

VISUAL IMPACT ASSESSMENT

CATHERINE HILL BAY DEVELOPMENT
WWTP SITE AND ASSOCIATED INFRASTRUCTURE

PREPARED FOR
ROSEGROUP PTY LTD

BY
PLANIT CONSULTING PTY LTD
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Terms & Abbreviations

Aesthetic	A general term referring to visual appearance and its human perception.
Baseline conditions	Description of the existing situation in the area of interest.
CHB	Catherine Hill Bay Development
Cross Section	A vertical view drawn at right angles to the control line, showing the existing ground and various elements that make up the landscape.
Fauna	Refers to animals, both individually and collectively.
DCP	Development Control Plan (Approved).
Flora	Refers to plants, both individually and collectively.
Landscape	A holistic term that encompasses visual, ecological and cultural values of the physical landscape.
Native Plants	Plant species that are indigenous to the local area, or to Australia.
Nature	All aspects of nature, including but not limited to: <ul style="list-style-type: none">a. ecosystems and their constituent partsb. all natural and physical resourcesc. natural dynamic processes, andd. the characteristics of places, however large or small, that contribute to their biological diversity and integrity, or their intrinsic or scientific value
Scenic Amenity	A measure of the relative contribution of each place in the landscape to the collective appreciation of open space as viewed from places that are important to the public
Screen Planting	The intentional use of landscape planting to visually screen adjoining uses and structure or views of these.
Visual Amenity	The degree of positive or negative factors associated with viewing a particular structure or proposal.
Visual Catchment	Visual catchments are areas bound by a shared viewing exposure from a particular vantage point or location on the ground plane.
VIA	Visual Impact Assessment
WWTP	Waste Water Treatment Plan ('The Site')

1.0 Introduction

Planit Consulting Pty Ltd has been commissioned by Rosegroup Pty Ltd to prepare a Visual Impact Assessment (VIA) associated with the Catherine Hill Bay development (CHB). This VIA pertains to the proposed Waste Water Treatment Plant (WWTP referred to as 'The Site') and associated storage and evaporation ponds. This report identifies the potential visual impact of the proposed infrastructure of the WWTP and identifies treatments that will assist in mitigating any potential adverse visual impacts these may have to the surrounding visual catchment areas.

Reference throughout this report is made to the Visual Impact Statement prepared for the development as a whole (refer to Fig 2 for development layout and scope) prepared by CONTEXT Landscape Design February 2011. Other reports and guidelines referenced are the Visual Impact Assessments prepared for the development by VERGE Pty Ltd and the Scenic Quality Guidelines (April 2004, LMC2).

2.0 Limitations and Assumptions of Study

This report examines the current landscape and visual amenity of the study area. A field inspection of the study location and identified area of interest was conducted to determine amenity values and potential visual impacts. This inspection exercise was to gain familiarity with the location and its landscape character and amenity values, this investigation was conducted with reference to existing visual investigations conducted by CONTEXT Landscape Design and VERGE Pty Ltd.

Whilst various data and information sources were utilised in association with this report, various data limitations are present in such documents. As such, these limitations would also be transferrable to the information within this current report.

In this way, although Planit Consulting has taken every precaution in the report preparation process to ensure data accuracy, Planit Consulting makes no representations or warranties about report suitability, accuracy or completeness for any particular purpose and disclaim all responsibility and all liability for all expenses, losses, damages and costs which may be incurred as a result of data being inaccurate or incomplete in any way and for any reason.

3.0 Objectives and Methodology

The objective of this report is to assess the potential impact of the WWTP in context with the scenic amenity of the CHB development as a whole. Key visual catchment zones will be identified through both topographic, vegetation and on site photographic studies. The potential visual impact of the WWTP on the identified catchments will be assessed and evaluated against recognized visual assessment principals. Recommendations as to treatments including species list (in accordance with all relevant approvals and guidelines) will be proposed to reduce any potential visual impact.

The impact of the WWTP will be assessed through detailed topographic studies including the generation of view shed analysis presented in both 2D and 3D mapping to clearly illustrate findings.

A list (summary) of findings and recommendations will conclude this report outlining design principals to enhance the visual quality and minimize any potential adverse impacts related to the proposed WWTP and associated infrastructure.

4.0 Site Location

The CHB development is a 72ha site originally subject to coal mining activities located to the east of the Pacific Hwy to the south of the existing Catherine Hill Bay Village. The site is north of the Munmorah State Conservation Area within the lake Macquarie LGA, and is approximately 100km north of Sydney and 26km south of Newcastle.

