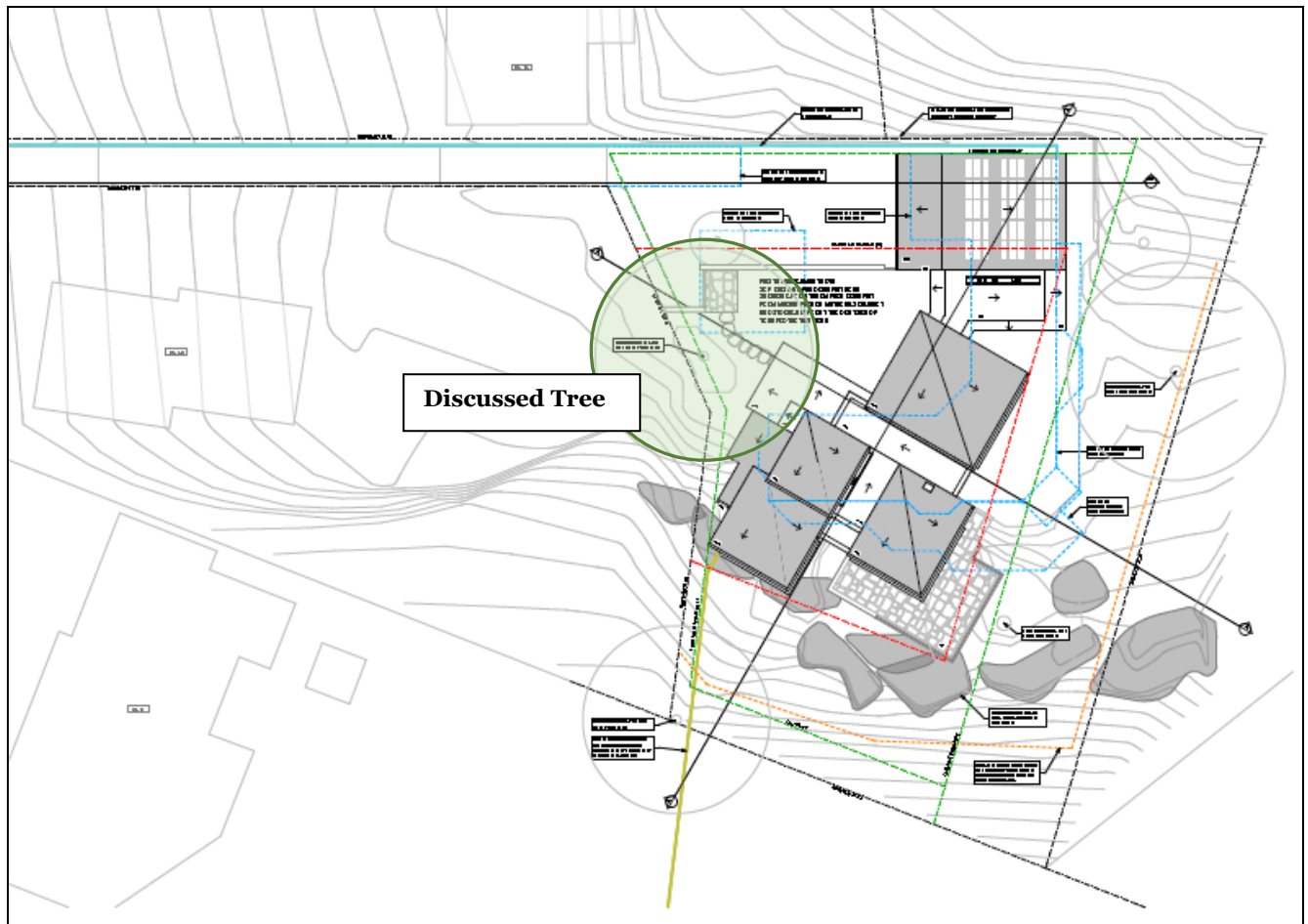


Figure 2: Illustrates as lodged Site Plan, note proposed works in the main are significantly further away than existing structures (proposed to be demolished).

5.3 *Tree & Site Images*



Figure 3: Illustrates location of Tree #1.



Figure 4: Illustrates tree trunk location & existing competing structures.



Figure 5: Illustrates discussed tree canopy.

5.4 The Trees – Summary Table

Read this table in conjunction with Appendix A– Common Arboreal Terms

Trees Recommended for removal

Trees Recommended for retention

Exempt species

Trees retainable but of low amenity

	Identification	Height (m)	Crown (m)	DBH (m)	TPZ	SRZ	Age	Health / Vigour	Structure	Significance / Retention Value	Comments
1	<i>Araucaria heterophylla</i> Norfolk Island Pine	19.0– 12.0	13.50– 14.50	0.70	8.40	3.17	M	Good & Good	Typical	Medium / Medium	Retain & Protect: Tree is easily retained, protected & managed prior to & during the proposed redevelopment of this site.

6 Discussion

This document has been prepared to compliment the lodged Development Application (DA 279/16) submission which highlights the support for the retention & protection of the one (1) discussed A.h. tree. (See page 6 of this document (portion of site survey) for confirmation of the discussed tree location.)

NBC Tree Management & Protection Policy confirms the discussed tree to be protected by virtue of size & specie.

The subject site is not within a designated “Heritage Conservation Area”, nor is the site identified as being within any recognised “wildlife corridor”.

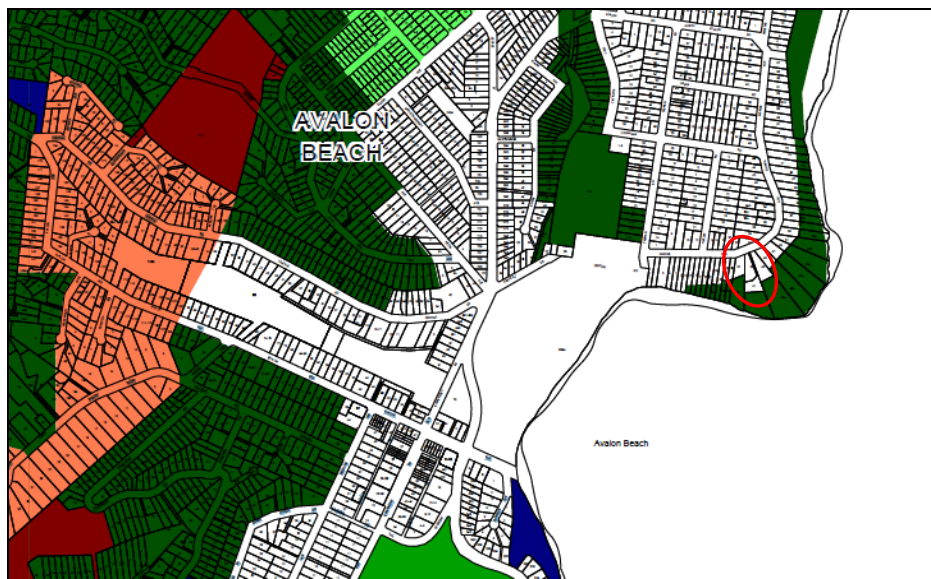


Figure 6: Illustrates subject site is not in a designated “wildlife corridor”. Map courtesy of Pittwater Council.

The two (2) A.h. trees within the subject site (41 Marine Parade) are presumed to have long term Useful Life Expectancies. A third same specie tree is planted within the 37/39 Marine Parade properties. It is also presumed to have a long term Useful Life Expectancy. This tree is noted to be very close to the common boundary shared with the 41 Marine Parade property but is well away from any impact that could reasonably be predicted to compromise its Useful Life Expectancy.

The proposed (by lodged DA submission) new residence requires an 18.15m² breach of the total 222.00m² Tree Protection Zone surface area. This equates to a less than 10% (i.e. 8.2%) total Tree Protection Zone surface area (222.00m²) breach by definitions within the Australian Standard (AS4970-2009 Protection of trees on development sites). As such the breach is considered to be minor & therefore

acceptable with implementation of a “Site Specific Tree Management Plan”.



Figure 7: Illustrates subject tree (yellow circle) plus same specie trees within or near the subject site (red circles). Photo courtesy of NearMap 4 July 2016.

7 Site Specific Tree Management Plan

- Install temporary metal mesh fencing as close to 8.40m TPZ radial distance as site restrictions/proposed works allow.
- Prior to the proposed demolition of existing structures install a “Tree Trunk Guard” (see Appendix C) to a height not less than first whorls of branches (approximately 3.00m). Photographic evidence is essential.
- No demolition or builder’s material of any description (including loose soil) is to be stored within the 8.40m TPZ radial distance.
- Any excavation required within TPZ radial distance, i.e. the identified 8.2% breach of total TPZ surface area **MUST BE UNDERTAKEN MANUALLY**. Photographic evidence is essential.

- Any “live tree root” less than 0.05m/50mm in diameter exposed by the manual excavation process may be cleanly severed without the input of the sites retained Practicing/Consulting Arborist. Photographic evidence is essential.
- Any “live tree root” greater than 0.05m/50mm in diameter **REQUIRES THE DIRECT INPUT OF THE SITES RETAINED PRACTICING/CONSULTING ARBORIST.** This person is to develop a “root by root” management strategy with both written & photographic evidence confirming the strategy adopted & deemed to be closest to best practice for the specific site.
- Any pruning required (not foreseen) must address both NBC “Tree Management Provisions” as well as be compliant with the *Australian Standard (AS4373-2007 Pruning of amenity trees)*.

8 Recommendations

Recommendation is made that:

- **The DA submission relative to the retention & management of the discussed tree be conditionally determined by NBC planning assessment officers.**
- **The “Site Specific Tree Management Plan” be stringently applied so as to achieve an Arboriculture “best practice” outcome.**

If you have any questions relating to this report or implementation of recommendations, please contact Kyle Hill on 0412-221-962.

Yours faithfully,



Kyle A. Hill (Practicing & Consulting Arborist)

9 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, & directly attached to that submission, report or presentation.

10 Assumptions

Care has been taken to obtain information from reliable resources. All data has been verified insofar as possible; however, Growing My Way Tree Services, 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 & reflects the condition of the trees at the time of inspection.

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.

11 Recommended References

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

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

Dr. G. Watson & Dr. D. Neely, '*Trees & Building Sites*', LSA Illinois USA 1995

Dr. N. Matheny & Dr. J.R. Clark, '*Trees & Development*', ISA Illinois USA 1998

Phillip J. Craul, '*Urban Soil in Landscape Design*', J. Wiley & Sons, New York USA 1992

12 Selected Bibliography

Hitchmough, J.D. 1994. '*Urban Landscape Management*', Inkata Press, Sydney.

Mattheck, C. & Breloar, H. 1994 '*Body Language of Trees*', The Stationery Office, London.

