ACS Environmental Pty Ltd

BIODIVERSITY MANAGEMENT PLAN

FOR

PROPOSED DEVELOPMENT

AT

168 WHALE BEACH ROAD,

WHALE BEACH NSW 2107

Prepared for:

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Whale Beach

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GLOSSARY & ABBREVIATIONS

AIA - Arboricultural Impact Assessment

BC ACT (2016) - Biodiversity Conservation Act

BMP - Biodiversity Management Plan

CRZ - Core Riparian Zone

DAWE - Dept of Agriculture, Water and Environment

DPIE - Dept Planning, Industry and Environment

EEC - Endangered Ecological Community

EPA Act – Environment Protection Act

EPBC Act – Environment Protection and Biodiversity Conservation Act

MZ - Management Zone

NPWS – State National Parks and Wildlife Service

OEH – Office of the Environment and Heritage

RoTAP – Rare and Threatened Australian Plants

SMCMA – Sydney Metropolitan Catchment Management Authority

SRZ - Structural Root Zone

SULE - Safe Useful Life Expectancy

TPZ– Tree Protection Zone

VMP - Vegetation Management Plan

Biodiversity Management Plan

168 WHALE BEACH ROAD, WHALE BEACH

1 INTRODUCTION

1.1 AIMS

A Biodiversity Management Plan (BMP) is a map-based report intended to assist the landowner to manage a site to ensure that biodiversity on the site is protected, maintained and enhanced. The aim of a BMP is to provide a working document that will successfully protect, maintain and enhance the subject site's native vegetation both for immediate rehabilitation purposes and also for maintenance into the future. The BMP provides quantifiable goals and strategies on how this can be achieved.

1.2 OBJECTIVES

The BMP must contain sufficient detail on how the aims can be achieved. The objectives should be related to ensuring that biodiversity values on the site are improved or maintained and ensuring that the development does not result in an overall decline in biodiversity value.

The objectives include the following:

- to conserve and preserve any existing remnant native vegetation;
- to maintain an area of APZ in perpetuity;
- to enhance habitat for natural vegetation and native animals;
- to undertake native vegetation protection measures; and
- to manage weed incursions by removal of existing weeds and management of potential future occurrences

2 SITE DESCRIPTION

2.1 PROPOSAL

'ACS (Actinotus Consultancy Services) – Environmental' was commissioned by Mr Marcus Ayres to prepare a BMP for a proposed building development on an area of land of area 2,825m^2 currently occurring as natural bushland at 168 Whale Beach Road. Figure 1 indicates the subject land in relation to surrounding allotments in the locality.

The proposal is to construct a new residential dwelling on the eastern flank of the land with associated swimming pool at the subject address. Figure 2 is a schematic representation of the house plan in relation to the site and the small area of bushland directly to the west of the building site which will be modified to establish an APZ.

2.2 LANDSCAPE AND ECOLOGICAL COMMUNITY OCCURRING AT SUBJECT LAND

The site is an extended, relatively narrow block of land about 120m in length over its greater part and about 22m wide at its median width (Figure 1).

From the hill crest the site has an easterly aspect with gradients to 10^O - 15^O and a westerly aspect with gradients to 5^O - 10^O from the hill crest (Figure 1).

The local substrate geology of the hillcrest at the subject area at 168 Whale Beach Road, Whale Beach, occurs at the boundaries of the lower strata of the Hawkesbury Sandstone overlying sediments of the Narrabeen Sandstone.

On the eastern hill slope, the vegetation includes emergent individuals of low to medium tall trees of Coast Mahogany, Coast Banksia, Hickory Wattle and Forest Oak (Figure 3) and is best described as Coastal Sandstone Foreshores Forest.

On the western hillslope, the vegetation occurs on Narrabeen Sandstone sediments and is described as Pittwater Spotted Gum Forest, an endangered ecological community characterised by tall trees of Spotted Gum, Grey Ironbark and Forest Oak (Figure 4). This bushland occurring on the western flank will be preserved with some bush regeneration and weed removal works undertaken to enhance the habitat elements of this vegetation.

Figure 1 - Subject land at 168 Whale Beach Road, Whale Beach (blue marker), with long axis from east to west in relation to adjoining allotments, indicating cleared areas on eastern flank of the property (Nearmap 2021)

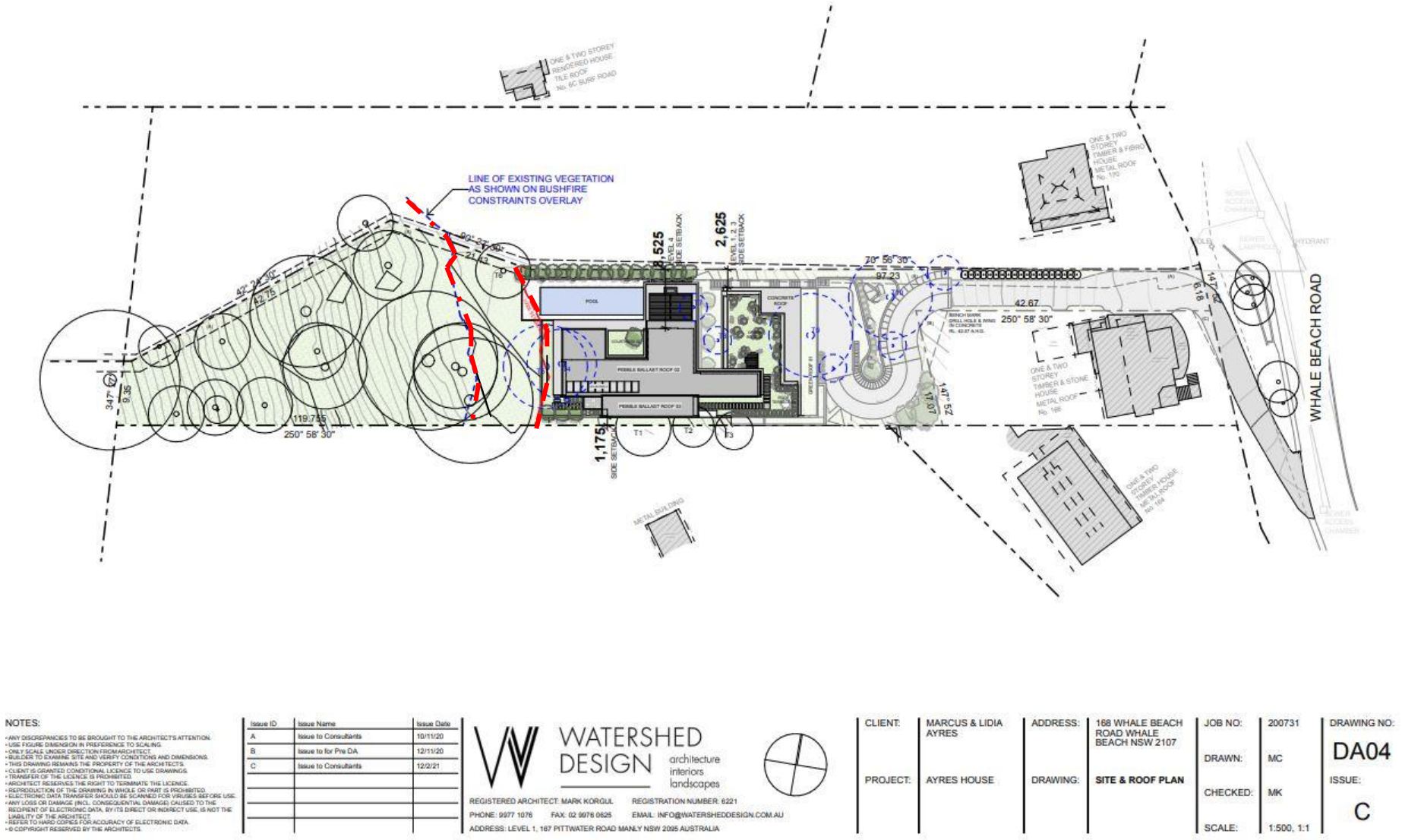

Figure 2 - Site and roof plan of proposed residence on eastern hillslope with retained bushland on western flank of 168 Whale Beach Road, Whale Beach

Figure 3 - Eastern hillslope with weedy scrub vegetation and emergent trees of Bangalay

Figure 4 - Western flank of subject land with tall trees of Grey Ironbark and Spotted Gum with weedy scrub understorey

2.3 IMPACTS TO VEGETATION AT SITE

Figure 5 is a site plan indicating the position of the proposed dwelling in relation to proposed tree retention and tree removal within the eastern hillslope of the site, plans prepared by Peake Arboriculture (2020).

The proposed development will impact all the trees occurring on this eastern hillslope including for the construction of the dwelling with associated driveway, garages, pathways, swimming pool and general landscaping (Figure 2). These developments would involve construction activities including regrading site levels by excavation, cut/fill processes and trenching. Tree Nos. 7, 8, 9 and 10 require removal as they occur within the building footprint (Figures 2 & 5)

Three small trees with stems occurring in the neighbouring property to the south, that is Tree Nos. 1, 2 and 3 (Two individuals of Hickory Wattle and one of Bangalay) are not proposed for removal (Figures 2 & 5). However, as indicated by Peake (2020), Tree No. 1, an individual of Bangalay, has a split lignotuber at the base contributing to a lower SULE (Safe Useful Life Expectancy), as has Tree No. 3, an individual of Hickory Wattle, that has a failed inclusion or split at co-dominance of two branching stems (Peake 2020).