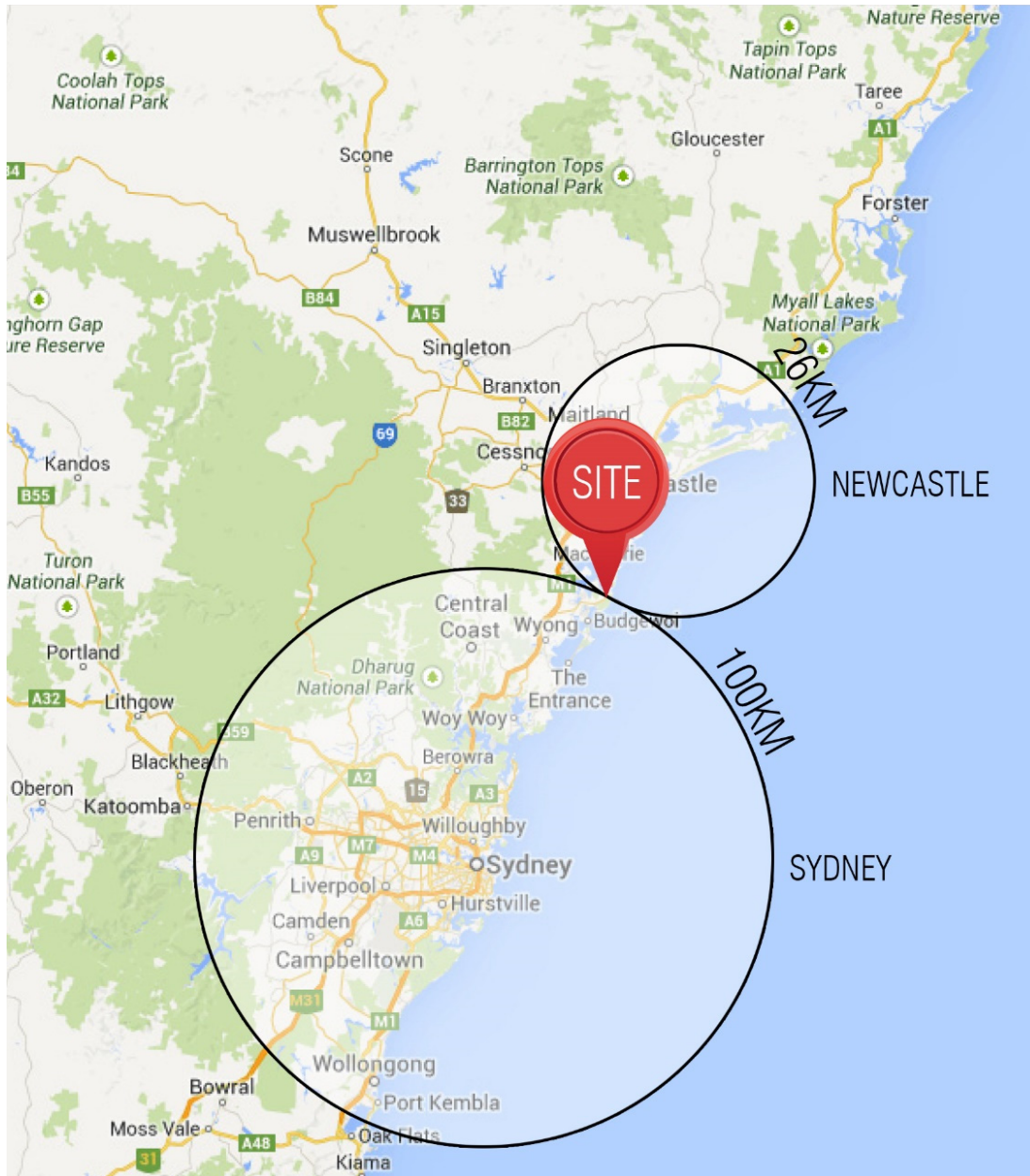


Fig. 1 Site Context Plan 01



Fig. 2 Site Context Plan 02 :: Area of Investigation

5.0 Area of Investigation

The area of investigation (WWTP) is located on the southern side of Montefiore Street at the western edge of the proposed development footprint as illustrated in Fig. 2 and Fig.3. The AOI is bounded to the south by the Munmorah State Conservation Area and to the east by the proposed residential lots of the CHB development (Stage 6 and 7).

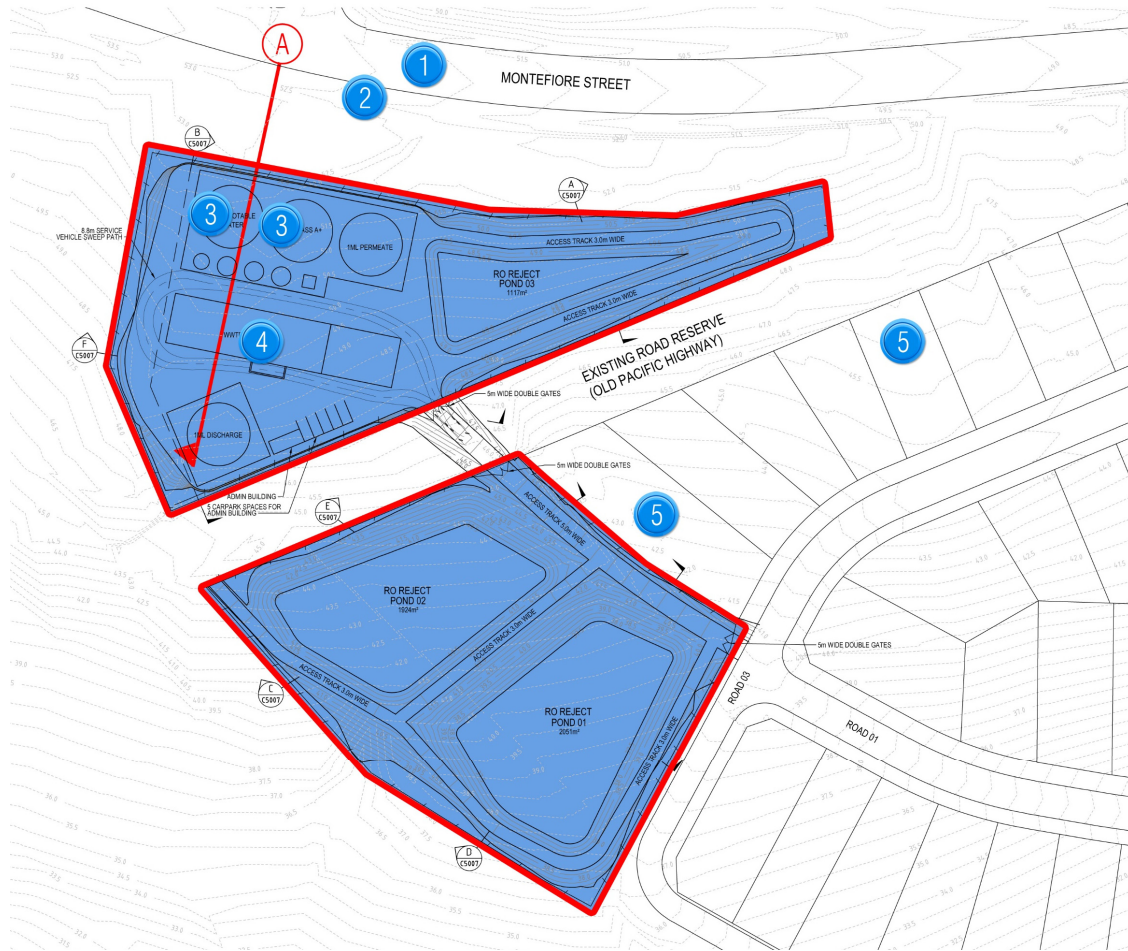


Fig. 3 Site Context Plan 02 :: Area of Investigation

The AOI covers an area of 14,500m² over two sites separated by an existing road reserve. The northern portion of the site covers 7,300m² and contains a number of structures associated with the WWTP. These include a multipurpose shed a number of process tanks. The scale and dimensions of these elements are detailed below. The southern portion covers an area of 7,200m² and contains two evaporation basins. An access maintenance track runs from the internal road layout of the CHB development along the northern border of the southern WWTP site providing access to the northern WWTP site.