AS 4373:2007, '*Pruning of Amenity Trees*', Standards Australia.

AS 4970:2009, '*Protection of Trees on Development Sites*', Standards Australia.

BS 5837:2005, '*Guide for Trees in Relation to Construction*', Standards Board, UK.

Appendix A – Glossary

Glossary of common Arboreal terms

- Age:**
- I** *Immature* refers to a well-established but juvenile tree
 - SM** *Semi-mature* refers to a tree at growth stages between immaturity & full size
 - M** *Mature* refers to a full sized tree with some capacity for further growth
 - LM** *Late Mature* refers to a full sized tree with little capacity for growth that is not yet about to enter decline
 - OM** *Over-mature* refers to a tree about to enter decline or already declining
 - LS** *Live Stag* refers to a tree in a significant state of decline. This is the last life stage of a tree prior to death

Hth & Vig Health & Vigour

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

Excellent (E), V. Good (VG), Good (G), Fair (F), Declining (D), Poor (P), Very Poor (VP)

Vigour refers to the tree's growth rate/condition as exhibited by the crown density, leaf colour, presence of epicormic shoots, ability to withstand disease invasion & the degree of dieback. Classes are:

Excellent (E), V. Good (VG), Good (G), Fair (F), Declining (D), Poor (P), Very Poor (VP)

Diameter at Breast Height (DBH) refers to the tree trunk diameter at breast height (1.4 metres above ground level)

Critical Root Zone (CRZ) refers to a radial offset of five (5) times the trunk DBH measured from the centre of the trunk. This zone is often the location of the tree's structural support roots

Primary Root Zone (PRZ) refers to a radial offset of ten (10) times the trunk DBH measured from the centre of the trunk. This zone often contains a significant amount of (but by no means all of a tree's) fine, non-woody roots required for uptake of nutrients, oxygen & water

Tree Protection Zone (TPZ) is a "No Go Zone" surrounding a tree to aid in its ability to cope with disturbances associated with construction works. Tree protection involves minimising root damage that is caused by activities such as construction. Tree protection also reduces the chance of a tree's decline in health or death & the possibly damage to structural stability of the tree from root damage

To limit damage to the tree, protection within a specified distance of the tree's trunk must be maintained throughout the proposed development works. No excavation, stockpiling of building materials or the use of machinery is permitted within the TPZ

Using the *British Standard for Trees on Construction Sites* (BS 5837:2005), a TPZ is calculated based on the age of the tree, (young, middle aged or mature), the trunk diameter at D.B.H. & the tree's vigour. A TPZ is required for each tree or group of trees within five metres of building envelopes.

Stem/bark inclusion refers to a genetic fault in the tree's structure. This fault is located at the point where the stems/branches meet. In the case of an inclusion this point of attachment is potentially weak due to bark obstructing healthy tissue from joining together to strengthen the joint

Decay refers to the break down tissues within the tree. There are numerous types of decay that affect different types of tissues, spread at different rates & have different affect on both the tree's health & structural integrity

Point of Attachment refers to the point at which a stem/branch etc joins

Dead wood refers to any whole limb that no longer contains living tissues (eg live leaves &/or bark). Some dead wood is common in a number of tree species

Die back refers to the death of growth tips/shoots & partial limbs. Die back is often an indicator of stress & tree health

One dimensional crown refers to branching habits & leaves that extend/grow in one direction only. There are many causes for this growth habit such as competition & pruning

Crown Foliage Density of Potential (CFDP) refers to the density of a tree's crown in relation to the expected density of a healthy specimen of the same species. CFDP is measured as a percentage

Epicormic growth/shoots refer to growth/shoots that are/have sprouted from axillary buds within the bark. Epicormic growth/shoots are a survival mechanism that often indicates the presence of a current or past stress even such as fire, pruning, drought etc

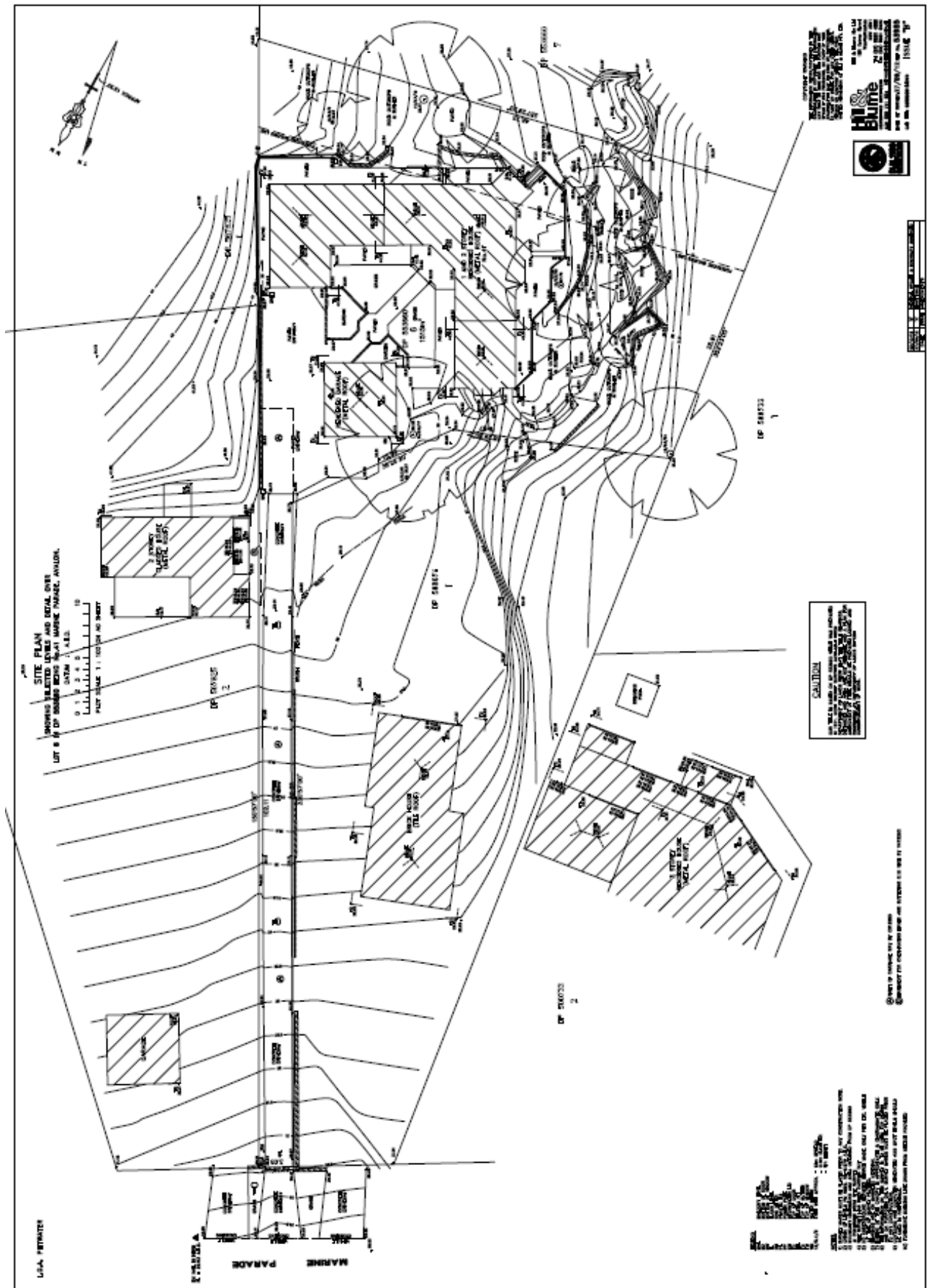
Over Head Powerlines (OHP) refers to over head electricity wiring

