Our Ref: BS:TM:239312s

11 May 2017

Department of Planning and Environment
GPO Box 39
SYDNEY NSW 2001

ATTENTION: CAROLYN MCNALLY

Dear Ms McNally

APPLICATION FOR MODIFICATION OF CONCEPT PLAN APPROVAL MP05-0083 PURSUANT TO SECTION 75W OF ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979.

Land: Lot 22 in DP 1070182 and Lots 497 and 498 in DP 227298 Pacific Highway and Pine Crescent Sandy Beach, Coffs Harbour.

We act for the owner of the above land (the site) Elite Constructions NSW Pty Ltd. The Concept Approval requires development consent to be obtained prior to any subdivision works being undertaken. The Department has confirmed any future development application will need to be lodged with Coffs Harbour City Council. To facilitate lodgement of a development application with Council we seek to modify the Concept Approval to address design issues and potential inconsistencies between the Concept Approval and what will be proposed in a development application.

The approved plan was approved subject to numerous amendments. As part of this application we have provided an updated plan that clearly reflects what has been approved.

As part of this application we seek to remove the proposed laneways from the Concept Plan. Laneways are a design feature not favoured by our client. The development footprint and road standards required by Council significantly constrain potential lot sizes achievable within the approved development to the extent that the development footprint would need to be increased if the laneways are retained. While we acknowledge the design objectives of including the laneways we are of a view that for this development the inclusion of laneways is not essential.

The removal of the laneways would potentially lead to other inconsistencies with the Concept Plan.

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The concept plan as approved seeks to maximise rear access to amongst other things provide improved solar access by optimising north orientation and create a high quality public domain that includes vegetated drainage bio-swales in all roads. While the houses would have a conventional streetscape appearance and address it was intended this would be without the disruption to the streetscape of garages and driveways.

We have undertaken a review of the stormwater strategy in addition to general design review. Due to the relative poor performance of swale drains from a water quality perspective it now proposed to provide smaller bio-retention areas around the perimeter of the development footprint rather than rely on swales within all internal roads. While smaller internal swales have been removed a larger swale drain to convey upstream water has been retained as part of the strategy. This would have been required irrespective of whether the internal swale drains were retained or not. Refer to the stormwater report included as **Appendix F.**

Removal of swales adjacent to proposed lots and introducing garages and driveway crossings to the development will change the character of the development however it is considered that these changes while representing a more conventional subdivision design still allow for high level design outcomes to be achieved. It remains our client's intention to ensure high quality architectural design throughout the development. The shared path will provide for pedestrian and cycle movements within and through the site. Street tree planting will be provided within verge areas and building controls addressing materials as well as appearance will be imposed.

BACKGROUND

Concept approval was granted pursuant to Section 75O of the Environmental Planning and Assessment Act 1979 to a concept plan for the subdivision of Lot 22 DP 1070182 and Lots 497 and 498 DP 227298, Pacific Highway and Pine Crescent, Sandy Beach. Refer to the plan included as **Appendix A**.

The Concept Plan Description as detailed in Condition A1 includes:

- Community Title residential Subdivision;
- Associated road, cycle and pedestrian traffic routes;
- Indicative architectural concepts for six building types;
- Landscape concept;
- Noise attenuation buffers;
- Recreation open space;
- Ecological buffers and environmental protection areas; and
- Vegetation, habitat, bushfire and foreshore management concepts and stormwater management concept.

The approval requires the proponent to carry out the concept plan and all related future applications generally in accordance with the:

a) Environmental Assessment;
b) Preferred Project Report and Addendum letter; and
c) The Statement of Commitments.

Part B of the approval details Modifications to the Concept Plan pursuant to Section 75O (4) of the Act.

Condition B1 confirms that part Stage 1, Stage 2 and Stage 6 were not approved and we have deleted these from the attached version of the concept plan. The direct connection to the Pacific Highway in the North West corner of the site (Refer Condition B4) was also not approved and has been deleted.

Condition B2 requires that no roads, acoustic barrier walls or lots are to encroach into the 20 metre wide scenic protection zoned land that runs parallel to the Pacific Highway. We have amended the concept plan accordingly.

Condition B6 requires the construction of all roads to be in accordance with the specifications of Coffs Harbour Council. It is noted that the verge widths are for convention subdivision design outcomes which do not provide for swale drains within the verge area. The following is an extract from Council's DCP.

	Collector Road	**Local**	**Minor Road**
Road Reserve Width	20m	15-16m	13.5-15m
Carriageway Width	9-11m	7-8m	5.5-7m
Verge	4.5 – 5.5m	2 x 4.0m	2 x 4.0m
Minimum Design Speed	50km/h	40km/h	25km/h

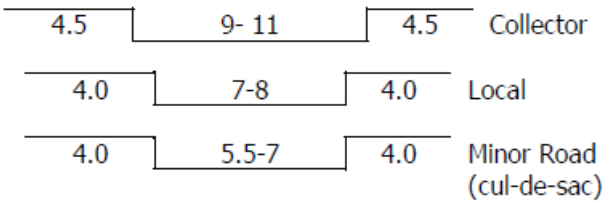

Figure 1: Extract from DCP relating to Coffs Harbour LEP 2000.

The approved concept plan application detailed the road hierarchy and road widths proposed for the development as detailed below. While not significantly different to Council's DCP requirements, these widths are inconsistent with the Concept Approval Plan.

Road Type	Road Reserve Width	Footways / Carriageway Widths (Proposed)	Council standard DCP applying to LEP 2000
Collector Road	21	5.0 -11 – 5.0	4.5 – 11 - 4.5
Local Streets	16	4.5-7-4.5	4.0 – 8.0 – 4.0
Lanes / Shareways	8	2.5 – 5.5 - 0	Unspecified

Note: Council Subdivision Design Specification or DCP do not include a requirement for or make provision for the use of lane ways.

In order to provide a more sensible and practical design outcome our client would like to delete the laneways and increase the width of the streets to comply with Council standards.

PROPOSED AMENDMENT

We seek to amend that concept approval such that it allows the proposed laneways to be removed from the concept subdivision layout. This could be achieved by including the amended concept plan ADW Johnson Plan Ref 239312 DA003-D-PLAN OF PROPOSED AMENDMENT TO CONCEPT PLAN 05-0083 dated 02/03/2017 as schedule 4. Refer to **Appendix B**.

It is suggested an additional note be added to Condition A1 so that it reads as follows:

Note: The proponent sought Concept Plan approval for community title subdivision of 280 lots. Due to environmental constraints, approval has not been granted to a scheme of this size. Modifications to the Concept Plan are detailed in Part B of this schedule. **These modifications are reflected in the amended concept plan included as Schedule 4.**

The note in PART B – MODIFICATIONS TO CONCEPT PAN APPROVAL PURSUANT TO SECTION 750(4) OF THE ACT could also be amended by adding additional note

Note 2: the modifications as described in this schedule have been reflected in the Amended Concept Plan ADW Johnson Plan Ref 239312 DA003-D-PLAN OF PROPOSED AMENDMENT TO CONCEPT PLAN 05-0083 dated 02/03/2017 included as Schedule 4.

Deletion of the laneways would result in two building types referred to in the Sandy Beach North Coffs Harbour Design Guidelines becoming redundant. Condition A1 c) is to be amended as follows:

c) Indicative architectural concepts for ~~six~~ **four** building types.

ENVIRONMENTAL ASSESSMENT / JUSTIFICATION OF PROPOSED AMENDMENT

Deletion of the laneways from the proposed development will allow roads to be constructed to Council standards without expanding the development footprint or unduly affecting the residential lots.

An overlay of the approved concept plan and the proposed amendment to the concept plan are included as **Appendix C**. Refer to PLAN OF LAYOUT COMPARISON OF DEVELOPMENT REFERENCE 239312/DA004A.

Laneways may have a place in residential subdivision design particularly for lots fronting parks or major streets and in high pedestrian traffic areas such as local centres, where it is desirable to avoid frequent driveway crossings which reduce car parking or can on impact traffic flows and pedestrian safety.

Street Design Guidelines prepared for Landcom may be considered to represent "best practice" for street design in NSW. These guidelines include Laneways as a road typology and provide a description on the use of lanes and issues to be considered. Refer to **Appendix D**.

A lane provides vehicular access to the rear of a property and can provide a high level of pedestrian amenity, optimise kerb side parking particularly where narrow lots that would otherwise result in unacceptably frequent footpath crossings and garages facing the street e.g. Row houses and small lot housing projects.

Removal of laneways would mean that access to lots would be obtained from the road frontage. It is proposed that drainage swales be relocated to the outer side of perimeter roads and a conventional footway be provided adjacent to proposed lots.

Removal of the laneways will require amendment to the "building typologies" as rear access would not be available to the lots. The Concept Approval condition C1(c) requires design guidelines for future housing to be developed in consultation with Council.

In considering the use of laneways in the Sandy Beach Development the following observations are made:

- The proposed lanes were included as an urban design element of the proposed development noting their potential benefits. The use of lanes however is not essential in achieving a high quality design outcome. The development is of a scale where traffic volumes will be relatively low and do not warrant denying vehicular access to lots from any of the proposed roads. We note that the northern connection of the collector road to the Pacific Highway has been deleted and limited non local traffic will enter the development.

- A shared path is proposed adjacent to the road edge adjoining the conservation area. This path will provide a focus for pedestrian activity rather than footpaths adjacent to proposed lots.

- Proposed lots are not proposed as small lot housing lots and adequate street frontage will be available to allow on street parking and ensure garages do not dominate the streetscape. The Housing Design guidelines referenced in Condition A1 c) have been amended by deleting the two building types requiring access off the laneways. Amended Housing Design Guidelines are included in **Appendix E.**

- The laneway reserve (nominally 8.0 metres) takes up significant land.
- Including laneways increases the per lot construction cost.
- Maintenance costs will be imposed on Council for future maintenance of laneways.
- The laneways as proposed do not provide visual connection from one end to the other raising issues in relation to crime prevention.
- The need to provide studios with access from the laneways, with balconies or windows looking over the laneway is not supported by the current owner the proposed lot sizes and the market.

The development footprint approved in the concept approval as it relates to the location of road carriageways and lots will not be increased. As required by the concept plan approval, the impact on conservation area is minimised by the proposal. There will not be any significant environmental impact caused by the proposed amendment. Road batters will be revegetated.

The amended drainage strategy utilises a combination of swale drains primarily for conveyance of upstream water, and bio-retention areas to address water quality. A stormwater quality assessment report prepared for stages 1 and 3 demonstrates that the objective of treating stormwater to ensure a neutral or beneficial impact on water quality can be achieved. A copy of the stormwater report and a typical road cross section are included in **Appendix F**.

Deleting the rear laneways will mean that garages will address the street frontage. Adequate frontage and development controls are in place to ensure this does not have an undesirable impact on the streetscape.

Deleting the rear laneways will potentially improve community safety within the development.

We trust the Minister will support the proposed amendment. Should you require any additional information please contact Trevor Carter or myself at our Hunter office on 49785100.

Yours Faithfully

Brett Stein
SENIOR PLANNER
ADW Johnson Pty Ltd
Hunter Office

Appendix A

APPROVED CONCEPT PLAN

SCHEDULE 3

Sandy Beach North

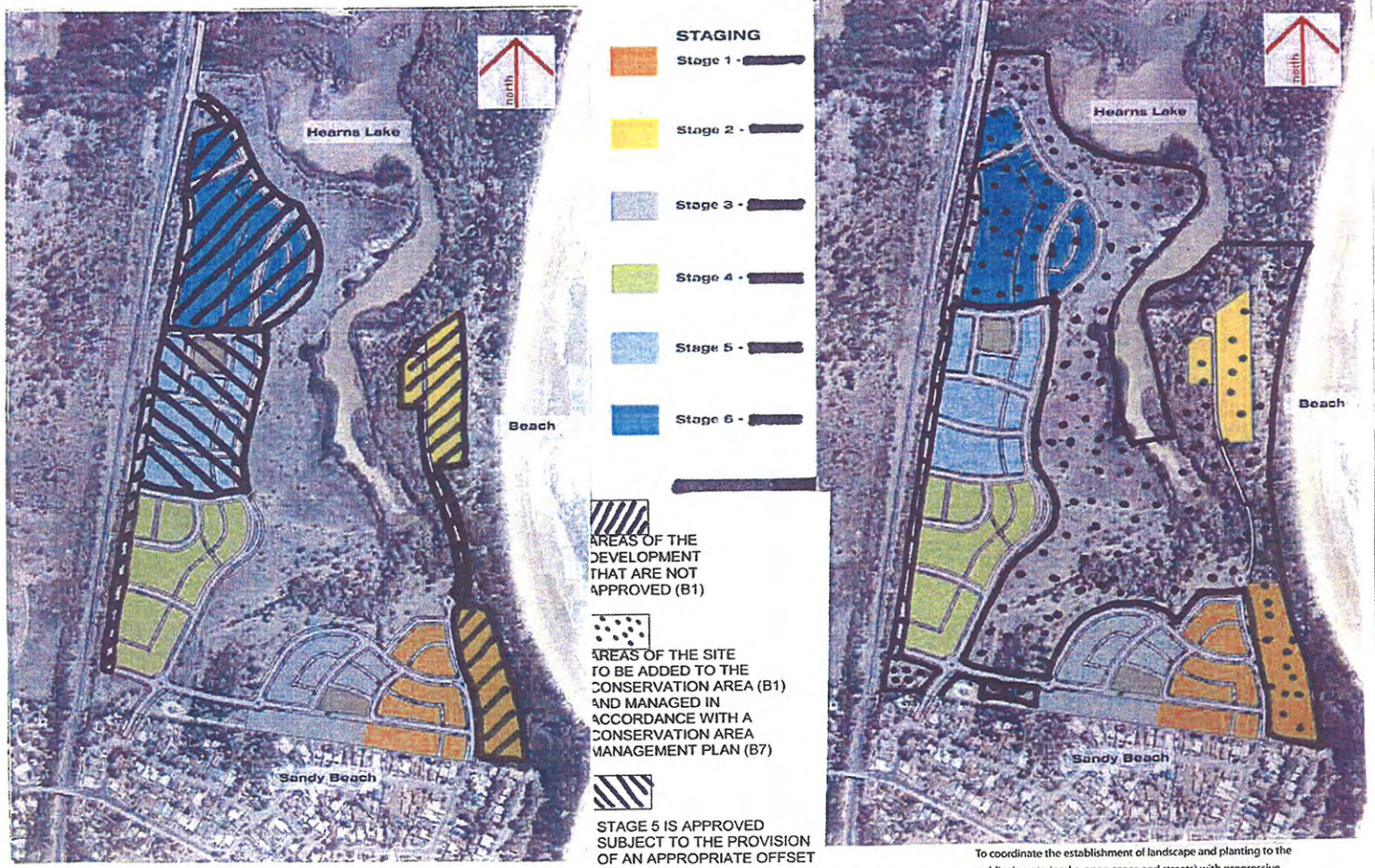

Fig 72 - Staging Strategy

To coordinate the establishment of landscape and planting to the public domain (parks, open space and streets) with progressive

Appendix B

AMENDED CONCEPT PLAN

239312-DA-003-D

CREEK

CROSSING

ORIGINAL M.H.W.M.

HEARNES LAKE

258
D.P. 752853
CROWN LAND
RESERVE 87962

7012
D.P. 1055592
CROWN LAND
RESERVE 1082

HIGHWAY

PACIFIC

PACIFIC OCEAN

APPROX. BOUNDARY ONLY

1063.51 M.H.W.M.

ROAD 18 WIDE
ROAD 16 WIDE
ROAD 20 WIDE
ROAD 16 WIDE
ROAD 16 WIDE
ROAD 16 WIDE
ROAD 20 WIDE
ROAD 20 WIDE
ROAD 16 WIDE
ROAD 18 WIDE
ROAD 20 WIDE
ROAD 16 WIDE
ROAD 18 WIDE
ROAD 16 WIDE (13.5 WIDE)
ROAD 16 WIDE
ROAD 20 WIDE

66.39
373.57
264.94
137.4
546.535
53.63
35.405
A.9.145
A.1.725
50.02
74.535
18.475
33.845
33
33.845

(A) (C) (D) (E)

D.P.227298
LOT 1 DP.813954

OAK CLOSE
BLACKBUTT AVE.
PINE CRESCENT
DIAMOND HEAD DRIVE
MAPLE ROAD
CHESTNUT AVENUE
TI TREE ROAD
AVENUE
SANDY'S BEACH DRIVE

LEGEND

SITE SUMMARY

- STAGE 1
- STAGE 3
- STAGE 4
- STAGE 5

TOTAL RESIDENTIAL AREA 9.519 ha.