- 1) Montefiore Street 13.00m carriage way (RL 52.0)
- 2) 4.50m verge
- 3) Storage Tanks maximum height 6.00m
- 4) Shed maximum height 5.10m
- 5) 9.00m height (Maximum height of dwellings within Zone J – DCP Section 5.3.2 Height Control)

6.0 Visual Catchment Areas

Visual catchments are areas bound by a shared viewing exposure from a particular vantage point or location on the ground plane. Visual catchment areas are defined largely by topography, the height of a particular point on the ground plane, relative to the surrounding area. This is best illustrated in Figure 4 below.

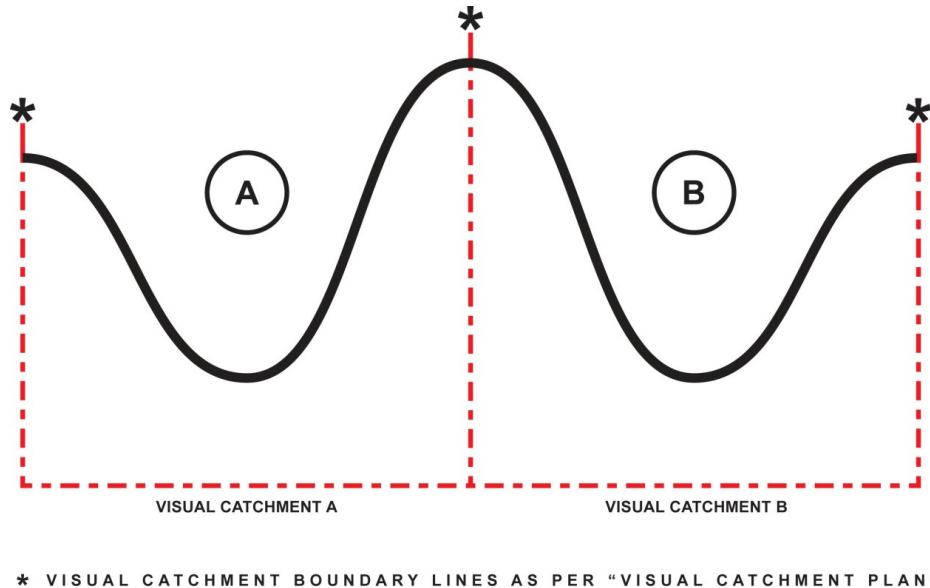


Figure 4: Visual Catchment Graph

This cross-sectional view illustrates two distinct Visual Catchments 'A' and 'B'. A particular land-use or structure that exist within Visual Catchment area A is likely to be contained within the confines of Visual Catchment Zone A. Further, its impact may be visually obscured (or its impact lessened) from Visual Catchment B by the central rise in topography. The dominant ridgelines form the extents of a visual catchment (illustrated as an '*' on the above diagram). This methodology for establishing visual catchment boundaries has been applied over the CHB study area. The result is a plan which separates the study area into 2 visual catchment zones.

The resultant Visual Catchment Zone Plan (refer to Figure 5) provides a base that will aid in determining the potential visual impact or exposure that the proposed WWTP will have to surrounding view catchments.

The Visual Catchments for the CHB are made up of two distinct primary regions, VCA1 Catherine Hill Bay VCA and VCA2 Moonee VCA. These regions are defined largely through topography with the main site ridgelines acting as the perimeters of these.

As identified in Fig 5 Montefiore Street is located along the primary east-west Ridgeline 1 (R1) with the WWTP site located to the south of this distinct topographic feature. Primary Ridgeline 2 (R2) is associated with the Pacific Hwy and forms the western perimeter of VCA2.

The topographic studies undertaken by Planit Consulting and included within this report as Fig 6 and 7 reiterate the findings within the Visual Impact Statement prepared for the development as a whole by CONTEXT Landscape Design February 2011. The CONTEXT VIS identified an additional VIA referred to as 'Middle Camp Landscape Unit' to the north of VC1. Given the distance of this VIA from the area of investigation (1.62km), coupled with the topographic features and existing vegetation characteristics of the 'Catherine Hill Bay VCA' (VCA2) the VCA of Middle Camp' is not investigated further within this report.