LVOHP Low Voltage Over head Powerlines

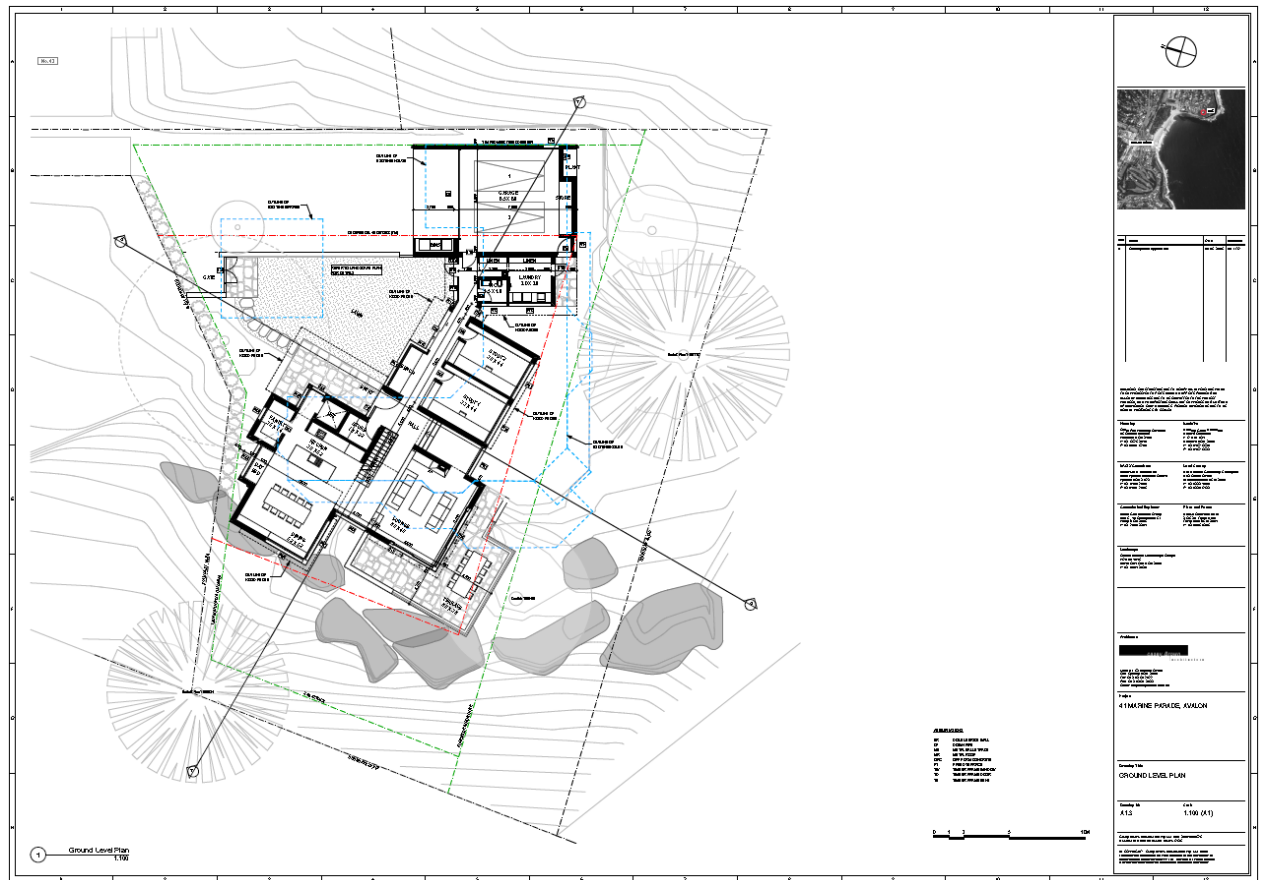
HVOHP High Voltage Over head Powerlines

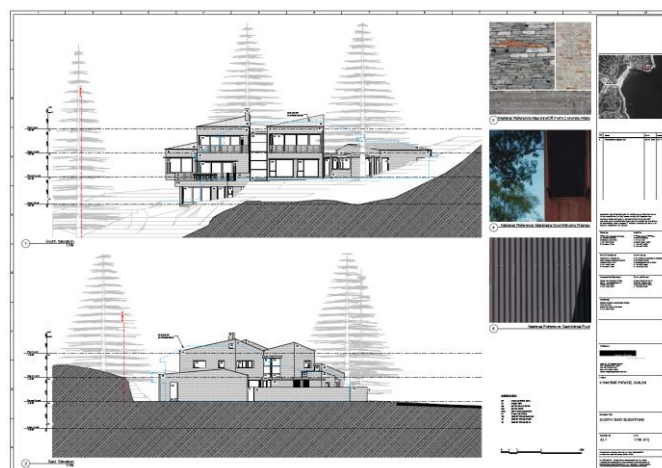
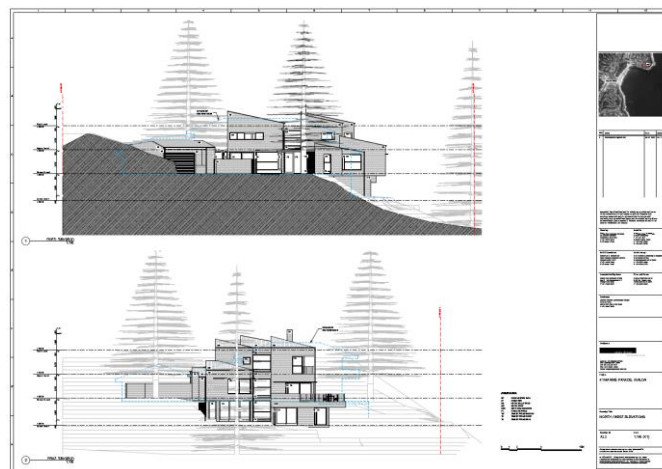
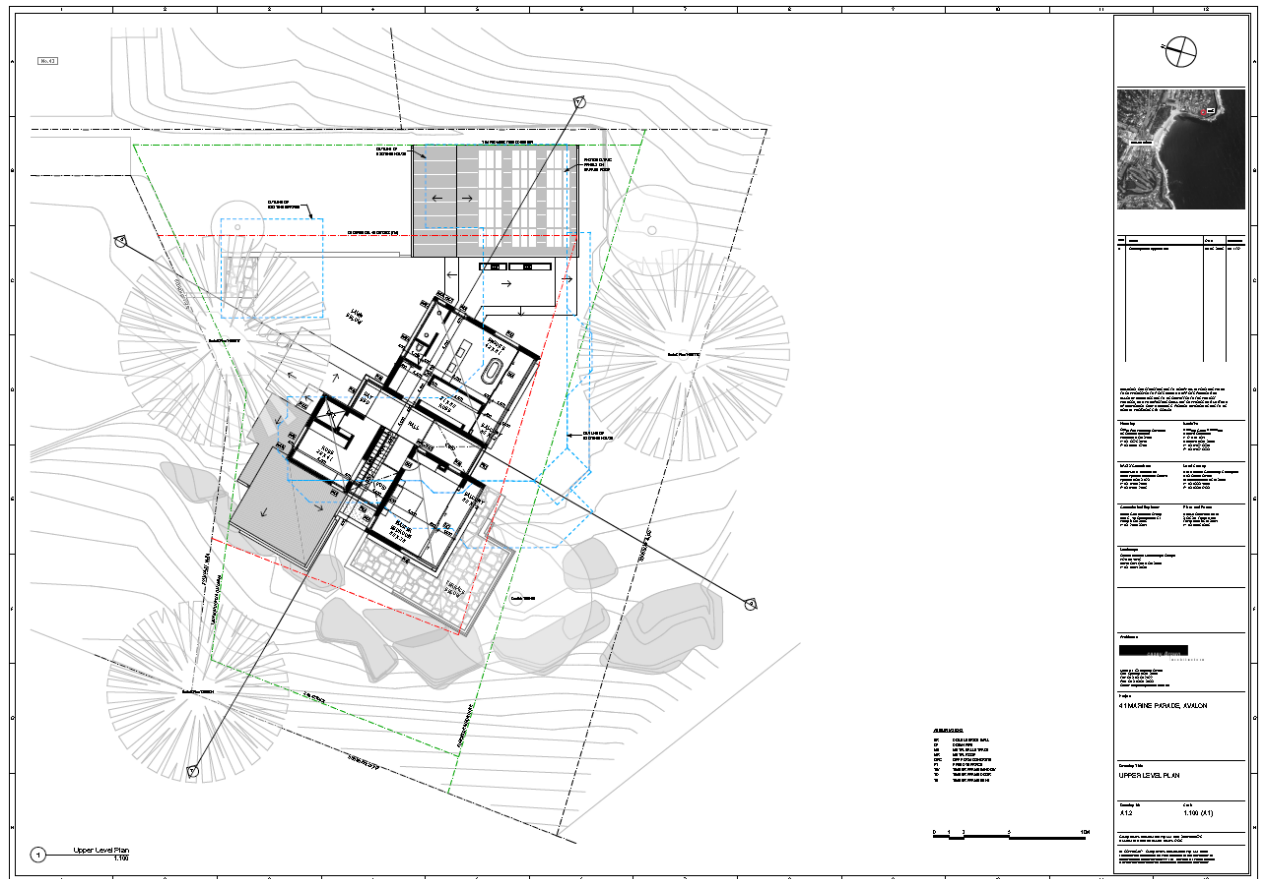
ABC Aerial Bundled Cable

Appendix B –Site Survey, Plans/Elevations









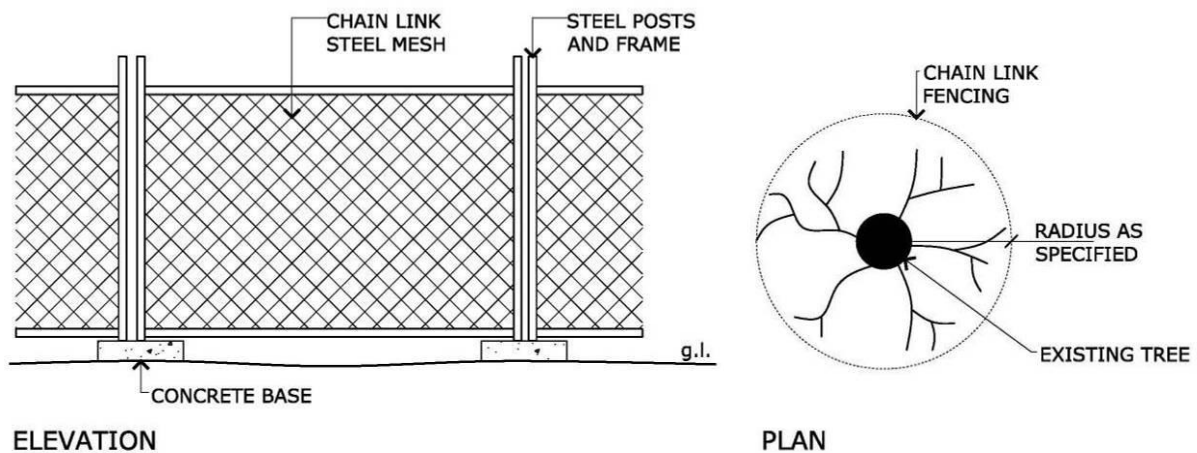
Appendix C – Tree Protection/Management Prior to & During Determined Works

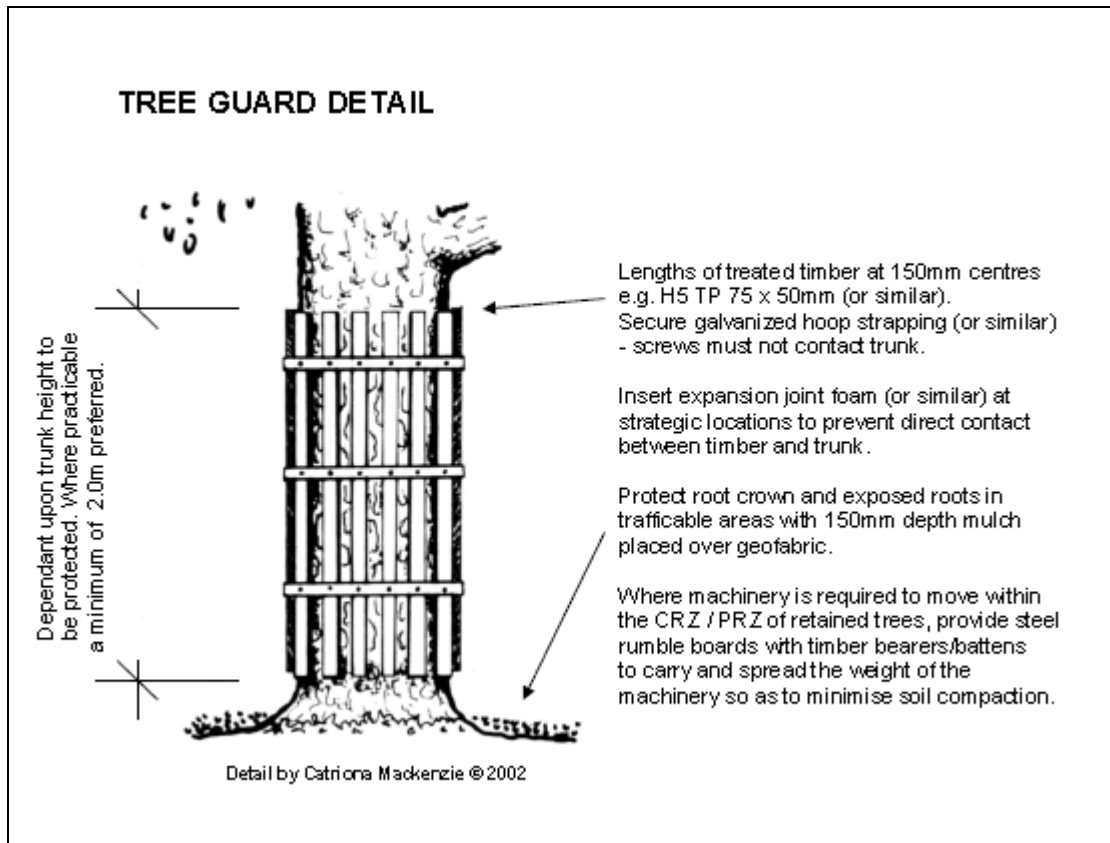
The installation of Tree Protection Zone (TPZ) fencing is to be carried out prior to commencement of all works. The most suitable fencing material is 1.8m tall chain link mesh with 50mm metal pole supports, see **detail 1: tree protection fencing**.