- PUBLIC ROAD - 6.327 ha.
- CONSERVATION AREA 33.88 ha.
- AREAS OF THE DEVELOPMENT THAT ARE NOT APPROVED (B1)

EXISTING SITE INFORMATION

LOT 22 D.P.1070182 (49.59 ha.)
LOT 497 D.P.227298 (689.2m²)
LOT 498 D.P.227298 (714.5m²)
TOTAL = 49.73 ha.

(A) EASEMENT TO DRAIN WATER 1.82 WIDE
(C) EASEMENT FOR SEWER PIPELINE 5 WIDE (E.740455)
(D) EASEMENT FOR ACCESS 5 WIDE AND VARIABLE (D.P. 813954) E740455
(E) EASEMENT FOR WATER 3.5 WIDE (T.536154)

ver.	date	comment	drawn	pm	level information	scale (A3 original size)
D	02/03/17	UPDATE - BOUNDARY TO NORTH	RC	TC	DATUM: N/A CONTOUR INTERVAL: N/A	0 100 200m SCALE: 1:4000 (FULL)

working beyond expectations

drawing title:
PLAN OF PROPOSED AMENDMENT TO CONCEPT APPROVAL 05-0083

location: WOOLGOOLGA COFFS HARBOUR
council: COFFS HARBOUR
dwg ref: 239312-DA-003-D
client: Elite Constructions NSW Pty Ltd

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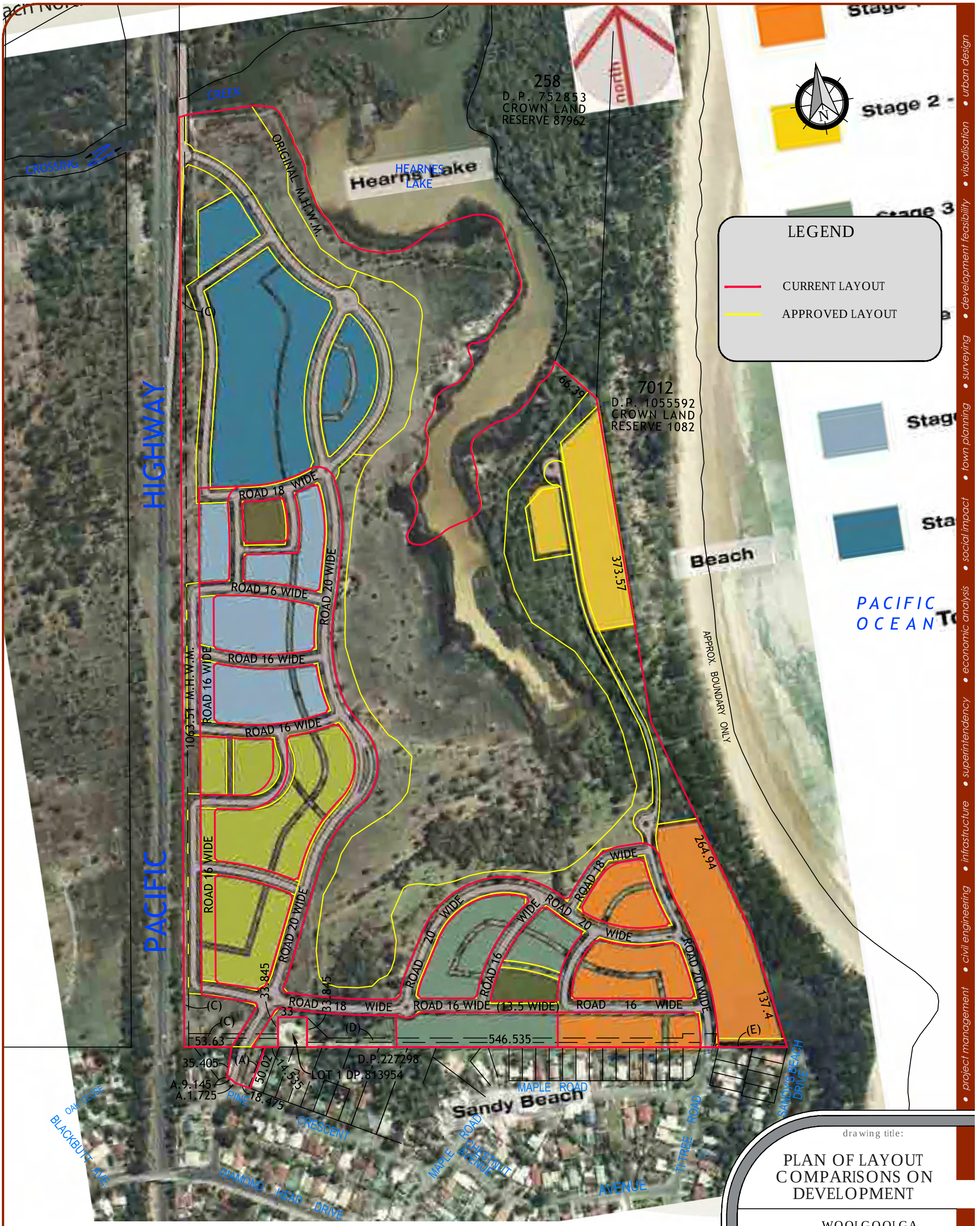
Appendix C

OVERLAY OF APPROVED CONCEPT PLAN AND PROPOSED AMENDED PLAN



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(D) EASEMENT FOR ACCESS 5 WIDE AND VARIABLE (D.P. 813954) E740455

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TOTAL = 49.73 ha.

ver.	date	comment	drawn	pm	level information	scale (A3 original size)
A	01/03/17	COMPARISON PLAN	RC	TC	DATUM: N/A CONTOUR INTERVAL: N/A	0 100 200m SCALE: 1:4000 (FULL)

working beyond expectations

drawing title:

PLAN OF LAYOUT COMPARISONS ON DEVELOPMENT

location: WOOLGOOLGA COFFS HARBOUR

council: COFFS HARBOUR

dwg ref: 239312-DA-004-A

client: Elite Constructions NSW Pty Ltd

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Appendix D

EXTRACT FROM LANDCOM STREET DESIGN GUIDELINES

3.5 Lanes and access-ways

Description

Lanes, access-ways and mews are generally used for small-lot housing to provide rear access for car parking. They may also be used for lots fronting parks or major streets to avoid frequent driveway cuts, which reduce the number of on-street parking spaces.

Issues to be considered

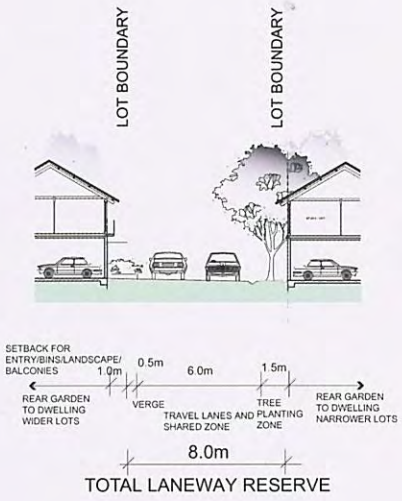
- Lanes should not be treated as purely utilitarian – they should be designed as pleasant and safe elements of the street network, with sufficient 'address' to create activity and provide passive surveillance.
- The safety of lanes and access-ways is critical – they should be designed according to CPTED (crime prevention through environmental design) principles and to minimise conflicts between vehicles and other users.
- Lanes should be short (less than 100 metres) and should always link other streets (no dead ends). They should generally be straight, providing visual connection from one end to the other.
- Lanes should provide a minor address for some dwellings to enable passive surveillance. This may be achieved with small apartments or studios accessed off the lane (e.g. above garages). Ideally these dwellings should have an actual 'front door' or clearly defined entry onto the lane rather than just a rear gate. They should also have windows or a balcony looking into the lane. These secondary dwellings should be located at each end of the lane, with at least some in the middle portion, when solar orientation allows.
- Lanes should be wide enough to allow some tree planting to improve visual amenity. Landscaping should be planted in a semi-mature state to minimise risk of damage. When mature, landscaping in lanes should have a raised canopy so that it does not block access and sight lines.
- Rear fences along lanes should be partly semi-transparent to enable passive surveillance – as a guide at least 25% of the fence should be transparent. Narrow inset areas of fencing should be avoided as they offer opportunities for concealment. However some variation in fence alignment can provide interest and allow for landscaping.
- Lanes should be designed as shared zones – materials and signage should make the intended behaviour of all users clear. However, the colour of the lane should not vary substantially from the local street to which is connects – it should read as a part of the overall street network.
- A minimum lane width of 6 metres is required adjacent to a garage door, to allow for a vehicle to enter and exit.
- Lighting of laneways is important to achieve safety at night – lighting should be positioned to minimise areas of darkness, and light spill to surrounding residences should be avoided.
- Ideally, screened bin storage should be provided in lanes for residences.

This image shows how a quality rear fence, a gate and small amount of landscaping can improve the amenity of the lane considerably.

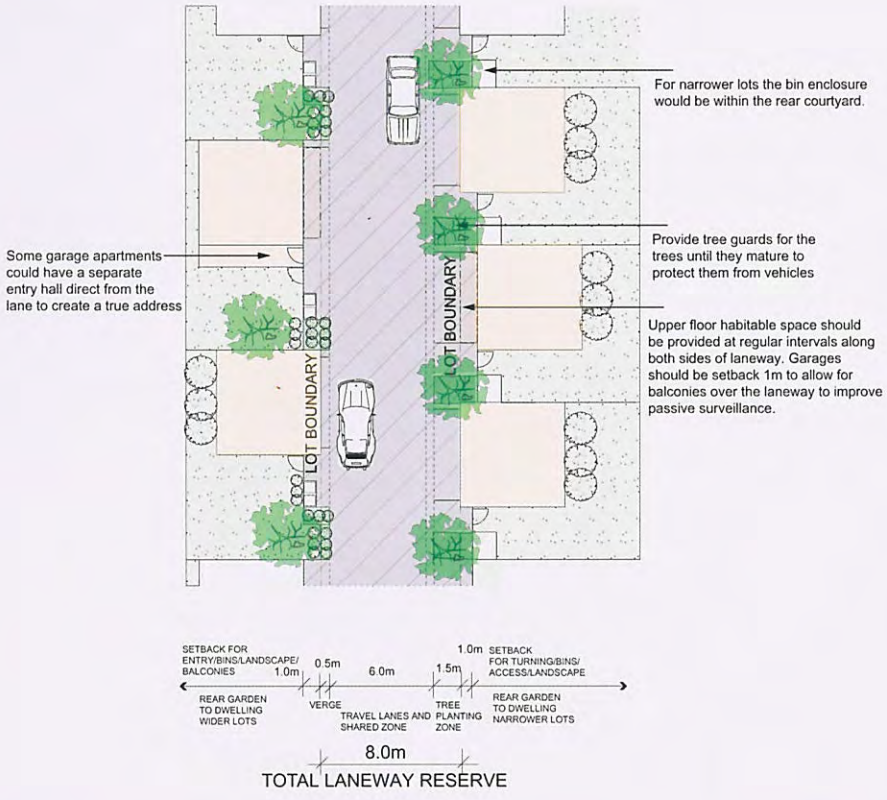
This lane is not typical but shows how the inclusion of a footpath, landscaping and parking, as well as studio apartments, can all contribute to a quality rear lane solution.

3.5 Lane

Note: dimensions are to the kerb upright



Section - Laneway or Access Street/ Mews



Plan - Laneway or Access Street/Mews

Appendix E

HOUSING DESIGN GUIDELINES

SANDY BEACH NORTH - DESIGN GUIDELINES

DESIGN GUIDELINES

INTRODUCTION

These Design Guidelines have been produced to assist land-owners, potential purchasers, designers or builders to prepare house designs that meet the requirements of the Sandy Beach North community. Sandy Beach North (SBN) is a subdivision development in a unique and environmentally important area and the built environment needs to respect and reflect this location.

These guidelines set out planning and aesthetic controls that should be followed, in order to present prepared designs to the Sandy Beach North Design Review Committee (DRC) for approval, prior to any submission of a Development Application to Coffs Harbour Council.

Where an Owner or Purchaser wishes to construct a design that does not comply with these Design Guidelines, they must make a representation to the DRC and show how non-compliance can be approved on merit or how their alternative solution meets the objectives of the Guidelines.

The controls in these guidelines have been written with reference to Coffs Harbour's current Local Environmental Plan (LEP 2013) and Development Control Plan for residential development (2015). It is noted that the SBN site is not currently covered by these controls, however this is expected to be a temporary situation. It is expected that once Coffs Harbour LEP is updated to include the SBN area, the zoning for the land will be R2 Low Density Residential.

It is noted that following these guidelines or receiving approval from the DRC does not guarantee approval of a Development Application from Council. It is the Owner's or prospective Purchaser's responsibility to confirm for themselves all the statutory regulations and controls that are relevant for their construction project. While BASIX (Energy rating) certification is not required for the DRC application, it is strongly suggested that this be obtained or coordinated prior to making the DRC application. BASIX certification will be required for lodgement of a DA with Council.

Following Development Approval from Council, Applicants must obtain a Construction Certificate prior to commencing construction and the works are to be constructed in compliance with the Development Approval, the Building Code of Australia and all relevant Australian Standards. Applicants must obtain an Occupation Certificate or Interim Occupation Certificate prior to occupying their homes.

ARTIST REPRESENTATION

VERSION 1.1 - MAY 2017

DESIGN GUIDELINES

PROCESS FOR DRC APPLICATION

Applicants should engage Architects or Building Designers to prepare suitable plans and elevations to provide the information requested below and show compliance with the Design Guidelines. Building designs must consider site orientation; solar access; potential solar impact on neighbours; potential privacy impacts on neighbours; vehicular and pedestrian access and (where constructed or approved) existing adjoining dwellings and fencing.

Applicants must complete the DRC application form and provide the following information for assessment:

Building Plans:

- Site plan (1:200 or 1:100 scale), showing the boundary; building outline or roof plan with boundary setbacks; north point; scale bar; driveways and proposed street crossings; ancillary structures such as pools, sheds, cabanas; extent of hard-paving
- Floor plans (minimum 1:100 scale), showing room layout and types; floor levels; external wall dimensions and offset to boundaries; external private open space, decks, terraces and the like; privacy screens and details of fencing.
- Elevations (minimum 1:100 scale), showing floor levels; ceiling levels; roof ridge and overall building height; external materials (wall finish, roof finish); windows and doors
- Sections (minimum 1:100 scale, one longitudinal or cross-section), showing setbacks; floor levels; ceiling levels; roof ridge and overall building height; existing ground level

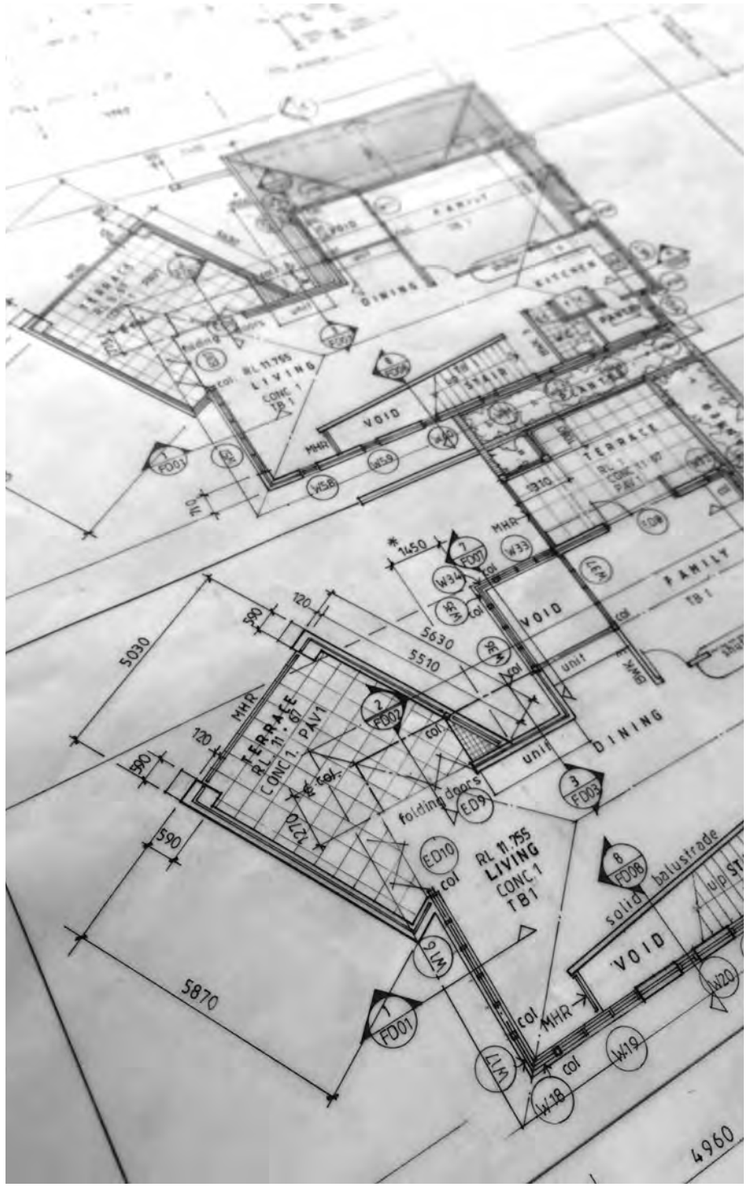
Landscape Plan:

- 1:200 or 1:100 scale Landscape plan, showing extent of hard and soft landscaping; external paving and floor finishes; plant types; description of number of plants and pot sizes
- Plant selections to be in accordance with Coffs Harbour DCP 2015 and the landscaping section below.