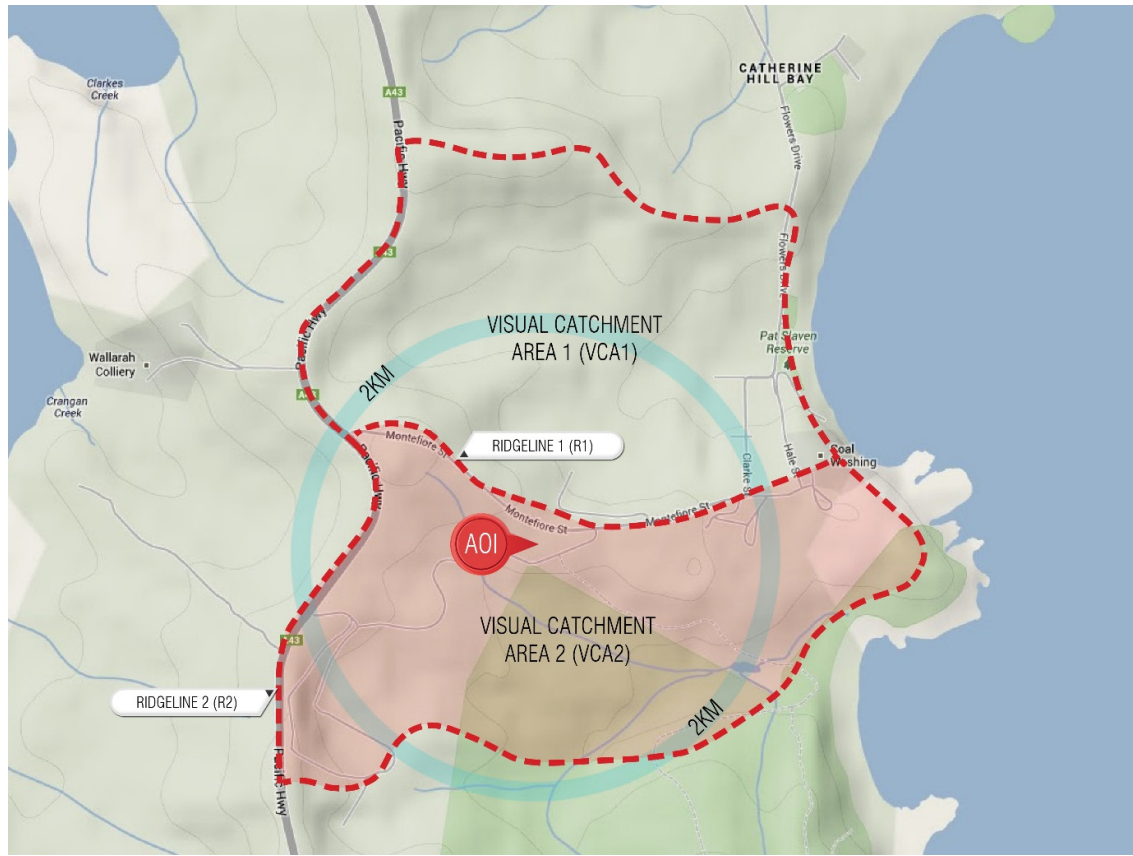


Figure 5: Visual Catchment Plan

7.0 Topographic Modelling

As illustrated in Typical Section A, the physical structures located within the northern portion of the WWTP site consist of a shed (5.10m above pad level), and storage/treatment tanks with a maximum height of 6.00m. This height data has been used to generate a view shed analysis of the WWTP. Elevation data (ASTER GDEM Elevation Data 2012) has been used to determine the potential view shed for these elements. This is illustrated graphically in Fig. 6.

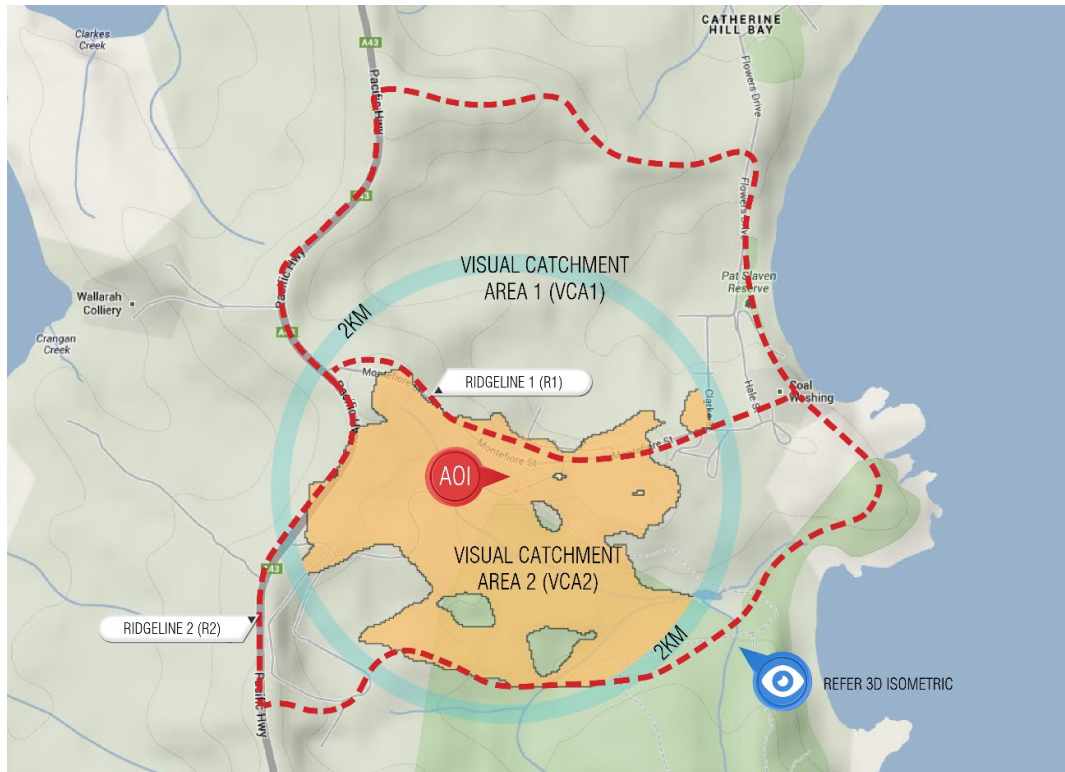


Fig. 6 View Shed Analysis

As illustrated in Fig 6 above, the view shed analysis of structures with a maximum height of 6.00m above a pad level of 48.50m is contained almost entirely within Visual Catchment Area 1. The primary east-west ridgeline (R1) provides a visual barrier to the northern VCA1. The viewshed is further contained by R2 associated with the Pacific Highway to the west of the AOI.

This View Shed Analysis mapping is based on topographic features only, the location of existing vegetation and the proposed built residential nature of the area surrounding the AOI is explored further in 8.1 Key Vantage Point 01.

The effect that the ridgelines and associated Visual Catchment areas and boundaries can be more clearly displayed in isometric view, see Fig 7.

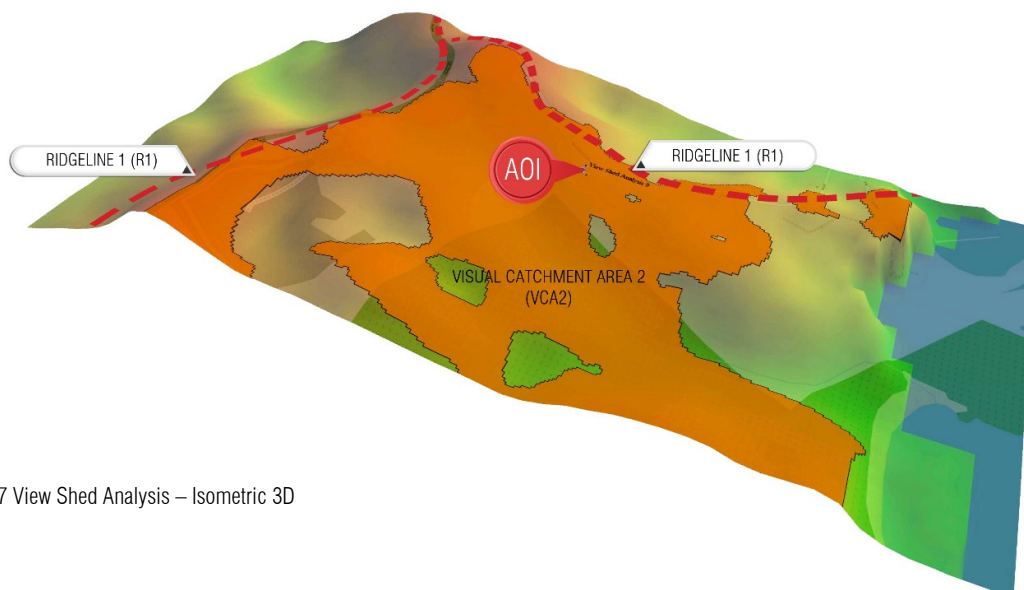


Fig. 7 View Shed Analysis – Isometric 3D

8.0 Key Vantage Points of Investigation

Within the established Visual Catchment Areas, 3 main key vantage points have been selected for further investigation. These vantage Points were selected based on several factors including:

- a) Distance to subject site
- b) Location along main roads / Entryways
- c) Areas of elevated topography
- d) Photographic and Site Investigation

These key vantage points are made up of 'External' and 'Internal' views. The external views are those vantage points within the view shed that are located external to the CHB development footprint. As indicated in the View Shed Analysis mapping, the external views are limited to R1 and associated Montefiore Street and the most southerly portion of CHB Development Stage 6. The internal viewshed is contained within VCA2 in which CHB Development Stage 5 is located.