The other proposed impact on trees on site includes the establishment and maintenance of the Asset Protection Zone (APZ) that complies with a Bushfire Attack Level (BAL) rating of Flame Zone (FZ). The APZ wholly comprises an Inner Protection Area (IPA) of 10m distance from the dwelling walls on its western side. Tree Nos 4 and 5, both small individuals of Bangalay to 7m tall, occur within this designated APZ and require removal (BC & BHS 2021) (Figures 2 & 5).

For the IPA, the tree canopy is required to be reduced to a maximum of 15% and canopies separated by from 2 - 5m, and with the shrub stratum reduced to a maximum cover of only 10% and formed into discrete clumps *(PfBP 2019)*.

Only one tree, an individual of Bangalay (*Eucalyptus botryoides*), (Tree No 6 in Peake 2020) will be retained within the IPA (Figures 2 & 5).

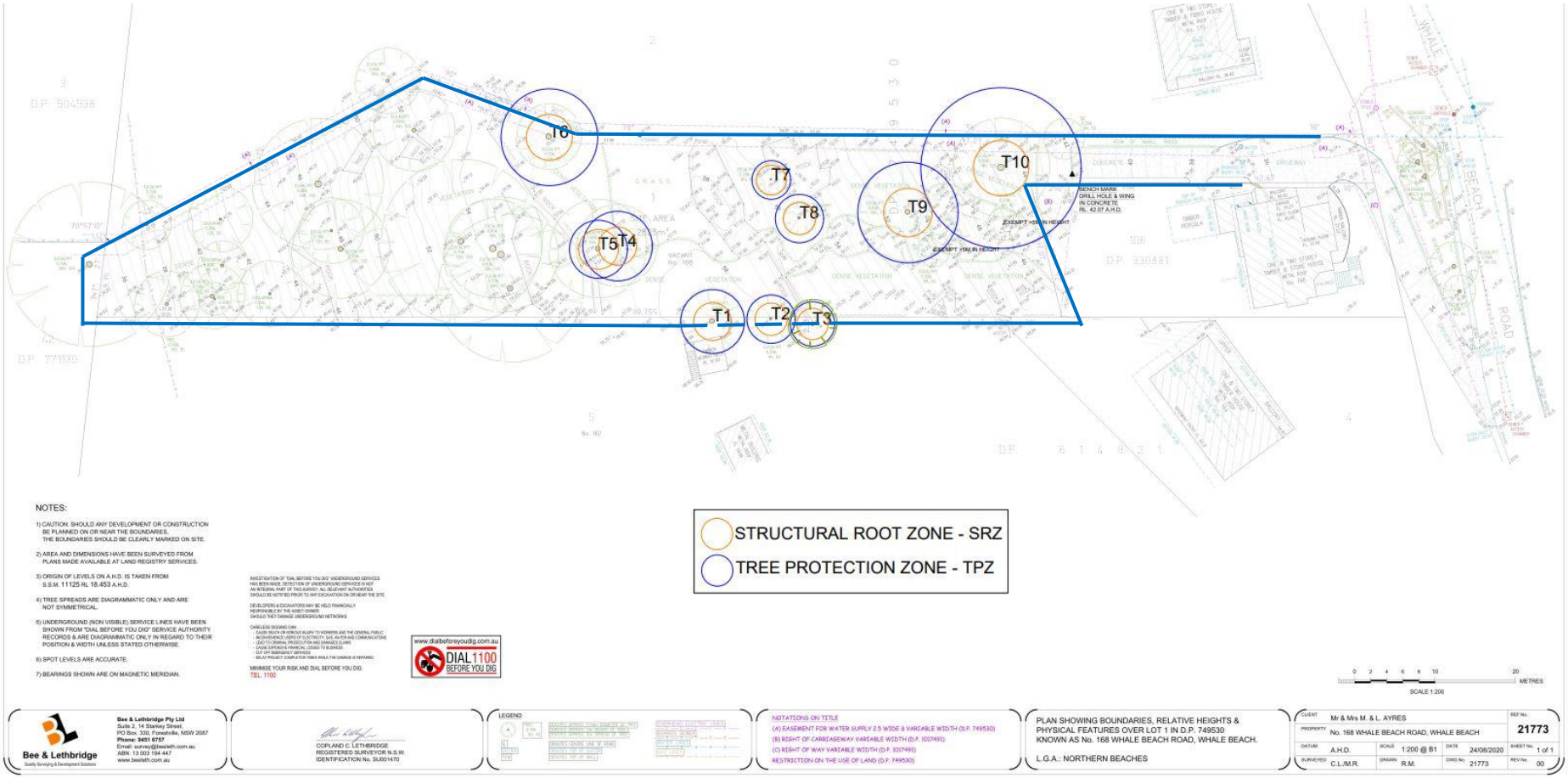

Figure 5 - Subject land at 168 Whale Beach Road, Whale Beach, indicating location of 10 trees, all of which will be removed for the building construction except for Tree No. 6 (Bangalay) which occurs within the APZ. All trees are individuals of Bangalay, except for Tree Nos. 2 & 3 which are Hickory Wattle (*Acacia implexa*) and Tree No. 7 which is an individual of Coast Banksia (*Banksia integrifolia*) (from Peak Arboricultural 2020)

3 COUNCIL PLANNING INSTRUMENTS

The subject site occurs within the Northern Beaches Local Government Area and development must comply with the Northern Beaches Council Former Pittwater Local Environmental Plan (2014) and Northern Beaches Former Pittwater 21 Development Control Plan (2004).

4 PURPOSE OF PLAN

This plan outlines details of the following measures required to afford sustainable long term management of the environment at the subject site:

1. Tree protection measures for significant remnant trees, including habitat trees, occurring within the APZ at the subject site;
2. Establishing and maintaining in perpetuity an effective APZ consisting of a discrete IPA and OPA;
3. Identification and removal of weeds including any High Threat Weeds (HTW), including woody HTW weeds that may establish at the site, and monitoring any future occurrences and maintaining removal and control of weeds including any HTW weeds; and
4. Minimising erosion resulting from construction activities.

5 CONCOMITANT REPORTS

Concomitant reports to be read in conjunction with this BMP include the following:

- ACS Environmental P/L (2020) Flora and fauna surveys and Biodiversity Impact Assessment Report for 168 Whale Beach Road, Whale Beach
- BC & BHS (2021) Bushfire Risk Assessment for 168 Whale Beach Road, Whale Beach
- Peake Arboriculture (2020) Arboricultural Impact Assessment at 168 Whale Beach Road, Whale Beach
- Watershed Design (2020) Sketch Design of residence at 168 Whale Beach Road, Whale Beach
- Harrisons Landscaping (2021) Landscape Plan for 168 Whale Beach Road, Whale Beach

6 VEGETATION

The subject land has been highly degraded with dense patches of weed infestation comprising up to 70% of the vegetation, particularly on the eastern hill slope, the vegetation including emergent individuals of low to medium tall trees of Coast Mahogany (Bangalay), Coast Banksia, Hickory Wattle and Forest Oak (ACS Environmental Pty Ltd 2020).

On the western hillslope, the vegetation occurs on Narrabeen Sandstone sediments and is described as Pittwater Spotted Gum Forest, an endangered ecological community characterised by tall trees of Spotted Gum, Grey Ironbark and Forest Oak (ACS Environmental Pty Ltd 2020).

The principal weed species occurring at the site include Lantana, Ground Asparagus, Privet, Mickey Mouse Plant, Crofton Weed and Morning Glory (ACS Environmental Pty Ltd 2020), with a suite of other exotic herbaceous weed species occurring at lower frequency.

7 POTENTIAL IMPACTS OF PROPOSED DEVELOPMENT

The principal elements of the vegetation and related landscape features that will require to be managed include the following:

7.1 POTENTIAL IMPACTS OF PROPOSED DEVELOPMENT ON FAUNA HABITATS

In a previous report it was assumed that a stag occurring at the hillcrest was located within the subject property (ACS Environmental Pty Ltd 2020), however, on closer inspection and according to the owner, this stag actually occurs on the neighbouring property to the north and will not be impacted.

There is a small hollow in an individual of Bangalay (Tree No. 9 in Peake 2020) on the lower eastern hillslope of the subject land (Figure 6). This hollow may be suitable habitat for small birds or microchiropterans and must be inspected for potential occurrence of any fauna before felling of the tree.

To compensate for any loss of potential fauna habitat a total of two nest boxes suitable for small to medium sized birds and two bat boxes must be installed at heights of about 5 - 10m on trunks of existing trees in suitable locations.

Figure 6 - Small hollow occurs about 2m from ground in Tree No. 9 (Coast Mahogany in Peake 2020 in Figure 5)

7.2 POTENTIAL IMPACTS OF PROPOSED DEVELOPMENT ON TREE POPULATIONS

Native trees - area of Building Footprint

The stems of Tree nos. 1, 2 and 3 occur in the neighbouring property at 162 Whale Beach Road. Tree nos. 1 and 3 have major defects which may reduce their SULE (Peake 2020). However, none of these individuals are proposed for removal (Peake 2020).

For the building envelope, 4 individuals, 3 of Bangalay and one of Coast Banksia, are required to be removed (Figures 2 & 5) (Peake 2020).