A mulch layer of composted leaf & woodchip to a depth of 75mm is required within the TPZ to aid in retention of soil moisture & to protect soil from contaminants. Water is to be applied by hand held or soaker/leaky hose within TPZ as required & in Accordance with Stage 3 Water Restrictions. Watering is to be carried out by either an Arborist or is to form part of the Builder's/Contractor's contract, with recommended monthly checks by an Arborist.

There is to be no stock piling of building material (including waste), machinery or any other item within TPZ of any retained tree. Access to personnel & machinery, & storage of fuel, chemicals, cement or site sheds is prohibited

Regular monitoring of protected trees during development works for unforeseen changes or decline, will aid in the success & longevity of the retained trees.





41 Marine Parade, Avalon

Response to Stability Assessment

The purpose of this correspondence is to respond to the JK Geotechnics Geotechnical Stability Assessment (the JK Report) dated 15th August 2016.

Prior to the preparation of this response I carried out a further site inspection on the 24th August 2016 to reaffirm our observations and conclusions and as a consequence I can categorically state that the proposal as submitted complies with the requirements of the Pittwater Geotechnical Risk Management Policy, (2009) and upon completion the project will achieve an 'acceptable' rating subject to the works being carried out in accordance with the recommendations detailed in my report and subject to good engineering & building practice.

Response to the JK Report contentions:-

"Mapping details have not been presented on a contoured site plan"

1. The mapping details were presented on a contoured site plan. In the scanning the plan the light grey contours were not picked up by the scanner though the surveyed boulder locations below the house were. A darker copy of that plan is attached.

"Not all of the geotechnical hazards have been identified. We consider that the most significant hazards are the potential dislodgment of floaters' from the western portion of the site during bulk and trench excavation, and the potential of trees being destabilised by the above excavations and collapsing onto adjoining properties."

"We do not consider that the issue of 'floaters' dislodging and/or becoming destabilised and toppling over can be addressed by a simple condition requiring the geotechnical professional to inspect the cut face. This hazard should first be assessed in terms of establishing the risks and then specific recommendations to reduce the risks to 'acceptable' levels. Specific recommendations (aside from a geotechnical inspection of the excavation) must be provided as to how the stability of the numerous

floaters' which will be impacted by the proposed bulk and trench excavation over the northern and western portions of the site will be ensured".

2. It is our understanding that the proposed house was designed specifically to retain the outcropping joint blocks on the Western side of the development. As such the base of the proposed excavation is ~ RL 35.65 so these rocks are positioned in/or on the rock slope at a level below the base of the proposed excavation. It should also be noted that the western downhill margin requires very little excavation as viewed in plan A2.3 Section A.

The JK report appears to confuse the jointed sandstone bedrock with very large 'floaters'. These are not the same thing. The use of the term 'floaters' insinuates a stability issue that does not exist in the bedrock profile that is present on the site, where the rock beds exposed at the surface are positioned on the underlying rock beds. It should be noted that the geometry of the joint blocks on site were observed to be tabular i.e. thin in height relative to width and depth, as well as being horizontal to sub-horizontally bedded. Joint blocks of this geometry were observed outcropping below the house (western margin of the excavation) and at either side (northern margin). Joint blocks of a tabular geometry are not easily toppled and given the high friction angle of sandstone do not slide easily.

Taking these points into consideration it is apparent the outcropping bedrock on the western and northern side of the site is not a significant hazard in relation to the proposed excavation works.

However, should Council deem it necessary we are prepared to specify a site inspection/ geotechnical supervision regime during the soil clearing phase of the excavation adjacent to the western and northern boundary. Further we suggest that this could be imposed by way of a condition of consent, again should Council consider this to be necessary.

"Also in terms of zone of influence, the presence of very large floaters' means that a simple 1V in 1H (ie. 45°) within the soil profile is not appropriate. The zone of influence will be controlled by the size and location of some of the 'floaters' relative to the excavation. On this basis, it is our opinion that the zone of influence extends several metres beyond the perimeter of the excavation and will extend beyond the northern site boundary (into No 39) and the western site boundary."

3. It is our opinion that the zone of influence extends from the top of the jointed bedrock. As confirmed in the comments above that this rock is stable due its geometry, the angle of the bedding

and the high friction angle of sandstone. On this basis, and given the fact that bedrock is visible at the surface at several locations along the north boundary and extensively at the western, eastern and northern sides of the property it is apparent that the soil profile does not extend to depths sufficient for the zone of influence of the excavation to extend beyond the northern common boundary.

"Not all of the geotechnical hazards have been identified. We consider that the most significant hazards are the potential dislodgment of floaters' from the western portion of the site during bulk and trench excavation, and the potential of trees being destabilised by the above excavations and collapsing onto adjoining properties."

"The issue of the proposed sewer trench has not been addressed or assessed at all. We acknowledge that White Geotechnical Group may not have been aware of the proposed sewer. However, we consider it incumbent on the geotechnical engineer to ensure that he has all of the available information (i.e. the information submitted to Council in support of a DA) before signing off such onerous forms as Form 1 and Form 1 a."

"Similarly, the opinion that the site is considered suitable for the development is based on incomplete information. This opinion also is not in accordance with the Geotechnical Risk Management Policy which requires that an opinion be provided 'That the design can achieve the Acceptable Risk Management' criteria provided the specified conditions are achieved."

4. The JK report refers to a trench excavation in excess of 2.0m deep for the sewer. We are aware of no plans that refer to trench excavations of this depth. The only place a trench/ pit approximating this depth may be required is where the line joins the Sewer Main well below the subject property. In our experience where domestic sewer lines need to cross rocky slopes excavations through rock are minimised as a requirement of cost. Any cuts through rock are kept as close to the surface as possible and in many cases (as on nearby Northern Beaches properties) are run over the surface of the rock. Should a rock outcrop block the path of a pipe it is typically diverted around the obstacle. If this is not possible directionally drilling is commonly used to pass through the rock obstacle where necessary. Additionally the note on the architectural plan A1.1 that points to the Norfolk Pine (near the lower boundary) in the location of where the sewer line passes states 'Existing Norfolk Pine Tree to be protected'. Running a trench past this location is not an option and it would contradict the note on

the plans. As there is no evidence that a deep trench will be required it does not warrant discussion in the geotechnical report.

"The effect of the proposed bulk excavation which will extend well below the canopy, and to about 4m, of the existing Norfolk pine towards the eastern end of the northern site boundary has not been assessed by either the Geotechnical or Flora and Fauna assessment reports. In this regard, we note that the survey was carried out in 2012 and the current survey plan (Rev B) was not updated to show the subsequent notable increase in tree growth, with both Norfolk pines along the northern site boundary having a larger canopy (or spread) and trunk diameter to that shown. An arborist's report concerning the effect of the new sewer on the existing tree has not been submitted."

5. Our calculations taking into consideration the current diameter of the tree indicate a structural root zone of ~ 2.9m. At its closest point the proposed excavation is 5.1m from the centre of the tree. Additionally the excavation breaches significantly less than 10% of the tree protection zone indicating that the proposed excavation is not a hazard to the stability of the tree. We use the calculations of AS4970-2009 to ensure an excavation set back from a nearby tree is sufficient in terms of stability but we are not Arborists. Given the concern of the neighbours it is recommended an Arborists Report be obtained to confirm the excavation will not detrimentally impact the health of the tree over the medium to long term.

In order to further allay any concerns I understand that the owner of the property has commissioned an arborist's report to specifically address any potential stability issues. Again the findings and recommendations of this report could if necessary be imposed by Council by way of a condition of consent.

"Basix Certificate 3A (Drawing A1.1) states "Existing boulders and rock formations to be protected" on western side of site. Also, Section A on Drawing A2.3 shows existing ground line at lower level dotted, but no 'floaters'. We consider that such protection will not be feasible."

6. Further to my related responses to the on-going stability of the outcropping joint blocks on the western side of the development I also note that architectural Plan A1.4 confirms that the large joint blocks immediately below the house will be retained as part of the development.

Conclusion

In our opinion the following inaccuracies are present in the JK report:

- Describing the outcropping jointed sandstone bedrock below the house as very large 'floaters'.
- Assuming the joint blocks at the western side of the excavation could become destabilised by the excavation when they are seated on the rock slope at an RL level below the base excavation.
- Stating the maximum excavation depth reaches about 3.5m. From the survey and plans provided it is apparent at the perimeter of the excavation the maximum excavation height reaches 3.0m and this maximum height progressively tapers away.
- Stating the excavation will be within 4m of the Norfolk Pine near the NE corner. The measured distance from the centre of the tree to the closest point of the excavation is more than 5.1m.
- The assumption a trench excavation of in excess of 2.0m deep will be required to install the sewer. There is no evidence a trench excavation of this depth will be required.

These inaccuracies exacerbate the assessed geotechnical risk of the project suggested in the JK report.

Based on the responses in this document and the contents of our Geotechnical Report lodged for the DA it is clear that the report is in accordance with the Pittwater Geotechnical Risk Management Policy (2009).

This response systematically confirms that the alleged issues claimed in the JK Report to be "not considered in, or omitted from, the geotechnical report" were in fact considered as part of the normal process of carrying out the geotechnical report. This includes the issues raised in relation to the existing Norfolk Pines and in relation to the rock formation stability presently, during and on completion of the proposed works.

Finally we stand by the information contained in the Geotechnical Report and lodged as part of the DA for this project, particularly in regard to the risk assessment component and the assessment that the works can be carried out with an 'acceptable risk' to life and property.

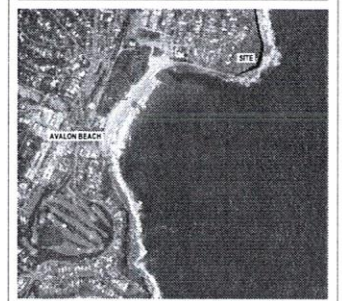
White Geotechnical Group Pty Ltd.



Ben White M.Sc. Geol.,
AusIMM., CP GEOL.
No. 222757
Engineering Geologist.