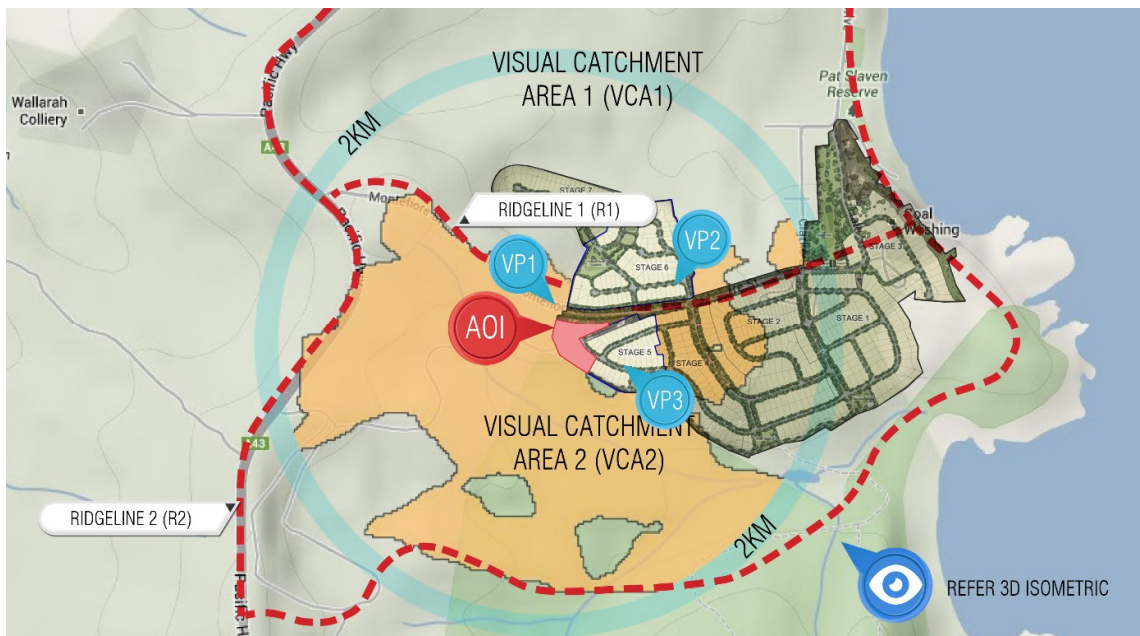


Fig. 8 Key Vantage Points

8.1 Key Vantage Point 01: Montefiore Street (VP1)

Montefiore Street provides the main access to the CBH development from the west when travelling from the Pacific Hwy. This street runs along the main east-west ridgeline that forms the Visual Catchment boundary between VC1 and VC2.

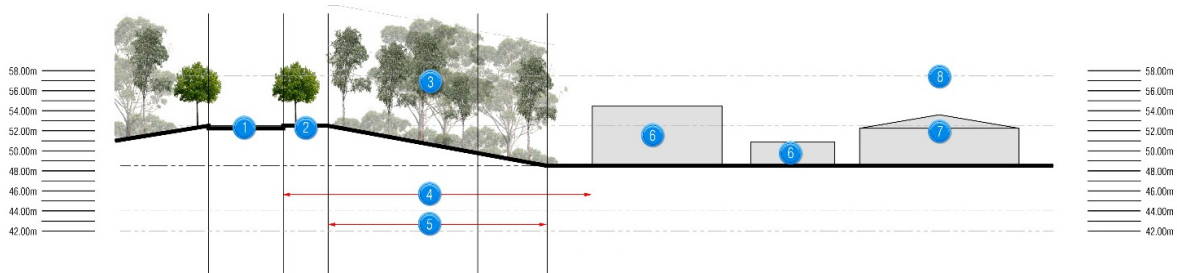


Fig. 9 Section A, Montefiore Street

The location of the above section is illustrated in Fig.3

- 1) Montefiore Street 13.00m carriage way (RL 52.0)
- 2) 4.50m verge
- 3) Existing bushland including 15.00m Landscaped Buffer (refer to supplementary planting zones)
- 4) Set back to first WWTP structure 31.20m from sealed road
- 5) Total width of vegetation buffer 22.00m
- 6) Storage Tanks maximum height 6.00m
- 7) Shed maximum height 5.10m
- 8) 9.00m height (Maximum height of dwellings within Zone J – DCP Section 5.3.2 Height Control)

As illustrated in Typical Section A, potential views of the WWTP and associated structures will be greatly reduced based on the raised elevation of Montefiore Street which in this location is elevated 3.5m above the pad level of the WWTP (48.5). As detailed within the CHB Development Control Plans, a 52m road reserve including a 15m landscaped buffer is proposed the length of Montefiore Street. This buffer is described within the DCP as

A landscaped zone on each side of the street (that) will provide a visual buffer to Catherine Hill Bay Village and the proposed Residential lots to the south.

As illustrated in Fig 9 Item 9, dwellings referred to in the above DCP control have a maximum height of 9.00m (Maximum height of dwellings within Zone J – DCP Section 5.3.2 Height Control). It is noted that all proposed structure associated with the WWTP have a maximum height of 6m.

Any potential views into the AOI from the Montefiore Street Vantage Point will be greatly reduced by the vegetation zone identified in Fig. 9 Section A. The recommendations section of this report identifies this area as one of the areas in which supplementary planting to ensure adequate screen vegetation densities are achieved. Refer to Section 9.0 for further details.