Native trees - area of APZ (IPA)

Proposed activities that impact trees on site includes the implementation of an Asset Protection Zone (APZ) that caters to a Bushfire Attack Level (BAL) rating of Flame Zone requiring an Inner Protection Area (IPA) of 10m width from the forest that occurs to the west of the proposed building (Figure 2). The supplied Bushfire Risk Assessment prescribes these areas to be modified to a point where:

- in the IPA, the mature tree canopy does not exceed 15%; the shrub canopy does not exceed 10%; and grasses kept to <100mm in height with no leaf litter or debris in the ground stratum.

Native trees to be retained within the APZ will require special safeguards to maintain condition and protection amongst other less mature trees and shrubs that will require removal to provide for an effective APZ.

Two individuals, Tree Nos 4 and 5, both small individuals of Bangalay to 7m tall, occur within this designated APZ and require removal (BC & BHS 2021) (Figures 2 & 5).

Native trees - total number proposed for removal and compensatory planting

A total of 6 trees including 5 individuals of Bangalay and one of Coast Banksia are required to be removed to satisfy the proposal.

It is required that a total of 6 native trees (preferably 5 of Bangalay and one of Coast Banksia) be planted to compensate the loss of these 6 trees. This compensatory planting could be incorporated into the landscape plan or into the area of the APZ as long as at maturity, the tree cover was no greater than 15% of the area of the IPA.

Additionally, one or two individuals of Bangalay could be planted in the upper reaches of the PSGF after weeds had been cleared, as this species is also typical of this community (OEH 2016).

7.3 POTENTIAL IMPACTS OF WEED INCURSION

Identification and removal and control of High Threat Weeds (HTW) throughout the property

A high incidence of several species of High Threat Weeds (HTW) (DPIE 2021) were observed within the assemblage at the eastern hillside of the property as well as amongst elements of native vegetation on the western flanks of the property.

The vegetation would be wholly cleared on the eastern hillslope with weeds disposed of in an appropriate manner at a licenced disposal facility.

However, on the western hillslope, weeds must be discretely removed in a staged removal process allowing assisted regeneration to occur with some augmented planting of Pittwater Spotted Gum Forest species undertaken where required.

7.4 POTENTIAL IMPACTS OF SOIL EROSION

Minimising erosion and sediment movement during and after construction

Silt fencing must be placed at strategic locations along the eastern hillslope to prevent erosion and sediment movement downslope during and following construction until such time as soil stability has been attained.

8 MANAGEMENT ZONES OF THE BMP

Due to the relatively small area subject to this BMP, three distinct management zones are appropriate. Figure 7 is a schematic overlay of Figure 2 that indicates the diagrammatic representation of these three zones of management that are applicable to the development proposal.

From Figure 7 the three discrete management zones applicable to the biodiversity management of vegetation at the subject site are denoted as follows:

1 - light blue outline (dwelling house, associated structures and landscaped areas)

2 - red outline (IPA where tree cover thinned to 15%; shrub cover to 10%)

3 - dark green outline (residual native Pittwater Spotted Gum Forest vegetation occurring outside APZ area)

Note: Brown dashed outlines represent position of sediment fencing

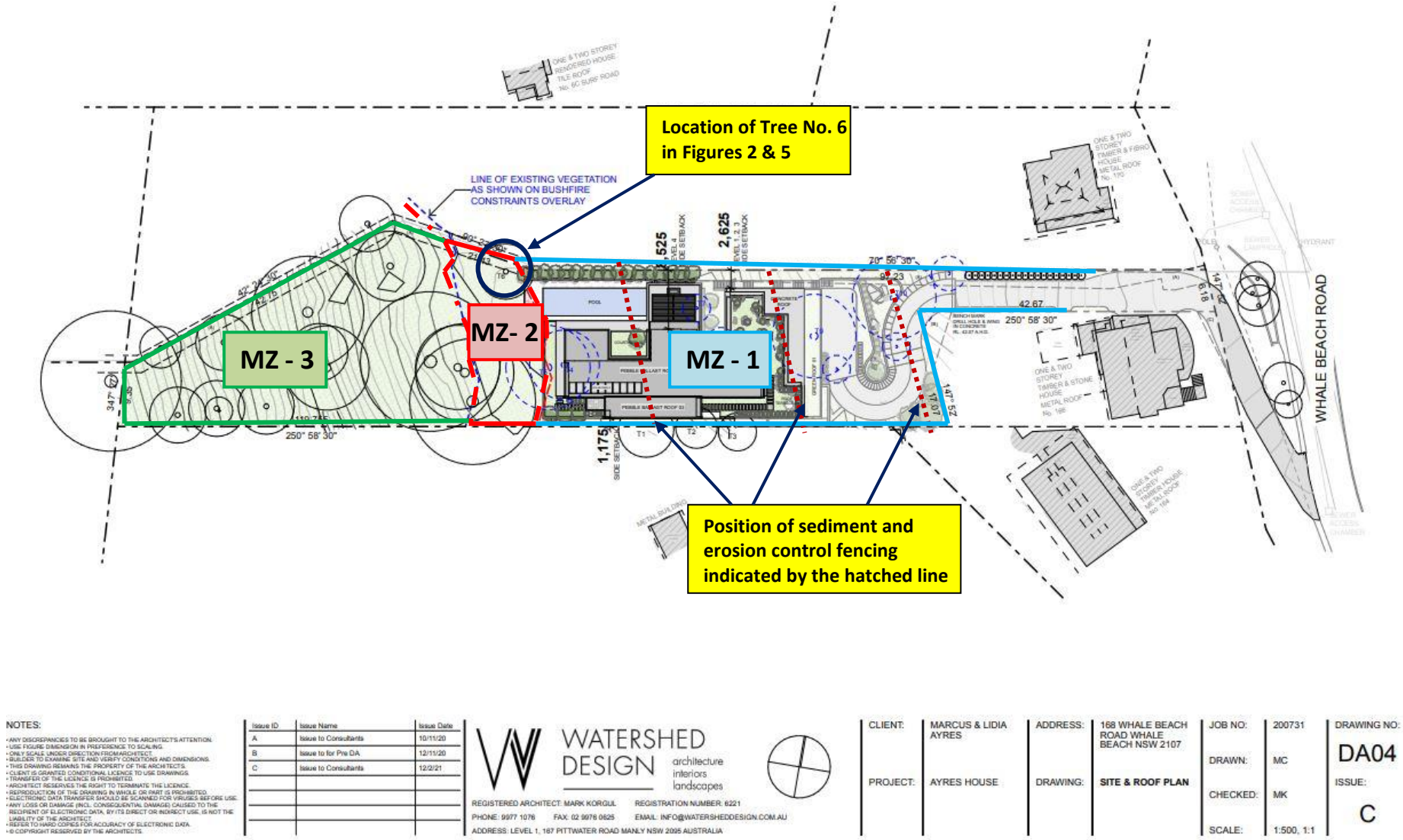

Figure 7 - Three denoted Management Zones (overlain on Figure 2 from Watershed Design 2021) (see text for explanation of zones)

From Figure 7 the three discrete management zones applicable to the biodiversity management of vegetation at the subject site can be detailed as follows:

8.1 MANAGEMENT ZONE 1 (MZ - 1): This Zone has been partially cleared but still comprises a high cover of weed-infested scrub vegetation as well as 9 small to medium sized trees (Figure 3). This zone will comprise the construction area for the dwelling and associated structures. A 1.8m wiremesh fence with entrance gate and appropriate signage should be installed around this area.

After initial tree and scrub clearing, and during the initial stages of construction, sediment control fencing should be installed along positions along the slope of the construction site as the land slopes steeply to the east (Figures 3 & 7).

8.2 MANAGEMENT ZONE 2 (MZ - 2): This Zone includes the relatively narrow area of the IPA of the APZ and extends 10m from the proposed western building wall location along the crest of the hill towards the delineation of the Pittwater Spotted Gum Forest vegetation that is established on the western hillslope (Figures 2 & 7).

The outer western extent of this Zone should be demarcated by orange barrier mesh material held in place by star pickets to delineate this Zone from the MZ - 3 (Figures 4 & 7). Tree guards and armouring to be placed around the significant trees to be retained in this Zone (including particularly Tree No. 6 in Figures 5 & 7 from Peake Arboriculture 2020).

Peake (2020) has described the various tree protection measures required to ensure that no damage occurs within the TPZ's of these individuals such that the structural root zones (SRZ) and trunks of the trees are not damaged by any excavation or machinery coming into contact with these trees.

8.3 MANAGEMENT ZONE 3 (MZ - 3): This Zone includes the remaining area of the property not directly impacted by the construction and the requisite IPA and incorporates the natural, albeit weed affected vegetation that occurs at the western hillslope sections of the property beyond the delineation of the APZ (Figures 2, 4 & 7).

Potentially, before construction commences, even during clearing of vegetation in the IPA (MZ - 2) and at the eastern hillslope (MZ - 1), some discretionary staged weed removal can proceed in this zone, however, when construction commences the site will be a construction zone and staged weed removal in the MZ - 3 would be temporarily suspended and only recommenced following construction.

9 CONSTRUCTION PHASES

The three discrete phases of construction include the 'Pre-construction phase'; the phase 'During construction' and the 'Post-construction or 'Operational phase'.