Material and Finishes schedule:

- Details (preferably including colour swatches, photos of materials or a visual representation) to be provided of the proposed wall materials and colours, roof and roof-plumbing materials and colours, fencing material and colours, front paving and driveway materials and colours

The following guidelines are broken into different sections, each which include an **Objective** and **Controls** which must be adhered to and/or **Suggestions**, which are not mandatory but indicate what the DRC is looking for. From lodgement of DRC application, the SBN Design Review Committee will provide an assessment of the application within 21 business days, either requesting further information, or a meeting to review the application further. After assessment, the DRC may approve the application or reject the application. If the application is rejected, the Applicant may wish to request a meeting with the DRC or make another application wxcith revised building plans. A DA may not be lodged to Council without DRC approval.



DESIGN GUIDELINES

OVERVIEW

These Guidelines are written for Stage 1 of the Subdivision works, but the intention for the future is that they will be run out across later stages of the development. The subdivision has been designed as a sensitive response to a unique environment, with road boundary division of the environmental areas from the residential areas.

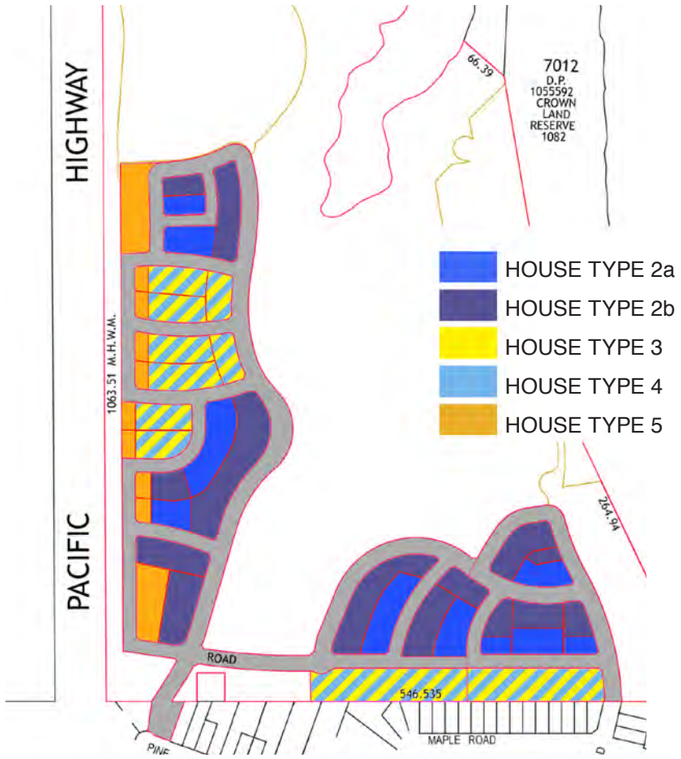
EXAMPLE HOUSE DESIGNS

The Subdivision approval originally included a series of five concept house designs that proposed some design solutions for particular areas of the subdivision and different lot site widths and orientations.

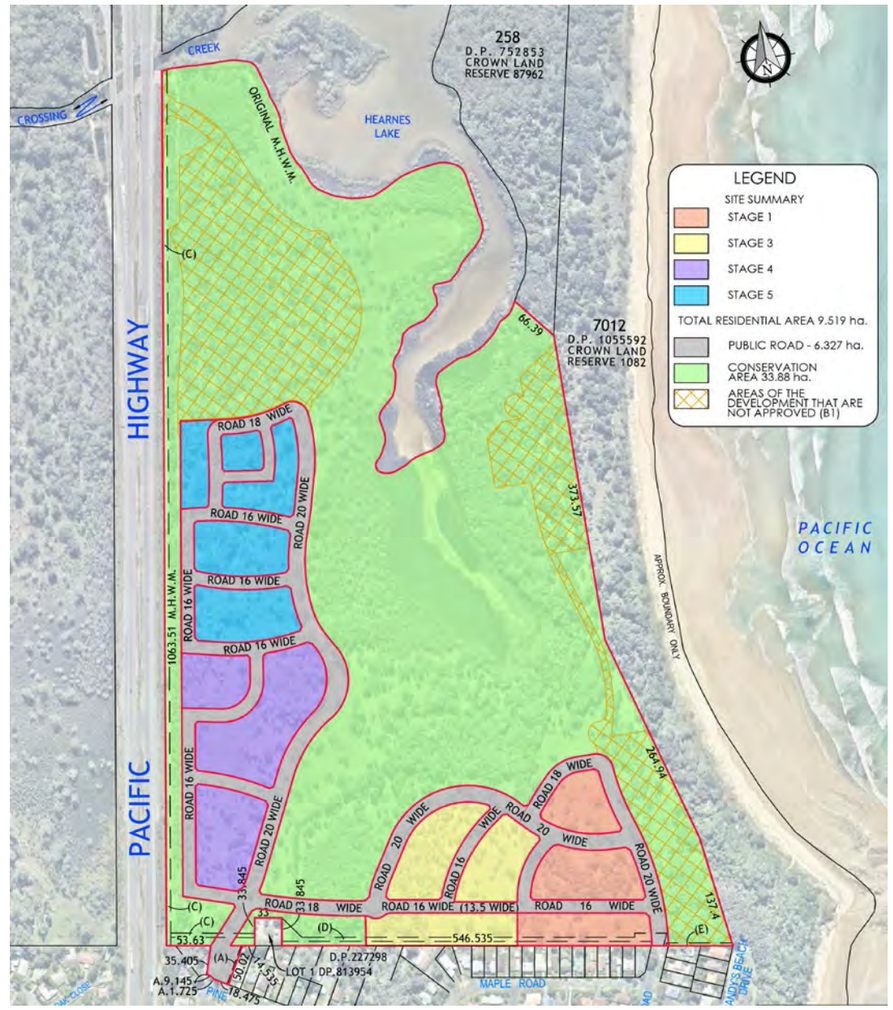
While the subdivision approval does not require owners or purchasers to follow these concept plans, they are included in the Design Guidelines for reference in order to assist in describing the planning controls to be followed.

Due to later changes in the scope of subdivision approved, only House Types 2, 3 and 4 are relevant for Stage 1. For later stages, the original House Type 5 may be re-introduced, which was a specific design for the edge of the subdivision closest to the Pacific Highway.

The example House Types are described in the following pages.



INDICATIVE HOUSE TYPE LOCATIONS



STAGES OF THE SITE DEVELOPMENT

DESIGN GUIDELINES

House Type 2a

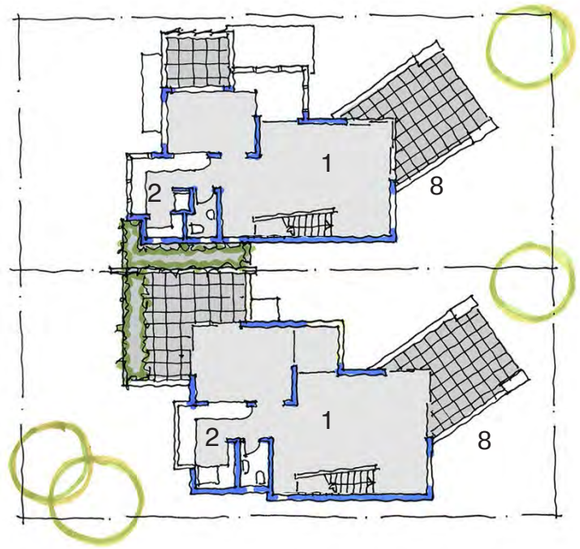
Two storey dwelling for sites with road access to the West or South

- Two storey dwelling, with living level on either the Ground Floor or First Floor.
- 8.5m maximum height limit from surveyed finished ground level (Approx 2.7m ceiling heights (3.1m floor-to-floor) with 2.7m for roof zone).
- If living levels are included on the top floor, privacy screens will be required to side boundaries to protect neighbour's privacy.
- Ground-level garages are integrated into the house. No allowance for underground garaging.
- Garages can be built to one side boundary, subject to achieving BCA compliance for fire-rating of walls and openings. Refer to setback provisions below.
- Adjoining House Type 2 residences can be constructed as attached, only through the garages and only by agreement of both land-owners. Construction must be wholly within subject allotment.

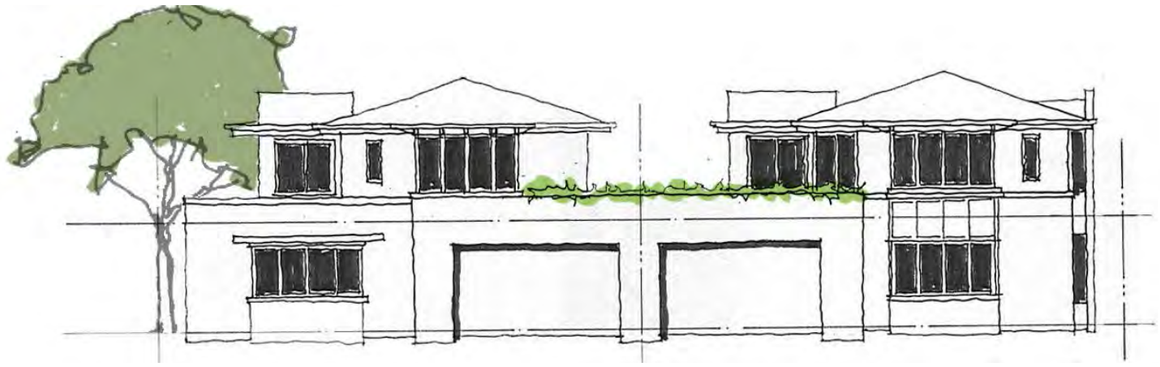
LEGEND

1 LIVING ROOM
2 KITCHEN
3 BEDROOM
4 BATHROOM
5 LAUNDRY
6 STUDY
7 GARAGE
8 PRIVACY SCREENS

HOUSE TYPE 2a GROUND FLOOR



HOUSE TYPE 2a FIRST FLOOR



HOUSE TYPE 2a (NTS)

DESIGN GUIDELINES

House Type 2b

Two storey dwelling for sites with road access to the North

- Similar design to House Type 2a, but more suited for sites where the road access is to the North side of East side of the property, particularly if the predominant views are over the road.

- House type 2b includes articulated garages but not built to boundaries or attached to neighbouring garages. Garage siting should aim to not block sunlight access to the remainder of the dwelling. Garages are to angled to front boundary with landscaping to side of garage. No allowance for underground garaging.

- 8.5m maximum height limit from surveyed finished ground level (Approx 2.7m ceiling heights (3.1m floor-to-floor) with 2.7m for roof zone).

- If living levels are included on the top floor, privacy screens may be required to side boundaries to protect neighbour's privacy.

LEGEND

1 LIVING ROOM
2 KITCHEN
3 BEDROOM
4 BATHROOM
5 LAUNDRY
6 STUDY
7 GARAGE
8 PRIVACY SCREENS

HOUSE TYPE 2b GROUND FLOOR

HOUSE TYPE 2b FIRST FLOOR

HOUSE TYPE 2b STREET ELEVATION (NTS)

HOUSE TYPE 2b REAR ELEVATION (NTS)

DESIGN GUIDELINES

House Type 3

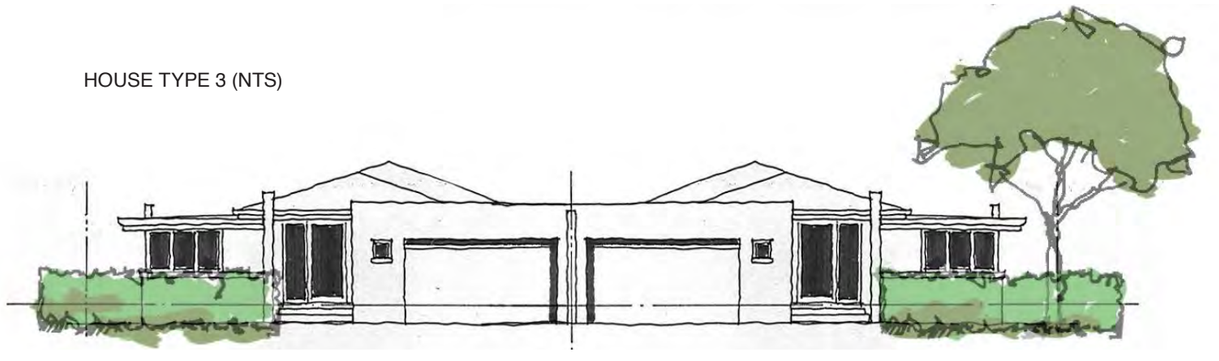
Single storey dwelling

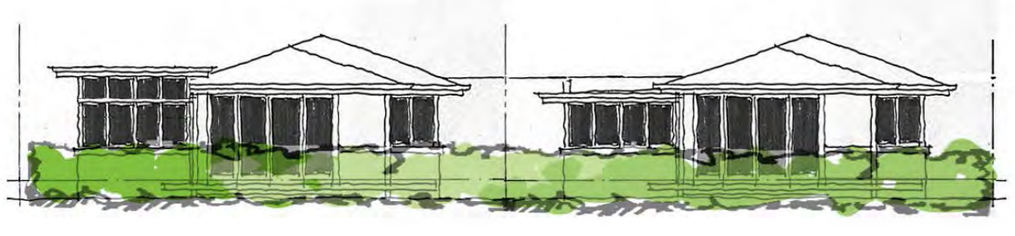
- Single storey dwelling with attached garages. No allowance for underground garaging.
- 5.6m maximum height limit from surveyed finished ground level (Approx 2.7m ceiling heights with 2.7m for roof zone).
- Layout of House Type 3 is encouraged to include courtyard spaces to allow light and ventilation into the residence.
- Garages can be built to one side boundary, subject to achieving BCA compliance for fire-rating of walls and openings. Refer to setback provisions below.
- Adjoining House Type 3 residences can be constructed as attached, only through the garages and only by agreement of both land-owners. Construction must be wholly within subject allotment.