8.2 Key Vantage Point 02: Development Stage 6

The vast majority of the CHB development Stage 6 is located within VCA1 and will not be visible to this visual catchment area. This is due to the Visual Catchment Boundary formed by Montefiore Street and the associated ridgeline RC1. This reflects the findings of VIS prepared by CONTEXT, Section 7.0:

The proposed Stages 6 and 7 located north of Montefiore Street cannot be seen from the existing Catherine Hill Bay hamlet or Montefiore Street. The 15m landscape buffer zone and setback of the proposed stages from the ridgeline conceals the proposed stages from the view along Montefiore Street.

This finding was based on a maximum building height of dwellings within Stage 5 and 6 of 9.00m (Maximum height of dwellings within Zone J – DCP Section 5.3.2 Height Control). As detailed in Section 5.0 Area of Investigation, the maximum height proposed within the WWTP site is 6.00m.

Key Vantage Point 2 (CHB Development Stage 6) will have no clear line of sight to the WWTP and associated Infrastructure based on the topographic nature of the Montefiore Ridgeline (R1) and the combined 30m (2 x 15m) vegetation buffer that form part of the 52m road reserve. The recommendations section of this report identifies this area as one of the areas in which supplementary planting to ensure adequate screen vegetation densities are achieved. Refer to Section 9.0 for further details.

8.3 Key Vantage Point 03: Development Stage 5

As illustrated in Fig 10.0 below, Stage 5 of the CHB development is located to the immediate east of the proposed WWTP site. The southern portion of the WWTP site consists of two evaporation ponds. The western pond (Pond 02) has an external perimeter bund at maximum height of 42.00m (central separation bund – refer Fig 10) and the easterly pond (Pond 01) has external perimeter bund at maximum height of 39.00m. In contrast to the northerly portion of the WWTP site, this southerly portion does not contain structures such as tanks, buildings etc. The primary potential visual impact of this southerly portion is from the associated batters required to achieve the design heights of the evaporation ponds.

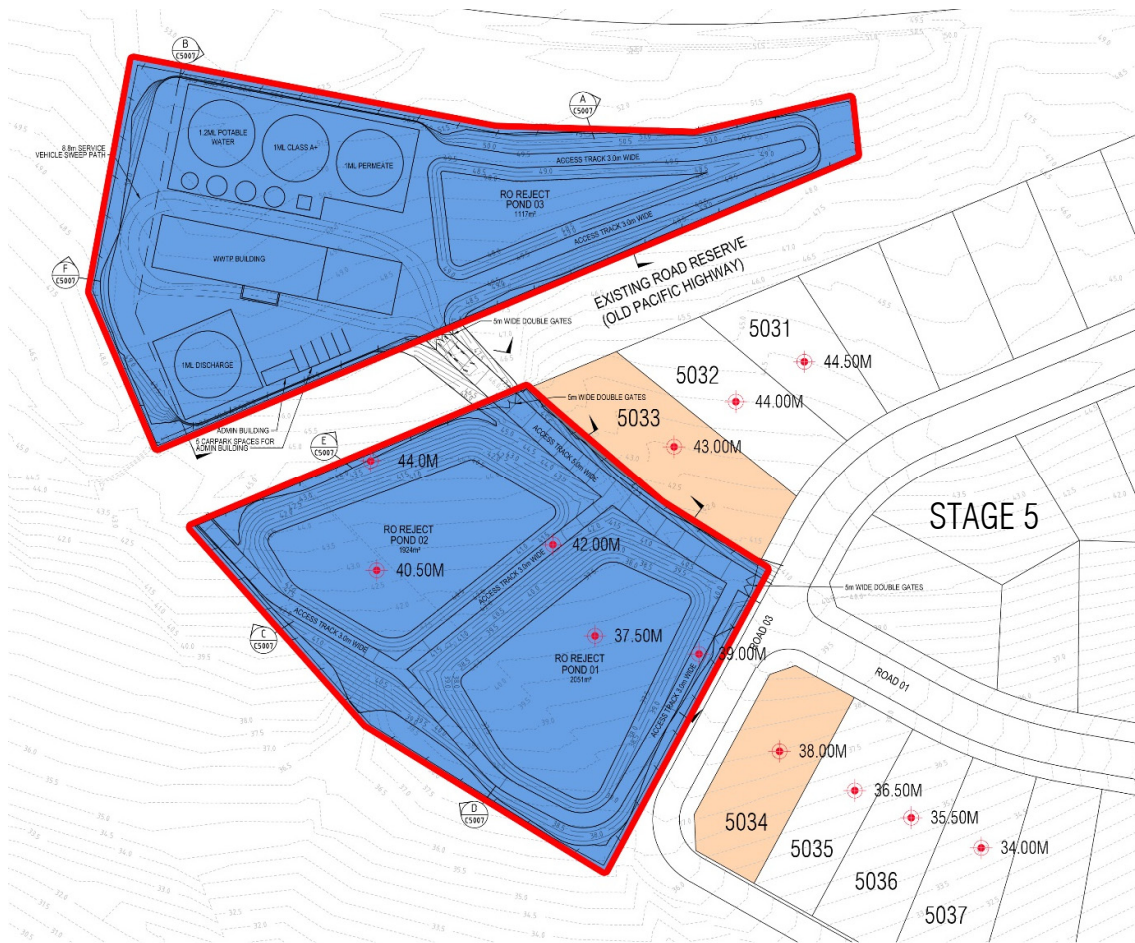


Fig. 10 Visual Impact Zone

Potential views of these basins to the east and south east (lots 5034, 5035, 5036, 5037) are decreased significantly due to the gradual lowering of topography which results in closing the viewing angle and potential visual catchment (refer spot heights of Fig 10). Lots to the north east have a higher viewing potential (lots 5033, 5032, 5031) as their pad levels are 43.00 – 44.50m and subsequently their viewing angle is increased ie they are elevated at the same height as, or higher, than the evaporation basins. The greatest potential visual impact from the evaporation ponds is to lot 5033. This potential visual impact will be greatly reduced through strategic mitigation plantings, refer to Section 9.0.

9.0 Recommendations – Planting Zones



Fig. 11 Planting Zones

9.10 Planting Zone 1 (PZ1) – Montefiore Buffer Planting

The 52m road reserve of Montefiore Street contains a combined 30m vegetated buffer. This green spine is vital in achieving the visual mitigation measures as stated throughout this report. All proposed landscape works should aim to maintain this dense vegetated road reserve and the high level of scenic amenity that this will create. As detailed in the DCP Street Character Section 4.3:

A landscaped zone on each side of the street (that) will provide a visual buffer to Catherine Hill Bay Village and the proposed Residential lots to the south.