SITE PLAN – showing test locations

DP: 553660	LOT: 6
SITE AREA:	1515 m ²
SITE COVERAGE:	HARD SURFACE LANDSCAPED
PERMISSIBLE	40% (606 m ²) 60% (909 m ²) incl. 6% impervious (90.9 m ²)
EXISTING	46% (700 m ²) 54% (815 m ²) incl. 3% impervious (51 m ²)
PROPOSED	50% (758 m ²) 70% (1060 m ²) incl. 0% impervious
Note: Formal soft landscaping likely to require watering 122m ³	



Rev.	Notes	Date	Reviewed
A	Development Application	18.05.2018	RB / TD

BUILDERS/ CONTRACTORS ARE TO VERIFY ALL DIMENSIONS PRIOR TO COMMENCEMENT OF SITE WORK OR OFF-SITE FABRICATION. ALL SHOP DRAWINGS ARE TO BE SUBMITTED TO THE PROJECT MANAGER AND MANUFACTURE SHALL NOT COMMENCE UNTIL RETURN OF UNAMENDED SHOP DRAWINGS. FIGURED DIMENSIONS ARE TO BE READ IN PREFERENCE TO SCALED.

Planning Dennis Fish Planning Services 15 Edward Avenue Pottsville NSW 2489 P: 02 4676 2841 F: 02 9918 5785	Bushfire Building Code & Bushfire Hazard Solutions P.O. Box 124 Berrima NSW 2576 P: 02 9457 6530 F: 02 9457 6532
---	---

BASIX Consultant Victor Lin & Associates 1100 Pyrmont Business Centre Pyrmont NSW 2073 P: 02 9488 7899 F: 02 9488 7896	Land Survey Hill & Blum Consulting Surveyors 103 Crown Street Woolloomooloo NSW 2011 P: 02 9332 4886 F: 02 9331 6422
--	--

Geotechnical Engineer White Geotechnical Group Unit 5, 48 Collingwood St Manly NSW 2095 P: 02 7900 3214	Flora and Fauna NARLA Environmental 2/28-30 Trevelyan Road Terry Hills NSW 2084 P: 02 9986 1295
--	--

Landscape Selena Hannan Landscape Design PO Box 4148 North Curl Curl NSW 2099 P: 02 8084 3531
--

Architects Casey Brown Level 1 / 63 William Street East Sydney NSW 2010 Tel: 61 2 9360 7972 Fax: 61 2 9360 2123 Email: cbb@caseybrown.com.au
--

Project
41 MARINE PARADE, AVALON

Drawing Title
SITE PLAN / DRIVEWAY SECTION

Drawing No. Scale
A1.1 1:200 (A1)

Casey Brown Architecture Pty Ltd ABN 56004010575
Nominated Architect Robert Brown 5425

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ABBREVIATIONS

BR	DOUBLE BRICK WALL
DP	DOWN PIPE
MB	METAL BALUSTRADE
MR	METAL ROOF
OFC	OFF FORM CONCRETE
PT	PAVED TERRACE
TV	TIMBER FRAME WINDOW
TD	TIMBER FRAME DOOR
TV	TIMBER FRAME VENT

ROOF/SITE/DEMOLITION PLAN LEGEND

---	STORM WATER DISCHARGE
---	SEWER CONNECTION TO MAIN
---	SEDIMENT FENCE DURING CONSTRUCTION

BASIX COMMITMENT

- RAIN WATER TANK MIN. CAPACITY 2000L TO BE INSTALLED IN ACCORDANCE WITH THE REQUIREMENTS OF ALL APPLICABLE REGULATORY AUTHORITIES
- FLOOR CONSTRUCTION TO BE EITHER CONCRETE SLAB ON GROUND OR SUSPENDED FLOOR/OPEN SUBFLOOR
- HOT WATER SYSTEM TO BE GAS INSTANTANEOUS WITH A PERFORMANCE OF 3 STARS OR A SYSTEM WITH A HIGHER ENERGY RATING
- MUST INSTALL A WINDOW AND/OR SKYLIGHT IN 3 BATHROOMS/TOILETS IN THE DEVELOPMENT FOR NATURAL LIGHTING

NOTE: FOR MORE DETAIL REFER TO THE BASIX REPORT

THE PROPOSED WORKS HAVE BEEN DESIGNED TO COMPLY WITH:

- NATIONAL CONSTRUCTION CODE
- STATEMENT OF ENVIRONMENTAL EFFECTS PREPARED BY DENIS FISH
- BUSHFIRE HAZARD ASSESSMENT REPORT PREPARED BY BUILDING CODE & BUSHFIRE HAZARD SOLUTIONS
- BASIX REPORT PREPARED BY VICTOR LIN & ASSOCIATES
- GEOTECHNICAL REPORT PREPARED BY WHITE GEOTECHNICAL GROUP
- FLORA AND FAUNA REPORT PREPARED BY NARLA ENVIRONMENTAL
- LANDSCAPE DESIGN PREPARED BY SELENA HANNAN LANDSCAPE DESIGN

1 Roof / Site / Demolition Plan
1:200

2 DW Section
1:200

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Tree Consultancy

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EXCELLENCE in ALL ASPECTS OF TREE MANAGEMENT

FULL INSURANCE PROTECTION

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Phone: (02) 9997-4101 Mobile: 0412-221-962 Fax: (02) 9940-0217

E-mail: kyleahill@optusnet.com.au

ABN 97 965 355 200

TREE ASSESSMENT REPORT

September 2016

Site: Lot 6 in DP 553660
41 Marine Parade
AVALON BEACH, NSW

Client: Jane Rowe
c/o Casey Brown Architects
Attn: Robert Brown
Level 1 63 William Street
EAST SYDNEY, NSW 2010
Ph: 61 2 9360 7977
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Author: Kyle A Hill
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Diploma of Horticulture–Arboriculture TAFE, Grow SA
Certificate of Horticulture, TAFE
Certificate Advanced Tree Care TAFE
Founder -Growing My Way Tree Services (1977)
Member of International Society of Arboriculture
Member of Arboriculture Australia

1 Summary

The site is known as 41 Marine Parade, Avalon Beach (the subject site from herein).

Casey Brown Architects on behalf of the property owner (Jane Rowe) has commissioned the *Growing My Way Tree Consultancy (GMW)* to prepare a *Tree Assessment Report* to be linked to a lodged *Development Application (DA No279/16)* submission for the demolition of existing residence & construction of a new residence.

One (1) tree has been identified as requiring discussion. The discussed tree is within the subject site.

The site is presently developed to contain a two (2) storey dwelling with metal roof. Motor vehicle access is only via Marine Parade. Pedestrian access is available via both Marine Parade & an informal pathway from the beach.

I, Kyle A Hill, as a qualified Practising & Consulting Arborist, have prepared this report based on “*Visual Tree Assessment*” (VTA) undertaken on Sunday, 4 September, 2016.

The sole consent authority is *Pittwater Council, (now Northern Beaches Council)*.

Information/data collection related to the one (1) tree was gathered & cross referenced using:

- *Site Survey by Hill & Blume Consulting Surveyors, dated 27-09 - 2012;*
- *Site Plans/Elevations by Casey Brown Architects, dated 18-05-2016, Rev A, drawings # A1.1, A1.2, A1.3, A1.4, A2.1 A2.2 & A2.3;*
- *Observations & data collection on site by Kyle Hill.*

The aim of this report is:

1. *To confirm the viability of the discussed tree, relating to its individual health, vigour & condition taking into account the as lodged DA submission.*
2. *Provide a “Site Specific Tree Management Plan” for the discussed/proposed to be retained tree.*

This document supports the as lodged proposal for development relative to management of the discussed tree.

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3 Introduction

This report contains observations & recommendations intended to assist in the management of the one (1) tree identified to be discussed.

The tree is a planted *Araucaria heterophylla* (A.h.) or colloquially a “Norfolk Island Pine”.

Reference to the Pittwater Council (from herein NBC) website confirms the subject site to NOT be within a “Heritage Conservation Area”, nor is the subject site located within any recognised “Wildlife Corridor”.

The tree discussed tree is subject to the “Tree Protection Provisions” within the PC Pittwater 21 Development Control Plan (P21 DCP). The specific Clause referred too relative to tree management is Control B4.22 Preservation of Trees or Bushland Vegetation.

The sole consent authority is NBC.

Information related to the discussed tree was collated during onsite data collection with cross referencing to:

- *Site Survey by Hill & Blume Consulting Surveyors, dated 27-09 - 2012;*
- *Site Plans/Elevations by Casey Brown Architects, dated 18-05-2016, Rev A, drawings # A1.1, A1.2, A1.3, A1.4, A2.1 A2.2 & A2.3;*
- *Observations & data collection on site by Kyle Hill.*

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1. *To confirm the viability of the discussed tree, relating to its individual health, vigour & condition taking into account the as lodged DA submission.*
2. *Provide a “Site Specific Tree Management Plan” for the discussed/proposed to be retained tree.*

This document supports the as lodged proposal for development relative to management of the discussed tree.

4 Methodology

Assessment of the tree has been from ground level by eye, using *Visual Tree Assessment (VTA)* techniques developed by Claus Mattheck. The principles of *VTA* are explained in his widely used reference book “*The Body Language of Trees (1994)*”.

Assessment includes:

- *Tree’s current condition & likely future health.*
- *Species tolerance to root disturbance &/or development*
- *Likely future hazard potential to persons & property*
- *Tree’s amenity value, such as significance, screening & habitat.*

No root analysis, soil testing, ‘Resistograph’® drilling or aerial canopy inspection was undertaken. See the following Appendices for further information:

- *Appendix A Glossary of Common Arboreal terms*
- *Appendix B Site Survey, Plans/Elevations with tree location plotted*
- *Appendix C Tree Management/Protection Prior to & During Determined Works*

5 Observations

5.1 The Site

The report discusses one (1) tree only. The tree is within the subject site. The site is 1515.00m² (as per site survey) in size. It is accessed via a long “battle axe” private driveway from Marine Parade.

Adjacent properties are developed & contain single dwelling residences.

The site has shallow to skeletal average topsoil depth.