LEGEND

1 LIVING ROOM
2 KITCHEN
3 BEDROOM
4 BATHROOM
5 LAUNDRY
6 STUDY
7 GARAGE
8 PRIVACY SCREENS

HOUSE TYPE 3 (NTS)





HOUSE TYPE 3 (NTS)

DESIGN GUIDELINES

House Type 4

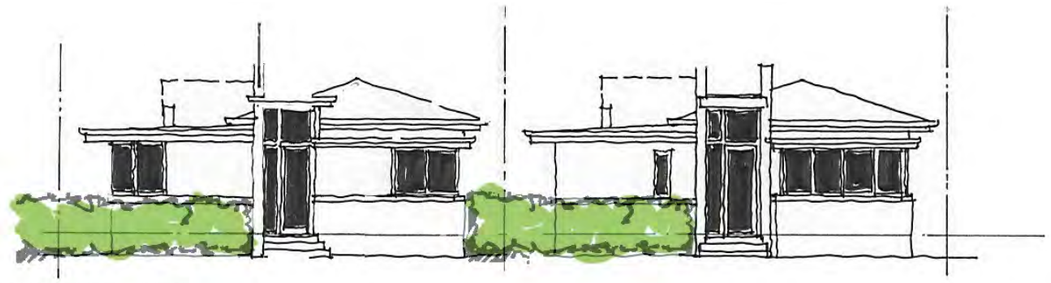
Single storey dwelling (for narrow allotments)

- Single storey dwelling with detached garages. No allowance for underground garaging.
- 5.6m maximum height limit from surveyed finished ground level (Approx 2.7m ceiling heights with 2.7m for roof zone).
- Layout of House Type 4 is encouraged to include courtyard spaces particularly to the North or the East to allow light and ventilation into the residence. For a narrow block, the house design should place service type rooms along the West (for a North-South oriented block) or the South (for an East-West oriented block).
- Garages can be built to one side boundary, subject to achieving BCA compliance for fire-rating of walls and openings. Refer to setback provisions below.
- Shared driveway and inward-facing garages allow for substantial front street planting.
- House Type 4 residences are to be entirely unattached, free-standing. Construction must be wholly within subject allotment.
- Small roof-terraces may be considered subject to evidence being provided that neighbours' privacy is being protected.

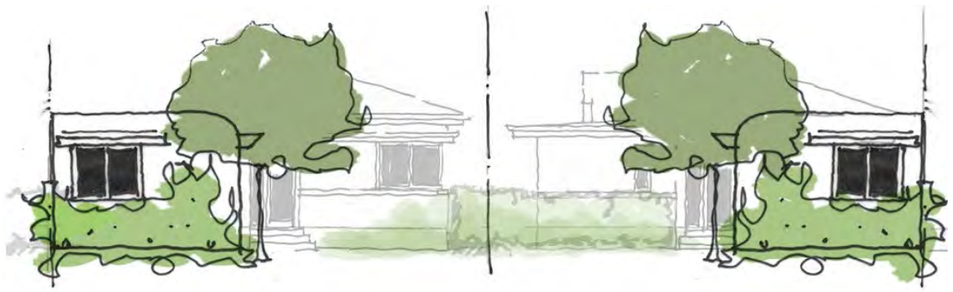
LEGEND

1 LIVING ROOM
2 KITCHEN
3 BEDROOM
4 BATHROOM
5 LAUNDRY
6 STUDY
7 GARAGE
8 PRIVACY SCREENS

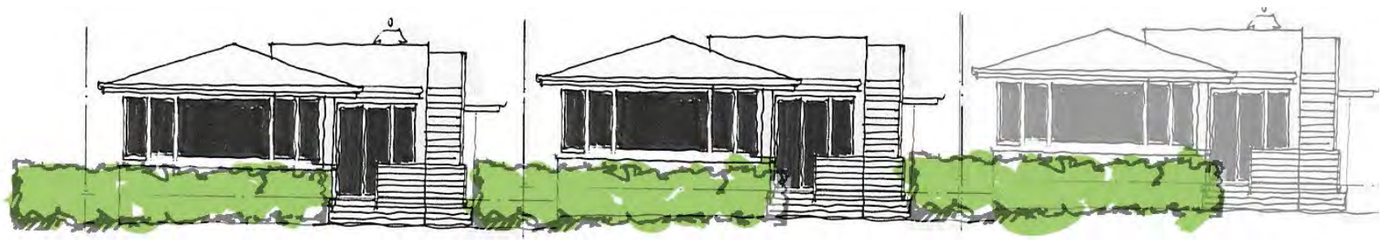
HOUSE TYPE 4 (NTS)



HOUSE TYPE 4 (NTS)



STREET ELEVATION (NTS)



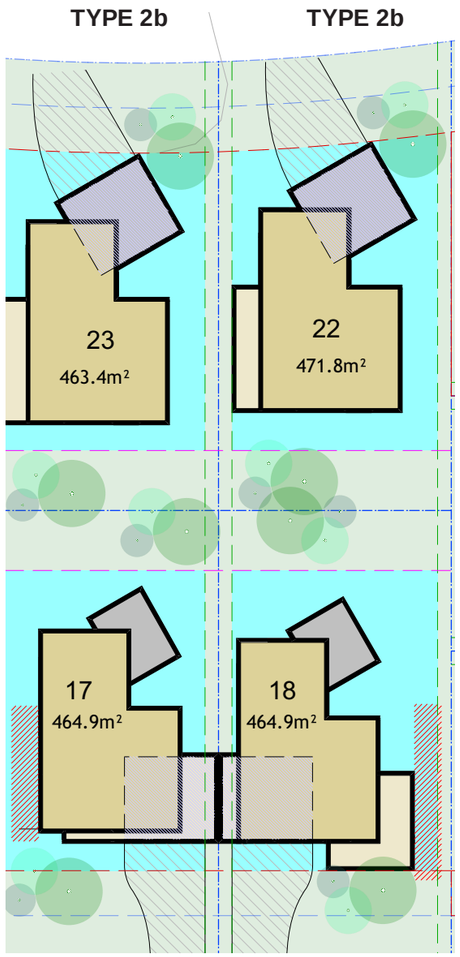
REAR ELEVATION (NTS)

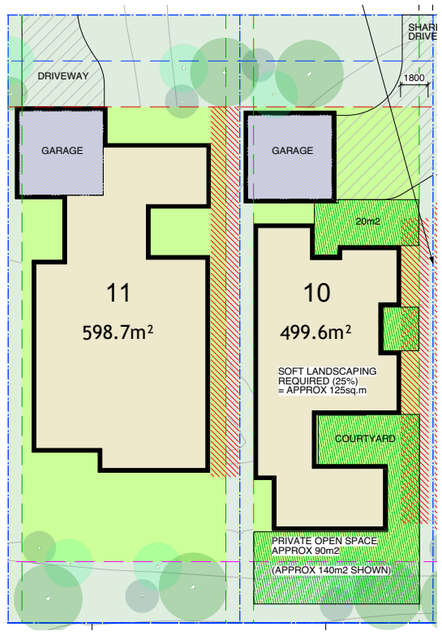
DESIGN GUIDELINES

POSSIBLE SUBDIVISION LAYOUT WITH EXAMPLE HOUSE TYPES

The Concept subdivision plan (opposite) shows a possible house type placement, with the top two blocks being two-storey development but the bottom block being only singel storey.

This possible house type arrangement has considered solar access, outlook, privacy and vehicular access.





POSSIBLE SUBDIVISION

DESIGN GUIDELINES

GENERAL DESIGN CHARACTER, MATERIALS, FINISHES AND COLOURS

OBJECTIVE:
The exterior material selections (particularly roof, wall, window, paving and any feature details) affect the perception of the building from public areas. Internal layout or finishes are not controlled by these guidelines.
The Objective of control of the materials and the aesthetic quality of the building is to protect the unique coastal environment of the Sandy Beach / Hearnes Lake locality. Buildings should be constructed sympathetically and having a “coastal” character.

CONTROLS:

- No tiled roofs are allowed.
- Maximum 30% face-brickwork is allowed to the external walls.
- Roofs must include a minimum 600mm eave width to 70% of the dwelling.
- Parapets are allowable for a maximum of 20% of the external wall perimeter and subject to compliance with building height and BASIX requirements for shading of windows/doors.
- External walls must feature a minimum of two colours (complementary but noticeably different).
- Driveways to be a medium to medium-dark finish stone-coloured finish, either in coloured concrete, exposed-aggregate concrete or paving. No red, terracotta or bright coloured concrete stencil/spray-on finishes or paving is allowed. No plain off-white concrete driveways are allowed.

SUGGESTIONS:

- A roofing form that is compatible with the required “Coastal Aesthetic” is encouraged.
- A combination of both hipped and skillion roof forms is encouraged to give variety to the roof form. Curved roofs will be considered but are not preferred.
- The following external materials are encouraged:
  - Rendered, bagged or painted brickwork used in combination
  - Fibre-cement sheeting system with exposed or recessed joints
  - Lightweight materials (eg foam cladding) rendered and painted
  - Timber or fine-profile Fibre-cement weatherboarding
  - Natural timber (or natural timber-look) screens, features
  - Colorbond steel roof sheeting, preferably in the de-saturated earth-tones and chosen to complement the external wall colours and materials. Light coloured or white roof sheeting is not prohibited but glare should be considered.








DESIGN GUIDELINES

BUILDING SITING AND SETBACKS

OBJECTIVE:
Siting of the building must comply with the setback and built-upon controls and consider solar access and impact, room for vehicular and pedestrian access, room for landscaping, particularly along side boundaries and impact on neighbouring dwellings.

CONTROLS:

BUILT-UPON AREA:

- Maximum 60% Built-upon area is allowed. Refer to the Definitions section for the definition of Built-upon area (BUA)

- For designs with between 50%-60% BUA, rainwater harvesting and storage must be provided over and above the minimum BASIX requirement. As a minimum, the amount of roof area equivalent to the amount of BUA greater than 50% must be drained to the rainwater storage tank.

- For two-storey dwellings, the upper storey floor area must be 75% (maximum) the size of the ground floor area.

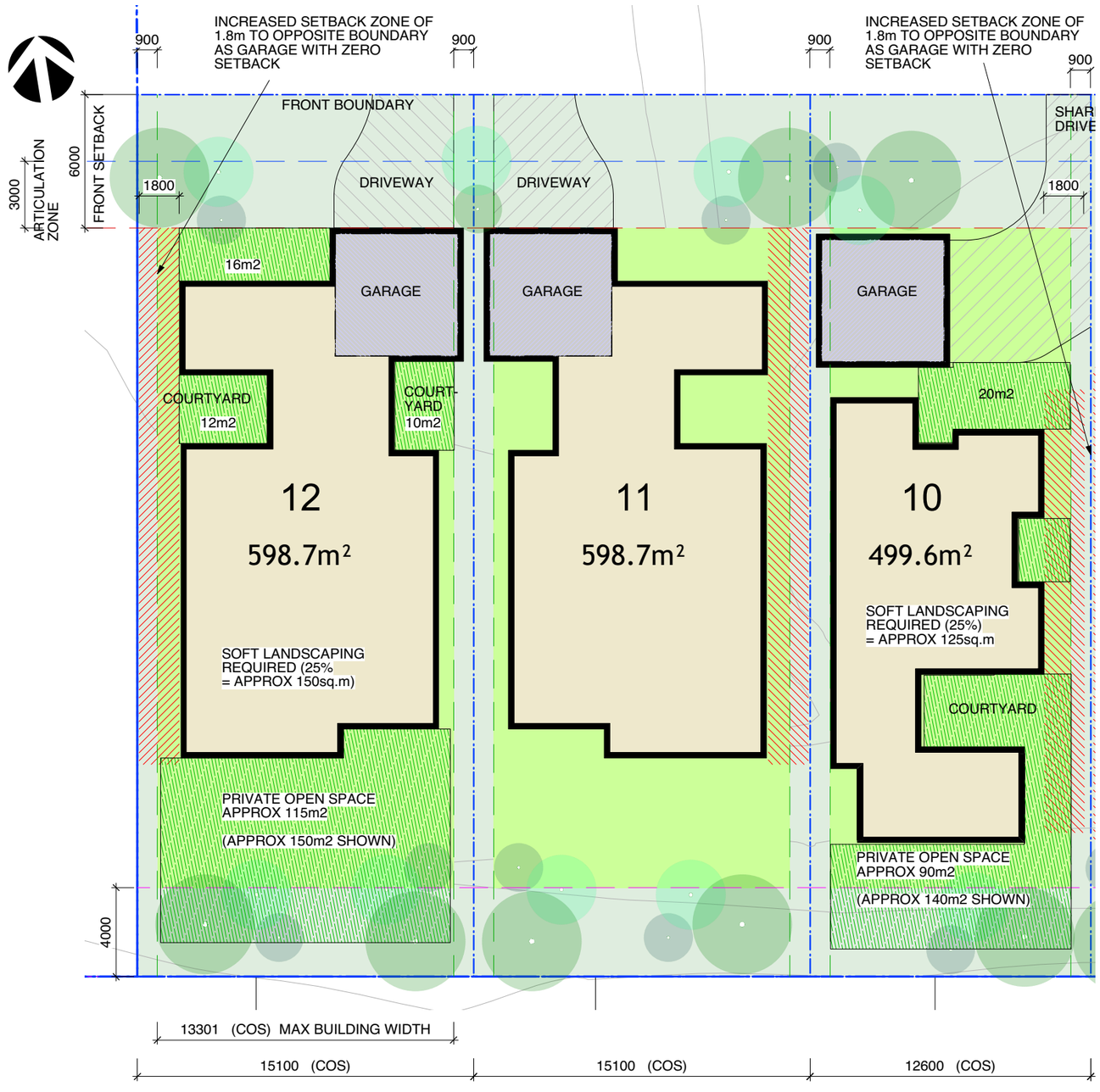
- Garages are to be no more than double car garages, maximum 6m x 6m internally)

- Driveways are to be maximum 5.5m wide, preferably tapering to a narrower street crossing.

FRONT SETBACK:

- 6m front setback to boundary immediately adjacent the Primary Street Frontage.

- A 3m Articulation Zone is allowed (between 3m and 6m from the boundary). The definition of what structures are allowed to be constructed in the Articulation Zone is included in the Definitions at the rear of the guidelines.



TYPICAL SETBACKS

DESIGN GUIDELINES

BUILDING SITING AND SETBACKS (Continued)

CORNER ALLOTMENTS:

- 6m front setback to boundary immediately adjacent the Primary Street Frontage, with a 3m secondary front setback for the secondary street alignment.

- If part of the building area is built between 3m and 6m front setback along the secondary street frontage, this section of building can only be single story in height.

SIDE SETBACKS:

- Side setback must comply with a 900mm minimum side setback to ground-floor walls and a 675mm minimum setback to the fascia line of projecting roofs.

- For two-storey dwellings, the upper storey floor must be set back 1.8 m minimum from the side boundary.

- Garages are allowed (within the Design Guidelines but not necessarily by Coffs Harbour Council) to be built up to one side boundary, however where garages are built to a side boundary (zero setback), a corresponding side setback of 1.8 m must be provided along the other side boundary for the length of the building (for both Ground and First floor walls and ancillary structures). All parts of the building with a zero side setback must be less than 3.5m in height.

- For areas of building with zero side setback, drainage of the site must be considered and overland flow not interrupted.

- For areas of building with zero side setback, the design of the wall, wall material and openings must comply with the Building Code of Australia. No openings in the boundary wall are allowed.

REAR SETBACKS:

- A 4m (minimum) rear setback is required, but a greater rear setback than 4m is preferred. Ancillary structures can existing within the 4 m rear setback.

DESIGN GUIDELINES

BUILDING HEIGHT

OBJECTIVE:
Height of building must comply with the controls and consider solar impact (overshadowing) to neighbouring properties.

CONTROLS:

- For two-storey dwellings, the dwelling shall not exceed two storeys, measured vertically at any point. For single-storey dwellings, only a single storey is allowed.
- Two storey dwellings may only be constructed on sites allowing two-storey dwellings (refer to figure showing two storey and single storey allotments)
- For two-storey dwellings, 8.5m maximum height limit is allowed, from surveyed finished ground level to roof ridge
  (Approx 2.7m ceiling heights (3.1m floor-to-floor) with 2.7m for roof zone).
- For single-storey dwellings, 5.6m maximum height limit is allowed from surveyed finished ground level to roof ridge
  (Approx 2.7m ceiling heights with 2.7m for roof zone).
- If living levels are included on the top floor, privacy screens will be required to side boundaries to protect neighbour's privacy.
- Garages are to be Ground-level only. No allowance for underground garaging.