To ensure the potential visual mitigation measures of this 'green spine' are achieved, the existing vegetation and supplementary planting should aim to incorporate the following design principles:

- Well vegetated road reserves
- Filtered views to surrounding landform
- Species selection based on existing native ecosystem
- Species selection to continue existing, ground, mid and upper story structure
- Planting densities increased as required to achieve adequate screening and filtered views

The high scenic amenity that 'natural' and vegetated landscapes provide is well documented and accepted internationally, the appropriate use of vegetation to both mitigate visual impact, and enhance the regional character, is considered a high priority objective.

Batter planting (both existing and supplementary) will significantly reduce the visual impact of WWTP (and the CHB development as a whole) and help to visual blend the development into the surrounding landscape. The following illustrations outline desirable design outcomes with the aim of providing a well vegetated, natural road reserve.

Key outcomes include:

- Integrate existing vegetation patterns into the road reserve plantings;
- Maintenance of clear sightlines where required
- Low Maintenance requirements
- Defragment existing vegetation; and
- Avoiding linear strip planting that accentuates the road form as opposed to obscuring or framing views.

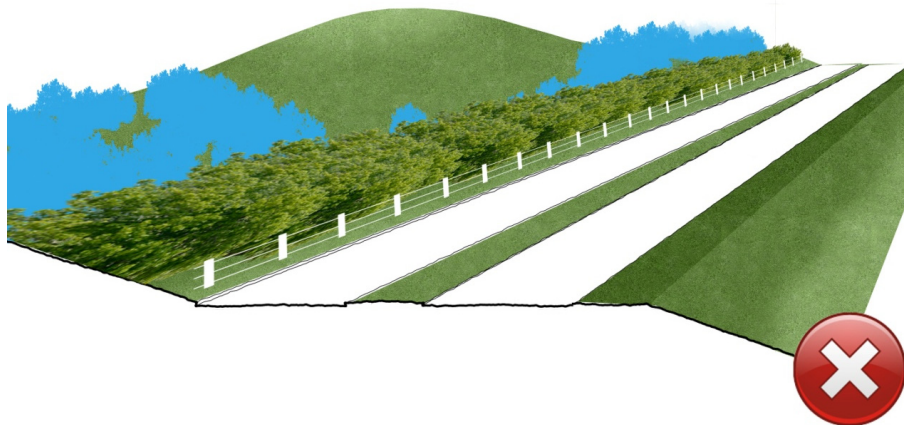


Fig 12 Non Desirable Outcome

- Prominent linear strip planting that accentuates the road form as opposed to obscuring or framing views.
- Non responsive to existing vegetation (shown as blue)
- Regular and continuous planting form
- Nil visual breaks to allow views to key landmarks, signage, and other key visual reference points (prominent hill used in example above is screened from view for the traveler)

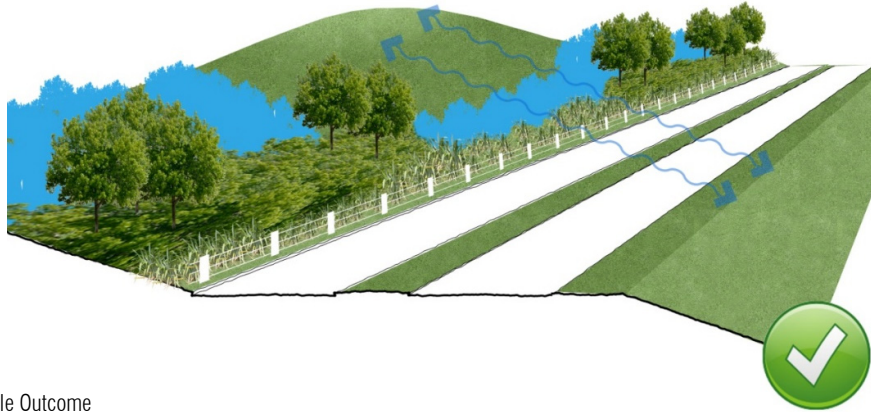


Fig 13 Desirable Outcome

- Integration with and defragmentation of existing vegetation (shown as blue)
- Planting form creates varying and interesting journey
- Visual breaks to allow views to key landmarks, signage, off ramps and other key visual reference points (prominent hill used in example above framed and visible to the traveler)

Species selection

Species selection should take into account the following desired outcomes:

- Native, hardy and easily maintained
- Plants that have regional significance should be used where appropriate (of particular relevance given the adjacent Munmorah State Conservation Area)
- Street tree and associated verge planting species chosen by form (mature height, spread etc) to adequately achieve the visual mitigation aims as recommended by this report

9.20 Planting Zone 2 (PZ2) – Internal Road Reserve Stage 5 CHB

The public landscaping (streetscape verge plantings) will assist in mitigating potential adverse visual impacts of the WWTP site and associated infrastructure. Street trees at an average of 1 per lot (15m centres) to internal road network with increased screening from trees at indicative spacings of 5m to the verge adjacent to the eastern Pond 01 batter.

It is noted that the built nature of the residential lots (Maximum height of dwellings 9.00m within Zone J – DCP Section 5.3.2 Height Control) combined with landscape screen plantings within the private residential lot landscapes will further reduce the potential adverse visual impact of the evaporation basin and associated batters.

The evaporation basins are bordered to the south by the Munmorah State Conservation Area.

The DCP nominates a number of species for use within 'Local Roads':

1. *Angophora costata* (Smooth bark Apple)
2. *Corymbia maculata* (Spotted Gum)
3. *Cupaniopsis anacardioides* (Tuckeroo)
4. *Eucalyptus botryoides* (Southern Mahogany)
5. *Eucalyptus capitellata* (Brown Stringybark)
6. *Eucalyptus haemastoma* (Scribbly gum)
7. *Eucalyptus piperita* (Sydney peppermint)

The placement of these trees should aim to maximize their screening qualities with the potential to increase the 'standard' spacings (1 per lot at an average of 15m centres) where space permits. A spacing of 7.5m is recommended

for lots in close proximity to the WWTP site. In particular lots to the east and south east (lots 5034, 5035, 5036, 5037) and to the north east (lots 5033, 5032, 5031).

As indicatively illustrated in Fig 11, street trees should be staggered on opposite sides of the road to assist in closing potential viewing angles into the WWTP site.