These phases include differing actions to be undertaken and these are detailed for the various Management Zones as follows:

9.1 PRE-CONSTRUCTION PHASE

Table 1 indicates the procedures that are required to be undertaken prior to any construction at the subject site. This phase includes the staged clearing of vegetation on the eastern hillslope of the MZ - 1, from the lower to the upper sections, followed by the discretionary thinning of vegetation in the MZ - 2 (IPA) to retain a maximum of 15% canopy cover. Much of the shrub strata that occurs within the MZ - 2 will also be removed to decrease the shrub canopy cover to clumped patches covering no more than 10% of the area. It is considered that this removal from the MZ -2 should be undertaken before construction commences for ease of access to this area and for removal of vegetation.

TASK	RESPONSIBILITY
Management Zone Areas of MZ - 1 & MZ - 2 (including the upper edge of MZ - 3 coincident with western edge of MZ - 2 (Figures 2 & 7), should be clearly demarcated on the subject site as depicted on the plan (Figure 7). The MZ -1 should be demarcated by wiremesh safety fencing with a locked gate and safety signage and using star pickets and visible barrier fencing for the upper slope MZ - 2/MZ - 3 boundary.	Project Manager
All trees to be retained within the MZ - 1 and MZ - 2 (including Tree Nos. 1, 2, 3 & 6, as well as any other trees that are deemed to be preserved) should have tree protection measures installed as outlined in Peake (2020)	Consulting arborist
Any logs lying on the ground in the areas of the MZ - 1 and MZ - 2 should be taken from these areas and displaced into the MZ - 3 for fauna habitat enhancement in this preserved zone.	Project Manager
The installation of nest boxes and bat boxes on retained trees in the MZ - 2 and MZ - 3 can be initiated, these secured to trees at least 5 - 10m above ground level.	Project Manager

TASK	RESPONSIBILITY
All trees to be removed within the MZ - 1 and MZ - 2 should be undertaken as described in the following: Before tree removal, the Project Ecologist should check for fauna occupying any hollows in trees to be removed (such as in Tree No. 9 Figure 6) and in the habitat in general to remove and protect any resident fauna. In the MZ - 2 (IPA), the final tree canopy cover should not exceed a maximum cover of 15% (BC & BHS 2021) All trees to be removed in the MZ - 1 and MZ - 2 (IPA) should be cut and stumps ground where required, foliage chipped and/or larger timber and root balls removed off site. Care must be taken when felling trees not to damage trunks or root systems of any trees to be retained (including those listed previously). The shrub cover in the MZ - 2, including immature trees and saplings, which is estimated to have a canopy cover of about 50% should be reduced to a canopy cover of only 10% to satisfy the conditions of the IPA (*PfBP 2019*) (BC & BHS 2021). The shrub cover should be retained in clumps rather than evenly spread over the area. Any ground cover remaining in the MZ -2 should be reduced to heights of no more than 100mm (*PfBP 2019*) (BC & BHS 2021).	Project Manager Project Ecologist Project Manager Tree Service Arborist
Discretionary removal of weeds in small areas of the MZ - 3 can be initiated, particularly in regard to Biodiversity Weeds such as Lantana, African Olive and Ground Asparagus, as well as High Threat Weeds such as Morning Glory, Mickey Mouse Plant (*Ochna serrulata*), Common Cassia (*Senna pendula*) and Small-leaf Privet. This material, including flowers, fruit and seed, as well as tubers, underground stem structures etc should be bagged and removed from the site to be disposed of in at a licenced facility. Natural (assisted) regeneration of native plants can commence.	Professional Bush Regenerator or Owner
The positioning and installation of sediment fencing should be introduced, which could consist of a series of hay bales covered with geotextile fabric to form sediment control fences at various positions along the slope as indicated in Figure 7. Sediment fences could be left open in areas where tree access and removal is required in the MZ - 1	Project Manager

Table 1 - Procedures required to be undertaken prior to construction at the subject site

9.2 CONSTRUCTION PHASE

All construction staff on site should undergo induction for biodiversity issues related to the site.

During the construction period the applicant is responsible for ensuring all protected trees are maintained in a healthy and vigorous condition. This is to be done ensuring that all identified tree protection measures are adhered to. In this regard all protected native trees on the site (Peake Arboriculture 2020) shall not exhibit any of the following:

(a) A general decline in health and vigour.
(b) Damaged, crushed or dying roots due to poor trimming or pruning techniques.
(c) More than 10% loss or dieback of roots, branches and foliage.
(d) Mechanical damage or bruising of bark and timber of roots, trunk and branches.
(e) Yellowing of foliage or a thinning of the canopy atypical of its species.
(f) An increase in the amount of deadwood not associated with normal growth.
(g) An increase in kino or gum exudation.
(h) Inappropriate increases in epicormic growth that may indicate that the plants are in a stressed condition.
(i) Branch drop, torn branches and stripped bark not associated with natural climatic conditions.

Table 2 indicates the procedures required to be undertaken during development construction as follows:

TASK	RESPONSIBILITY
All trees to be retained within the MZ - 1 and MZ - 2 (including Tree Nos. 1, 2, 3 & 6 and any other trees that are deemed to be preserved) that have had tree protection measures installed as outlined in Peake Arboriculture (2020) should be periodically checked for any decline in health or condition during the construction phase. Care taken when removing trees from the MZ - 1 and MZ - 2 not to damage any trees deemed to be retained.	Project Manager Project Arborist
All construction in relation to the development including driveways, garages, swimming pool and associated structures located within the MZ - 1 should be undertaken under instruction by the project manager.	Project Manager
The sediment control fences should be regularly monitored and maintained to effect sediment trapping and preventing any excessive erosion and sediment wash to downslope areas	Project Manager

Table 2 - Procedures required to be undertaken during construction development at the subject site

9.3 POST-CONSTRUCTION OR OPERATIVE PHASE

This phase of the biodiversity management plan follows the completion of the building and ancillary structure construction process, and is also concerned with landscaping in the MZ - 1, weed control and maintenance of the vegetative elements of the IPA of the MZ - 2 and continued staged weed removal and assisted regeneration initially in the upper parts of the MZ - 3.

Following construction, the wiremesh fencing surrounding the MZ -1 can be removed, as well as any silt fencing still remaining installed within the MZ - 1.

Landscaping of areas surrounding the dwelling (MZ - 1) is also initiated during this phase.

Table 3 indicates the procedures required to be undertaken post-construction and during landscaping of the MZ - 1 and weed removal in the MZ - 2 and upper parts of the MZ - 3 at the subject site

TASK	RESPONSIBILITY
At the completion of construction, all tree protective fencing and armouring can be removed to allow for landscaping and weed removal and control.	Project Manager
The driveway and upper house sections within the MZ - 1 that is to be landscaped will include species indicated in Harrisons Landscaping Landscape Plan (2021). The area for landscaping should be prepared for planting and landscaping. Mulch utilised across the MZ - 1 should be organic mulch.	Bush Regeneration contractor/Owner
In the MZ - 2, any planting should be undertaken to produce a canopy that is compliant with an APZ of 15% canopy cover and shrub cover of no greater than 10% (BC & BHS 2021). Planting should be mainly ground covers of native plants representative of local assemblages as documented in ACS Environmental (2020)	Bush Regeneration contractor
Discretionary removal of weeds in small areas of the MZ - 3 can be continued, particularly in regard to Biodiversity Weeds such as Lantana, African Olive and Ground Asparagus, as well as other High Threat Weeds. This material, including flowers, fruit and seed, as well as tubers, underground stem structures etc should be bagged and removed from the site to be disposed of at a licenced disposal facility. Natural (assisted) regeneration of native plants can continue.	Professional Bush Regenerator or Owner
Bush regeneration contractor/owner should maintain records, details and photographs of the work undertaken during this period for inclusion into final reports	Bush Regeneration contractor/owner

Table 3 - Procedures required to be undertaken during landscaping of the discrete areas of the MZ - 1 and weed removal in upper sections of the MZ - 3

9.3.1 LANDSCAPING

As the area proposed for the dwelling, driveway and swimming pool encompasses much of the area of the eastern hillside, landscaping potential is necessarily very limited.

A landscape plan for landscaping around the dwelling house has been prepared by Harrisons Landscaping (2021) (Figures 8A & 8B). The landscaping mostly consists of plantings around the driveway (Figure 8A) and some limited landscaping along balcony edges and in a courtyard (Figure 8B) (Harissons Landscaping 2021).

The landscaping includes a total of 7 locally native species representative of Coastal Sandstone Foreshores Forest comprising 164 plants constituting 84% of the total number of landscaped plantings, with an additional 4 species comprising 15 plants of 'other' native species, comprising 8% of plantings with 2 exotic species comprising 16 plants to complete the landscaping program (Harrisons Landscaping 2021)

Either, the owners or consultant regeneration personnel, could be employed to prepare the soil, plant the subject plant species according to the landscape plan, and the owner to monitor the progress of the establishment operation.

9.3.2 PLANTING SAPLINGS OF TREES TO REPLACE LOSS FOR BUILDING

A total of at least 6 replacement saplings of species that were removed for building must be replaced in suitable areas of the property. Five saplings of Bangalay and one of Coast Banksia should be planted in areas including around the driveway, alongside the dwelling, within the MZ - 2 though maintaining canopy cover at no more than 15%, or in the upper section of the PSGF on the western side of the subject land.

Ideally the saplings should be purchased from a local nursery to maintain local provenance.