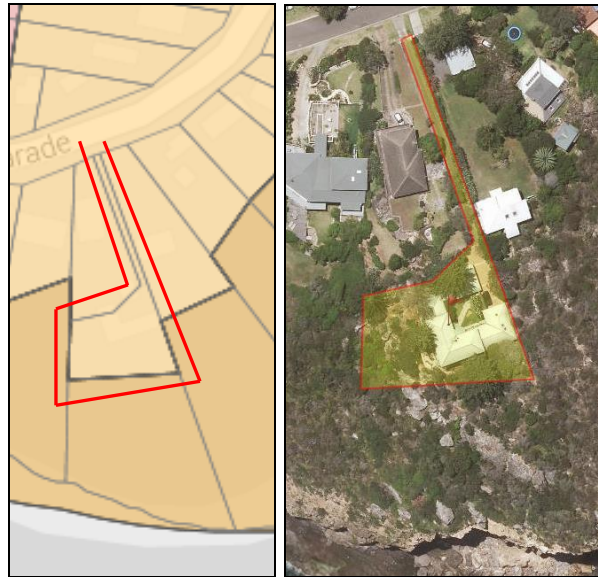


Figure 1: (Above) Map & Aerial photographs courtesy of Pittwater Council & SixMap.com

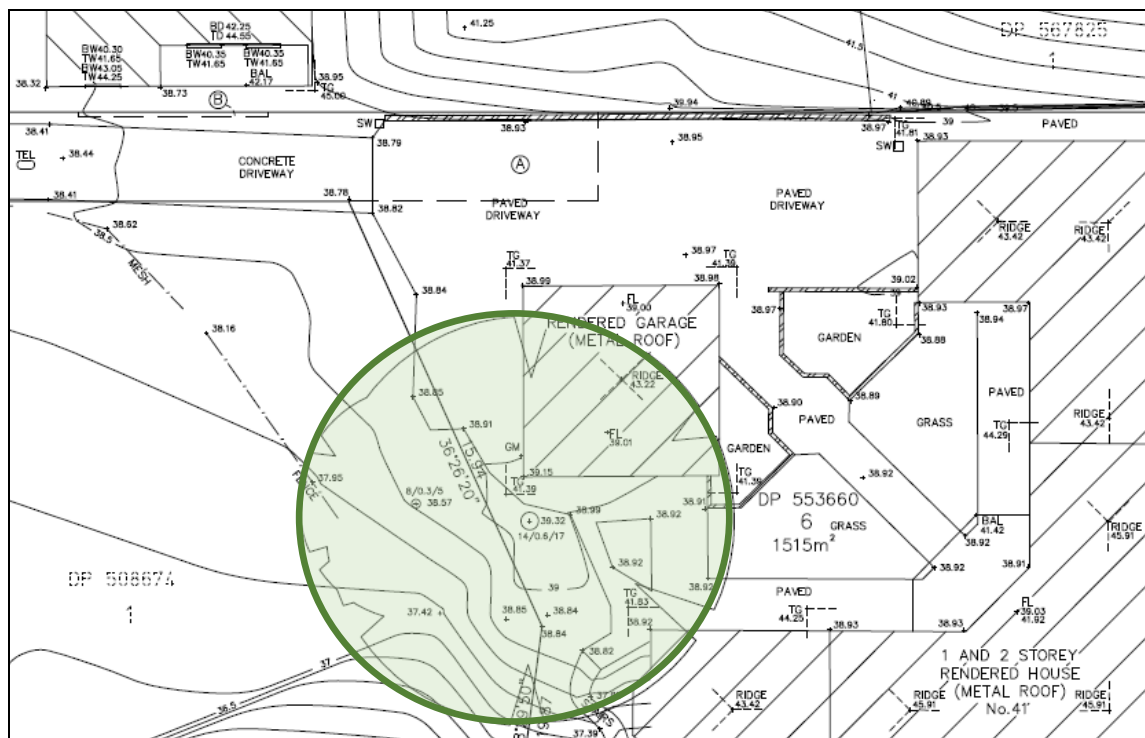


Figure 1: Portion of Site Survey illustrates location of the discussed tree.

5.2 The Proposal

The lodged *Development Application* (DA 279/16) supports:

- The retention of the discussed tree on the grounds of landscape (both private & public) amenity.

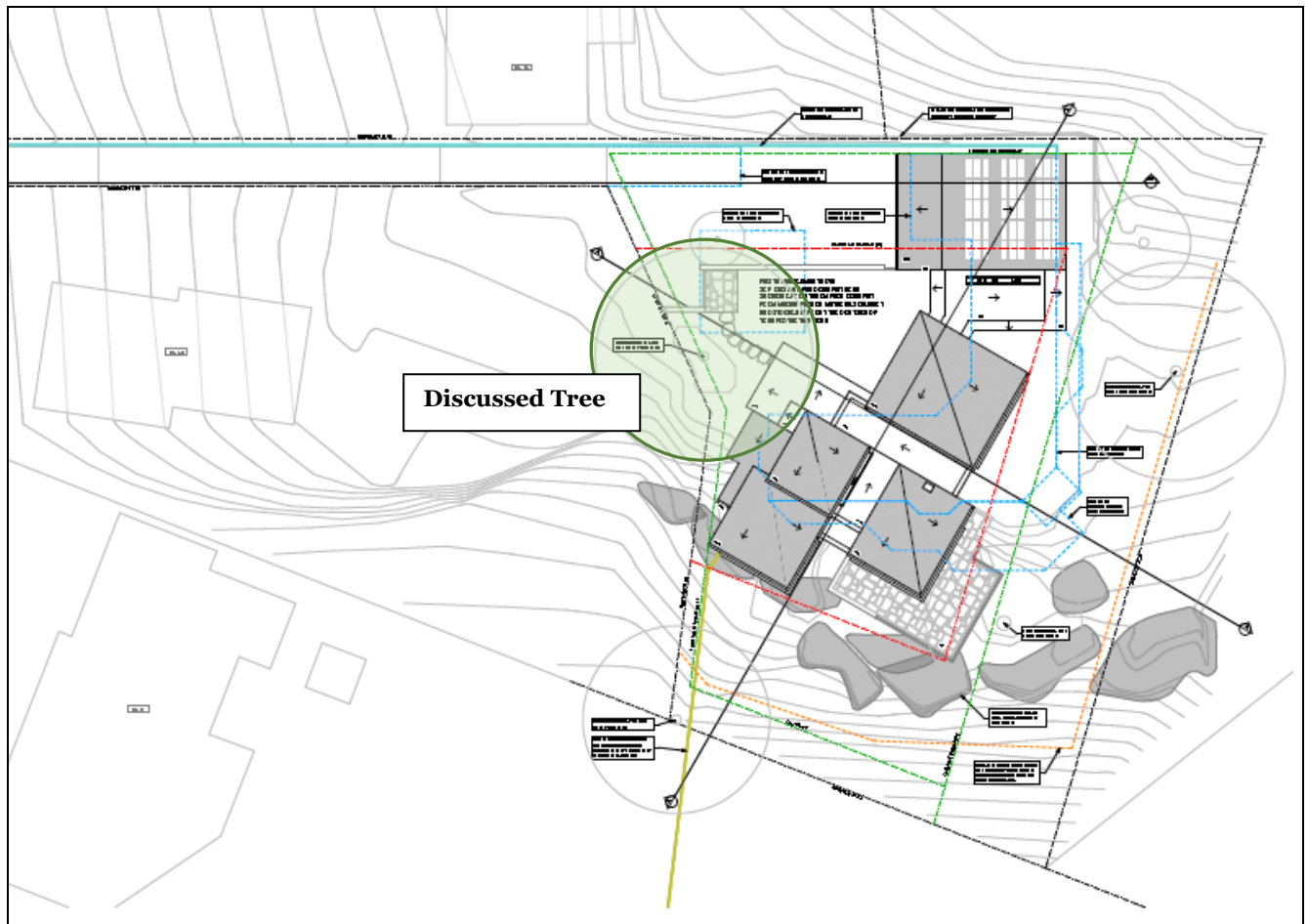


Figure 2: Illustrates as lodged Site Plan, note proposed works in the main are significantly further away than existing structures (proposed to be demolished).

5.3 *Tree & Site Images*



Figure 3: Illustrates location of Tree #1.



Figure 4: Illustrates tree trunk location & existing competing structures.



Figure 5: Illustrates discussed tree canopy.

5.4 The Trees – Summary Table

Read this table in conjunction with Appendix A– Common Arboreal Terms

Trees Recommended for removal

Trees Recommended for retention

Exempt species

Trees retainable but of low amenity

	Identification	Height (m)	Crown (m)	DBH (m)	TPZ	SRZ	Age	Health / Vigour	Structure	Significance / Retention Value	Comments
1	<i>Araucaria heterophylla</i> Norfolk Island Pine	19.0– 12.0	13.50– 14.50	0.70	8.40	3.17	M	Good & Good	Typical	Medium / Medium	Retain & Protect: Tree is easily retained, protected & managed prior to & during the proposed redevelopment of this site.

6 Discussion

This document has been prepared to compliment the lodged Development Application (DA 279/16) submission which highlights the support for the retention & protection of the one (1) discussed A.h. tree. (See page 6 of this document (portion of site survey) for confirmation of the discussed tree location.)

NBC Tree Management & Protection Policy confirms the discussed tree to be protected by virtue of size & specie.

The subject site is not within a designated “Heritage Conservation Area”, nor is the site identified as being within any recognised “wildlife corridor”.

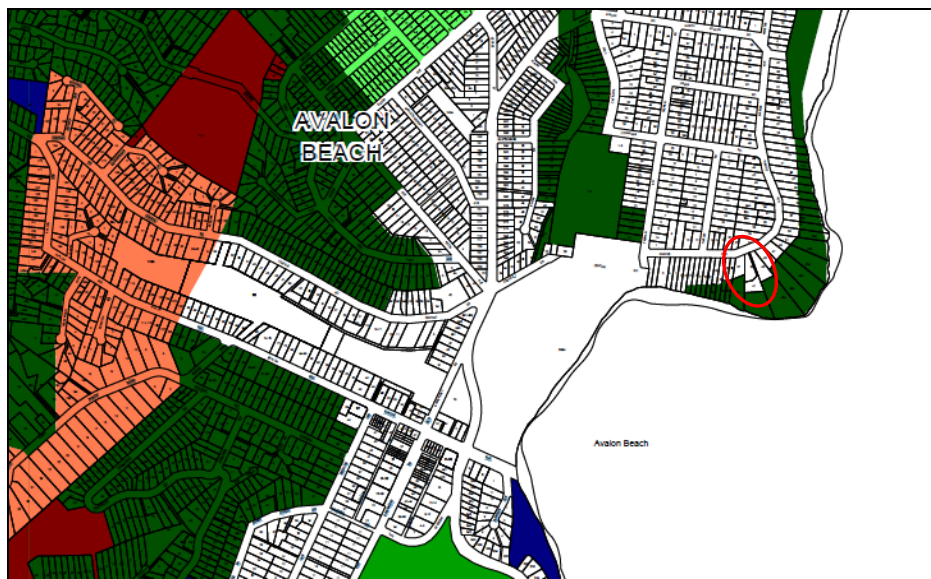


Figure 6: Illustrates subject site is not in a designated “wildlife corridor”. Map courtesy of Pittwater Council.