9.30 Planting Zone 3 (PZ3) – Internal Road Reserve

As indicatively illustrated in Fig 11, trees at indicative spacings of 5m to the verge adjacent to the eastern evaporation pond batter will greatly reduce the visual impact of the structures to the eastern and south eastern lots. The DCP outlines a number of trees that would be suitable for this application, these are listed below. These trees have been chosen based on their form and screening qualities.

Species selection

1. *Glochidion ferdinandi* (Cheese Tree)
2. *Angphora costata* (Smooth bark Apple)
3. *Cupaniopsis anacardioides* (Tuckeroo)
4. *Eucalyptus piperita* (Sydney Peppermint)

Understory Species and Midstorey plantings should also be incorporated (contained within DCP):

1. *Acacia longifolia* var. *longifolia* (Sydney Golden Wattle)
2. *Banksia oblongifolia*
3. *Leptospermum laevigatum* (Tea tree)
4. *Westringia fruticosa* (Coastal rosemary)
5. *Lomandra obliqua* (Fish Bones)
6. *Patersonia sericea* (Purple Flag Flower)
7. *Pultenaea elliptica*
8. *Themeda australis* (Kangaroo Grass).

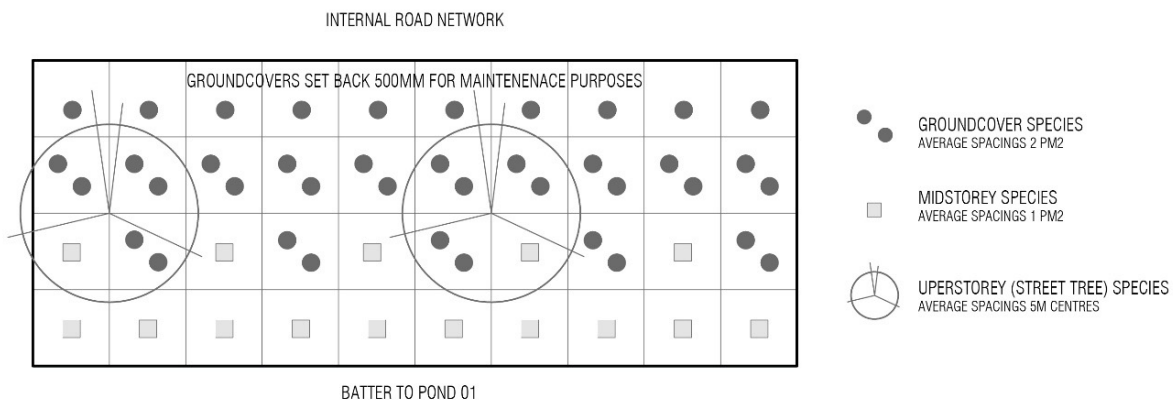


Fig 14 Indicative Planting Module planting Zone 3

9.40 Planting Zone 4 (PZ4) – Lot 5033

As determined through Visual Shed Analysis, Lot 5033 has been identified as having a clear line on sight to the WWTP southern area due to elevated pad level of 43.00m. Planting Zone 4 is located along the northern perimeter of the southern portion of the WWTP site. Tree and groundcover species should be planted to adequately screen the WWTP evaporation basins from the residential lots to the immediate north. Refer to indicative planting module Zone 4 Figure 15 and associated species list.

Species selection

1. *Angphora costata* (Smooth bark Apple)
2. *Cupaniopsis anacardioides* (Tuckeroo)
3. *Calistemon viminalis*
4. *Calistemon salignus*

Understory Species and Midstory plantings should also be incorporated (contained within DCP):

1. *Acacia longifolia* var. *longifolia* (Sydney Golden Wattle)
2. *Banksia oblongifolia*
3. *Leptospermum laevigatum* (Tea tree)
4. *Westringia fruticosa* (Coastal rosemary)
5. *Lomandra obliqua* (Fish Bones)
6. *Patersonia sericea* (Purple Flag Flower)
7. *Pultenaea elliptica*
8. *Themeda australis* (Kangaroo Grass).

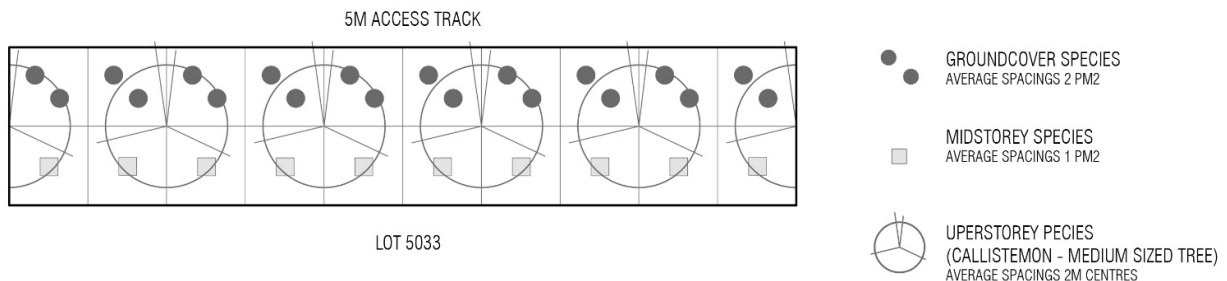


Fig 15 Indicative Planting Module planting Zone 4

10.0 Conclusions

- The general site topographic features reduces the potential visual impact of the WWTP to a single Visual Catchment Area referred to in this report and Visual Catchment Area 2. Visual Catchment Area 2 correlates to Stage 5 of the Catherine Hill Bay development.
- The 15m wide landscape planting buffer zone associated with Montefiore Street will provide a visual buffer screening any potential views of the WWTP and the proposed Residential lots to the north (Stage 6 and 7) (Visual Catchment Area 1).
- The 15m wide landscape planting buffer zone associated with Montefiore Street will greatly reduce any potential visual impact of the WWTP site from travelers on Montefiore Street.
- Screen planting as recommended in this report will assist in mitigating any potential adverse visual impact of the WWTP site and associated infrastructure for both Internal and External visual catchments.
- Mitigation planting within the WWTP southern site will provide screening of the WWTP evaporation basins from the residential lots to the immediate north.
- Streetscape plantings to the internal road network of Stage 5 CHB development will assist in mitigating any potential adverse visual impact of the WWTP site and associated infrastructure.
- The built nature of the residential lots (Maximum height of dwellings 9.00m within Zone J – DCP Section 5.3.2 Height Control) combined with landscape screen plantings within private residential landscapes will further reduce the potential adverse visual impact of the evaporation basins and associated infrastructure.