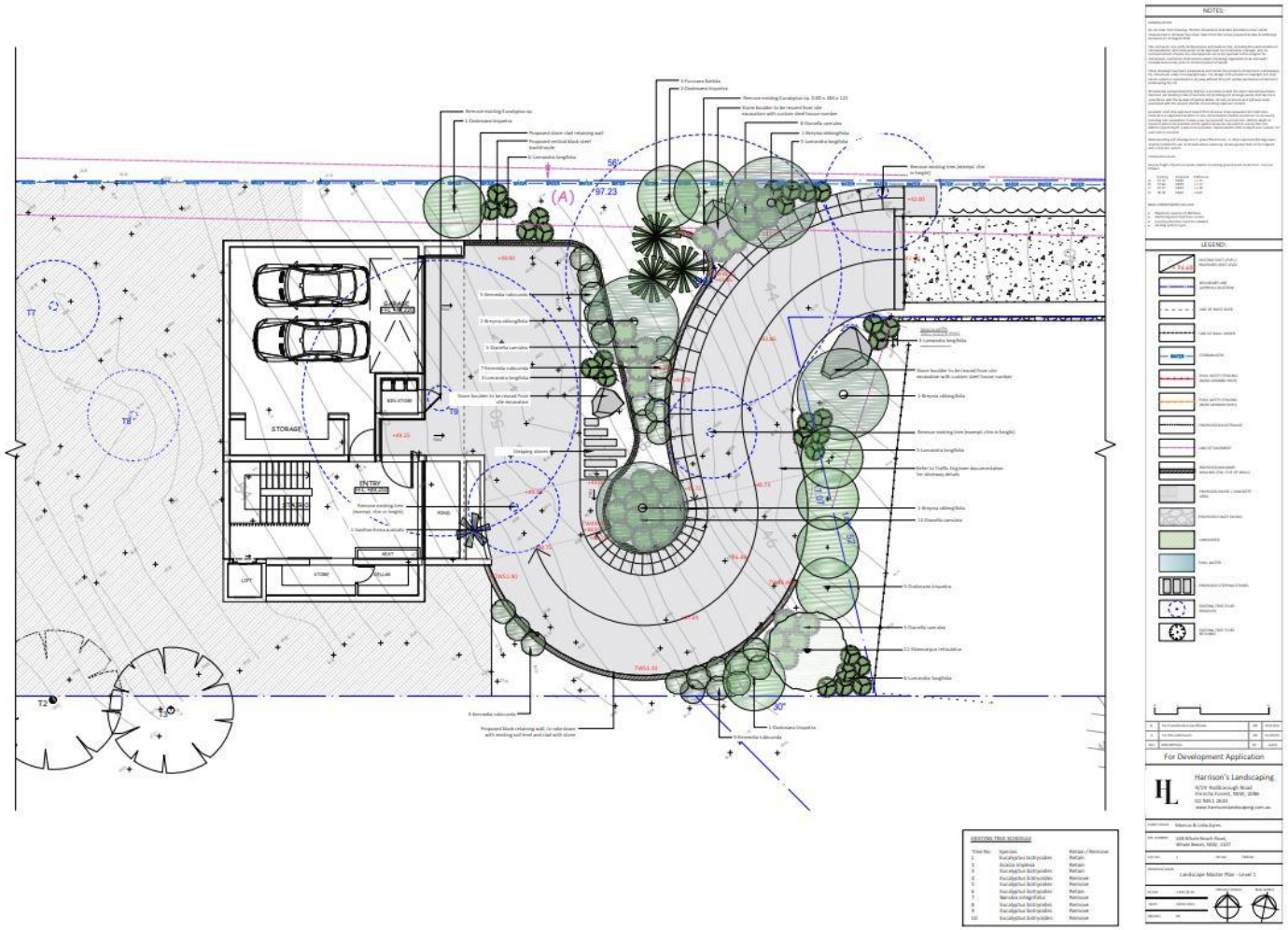

Figure 8A - Landscape plan prepared by Harrisons Landscaping (2021) indicating small tree, shrub and strap-like ground cover plantings within the landscaped areas around the driveway (for greater detail see Harrisons Landscaping Landscape Plan for 168 Whale Beach Road, Whale Beach 2021)

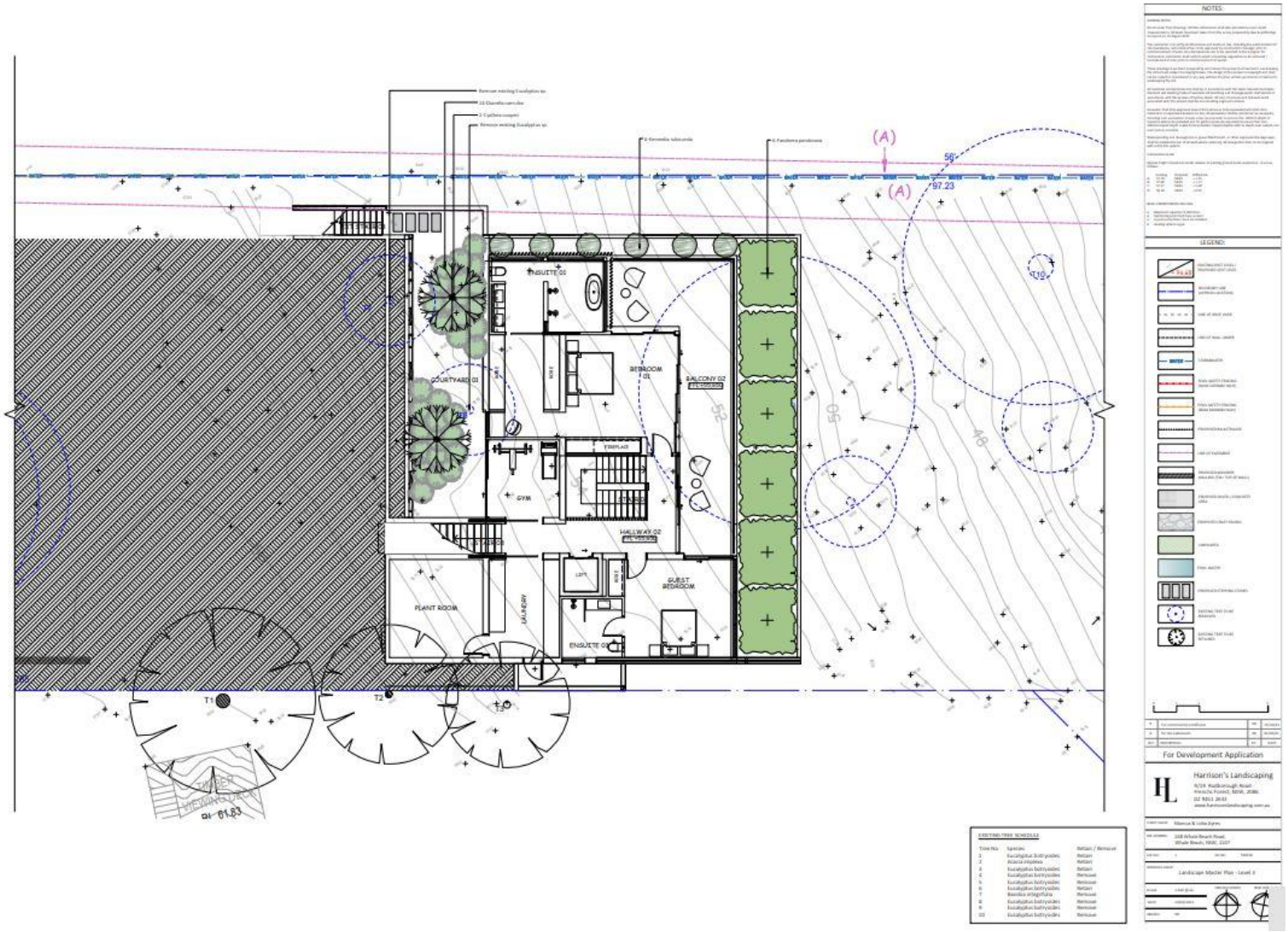

Figure 8B - Landscape plan prepared by Harrisons Landscaping (2021) indicating Treefern, strap-like ground cover and twiner/creeper plantings within the landscaped areas along balcony and courtyard areas (for greater detail see Harrisons Landscaping Landscape Plan for 168 Whale Beach Road, Whale Beach 2021)

9.3.3 WEED REMOVAL FROM DEVELOPED AREAS AND REMNANT BUSHLAND LOCATIONS.

Occurrence of weed species on the crest of the site

Periodic monitoring and control for HTW weeds (DPIE 2021) after construction, throughout the MZ - 2 (IPA) would be prudent to remove and prevent establishment of these and any other more incursive weed species in this dedicated APZ zone.