SINGLE STOREY AND TWO STOREY LOTS

DESIGN GUIDELINES

LANDSCAPING

OBJECTIVE:
The following objectives should be met in relation to provision of quality landscaping :

- To contribute to the streetscape and the public amenity.
- To enhance and reinforce existing landscaping and sub-species of the area.
- To create green buffers and screening of residential structures and lot boundaries.
- To create enjoyable and useful private open space areas.
- To improve privacy between residences.

CONTROLS:

- Minumum 25% of the site is to be reserved for deep-soil soft landsaping. Evidence of this calculation is to be provided with the DRC application. Planting areas less than 1.2m in width are excluded from the calculation.
- Soft landscaping is to be provided within each of the front, side and rear setback zones.
- Plant selections are to include a minimum of 30% Native and Endemic species, to be selected from Appendix 3 of the Coffs Harbour DCP 2015.
- A minimum of 1 tree (capable of attaining 10m in height) per lot is to be provided within the 6m setback zone
- A minimum of 1 tree (capable of attaining 10m in height) per lot is to be provided within the rear setback zone
- Screening shrubs are to be provided along side and rear boundaries

SUGGESTIONS:

- Visual impact of hard landscaping should be minimised and surrounded by soft landscaping.
- Consider placement of landscaping to improve driver visibility for ingress and egress to the site.








DESIGN GUIDELINES

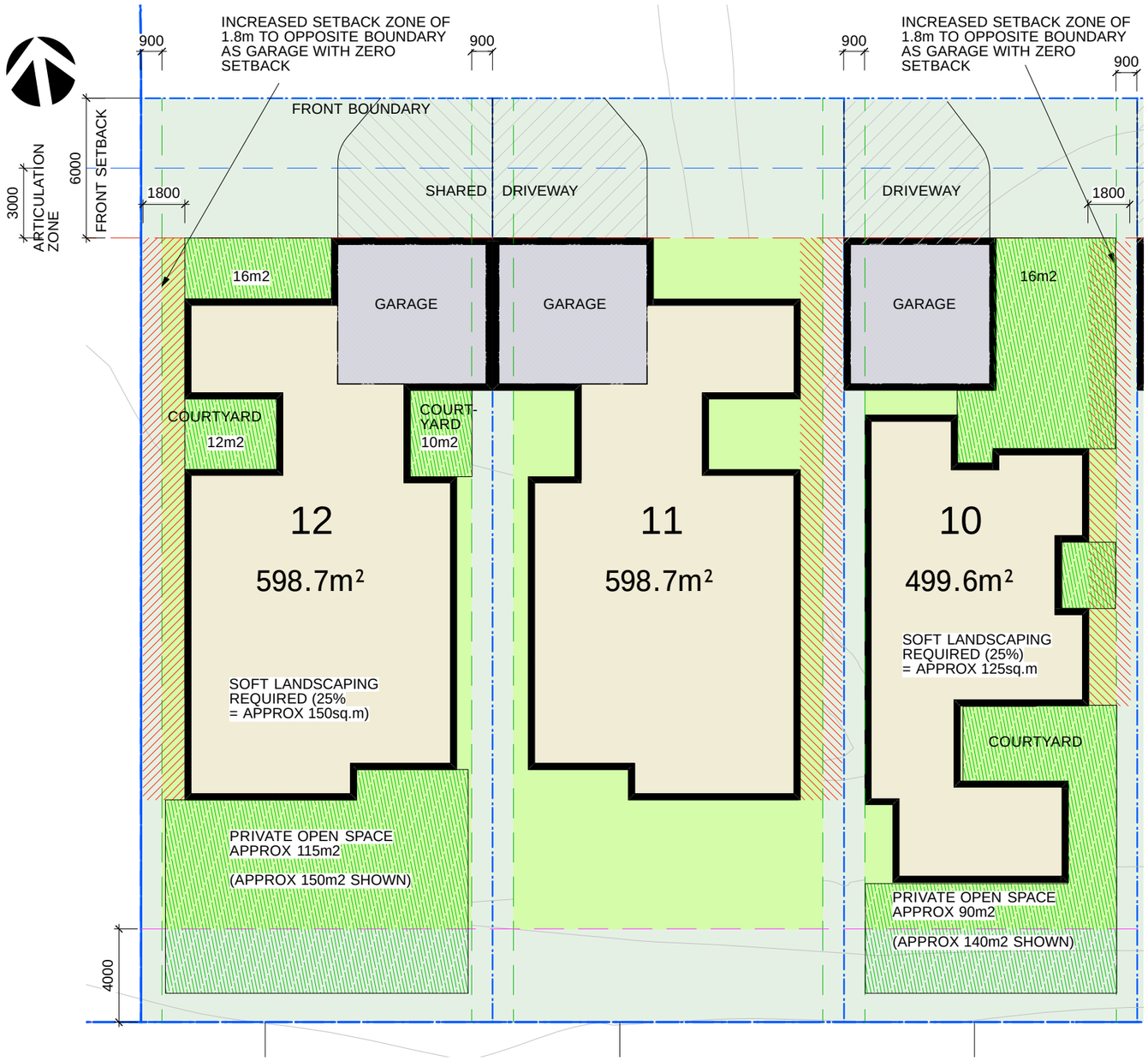
PRIVATE OPEN SPACE

OBJECTIVE:
The following objectives should be met in relation to provision of quality private open space:

- To ensure usable and functional private open space is provided for each dwelling.
- Private open space should be directly connected with living areas
- To define the edge between private and public land

CONTROLS:

- Minumum 150 sq.m (Coffs Harbour DCP requires 185 sq.m) of private open space is to be provided. At least 90 sq.m of this is to be a minimum width of 4m and of solid surface (eg paved terrace or timber deck). The remaining proportion of private open space can include useable (level) soft landscaping areas.
- Private open space that is provided within the front setback must be adeqautely screened with landscaping or fencing, as long as this complies with the fencing provisions.
- For two-storey dwellings with living areas on the first floor, a proportion of the required private open space can be provided as a first floor terrace, as long as privacy to neighbours is protected by screening.
- A maximum of 25% of the required private open space can be on the first floor.
- A maximum of 25% of the required private open space can be roofed with permanent roof structure.



DESIGN GUIDELINES

FENCING AND ANCILLARY STRUCTURES

FENCING

CONTROLS:

- Fencing is to be provided to side and rear boundaries to a maximum height of 2m above the existing ground level (unless it is already in place).
- Fencing may be provided within the 6m front setback zone but only to a maximum height of 1.2m. Fencing up to 1.6m may be accepted in the front building setback, but only if combined with landscape screening and the fencing is constructed with 75% clear visibility.
- The front boundary alignment and side boundaries up to the building alignment can be unfenced, so long as the landscaping defines a perceptible boaundary between private and public land.
- Retaining walls that raise or lower the ground level by a height of more than 900mm above or below the existing ground level must be set back from boundaries by 1.2m
- Pedestrian or vehicular access gates constructed within the front building alignment may only be 1.2m in height. gates may be constructed up to 1.6m only if they are constructed with more than 75% clear visibility

SWIMMING POOLS

CONTROLS:

- Swimming pools are to be sited behind the front building alignment (not within the 6m front setback zone).
- Cut and fill for swimming pools are to be balanced and the pool coping level must be less than 1m above the surrounding natuarl ground level.
- Pools must be fenced in compliance with the relevant pool code and Australian Standards. Landscaping around the pool must not reduce the compliance of the pool fence.
- All pool equipment must be located away from boundaries and adequately sound-proofed to comply with the Policy of the Environment Operations Act 1997.
- Setback of a side or rear boundary to the water edge is to be greater than 1.2m
- All waste water from the pool must be directed to sewer






DESIGN GUIDELINES

APPENDIX A: ALLOTMENT EXAMPLES

LOTS 9-12
(NTS)

APPENDIX A: ALLOTMENT EXAMPLES

DESIGN GUIDELINES

LOTS 13 - 16
(NTS)

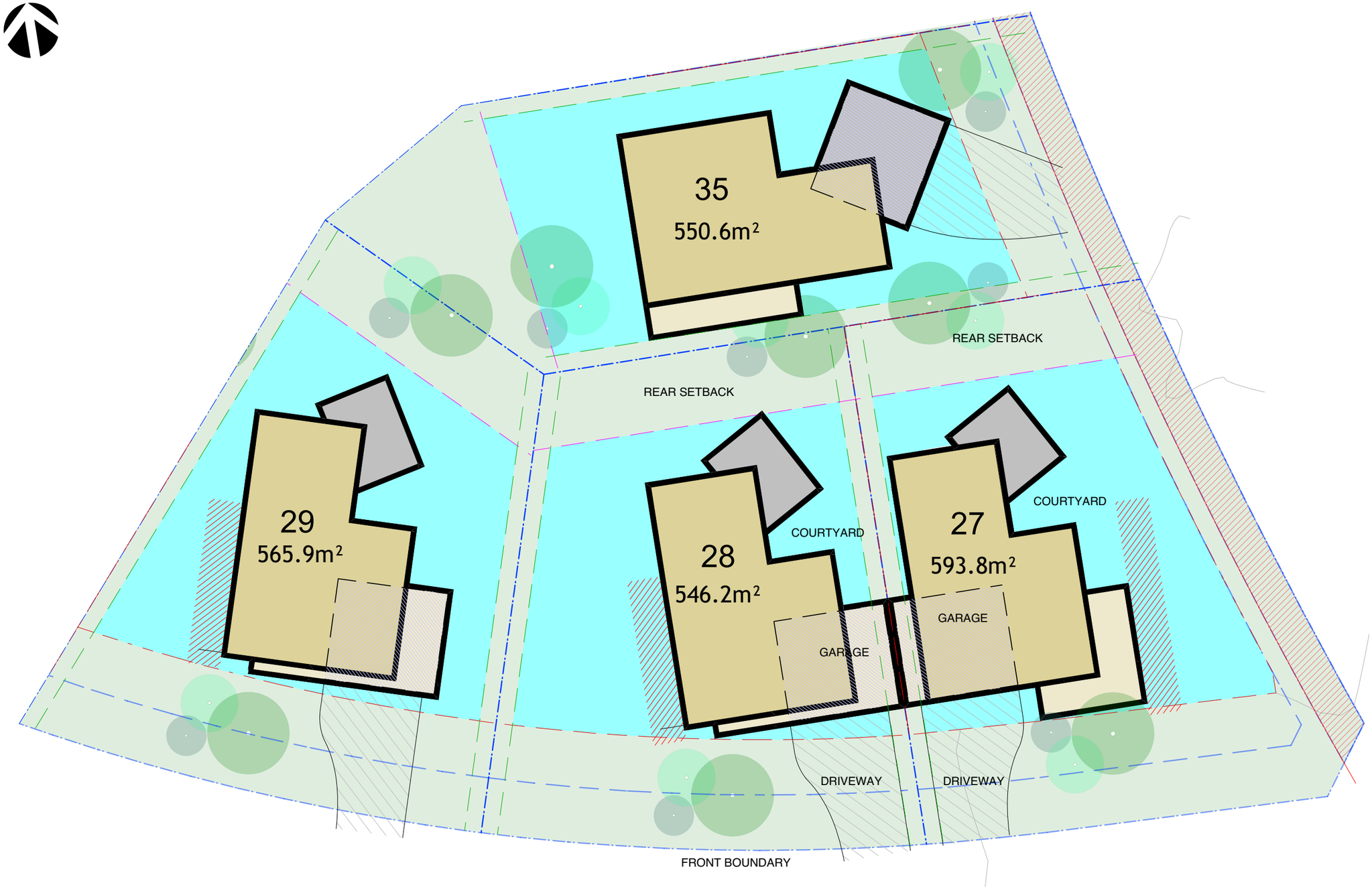
APPENDIX A: ALLOTMENT EXAMPLES

DESIGN GUIDELINES

LOTS 23 - 26
(NTS)

APPENDIX A: ALLOTMENT EXAMPLES

DESIGN GUIDELINES



LOTS 27 - 29, 35
(NTS)

APPENDIX A: ALLOTMENT EXAMPLES

DESIGN GUIDELINES

LOTS 32 - 34
(NTS)

APPENDIX A: ALLOTMENT EXAMPLES

DESIGN GUIDELINES

DESIGN GUIDELINES

APPENDIX B:

DEFINITIONS

The following definitions are a summary of the definitions as covered in the Coffs Harbour DCP 2015

Access handle *or laneway* means the portion of a battle-axe lot primarily providing vehicular and services access to a road.

Accessway means a continuous accessible path of travel (as defined in Australian Standards (AS) 1428.1) to, into or within a building.

Alteration means building works within the existing building footprint where, for example, internal walls may be removed and the building reconfigured for alternative or the same purpose, but which does not increase the total floor space. May include new or resized windows and doors or new roof design.

Ancillary development means any of the following that are not exempt development under State Environmental Planning Policy (Exempt and Complying Development Codes) 2008, or Coffs Harbour LEP 2013:
access ramp;
awning, blind or canopy;
balcony, deck, patio, pergola, terrace or verandah that is attached to a dwelling house;
carport that is attached to a dwelling house;
detached studio;
driveway, pathway or paving;
fence or screen;
garage that is attached to a dwelling house;
outbuilding;
rainwater tank that is attached to a dwelling house;
retaining wall; and
swimming pool or spa pool and child-resistant barrier.

Articulation zone means a notional area projecting three metres forward of the front building line within which building elements such as:
• entry features or porticos;
• balconies, decks, patios, pergolas;
• terraces or verandahs;
• awnings or other features over a window; and sun shading features
may be incorporated up to a maximum of 50% of the notional area, when viewed from above.

Australian standards are published documents setting out specifications and procedures designed to ensure products, services and systems are safe, reliable and consistently perform the way they were intended to. They establish a common language which defines quality and safety criteria.

Building maintenance means the upgrade or replacement of like for like materials on an existing building, but not including any increase in total floor area, such as re-painting, replacement of roof sheeting, replacement of guttering etc., typically with like for like materials.

Consent authority has the same meaning as in the Environmental Planning and Assessment Act 1979.

Deep soils zones means areas of natural ground retained within a development, uninhibited by artificial structures and within relatively natural soil profiles.

Development application has the same meaning as in the Environmental Planning and Assessment Act 1979.

Development consent has the same meaning as in the Environmental Planning and Assessment Act 1979.

Driveway means the constructed pavement for vehicular travel on private land.
Driveway crossover means the kerb and gutter or layback and constructed pavement for vehicular travel
to a lot over public land.

DESIGN GUIDELINES

Gross floor area has the same meaning as in Coffs Harbour LEP 2013

Note. This term means:

Gross floor area means the sum of the floor area of each floor of a building measured from the internal face of external walls, or from the internal face of walls separating the building from any other building, measured at a height of 1.4 metres above the floor, and includes:

the area of a mezzanine, and

habitable rooms in a basement or an attic, and

any shop, auditorium, cinema, and the like, in a basement or attic, but excludes:

any area for common vertical circulation, such as lifts and stairs, and any basement:

storage, and

vehicular access, loading areas, garbage and services, and

plant rooms, lift towers and other areas used exclusively for mechanical services or ducting, and car parking to meet any requirements of the consent authority (including access to that car parking), and

any space used for the loading or unloading of goods (including access to it), and

terraces and balconies with outer walls less than 1.4 metres high, and

voids above a floor at the level of a storey or storey above.

Habitable room has the same meaning as the Building Code of Australia.

Note: this term means:

Habitable room means any room or area used for normal domestic activities, including living, dining, family, lounge, bedrooms, study, kitchen, sun room and play room.

Hard landscaping means structures of physically hard materials to make architectural features in a garden design (or other landscaped area) such as paths, walls, fences, pergolas, patios, decking and water features.

Private open space has the same meaning as in Coffs Harbour LEP 2013.

Note. This term means:

Private open space means an area external to a building (including an area of land, terrace, balcony or deck) that is used for private outdoor purposes ancillary to the use of the building.

Primary road has the same meaning as in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.

Note. This term means:

Primary road means the road to which the front of a dwelling house, or a main building, on a lot faces or is proposed to face.