The two (2) A.h. trees within the subject site (41 Marine Parade) are presumed to have long term Useful Life Expectancies. A third same specie tree is planted within the 37/39 Marine Parade properties. It is also presumed to have a long term Useful Life Expectancy. This tree is noted to be very close to the common boundary shared with the 41 Marine Parade property but is well away from any impact that could reasonably be predicted to compromise its Useful Life Expectancy.

The proposed (by lodged DA submission) new residence requires an 18.15m² breach of the total 222.00m² Tree Protection Zone surface area. This equates to a less than 10% (i.e. 8.2%) total Tree Protection Zone surface area (222.00m²) breach by definitions within the Australian Standard (AS4970-2009 Protection of trees on development sites). As such the breach is considered to be minor & therefore

acceptable with implementation of a “Site Specific Tree Management Plan”.



Figure 7: Illustrates subject tree (yellow circle) plus same specie trees within or near the subject site (red circles). Photo courtesy of NearMap 4 July 2016.

7 Site Specific Tree Management Plan

- Install temporary metal mesh fencing as close to 8.40m TPZ radial distance as site restrictions/proposed works allow.
- Prior to the proposed demolition of existing structures install a “Tree Trunk Guard” (see Appendix C) to a height not less than first whorls of branches (approximately 3.00m). Photographic evidence is essential.
- No demolition or builder’s material of any description (including loose soil) is to be stored within the 8.40m TPZ radial distance.
- Any excavation required within TPZ radial distance, i.e. the identified 8.2% breach of total TPZ surface area **MUST BE UNDERTAKEN MANUALLY**. Photographic evidence is essential.

- Any “live tree root” less than 0.05m/50mm in diameter exposed by the manual excavation process may be cleanly severed without the input of the sites retained Practicing/Consulting Arborist. Photographic evidence is essential.
- Any “live tree root” greater than 0.05m/50mm in diameter **REQUIRES THE DIRECT INPUT OF THE SITES RETAINED PRACTICING/CONSULTING ARBORIST.** This person is to develop a “root by root” management strategy with both written & photographic evidence confirming the strategy adopted & deemed to be closest to best practice for the specific site.
- Any pruning required (not foreseen) must address both NBC “Tree Management Provisions” as well as be compliant with the *Australian Standard (AS4373-2007 Pruning of amenity trees)*.

8 Recommendations

Recommendation is made that:

- **The DA submission relative to the retention & management of the discussed tree be conditionally determined by NBC planning assessment officers.**
- **The “Site Specific Tree Management Plan” be stringently applied so as to achieve an Arboriculture “best practice” outcome.**

If you have any questions relating to this report or implementation of recommendations, please contact Kyle Hill on 0412-221-962.

Yours faithfully,



Kyle A. Hill (Practicing & Consulting Arborist)

9 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, & directly attached to that submission, report or presentation.

10 Assumptions

Care has been taken to obtain information from reliable resources. All data has been verified insofar as possible; however, Growing My Way Tree Services, 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 & reflects the condition of the trees at the time of inspection.

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.

11 Recommended References

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

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

Dr. G. Watson & Dr. D. Neely, '*Trees & Building Sites*', LSA Illinois USA 1995

Dr. N. Matheny & Dr. J.R. Clark, '*Trees & Development*', ISA Illinois USA 1998

Phillip J. Craul, '*Urban Soil in Landscape Design*', J. Wiley & Sons, New York USA 1992

12 Selected Bibliography

Hitchmough, J.D. 1994. '*Urban Landscape Management*', Inkata Press, Sydney.

Mattheck, C. & Breloar, H. 1994 '*Body Language of Trees*', The Stationery Office, London.

AS 4373:2007, '*Pruning of Amenity Trees*', Standards Australia.

AS 4970:2009, '*Protection of Trees on Development Sites*', Standards Australia.

BS 5837:2005, '*Guide for Trees in Relation to Construction*', Standards Board, UK.

Appendix A – Glossary

Glossary of common Arboreal terms

- Age:**
- I** *Immature* refers to a well-established but juvenile tree
 - SM** *Semi-mature* refers to a tree at growth stages between immaturity & full size
 - M** *Mature* refers to a full sized tree with some capacity for further growth
 - LM** *Late Mature* refers to a full sized tree with little capacity for growth that is not yet about to enter decline
 - OM** *Over-mature* refers to a tree about to enter decline or already declining
 - LS** *Live Stag* refers to a tree in a significant state of decline. This is the last life stage of a tree prior to death

Hth & Vig Health & Vigour

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

Excellent (E), V. Good (VG), Good (G), Fair (F), Declining (D), Poor (P), Very Poor (VP)

Vigour refers to the tree's growth rate/condition as exhibited by the crown density, leaf colour, presence of epicormic shoots, ability to withstand disease invasion & the degree of dieback. Classes are:

Excellent (E), V. Good (VG), Good (G), Fair (F), Declining (D), Poor (P), Very Poor (VP)

Diameter at Breast Height (DBH) refers to the tree trunk diameter at breast height (1.4 metres above ground level)

Critical Root Zone (CRZ) refers to a radial offset of five (5) times the trunk DBH measured from the centre of the trunk. This zone is often the location of the tree's structural support roots

Primary Root Zone (PRZ) refers to a radial offset of ten (10) times the trunk DBH measured from the centre of the trunk. This zone often contains a significant amount of (but by no means all of a tree's) fine, non-woody roots required for uptake of nutrients, oxygen & water

Tree Protection Zone (TPZ) is a "No Go Zone" surrounding a tree to aid in its ability to cope with disturbances associated with construction works. Tree protection involves minimising root damage that is caused by activities such as construction. Tree protection also reduces the chance of a tree's decline in health or death & the possibly damage to structural stability of the tree from root damage

To limit damage to the tree, protection within a specified distance of the tree's trunk must be maintained throughout the proposed development works. No excavation, stockpiling of building materials or the use of machinery is permitted within the TPZ

Using the *British Standard for Trees on Construction Sites* (BS 5837:2005), a TPZ is calculated based on the age of the tree, (young, middle aged or mature), the trunk diameter at D.B.H. & the tree's vigour. A TPZ is required for each tree or group of trees within five metres of building envelopes.

Stem/bark inclusion refers to a genetic fault in the tree's structure. This fault is located at the point where the stems/branches meet. In the case of an inclusion this point of attachment is potentially weak due to bark obstructing healthy tissue from joining together to strengthen the joint

Decay refers to the break down tissues within the tree. There are numerous types of decay that affect different types of tissues, spread at different rates & have different affect on both the tree's health & structural integrity

Point of Attachment refers to the point at which a stem/branch etc joins

Dead wood refers to any whole limb that no longer contains living tissues (eg live leaves &/or bark). Some dead wood is common in a number of tree species

Die back refers to the death of growth tips/shoots & partial limbs. Die back is often an indicator of stress & tree health

One dimensional crown refers to branching habits & leaves that extend/grow in one direction only. There are many causes for this growth habit such as competition & pruning

Crown Foliage Density of Potential (CFDP) refers to the density of a tree's crown in relation to the expected density of a healthy specimen of the same species. CFDP is measured as a percentage

Epicormic growth/shoots refer to growth/shoots that are/have sprouted from axillary buds within the bark. Epicormic growth/shoots are a survival mechanism that often indicates the presence of a current or past stress even such as fire, pruning, drought etc

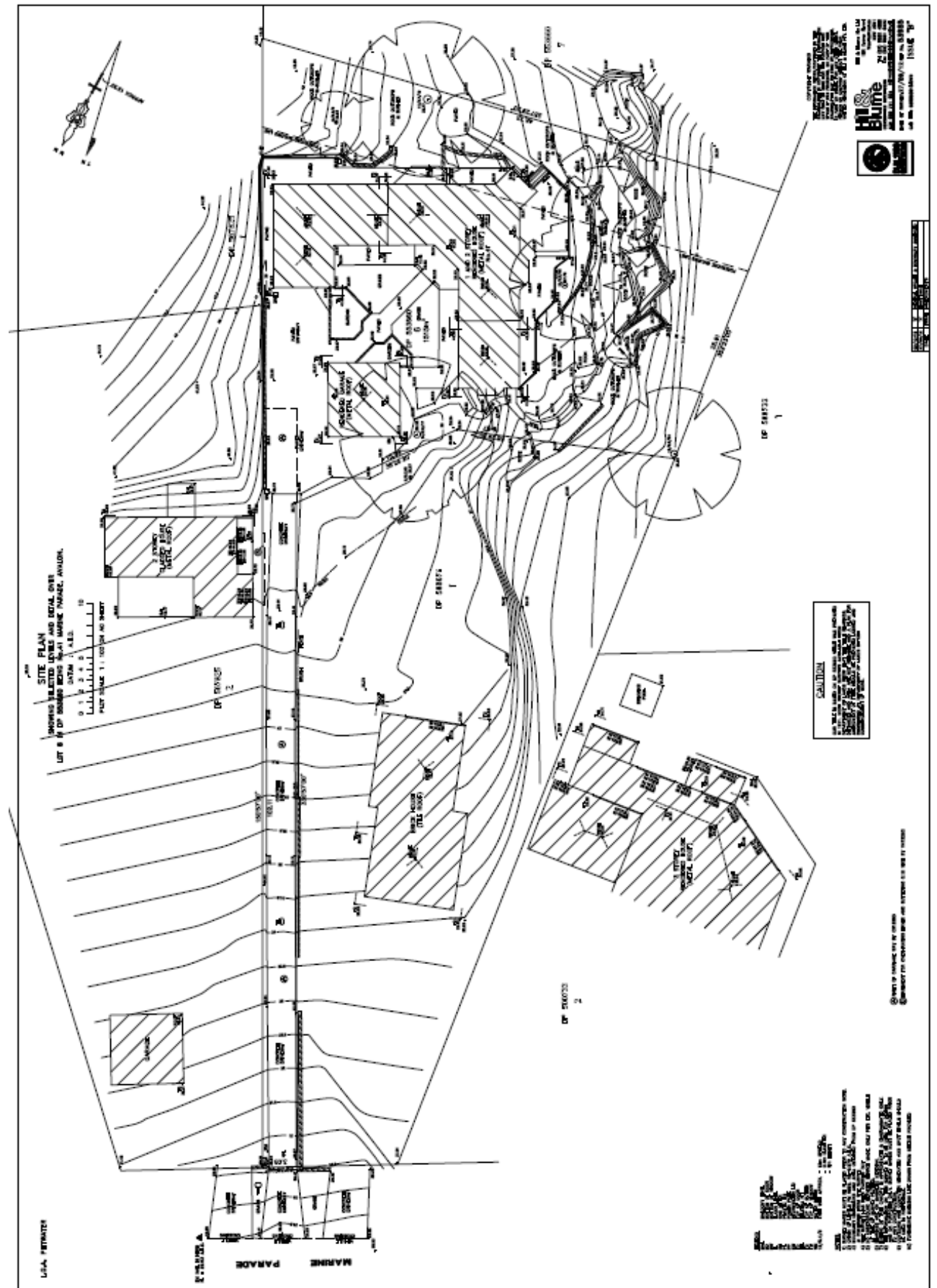
Over Head Powerlines (OHP) refers to over head electricity wiring