Occurrence of weed species on the western hillslope of the site

The Flora and Fauna surveys and biodiversity impact assessment undertaken by ACS Environmental (2020) identified a total of 8 High Threat Weeds (HTW) as occurring within much of the understorey of the PSGF at the western aspect of the subject land (Figure 4). Three of these HTW weeds are also Biosecurity Weeds with various required compliance measures listed on the DPI (Dept Primary Industries) website (Table 4). These weeds are listed in Table 4 in regard to their occurrence at the subject land and required compliance measure with reference to their Biosecurity Status

HTW Weed Species	Common name	Biosecurity status
Asparagus aethiopicus	Ground Asparagus	**Prohibition on certain dealings** *Must not be imported into the state, sold, bartered, exchanged or offered for sale.*
Lantana camara	Lantana	**Prohibition on certain dealings** *Must not be imported into the state, sold, bartered, exchanged or offered for sale.*
Ligustrum sinense	Small-leaf Privet	NA
Ligustrum lucidum	Large-leaf Privet	NA
Ipomoea indica	Morning Glory	NA
Senna pendula var *cuspidata*	Easter Cassia	NA
Ochna serrulata	Mickey mouse Plant	NA
Olea europea subsp *cuspidata*	African Olive	**Regional Recommended Measure** *Whole region: The plant or parts of the plant are not traded, carried, grown or released into the environment. Exclusion zone: The plant is eradicated from the land and the land kept free of the plant.*

Table 4 - HTW weeds occurring within understorey and ground strata of the PSGF at the subject site, their biosecurity status where relevant

Discretionary staged weeding in small patches of the lower strata of the PSGF is recommended. Ground cover weeds such as Ground Asparagus, small shrubby weeds such as Mickey Mouse Plant and climbers such as Morning Glory occur among remnant native species such as Snake Vine (*Stephania japonica*), Wonga Wonga Vine, Coffee Bush, Sweet Pittosporum etc (see ACs Environmental 2020).

Most immature weeds can be hand-pulled, bagged and taken offsite to be disposed of in a licensed disposal facility. More mature woody weeds may require to be cut and stems pasted with an effective herbicide that will prevent regrowth of the stems.

Periodic monitoring for weed incursion is essential and removal of any incursions before they mature is paramount particularly for these species of HTW and often Biosecurity Weeds.

Small discrete areas are cleared of weeds, hand-pulling where possible (and see Table 5 for weed removal techniques), and monitored to assess natural regeneration and colonisation and spread of native species, as well as further colonisation or incursion by weed species. The document 'Recovering Bushland on the Cumberland Plain' (DEC 2005) gives a useful guide on 'assisted regeneration' where staged removal of weeds is practised in conjunction with allowing native species to re-colonise these areas once they are weed-free.

All weed material, including stems, roots, tubers, flowers and fruit, must be bagged and taken offsite to be disposed appropriately in a licenced disposal facility.

Weed removal in discrete small areas is continued, with monitoring for native colonisation of areas and periodic weed removal and control, and over time, natural assisted regeneration should result in recovery of the natural elements of the PSGF assemblage in the subject land. If regeneration does not appear to be progressing to a schedule, augmented planting of native species representative of PSGF can be introduced, preferably from a local nursery that provided species having local genotypic provenance.

Identification of weed species occurring on the western hillslope of the site

Figures 9A - 9H provide a visual appearance of the 8 HTW weeds that occur on the western slopes of the subject land for easy onsite identification

Figure 9A - individual of Small-leaf Privet (Image from CSIRO)

Figure 9B - Immature individual of Lantana

Figure 9C - Individual of prostrate Ground Asparagus

Figure 9D - Individual of Broad or Large-leaf Privet (Image courtesy of Helensburgh Landcare)

Figure 9E - Individual of Easter Cassia (*Senna pendula*) (Image courtesy of lucidcentral)

Figure 9F - Mickey Mouse Plant (*Ochna serrulata*) (Image courtesy flickr)

Figure 9G - Mature individual of African Olive to 4m tall (individuals observed in MZ - 2, prior to clearing)

Figure 9H - Morning Glory with distinct purple flowers (Qland Govt)

Table 5 lists procedures to remove and control more mature individuals of particularly woody weeds which cannot be hand-pulled.

COMMON NAME OF WEED	**RECOMMENDED METHODS OF REMOVAL AND CONTROL (summarised from Muyt 2001)**
Lantana	Where individuals of Lantana cannot be effectively hand-pulled, the most effective initial control method to remove isolated patches of Lantana from the vegetation at the subject site is low-volume herbicide applications such as glyphosate using cut, scrape and paint or cut stump methods. A summary of appropriate registered herbicides for use in Lantana control is documented in pp36 – 38 of the Control Manual for Lantana (Queensland Dept Natural Resources, Mines and Energy 2004). These methods minimise the environmental damage to the ecosystem as the chemicals are applied directly to the stumps. Note that all methods of Lantana control require consideration of personal safety, regulations existing in relation to the safe use of herbicides. All above-ground Lantana foliage should be removed from the site to avoid the re-infestation of the area by suckering from stems and sections of broken layered roots (Muyt 2001, Queensland Dept Natural Resources, Mines and Energy 2004). The re-establishment of new infestations must be actively monitored and new seedlings hand-pulled. Further disturbance to Lantana-cleared areas should be minimised.
Ground Asparagus	Control and removal of seedlings and small infestations of Ground Asparagus can be achieved by digging out the individuals. Removal when soils are moist is most effective otherwise rhizomes are likely to fragment in the soil. Stems can be severed at the base and left to dry out in the canopy. The rhizome can be carefully excavated and levered out using hand tools. The entire rhizome must be removed otherwise plants will regrow. Tuberous and fibrous roots can be retained in the ground. Ensure that rhizomes are removed from the subject area and disposed of safely (Muyt 2001). Where practical, remove all semi-ripe or ripe fruit from cut stems and remove from site. Larger rhizomes can be treated with the 'Drill-Fill' method. Stems can be severed, soil cleared from cut ends and herbicide applied. Alternatively, the surface of the stems can be scoured with a sharp knife and herbicide applied to cut surfaces (Muyt 2001). Stems of dense low-growing infestations can be pulled off indigenous plants

	with a sturdy rake. Stems can then be severed and removed from the site. Rhizomes can either be dug out or treated using the 'Drill-Fill' method or the regrowth sprayed with selective herbicides a few months afterwards (Muyt 2001). Follow up spraying is recommended for larger plants of Asparagus Fern (Muyt 2001).
African Olive	Smaller plants can be hand-pulled or dug out including roots. For larger plants, use the Cut/Paint method, frequent follow up treatment may be required if reshooting occurs. Otherwise the Drill-Fill method can be used if the former is deemed ineffective. This method involves herbicide being placed immediately into holes or cuts made by drilling or cutting through the bark into the sapwood tissue in the trunks of woody weeds and trees. The aim is to reach the sapwood layer just under the bark (the cambium), where the chemical will be transported throughout the plant. It is essential to apply the herbicide immediately (within 15 seconds of drilling the hole or cutting the trunk), as stem injection relies on the active uptake and growth of the plant to move the chemical through its tissues. Stem injection methods kill the tree or shrub where it stands, and only trees and shrubs that can be safely left to die and rot should be treated this way. If the tree or shrub is to be felled, allow it to die completely before felling.
Small-leaf Privet and Large (Broad)-leaf Privet	Seedlings or small plants can be hand-pulled or dug out including the roots. Best not to weed these during hot, dry periods. Material should be disposed of appropriately. Monitor sites to ensure there is no regrowth. Larger plants can be treated with the Cut/Paint method applying herbicide to the cut surface and also along scrapes along the side of the stump.
Small-leaf Privet and Large (Broad)-leaf Privet	Seedlings or small plants can be hand-pulled or dug out including the roots. Best not to weed these during hot, dry periods. Material should be disposed of appropriately. Monitor sites to ensure there is no regrowth. Larger plants can be treated with the Cut/Paint method applying herbicide to the cut surface and also along scrapes along the side of the stump.
Mickey Mouse Plant	Seedlings or small plants can be hand-pulled or dug out including the roots. Best not to weed these during hot, dry periods. Ensure taproot is dug up. Material should be disposed of appropriately. Monitor sites to ensure there is no regrowth. Larger plants can be treated with the Cut/Paint method applying herbicide to the cut surface and also along scrapes along the side of the stump.

COMMON NAME OF	RECOMMENDED METHODS OF REMOVAL AND CONTROL (summarised from Muyt 2001)
Easter Cassia (*Senna pendula*)	Seedlings or small plants can be hand-pulled or dug out including the roots. Best not to weed these during hot, dry periods. Ensure taproot is dug up. Material should be disposed of appropriately. Monitor sites to ensure there is no regrowth. Larger plants can be treated with the Cut/Paint method applying herbicide to the cut surface and also along scrapes along the side of the stump.
Morning Glory	Seedlings or small plants can be hand-pulled or dug out including the roots. All stems in contact with soil must be removed and roots dug out to ensure no regrowth. Vines can be severed at base and left to dry out in canopy. Larger vines can be treated with the Cut/Paint method applying herbicide to the cut surface and also along scrapes along the side of the stump.

Table 5 lists procedures to remove and control individuals of particularly woody weeds, larger individuals of which cannot easily be hand-pulled.

9.3.4 POST-LANDSCAPING MONITORING FOR ATTRITION OF PLANTINGS AND WEED INCURSION

After landscape planting, opportunistic weed species, potentially including species of Biosecurity Weeds (Biosecurity Act 2015) and High Threat Weeds (HTW) (DPIE 2021) may colonise into landscaped areas of the MZ - 1 and MZ - 2 during and following establishment of planted saplings and seedlings.

As such, for a period from about 3 months after landscaping in the MZ - 1 and MZ - 2, until 24 months after this activity, the planted vegetation must be monitored to assess viability of individual plants and potential weed incursion into these zones.