Residential accommodation has the same meaning as in Coffs Harbour LEP 2013.

Secondary road has the same meaning as in State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.

Note. This term means:

Secondary road means, in the case of a corner lot that has boundaries with adjacent roads, the road that is not the primary road.

Secondary dwelling has the same meaning as in Coffs Harbour LEP 2013.

Note. This term means:

Secondary dwelling means a self-contained dwelling that:

is established in conjunction with another dwelling (the principal dwelling); and is on the same lot of land as the principal dwelling; and

is located within, or is attached to, or is separate from, the principal dwelling.

Note. See clause 5.4 for controls relating to the total floor area of secondary dwellings. Secondary dwellings are a type of residential accommodation—see the definition of that term in the Coffs Harbour LEP 2013 Dictionary.

Semi-detached dwelling has the same meaning as in Coffs Harbour LEP 2013.

Note. This term means:

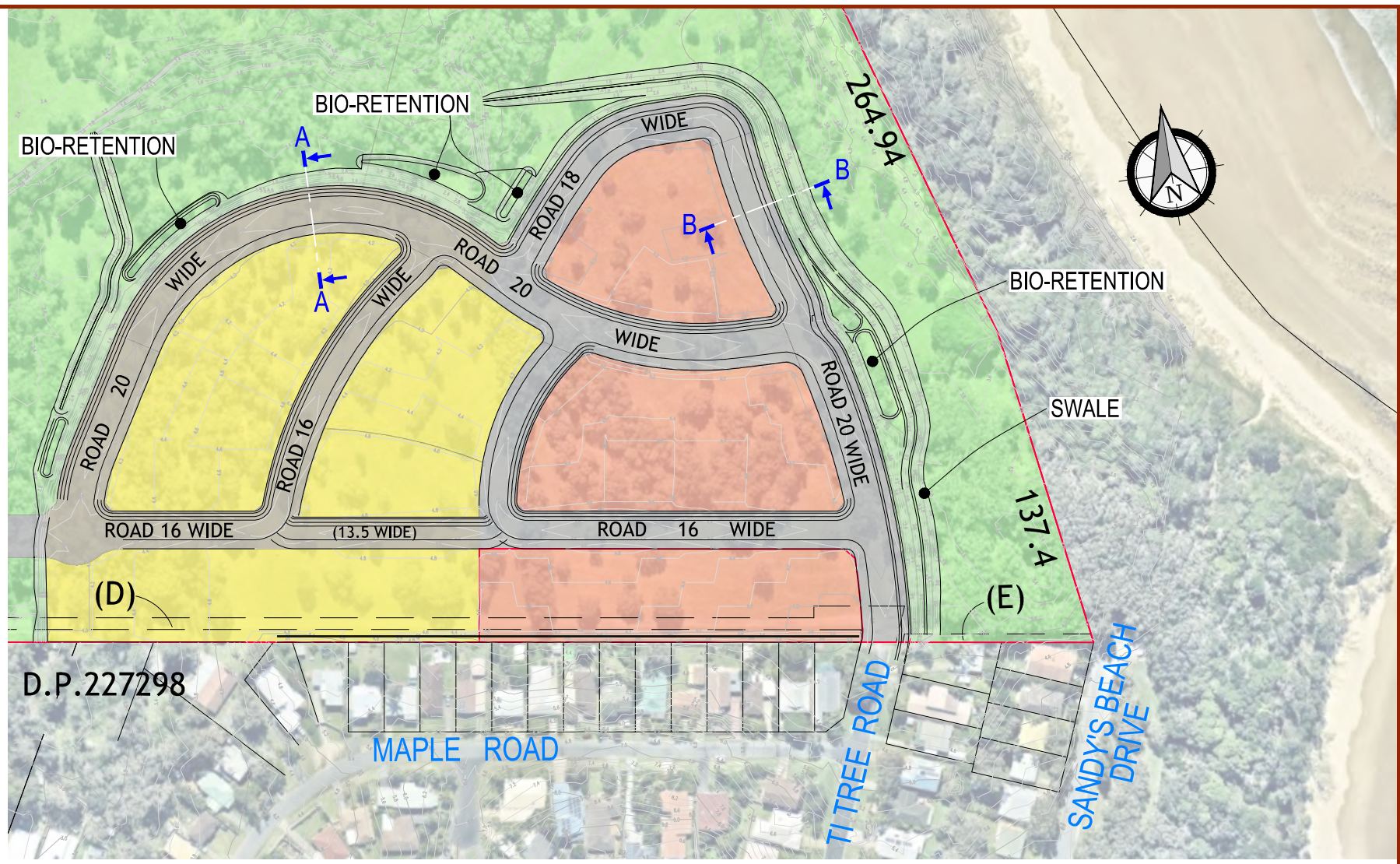
Semi-detached dwelling means a dwelling that is on its own lot of land and is attached to only one other dwelling.

Note. Semi-detached dwellings are a type of residential accommodation—see the definition of that term in the Coffs Harbour LEP 2013 Dictionary.

Soft landscaping means the soil and diverse plants used to help create a garden design including lawns, beds, borders, screens and trees.

Appendix F

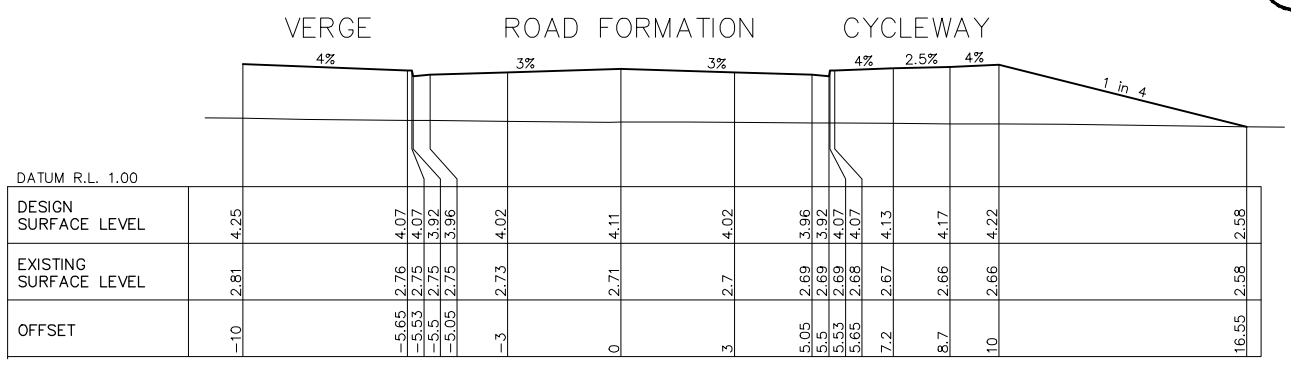
STORMWATER REPORT AND TYPICAL ROAD CROSS SECTION



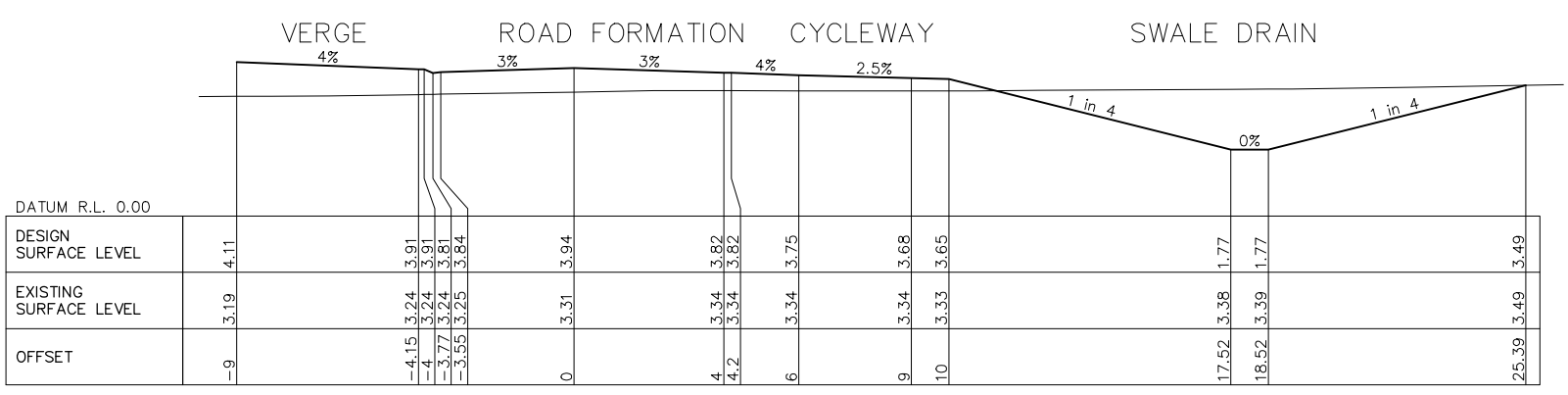
LEGEND

SITE SUMMARY

- STAGE 1
- STAGE 3
- CONSERVATION AREA 33.86 ha.



SECTION A-A



SECTION B-B

(D) EASEMENT FOR ACCESS 5 WIDE AND VARIABLE (D.P. 813954) E740455

(E) EASEMENT FOR WATER 3.5 WIDE (T.536154)

ver.	date	comment	drawn	pm	level information	scale (A3 original size)
A	5.5.17	FIRST ISSUE	MC	TC	DATUM: AHD CONTOUR INTERVAL: 0.2m	0 50 100 125m SCALE: 1:2500 (FULL)

working beyond expectations

drawing title:

PLAN OF PROPOSED SWALE DRAIN AND TYPICAL ROAD CROSS SECTIONS STAGE 1

location: WOOLGOOLGA COFFS HARBOUR

council: COFFS HARBOUR

dwg ref: 239312-SEC-001-A

client: Elite Constructions NSW Pty Ltd

adw johnson
central coast office ph: (02) 4305 4300
hunter office ph: (02) 4978 5100
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Ref: 301015-03760
File: lr301015-03760-SBN Stage 1&3 Stormwater Quality Assessment.docx

Mr Trevor Carter
ADW Johnson
7/335 Hillsborough Road
WARNERS BAY NSW 2282

10th May 2017

Dear Trevor,

SANDY BEACH NORTH RESIDENTIAL DEVELOPMENT
STAGES 1 & 3 – STORMWATER QUALITY ASSESSMENT

I refer to your request for a review of the potential impact on water quality of the proposed changes to the design for Stages 1 and 3 of the Sandy Beach North development on the North Coast of NSW. A water management strategy for the broader Sandy Beach North residential development was previously prepared by Patterson Britton & Partners in 2005 and updated in 2008. This strategy incorporated water quality treatment systems that were conceptually designed to deliver a net reduction in the total load of nutrients and suspended solids estimated to be currently discharged to the nearby Hearns Lake, and formed part of the Concept Approval.

Accordingly, we have reviewed the modified layout for Stages 1 and 3 of the development and have developed a modified stormwater management strategy for the site. This strategy has been iteratively assessed using an updated Model for Urban Stormwater Improvement Conceptualisation (MUSIC model). The following report details the components of the updated stormwater management system and the findings from the modelling.

1 INTRODUCTION

The following stormwater quality assessment has been prepared by Advisian on behalf of ADW Johnson to assess and develop a water quality control concept that can address the potential water quality impacts of Stages 1 and 3 of the proposed Sandy Beach North residential development.

The site comprises approximately 7.5 hectares of land located within the Coffs Harbour City Council (CHCC) Local Government Area (LGA) near Sandy Beach, New South Wales (refer **Figure 1**). The proposed development will involve the construction of buildings and paved surfaces such as roads, footpaths and driveways, resulting in an increase in the proportion of the site covered by impervious surfaces. Without the implementation of an appropriate surface water management strategy, such changes would result in a decrease in rainfall infiltration, a subsequent increase in runoff volumes, and increases in runoff pollutant loads associated with the increase in impervious surfaces and human activity.

As shown in **Figure 1**, the site drains in a northerly direction to Hearns Lake. Hence, the development has the potential to negatively impact water quality within the lake and consequently its aesthetic and ecological value.

A stormwater management strategy (SWMP) for the broader Sandy Beach North residential development has previously been prepared by Patterson Britton & Partners in 2005, and was subsequently updated in 2008. This strategy was aimed to deliver a net reduction in the total load of nutrients and suspended solids estimated to be currently discharged to the lake from the site, and formed part of the Concept Approval.

However, changes to the concept for Stages 1 and 3 have since been made, including the removal of laneways at the rear of some of the proposed lots. Hence, it is necessary to revisit the stormwater management strategy and to develop a revised plan for stormwater management that recognizes the changed road and lot layout, as well as the altered landform.

This SWMP has been developed in accordance with the terms of approval outlined in Section C5 of the Minister for Planning's Concept Approval for the development, and pursuant to Section 75O of the *Environmental Planning and Assessment Act 1979* (the Act), to ensure that:

- All stormwater to be discharged is treated and any stormwater discharge will have a neutral or beneficial impact on surface and groundwater water quality; and
- Water quality control devices are sited in such a way as to minimise their impact within the Conservation Area.

The scope of the investigation includes:

- Stormwater quality assessment
- Development of a stormwater quality management concept.

The quality of surface water leaving the site under existing and post-development conditions, and the effectiveness of proposed stormwater treatment measures have been assessed using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) modelling software.

2 EXISTING SITE CONDITIONS

2.1 Site Description

The development site is located on the eastern side of the Pacific Highway about 3 kilometres south of the North Coast town of Woolgoolga. It is situated immediately north of the village of Sandy Beach on land between the Pacific Highway, Hearns Lake and Hearns Lake Beach (refer **Figure 1**).

Stages 1 and 3 of the development have a combined area of about 7.5 hectares. According to DCP2011 Hearns Lake-Sandy Beach, the site is zoned for low density residential and is fringed by Development Buffer 3.5 mAHD, Bushfire Buffer and 7A Environmental Protection zonings. A condition of the Concept Approval is that any impact within the surrounding Conservation Area be minimised.

Existing vegetation across the site varies from open pasture to more densely vegetated areas that flank the lake shoreline, existing drainage channels, and the rear of the back beach dunal system that adjoins Hearns Lake Beach. Land to the south of the site comprises residential development.

2.2 Hydrology, Topography and Drainage

The site and surrounding areas drain to Hearns Lake. This includes the catchment of Double Crossing Creek which extends to the west of the Pacific Highway and covers an area of 526 ha. It discharges into Hearns Lake immediately downstream of the Pacific Highway bridge crossing (refer **Figure 1**).

Hearns Lake is an Intermittently Closed and Open Lake or Lagoon (ICOLL) which discharges to the ocean at the northern end of Hearns Lake Beach. The lake has a surface area of about 15 hectares.

A detailed Digital Elevation Model (DEM) for the site created from LiDAR survey data was sourced from Geoscience Australia and analysed to derive existing local hydrologic sub-catchments and drainage paths. The topographic DEM, local hydrologic sub-catchments, overland flow paths and drainage channels are presented in **Figure 2**.

The site and the adjoining sub-catchments of Sandy Beach are drained by two existing watercourses that appear to be man-made earth lined channels (refer **Figure 2**). The majority of the site lies between elevations of about 2.5 and 4.0 mAHD, with a maximum elevation of about 5.5 mAHD along the southern boundary and a minimum of around 1.7 mAHD along the drainage channel that passes through the centre of the site (refer **Figure 2**).

The site slopes toward the north to north-west at gentle grades in the order of 1%. Grades through the existing residential area immediately south of the development are steeper at around 5%, with a peak elevation of about 16.2 mAHD along Diamond Head Drive.

3 STORMWATER QUALITY ASSESSMENT

Stormwater quality modelling was undertaken using the MUSIC modelling software, in accordance with the *NSW MUSIC Modelling Guidelines* (*BMT WBM 2015*) and CHCC's *Water Sensitive Urban Design Guideline* (*revised August 2012*). MUSIC is the preferred modelling tool for the assessment of water sensitive urban design strategies across Australia.