LVOHP Low Voltage Over head Powerlines

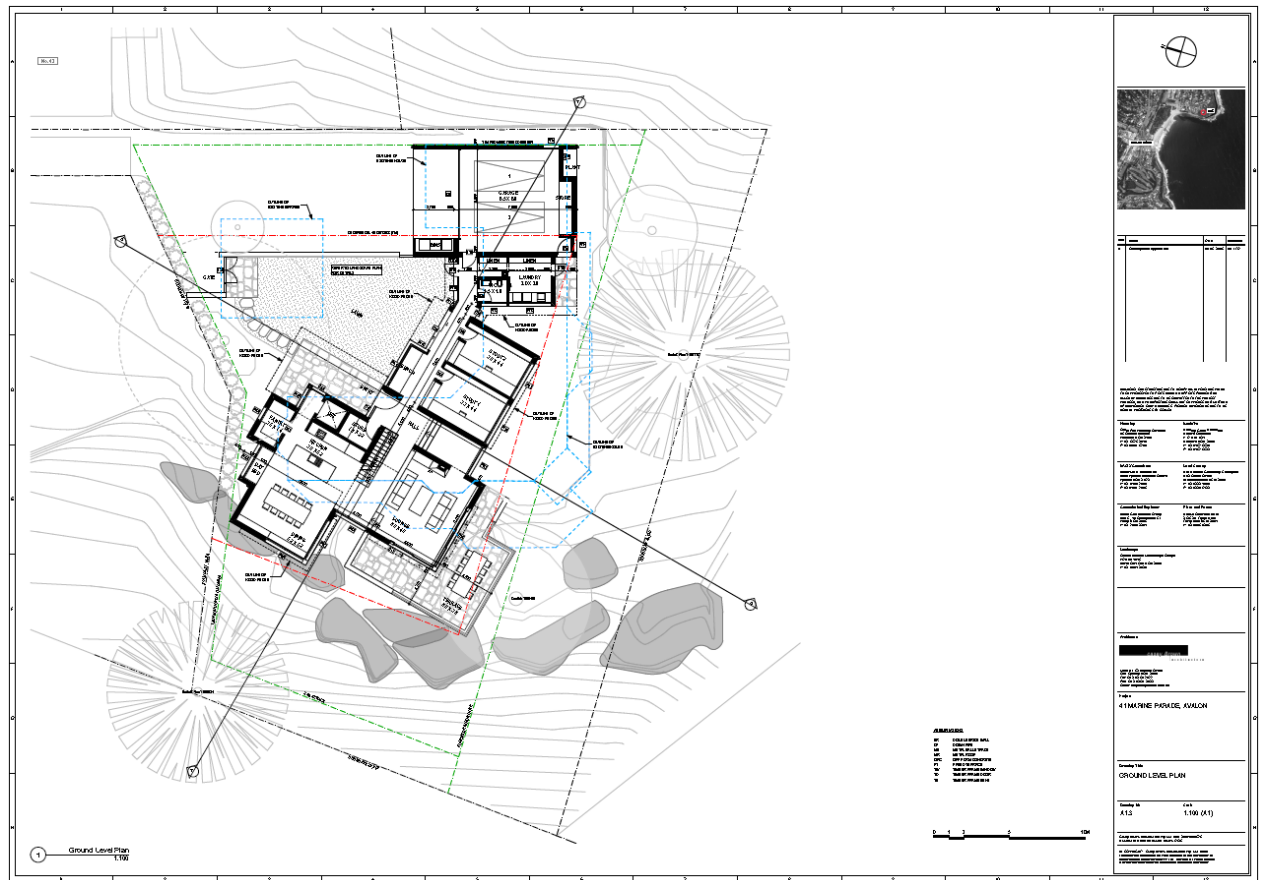
HVOHP High Voltage Over head Powerlines

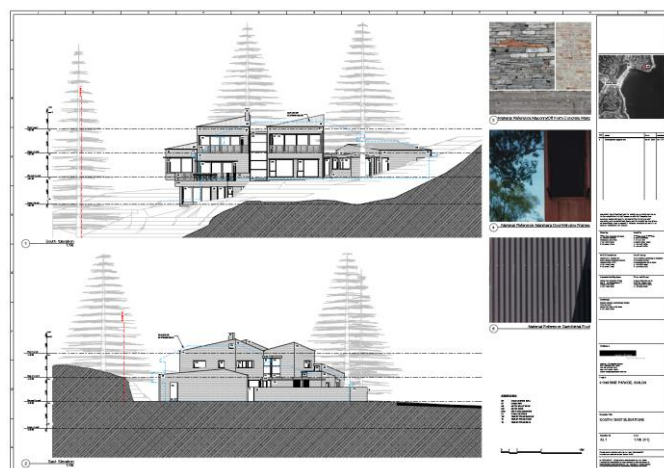
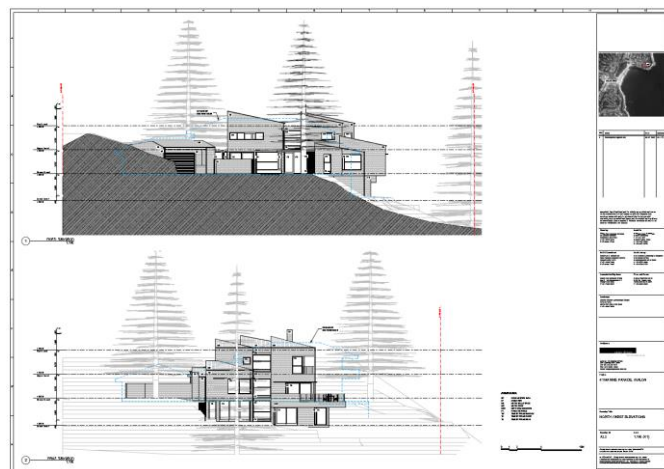
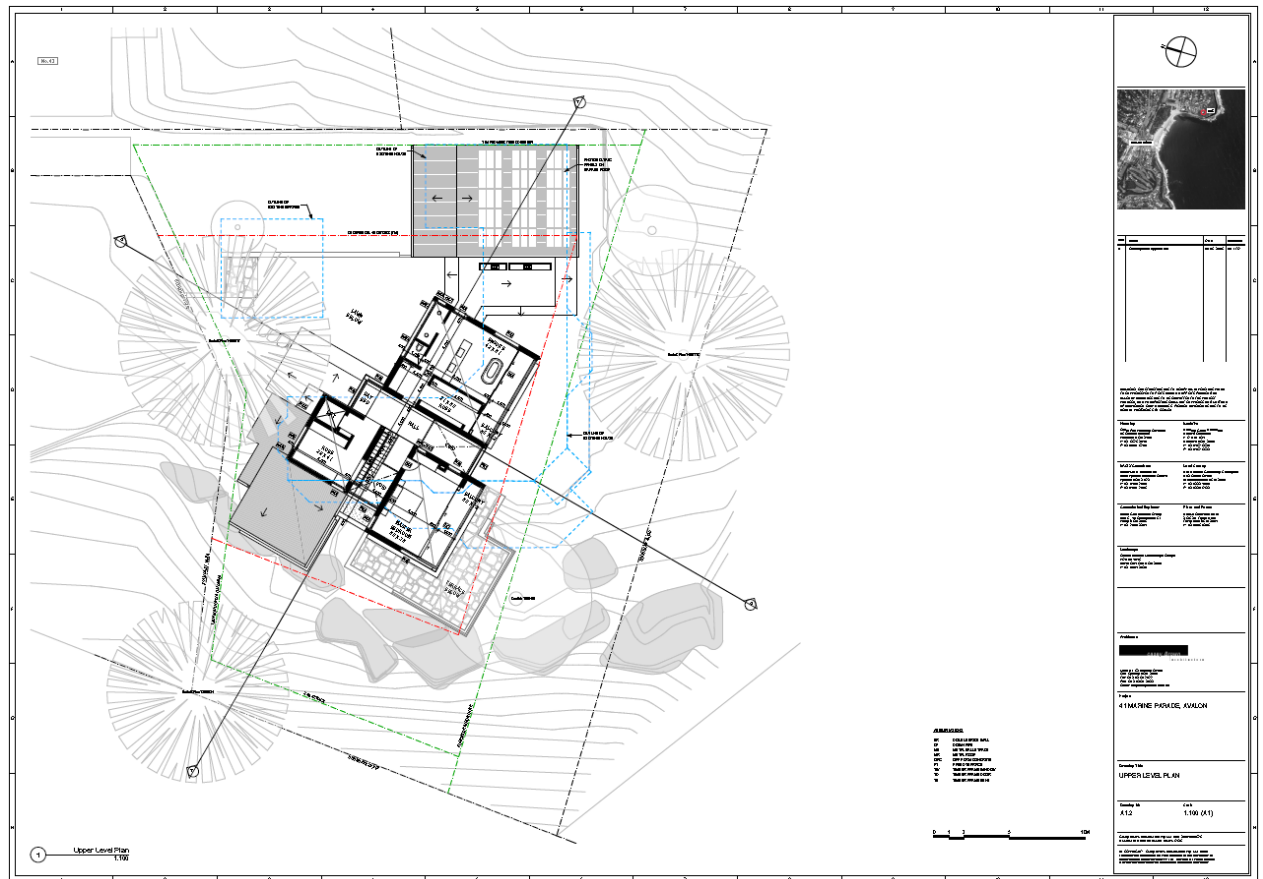
ABC Aerial Bundled Cable

Appendix B –Site Survey, Plans/Elevations









Appendix C – Tree Protection/Management Prior to & During Determined Works

The installation of Tree Protection Zone (TPZ) fencing is to be carried out prior to commencement of all works. The most suitable fencing material is 1.8m tall chain link mesh with 50mm metal pole supports, see **detail 1: tree protection fencing**.

A mulch layer of composted leaf & woodchip to a depth of 75mm is required within the TPZ to aid in retention of soil moisture & to protect soil from contaminants. Water is to be applied by hand held or soaker/leaky hose within TPZ as required & in Accordance with Stage 3 Water Restrictions. Watering is to be carried out by either an Arborist or is to form part of the Builder's/Contractor's contract, with recommended monthly checks by an Arborist.

There is to be no stock piling of building material (including waste), machinery or any other item within TPZ of any retained tree. Access to personnel & machinery, & storage of fuel, chemicals, cement or site sheds is prohibited

Regular monitoring of protected trees during development works for unforeseen changes or decline, will aid in the success & longevity of the retained trees.