9.3.5 POST-CONSTRUCTION MONITORING OF SHRUB AND TREE CANOPY COVER IN MZ - 2 TO COMPLY WITH APZ

The MZ - 2 must be monitored regularly to observe tree canopy growth and shrub cover to check that the limits of canopy coverage required for the IPA are not exceeded. It is recommended that in perpetuity, the canopy coverage of trees and shrubs should be monitored at a 6 month interval, initially in September and then again in March of each growth year.

It is considered that in the growing seasons of Spring and Summer, the canopy cover of trees should be maintained such that a maximum tree cover of 15% and a total clumped shrub canopy cover of 10%, is applicable to the area of the MZ - 2 (IPA).

Foliage, branches and excessive shrub growth should be trimmed annually to maintain the prescribed canopy cover of trees and shrubs in the MZ - 2 (IPA) (Figure 7).

9.3.6 POST-CONSTRUCTION MONITORING OF WEED REMOVAL AND ASSISTED REGENERATION FROM PHOTO-MONITORING POINTS

Table 6 lists the tasks and responsibilities that are required for the final stages of this management plan.

Table 7 is a Gantt chart outlining procedures and timing that is recommended as part of the management of this vegetation plan.

Photo-monitoring points can be established to observe details of progression of development, landscaping planting establishment, weed occurrence, maintenance of APZ and potential erosion at the property.

Figure 10 indicates the location for four such permanent photo-monitoring points where progressive photographs of successive post-development criteria can be acquired and assessed at 3 monthly intervals over an initial 2 years where action can be taken where necessary in relation to APZ maintenance, potential weed incursion, planting success and attrition and potential soil erosion.

Photo monitoring can be undertaken by the owner, bush regeneration personnel or an ecologist commissioned for the ongoing task.

Table 6 Indicates the procedures required for monitoring of the landscaped areas of the MZ - 1 (and MZ - 2 where applicable) and potential weed control of the MZ - 2 and MZ - 3 of the subject site

TASK	RESPONSIBILITY
Monitoring and maintenance of landscaping in the MZ - 1 should be undertaken initially at 3 monthly intervals for the first 12 months and then every 6 months for the following 12 months during the 2 year period after landscaping and issue of the occupation certificate. Any landscaped plants that have died should be replaced with similar species. An attrition rate of up to 20% may be expected but replacement planting in the landscaped area of the MZ - 1 should be undertaken. See Gantt Chart (Table 7)	Owner

TASK	RESPONSIBILITY
Monitoring and maintenance of the APZ in the MZ - 2 should be undertaken in the growth periods of Spring (September-October) and Summer (January-March) and then annually at these times each year. Where excessive canopy growth has occurred, trimming or removal of plants may be necessary. Leaf and branch litter should be removed from the ground layer and ground stratum plants kept to a maximum height of about 100mm (BC & BHS 2021; *PfBP 2019*). See Gantt Chart (Table 7)	Owner
Monitoring and maintenance of weed incursion and control in the MZ - 1 and MZ - 2 should be undertaken initially at 3 monthly intervals after construction for the first 12 months and then every 6 months for the following 12 months during the 2 year period after landscaping and issue of the occupation certificate. During weed control monitoring programs, weed control benchmarks of a 90 - 95% removal of weeds in the areas of the MZ - 1 and MZ - 2 should be expected; more frequent weed removal and control may be required.	Owner
Staged weed removal and assisted regeneration should be continued in small patches throughout, initially, the upper sections of the MZ - 3. Monitoring and maintenance of weed incursion and control In the MZ - 3 should be undertaken initially at 3 monthly intervals after construction for the first 12 months and then every 6 months for the following 12 months during the 2 year period after landscaping and issue of the occupation certificate. During weed control monitoring programs in the MZ - 3, weed control benchmarks of a 90 - 95% removal of weeds in the area should be expected; more frequent weed removal and control may be required. Over many years of persistent weed removal and assisted natural regeneration, the assemblage should return to a more natural and integrated steady state.	Owner
If any woody weeds have established during interim periods in the MZ - 3, and cannot be hand-pulled, the most effective treatment is to cut the plant at its base, and paste with herbicide containing glyphosate to prevent resprouting. Any HTW weeds, including woody weed species, should be bagged and disposed of off-site appropriately	Owner
Owner should maintain records, details and photographs of the work undertaken during this period for inclusion into final reports	Owner

Table 6 - Indicates the procedures required for monitoring of the landscaped areas of the MZ - 1 (and MZ - 2 where applicable) and potential weed control of the MZ - 2 and MZ - 3 of the subject site

10 GANTT CHART OF ESTIMATED TIME-FRAME ACTIVITIES & ESTIMATED COSTINGS

	Management Zones	TASKS	MONTHS						
			0-3	3-6	6-9	9-12	12-18	18-24	24-36
Pre-Construction Phase	**MZ - 1, MZ - 2 & MZ - 3**	Areas of the rear of the MZ - 1, the MZ - 2 coincident with the upper edge of the MZ - 3 clearly demarcated as depicted on the plan (Figure 7) and marked with flagging tape, visible barrier fencing and star pickets.							
	MZ - 1	Safety Protection Fencing should be constructed around the MZ - 1 as shown in Figure 7.							
	MZ - 2 & MZ - 3	Two medium nest boxes and two bat boxes to be installed in suitable remnant trees at heights of 5 - 10m above ground							
	MZ - 1 & MZ - 2	Tree Protection Fencing should be installed for trees to be retained in areas of the MZ - 1 and MZ - 2 (Trees 1, 2, 3 & 6) as shown in Figure 7 (Peake Arboriculture 2020). Tree armouring is recommended where any trunk damage to trees from machinery or construction equipment is considered possible.							
	MZ - 1 & MZ - 2	Any trees marked for removal should be checked for hollows and if present, ecologist to check for fauna potentially occupying hollows before clearing. Logs removed from MZ - 1 and MZ - 2 to MZ - 3 to enhance fauna habitat							
	MZ - 1 & MZ - 2	All trees to be removed within the MZ - 1 and MZ - 2 (Trees 4, 5, 7, 8, 9, 10 in Peake Arboriculture 2020) removed. All trees to be removed should have stumps ground where required, foliage chipped and larger timber and root balls removed off site.							

	MZ - 1	Geotextile fabric silt control fences installed along various parts of the MZ - 1 as indicated in Figure 7							
	Management Zones	**TASKS**	**MONTHS**						
			0-3	3-6	6-9	9-12	12-18	18-24	24-36
Construction Phase	**MZ - 1**	Construction of residence and ancillary structures, driveways, swimming pool etc commences and continued to completion							
	MZ - 1 & MZ - 2	All trees to be retained within the MZ - 1 (including Tree Nos. 1, 2 & 3) and in the MZ - 2 (Tree no. 6) any other trees that had deemed to be preserved that have had tree protection measures installed as outlined in Peake Arboriculture (2021) should be periodically checked for any decline in health or condition during the construction phase.							
	MZ - 1	Sediment control fences regularly monitored to ensure integrity and repair where necessary. Removed on completion of construction							
	Management Zones	**TASKS**	**MONTHS (AFTER CONSTRUCTION COMPLETED)**						
			0-3	3-6	6-9	9-12	12-18	18-24	24-36
Post-Construction Phase	**MZ - 1 & MZ - 2**	All tree protection fencing and armouring can be removed when construction is completed.							
	MZ - 1, MZ - 2 & MZ - 3	Planting of saplings of 6 native tee species, preferably 5 of Bangalay and one of Coast Banksia, derived from local provenance							
	MZ - 3	Continued weed removal in areas of MZ - 3. Discretionary staged removal in small patches							
	MZ - 1	MZ - 1 is prepared for planting and landscaping (Harrisons Landscaping 2021) (see Figures 8A & 8B)							

	Management Zones	TASKS	MONTHS (AFTER CONSTRUCTION COMPLETED)						
			0-3	3-6	6-9	9-12	12-18	18-24	24-36
	MZ - 1	Landscaped planting around driveway and courtyard and other areas in the MZ - 1. Ground cover planting in MZ - 2.							
	MZ - 1, MZ - 2 & MZ - 3	Periodic weed monitoring and landscaped plant establishment monitoring initiated. Photo monitoring initiated (Figure 10). Weeds that are observed within 3 monthly periods can generally be hand-pulled, taken offsite and disposed in authorised disposal facility. The level of weeding required here is low but periodically maintained over a 2 year period. Performance indicators of weed removal include a 95% reduction of weeds during and over the period of the BMP.							
Post-Construction Phase	**MZ - 1**	Any individuals of plant species that have failed to establish to be replaced by new seedling or saplings of the same species.							
	MZ - 2	Monitoring of canopy growth and spread commenced in September and repeated in March. Tree canopies trimmed and maintained at 15% in MZ - 2 (IPA) with clumped shrub canopies to 10%; this APZ management must be continued for life of development (perpetuity)							
	MZ - 3	Continued weed removal in areas of MZ - 3. Discretionary staged removal in small patches. If required and native regeneration not progressing according to schedule, augmented planting of representative PSGF species can be initiated							

Table 7 - Gantt Chart of Estimated Time-frame for activities in relation to development at 168 Whale Beach Road, Whale Beach

The number of individuals of various native plants as listed for landscaping by Harrisons Landscaping (2021) (procured from local nurseries, including Council nurseries), to be required for landscaping in the MZ - 1 is taken from the Landscape Plan prepared by Harrisons Landscaping (2021)

For further detail, see Landscape Plan by Harrisons Landscaping (2021)

From the Landscape Plan prepared by Harrisons Landscaping (2021) estimates of prices for bags/pots/tubes of native plants are as follows:

Estimates of prices for bags/pots/tubes are as follows:

2 x 75 litre bags: @$150/plant = $300

11 x 45 litre bags: @$110/plant = $1210

1 x 400mm (10 litre) pots: @$30/pot = $30

12 x 200mm (5 litre) pots: @$16.50/pot = $198

153 x 100mm pots: @ $7.5/pot = $1148

TOTAL costs of representative native plants for landscaping of the MZ - 1 with plant species representative of Coastal Foreshores Sandstone Forest is estimated at about $2,886

Estimated costs/hr of preparing for construction, actions during construction and post-construction activities by arboricultural contractors and bush regeneration personnel are estimated in Table 8.