3.1 Water Quality Criteria

The various requirements for stormwater quality management outlined in the following documents have been considered in the preparation of this study:

- The Minister for Planning's Concept Approval for the development (*December 2010*)
- CHCC *Water Sensitive Urban Design Policy* (*2013*)
- CHCC *Water Sensitive Urban Design Guideline* (*revised August 2012*)
- CHCC *Hearns Lake / Sandy Beach Development Control Plan* (*2011*)

The overarching condition of the concept approval is that "all stormwater to be discharged is treated and any stormwater discharge will have a neutral or beneficial impact on surface and groundwater water quality". The Statement of Commitments also cites that the permanent stormwater management strategy is to "incorporate the principles of Water Sensitive Urban Design and is to be in accordance with the requirements of Council. Accordingly, the requirements of CHCC's WSUD Policy and DCP are also applicable.

The CHCC *Water Sensitive Urban Design Policy* (*2013*) provides a set of objectives aimed at ensuring that stormwater quality is considered in the planning of new developments to control the impacts of urban development on pollutant loads discharged to receiving waters. The WSUD requirements for developments are further outlined in the CHCC *Water Sensitive Urban Design Guideline* (*revised August 2012*). The policy requires that all developments achieve a minimum percentage reduction of the post-development average annual load of pollutants in accordance with the criteria set out in **Table 1**.

Table 1: CHCC Water Sensitive Urban Design Policy Required Pollutant Reduction Targets

Pollutant	% Reduction in Post-Development Average Annual Load
Total Suspended Solids (TSS)	80%
Total Phosphorous (TP)	60%
Total Nitrogen (TN)	45%
Gross Pollutants	90%

3.2 MUSIC Modelling

3.2.1 Climate Data

Rainfall measured at Coffs Harbour MO (Bureau of Meteorology Station 059040) between 1st January 1999 and 31st December 2003 was used in the water quality modelling, as per CHCC *WSUD Guideline* requirements. The model was run with a 6 minute time step in order to appropriately define the rainfall pattern as per *NSW MUSIC Modelling Guidelines* recommendations.

Monthly potential evapotranspiration (PET) data for Coffs Harbour was adopted. Monthly average rainfall data for the period January 1999 to December 2003 and PET rates used in the model are presented in **Figure 3**.

3.2.2 Rainfall-Runoff Properties

Pervious area rainfall-runoff parameters for Sandy Clay were adopted in accordance with criteria specified in Table 5-5 of *NSW MUSIC Modelling Guidelines*. This soil type was selected as generally representative of the site in consideration of available borehole logs showing sandy and/or silty clay in the upper soil profile, types of fill that may be used on site, and the likelihood of sandy soils in the east of the site.

Default MUSIC parameter values for initial storage (25%) and initial depth (10 mm) were adopted.

3.2.3 Pre-Development Catchments

Existing or "pre-development" water quality conditions were assessed to provide a baseline against which to compare post-development and treated contaminant levels.

Sub-catchments were delineated in consideration of:

- hydrologic sub-catchments and surface flow paths derived from LiDAR topographic data;
- existing drainage infrastructure and drainage direction of existing developed lots; and,
- the required "post-development" scenario sub-catchment delineation to enable the ready modification of the MUSIC model to represent developed conditions.

Each sub-catchment was assigned a land use type, effective percentage impervious and pervious, and stormwater pollutant concentration parameters were set accordingly per Table 5-6 and Table 5-7 of *NSW MUSIC Modelling Guidelines*. The pre-development sub-catchments comprised "residential" and "undeveloped" land-use types which are further described below. The total area of the modelled catchments was 13.7 ha.

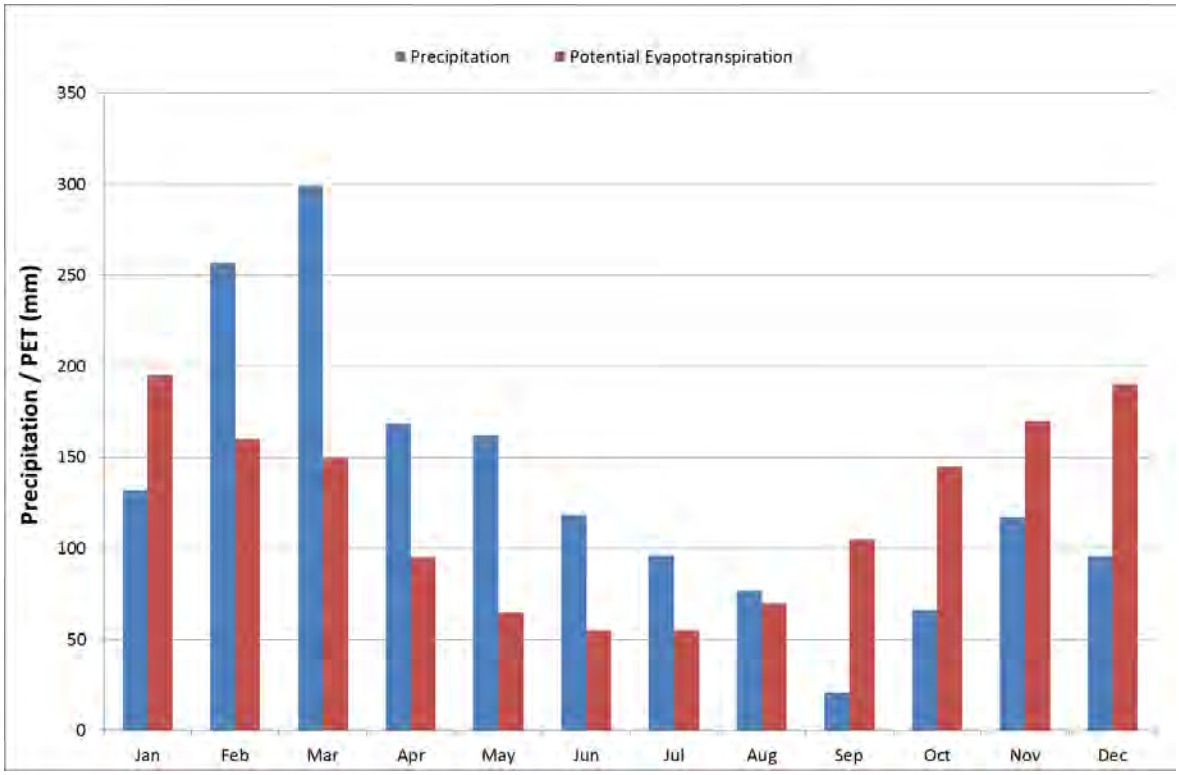


Figure 3 Average Monthly Rainfall for the Period 1999 to 2003 and Potential Evapotranspiration Rates used in the MUSIC Modelling Water Quality Assessment

3.2.4 Post-Development Catchments

"Post-development" water quality conditions were assessed to provide a baseline against which to assess treated contaminant levels. The adopted land use types are described in **Table 2**.

Existing residential areas were estimated to comprise 75% total impervious area. As these sub-catchments include roadways, the % effective impervious area was conservatively assumed to be 90% of the total impervious area. This is a proportion more typical of industrial areas rather than residential (refer Table 5-3 of *NSW MUSIC Modelling Guidelines*) and is therefore considered to provide a conservative assessment of the potential pollutant load in runoff.

Sub-catchments were delineated in consideration of:

- hydrologic sub-catchments and surface flow paths derived from LiDAR topographic data;
- existing drainage infrastructure-e and drainage direction of existing developed lots; and,
- the required "treatment" scenario sub-catchment delineation to enable the ready modification of the MUSIC model to represent treated conditions.

Each sub-catchment was assigned a land use type, effective percentage impervious and pervious, and stormwater pollutant concentration parameters were set accordingly per Table 5-6 and Table 5-7 of *NSW MUSIC Modelling Guidelines*. The sub-catchment delineation for post-developed conditions is shown in **Figure 4** and corresponding land use, catchment area and % effective impervious area (EIA) are provided in **Table 3**. Resulting average annual contaminant loads are presented in **Table 4**.

Table 2 Description of MUSIC model land use types

Land Use Type	Assumed % total impervious area (TIA)	Assumed proportion effective impervious area (EIA)	Comments
Residential	75	0.9 x TIA	Applied to existing residential development, where roofs were not accounted for separately. A high proportion EIA was assumed to account for inclusion of roads.
Undeveloped	0	NA	Applied to undeveloped areas with concentration parameters for "Rural" land use adopted
Roof	100	1.0 x TIA	The number of proposed lots within each sub-catchment was multiplied by 200 m^2 to calculate area of roof and 75% of this directed to rainwater tanks for the treatment scenario
Urban / Yard	75	0.6 x TIA	This Land Use Type was applied to proposed residential areas where roof areas were accounted for separately. Accordingly, a lower proportion EIA was used.

Table 3 Post-development catchment details

Catchment ID	Land Use Type	Area (ha)	% Effective Impervious	Comments
E1	Residential	2.737	68	Existing residential sub-catchment
E2	Residential	0.862	68	Existing residential sub-catchment
E3	Residential	0.695	45	Existing residential sub-catchment with part undeveloped; % impervious reduced accordingly.
E4	Undeveloped	3.038	0	Existing undeveloped sub-catchment; "rural" runoff concentration parameters adopted.
D1	Roof Urban / Yard	0.150 0.727	100 45	Proposed residential development, 10 lots
D2	Roof Urban / Yard	0.255 0.724	100 45	Proposed residential development, 17 lots
D3	Roof Urban / Yard	0.075 0.442	100 45	Proposed residential development, 5 lots
D4	Roof Urban / Yard	0.075 0.381	100 45	Proposed residential development, 5 lots
D5	Roof Urban / Yard	0.075 0.561	100 32	Proposed residential development, 5 lots. Includes recreational space, % impervious reduced accordingly.
D6	Roof Urban / Yard	0.045 0.400	100 32	Proposed residential development, 3 lots. Includes recreational space, % impervious reduced accordingly.
D7	Roof Urban / Yard	0.060 0.311	100 45	Proposed residential development, 4 lots
D8	Roof Urban / Yard	0.150 0.866	100 45	Proposed residential development, 10 lots
D9	Residential	0.123	68	Proposed residential development, 0 lots
D10	Roof Urban / Yard	0.045 0.227	100 45	Proposed residential development, 3 lots
D11	Roof Urban / Yard	0.060 0.348	100 45	Proposed residential development, 4 lots
D12	Roof Urban / Yard	0.030 0.261	100 45	Proposed residential development, 2 lots
TOTAL AREA		**13.7 ha**		

Table 4 Baseline post-development MUSIC results

Pollutant	From Site only	From adjacent sub-catchments	Total
TSS (kg/yr)	8,810	9,990	18,800
TP (kg/yr)	16.6	17.5	34.1
TN (kg/yr)	142	136	278
Gross Pollutants (kg/yr)	1,510	1,150	2,660

3.2.5 Proposed Treatment Measures

In order to meet water quality objectives, runoff from the proposed residential development requires treatment for TSS, TP, TN and gross pollutants prior to discharge from the site. A review of the current Stage 1 and 3 concept design including site levels and drainage infrastructure was undertaken to determine an appropriate water quality control strategy for the site. It was determined that a combination of the following treatment measures could provide the required level of stormwater treatment within the constraints of the site:

- Rainwater tanks
- Vegetated swales
- Bioretention basins

MUSIC treatment nodes were used to size and simulate the effectiveness of these measures in reducing stormwater pollutant loads. Input parameters were selected using recommendations from the *NSW MUSIC Modelling Guidelines* (BMT WBM 2015) and CHCC's *WSUD Guideline*. The treatment train as modelled in MUSIC is shown in **Figure 5** and a draft stormwater treatment layout plan presented in **Figure 6**.

Rainwater Tanks

A 4000 litre rainwater tank was modelled for each new residential lot in accordance with CHCC *WSUD Guidelines*. An average roof area of 200 m^2 per lot was estimated and it was assumed that 75% of the roof area would drain to the rainwater tank. These values are considered appropriate for greenfield development.

A water demand of 325 litres/day/dwelling for indoor use and 151 litres/day/dwelling for outdoor use was applied based on Table 6-1 of the *NSW Music Modelling Guidelines* and assuming two occupants per dwelling. These values are considered relatively conservative (i.e. low) for the purposes of water quality simulations. Outdoor re-use was scaled using the PET-Rain option while indoor re-use was applied as an average daily demand.

Vegetated Swales

A vegetated swale is to be included along the southern boundary of the site (refer to **Figure 6**) to convey and filter stormwater runoff through vegetation, removing coarse sediment and total suspended solids. A vegetation depth of 0.25 m was adopted.

A drainage swale around the perimeter of the site directs runoff from the site and upstream catchment to the discharge point at the north of the site. The primary purpose of this swale is stormwater conveyance and, given the low gradient of the swale, a vegetation height of only 0.05 m was adopted.

Bioretention Basins

The water quality control concept includes several bioretention basins located around the perimeter of the development (refer to **Figure 6**). With the exception of one basin in the south-east of the site which receives stormwater via a vegetated swale, these bioretention basins receive stormwater discharged by the pit and pipe drainage network, and discharge treated water to the perimeter drainage swale. ADW Johnson has indicated that site levels and drainage infrastructure can be designed such that a minimum bioretention discharge pipe invert elevation of 2.0 mAHD can be achieved.

The bioretention systems will consist of a vegetated runoff detention area overlying a granular infiltration bed. During smaller storm events, all runoff will infiltrate through the granular material, removing nutrients and finer sediment. During larger storm events, excess runoff that does not infiltrate and exceeds the storage capacity of the extended detention area will be discharged via an overflow weir. The base of the basins would incorporate an impermeable liner.

The bioretention basins were sized in MUSIC to achieve pollutant reduction targets while ensuring: that sufficient space is available in each location to provide the required surface area; that CHCC's minimum and maximum basin widths of 2 m and 3 m respectively are met, and; that maintenance access can be provided.

3.2.6 MUSIC Modelling Results

As discussed in **Section 3.1** of this report, there are potentially two stormwater quality objectives which apply to the site, those being:

- Any stormwater discharge will have a neutral or beneficial impact on surface and groundwater water quality; and,
- The CHCC *Water Sensitive Urban Design Policy* targets for % reduction in average annual load of pollutants leaving the developed unmitigated scenario compared to the developed mitigated scenario.

The performance of the developed water quality control concept has been assessed against both of these objectives, with results presented in **Tables 2** and **3**. Pollutant loads presented in **Table 2** are for the whole of the catchment draining to the sites discharge point, while pollutant loads presented in **Table 3** are for the proposed development area only.

While stormwater from adjacent sub-catchments will inevitably pass through parts of the proposed treatment train and receive some improvement in water quality, it is not the developer's responsibility to treat this stormwater and accordingly it has not been included in the assessment against % load reduction targets.

Table 5 Comparison of Pre-Development and Treated Post-Development Pollutant Loads

Annual Loads	Pre-Development (Whole Catchment)	Post-Development (Whole Catchment)	Post-Development with Treatment (Whole Catchment)
TSS (kg/yr)	12,200	18,800	4,440
TP (kg/yr)	23.9	34.1	18.4
TN (kg/yr)	202	278	200
Gross Pollutants (kg/yr)	1160	2660	17

Table 6 Modelled Reduction in Post-Development Pollutant Loads

Annual Loads	Post-Development (Site Only)	Post-Development with Treatment (Site Only)	Required % Reduction	% Reduction Achieved
TSS (kg/yr)	8,810	1,650	80%	**81.2%**
TP (kg/yr)	16.6	6.65	60%	**60.1%**
TN (kg/yr)	142	71.1	45%	**49.7%**
Gross Pollutants (kg/yr)	1,510	32.5	90%	**97.9%**

The results presented in **Table 2** show that the proposed water quality control concept would have a net neutral to beneficial impact on surface water leaving the site. The results presented in **Table 3** show that the concept is effective at removing TSS, TN, TP and gross pollutants, with percentage load reductions exceeding the treatment objectives specified by CHCC.

4 CONCLUSIONS

An assessment of the revised development proposal for Stage 1 and 3 of the Sandy Beach North Development has been undertaken to assess potential impacts on water quality and identify the mitigation measures that will be required.

MUSIC modelling has been undertaken to develop, size and assess the effectiveness of a stormwater quality control concept for the site. The concept comprises the use of rainwater tanks on each lot, vegetated swales, and several bioretention basins.

The results of the modelling show that the proposed treatment train will result in a net neutral to beneficial impact on surface water leaving the site, and will meet the percentage reduction in post-development pollutant loads required by CHCC's *Water Sensitive Urban Design Policy*.

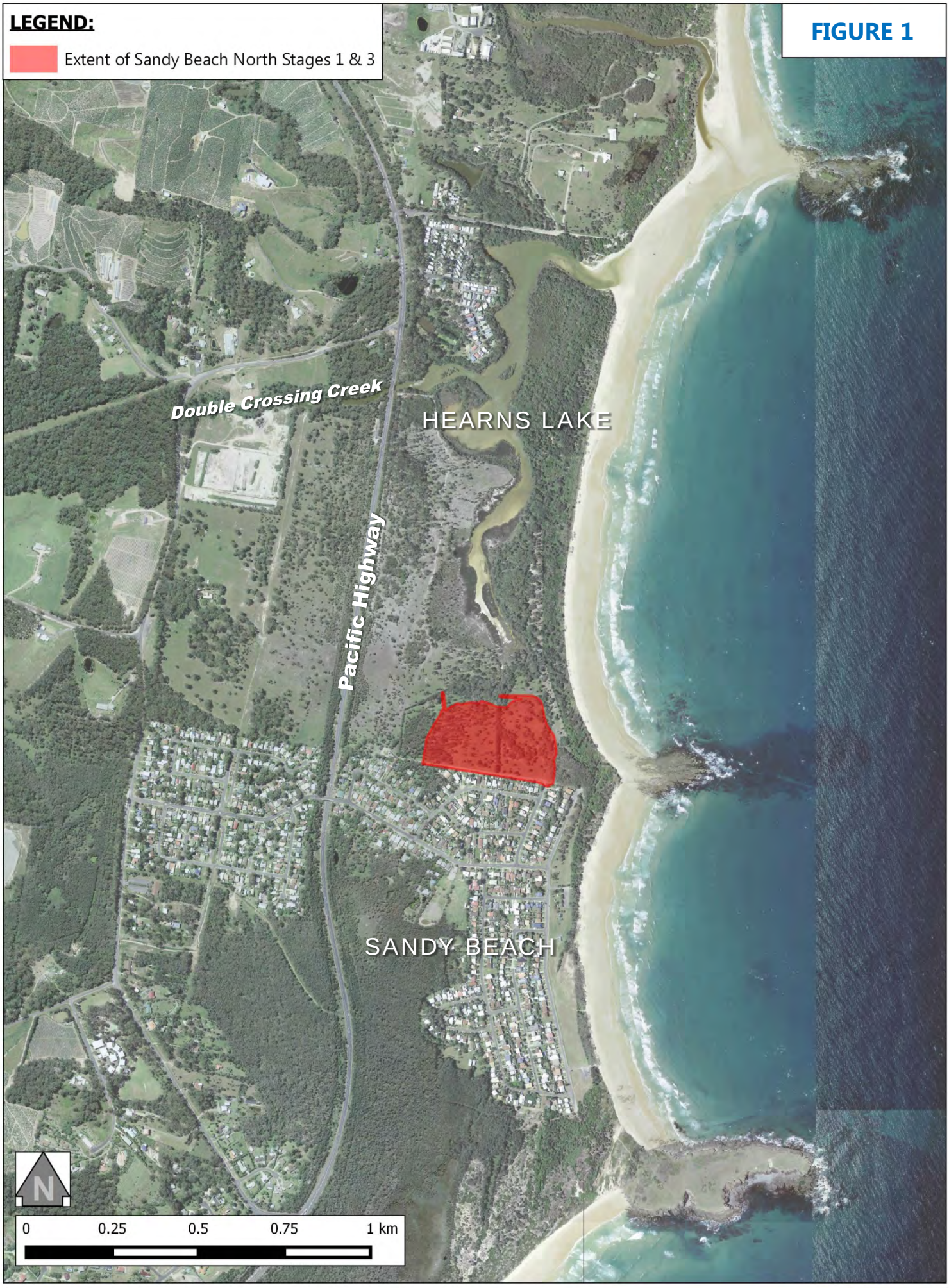
If you have any queries on the above report please do not hesitate to contact the undersigned.

Yours sincerely,
ADVISIAN

Leon Collins
Water Resources Engineer

Reviewed by

Chris Thomas
Principal
Practice Lead - Water



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SANDY BEACH NORTH, STAGES 1 & 3
SITE LOCATION

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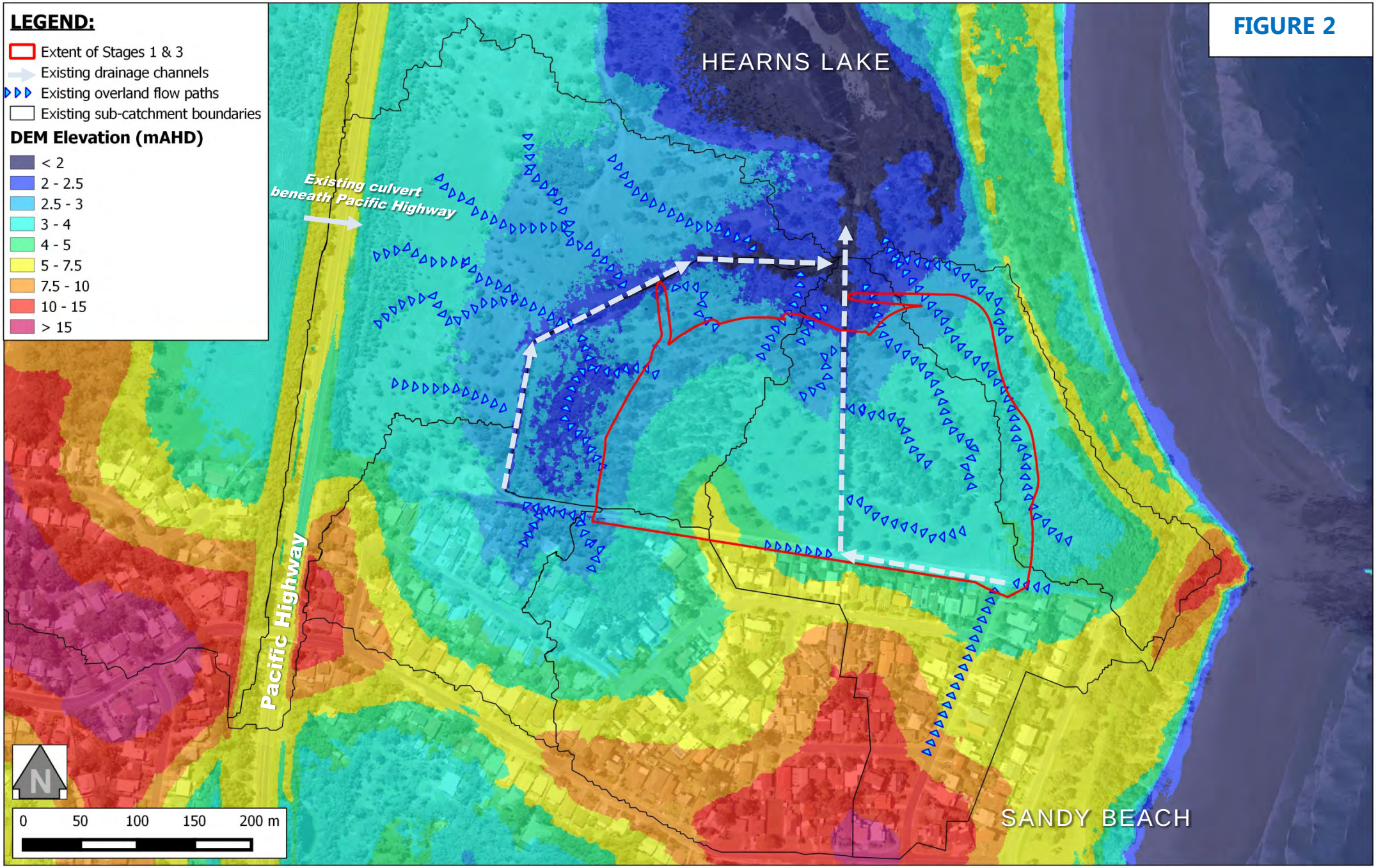

FIGURE 2

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SANDY BEACH NORTH, STAGES 1 & 3
SITE TOPOGRAPHY, CATCHMENT BOUNDARIES & FLOW PATHS

FIGURE 4

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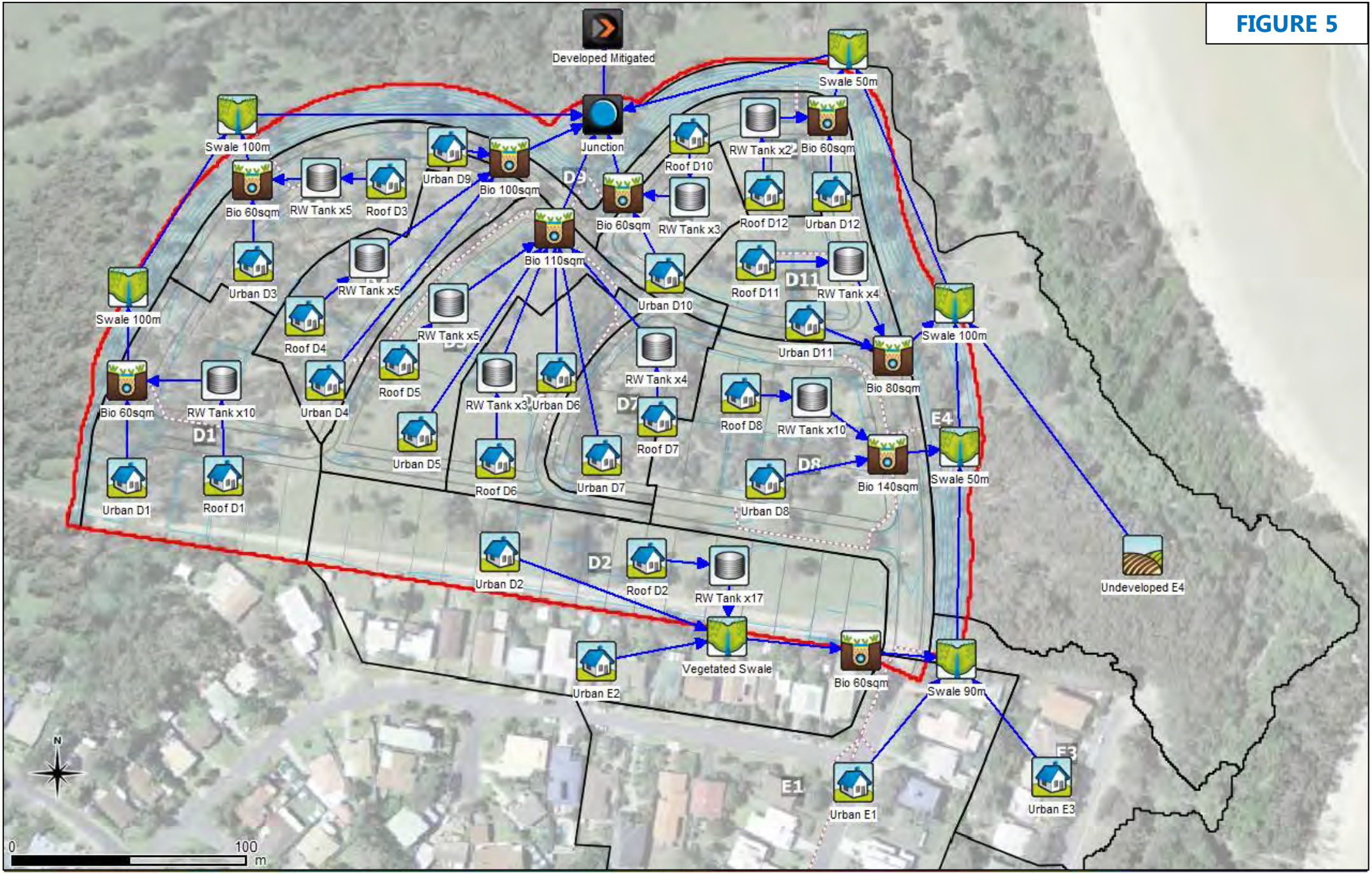
SANDY BEACH NORTH, STAGES 1 & 3
POST-DEVELOPMENT SUBCATCHMENT BOUNDARIES

FIGURE 5



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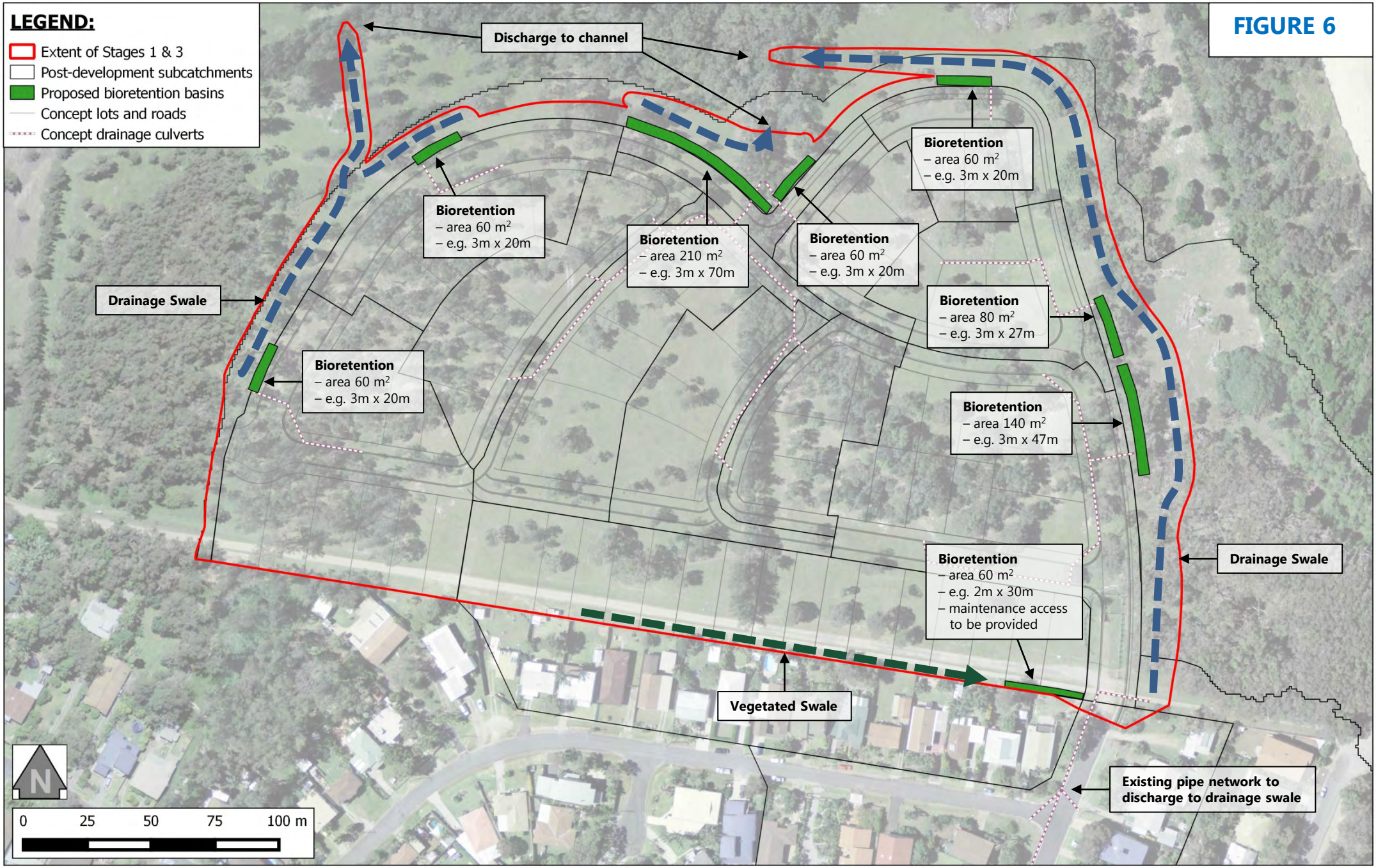
SANDY BEACH NORTH, STAGES 1 & 3
MUSIC MODEL SCHEMATIC



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SANDY BEACH NORTH, STAGES 1 & 3
DRAFT STORMWATER TREAMENT LAYOUT PLAN