Estimated cost/hr for each arboricultural contractor and bush regenerator personnel is approximately $60 at the time of preparing this BMP report (Table 8).

Note that construction costs of new dwellings is not included in costings for this BMP, these costings would be estimated independently from construction/building personnel.

DETAIL	MONTHS	MONTHS POST-CONSTRUCTION					
Cumulative Time period (CTP)	**0 - 3**	**0 - 3**	**3 - 6**	**6 - 12**	**12 - 15**	**15- 18**	**18 - 24**
Pre-Construction (Hrs preparing site) (Tree protection, fencing Management Zones; silt fencing, removing logs from MZ - 1 & MZ - 42	24						
Pre-construction tree removal	24						
During construction (sediment fence inspection and repair) (Hrs)	2						
Post-construction (preparing areas for planting, planting, weed removal & monitoring)		8	8	4	4	4	4
Post-construction maintenance of APZ (trimming trees and shrubs, management of leaf and branch litter) (Hrs)			4	4		4	4
Hours/task/session (Hrs)	50	8	12	8	4	8	8
Estimated Cost ($)	3000	960	720	480	240	480	480
Cost of plants	$2,886						
TOTAL ESTIMATED COST	$6,360 (labour) + $2,886 (plants) + $50 (mulch) = $9,296						

Table 8 - Estimated plant supplies and labour costs over an initial 2 year period of site preparation and landscaping, including post-planting monitoring, weed control and maintenance of APZ's (cost is less if owner provides labour to programs)

Figure 10A - Aerial depiction of the study area (outlined in yellow with blue marker) (Nearmap 2021) at 168 Whale Beach Road, Whale Beach, with the location of 6 permanent photo-points indicated taken from 2 locations, 1,2,3 to E, S and W respectively, and 4, 5, 6 to E, N and W respectively.

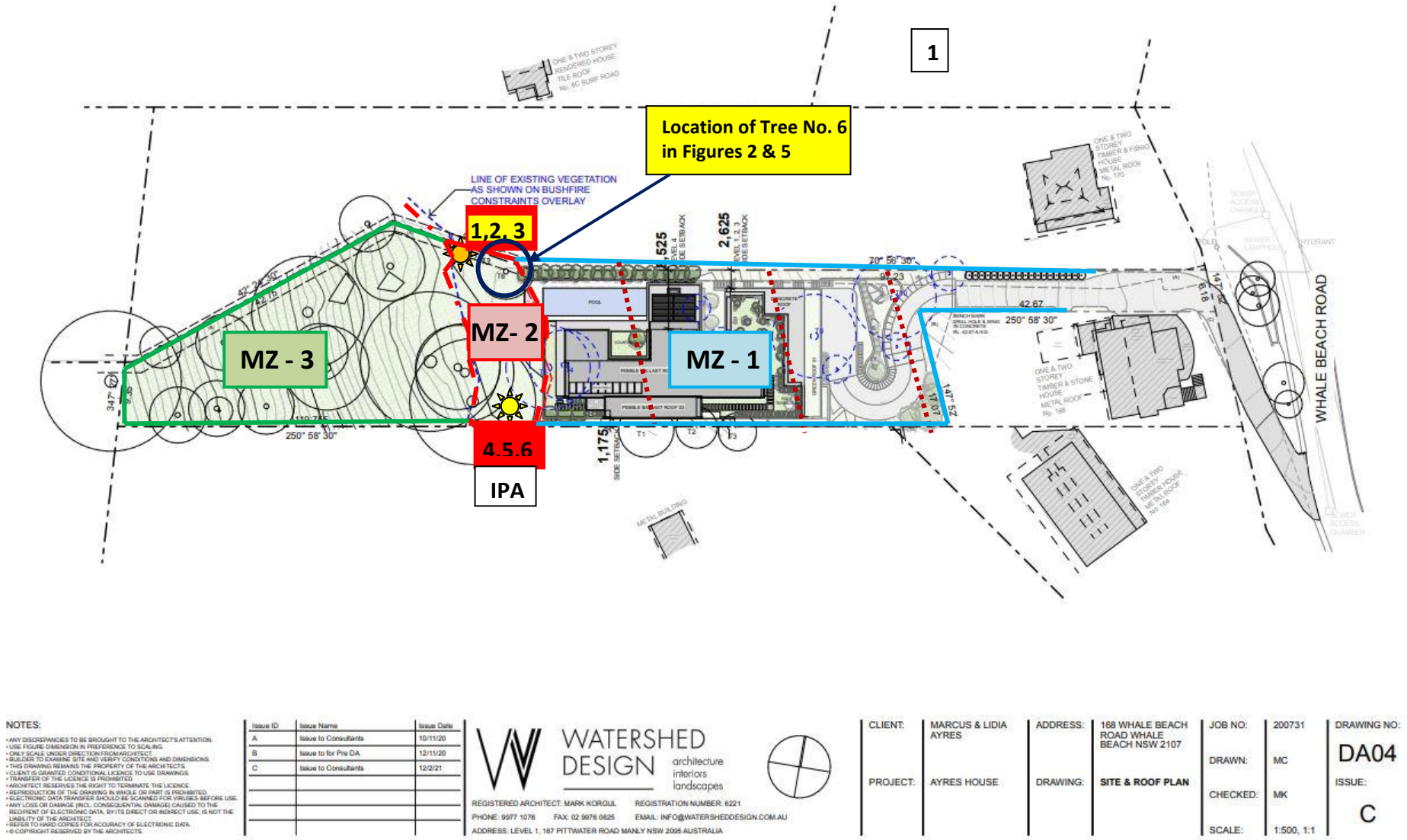

Figure 10B - Location of photopoints overlain on Figure 7 to indicate areas in relation to Management Zones at 168 Whale Beach Road, Whale Beach, the location of 6 permanent photo-points indicated taken from 2 locations, 1,2,3 to E, S and W respectively, and 4, 5, 6 to E, N and W respectively.

From Figures 10A and 10B the location of 6 permanent photo-points indicated from 2 locations can be summarised as follows:

1st Location: north edge of subject land (Figures 10A & 10B)

1. **Photo point 1** (View to East - landscaping progress in MZ - 1)
2. **Photo point 2** (View to South - canopy growth in MZ - 2 and potential weed incursions in MZ - 2)
3. **Photo point 3** (View to West - Progress of weed removal and assisted regeneration in MZ - 3), and

2nd Location: south edge of subject land (Figures 10A & 10B)

4. **Photo point 4** (View to East - landscaping progress in MZ - 1)
5. **Photo point 5** (View to North - canopy growth in MZ - 2 and potential weed incursions in MZ - 2)
6. **Photo point 6** (View to West - Progress of weed removal and assisted regeneration in MZ - 3)

Photos at these 6 photo-points should be taken every 3 months for a minimum of 24 months to qualify progressive monitoring of floristic and structural development of modified vegetation, and to take action on attrition of plantings, growth of canopy spread of trees and shrubs and to monitor weed incursion and potential soil erosion.

11 RESPONSIBILITY FOR PROJECT

Responsibility for implementation and completion of this BMP in perpetuity - Owner

Responsibility for commissioning Tree Removal Company - Owner

Responsibility for commissioning Bush Regenerator/Landscaping Company - Owner

Personnel undertaking continued APZ maintenance, bush regeneration including planting, weeding, watering, monitoring plant establishment and weeding benchmarks - Owner and /or Qualified bush regenerator personnel having a minimum of a Certificate II Bushland Regeneration or a Certificate III Natural Area Restoration (or equivalent).

12 REFERENCES AND LITERATURE REVIEWED

ACS Environmental P/L (2021) Flora and fauna surveys and Biodiversity Impact Assessment Report for proposed development at 168 Whale Beach Road, Whale Beach

Australian Standard 4970-2009 - Protection of trees on development sites.

BC & BHS (2021) Bushfire Hazard Assessment for 168 Whale Beach Road, Whale Beach

DEC (2005) Recovery of Bushland on the Cumberland Plain. Best Practice Guidelines for the Management and Restoration of Bushland.

Harrisons Landscaping (2021) Landscape Plan for proposed development at 168 Whale Beach Road, Whale Beach

OEH (2016) The Natural Vegetation of the Sydney Metropolitan Area; Volume 2: Vegetation Community Profiles.

Peake Arboricultural (2021) Arboricultural Impact Assessment at 168 Whale Beach Road, Whale Beach

Pittwater Council Local Environmental Plan (2014)

Pittwater Council Development Control Plan (2004)

Planning for Bushfire Protection' (2019). Produced by NSW Rural Fire Service in collaboration with Planning NSW.