Application to modify a development consent

NSW GOVERNMENT
Department of Planning

Date lodged: 10 / 11 / 14

DA modification no. _____
(Office use only)

1. Before you lodge

This form is to be used for applications to modify Part 4 development consents under section 96 or 96AA of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This form is also to be used for Part 4 development consents that are to be modified under section 75W of the Act.

Disclosure statement
Persons lodging modification applications are required to declare reportable political donations (including donations of or more than $1,000) made in the previous two years. For more details, including a disclosure form, go to **www.planning.nsw.gov.au/donations**.

Lodgement
Anyone wishing to lodge an application is recommended to call the Department of Planning to discuss their proposal and modification application requirements prior to lodging their application. You can lodge your completed form, together with attachments and fees at the relevant Department of Planning office listed below. Please lodge Part 4 modification applications with the Department of Planning head office or, for modification applications that are within the Kosciuszko ski resorts area, the Department's Alpine Resorts team.

NSW Department of Planning
Head Office
Ground Floor, 23–33 Bridge Street, Sydney NSW 2000
GPO Box 39 Sydney NSW 2001
Phone: 1300 305 695 Fax: (02) 9228 6555
Email: information@planning.nsw.gov.au

NSW Department of Planning
Alpine Resorts Team
Shop 5A, Snowy River Avenue
PO Box 36, Jindabyne NSW 2627
Phone: (02) 6456 1733 Fax: (02) 6456 1736
Email: alpineresorts@planning.nsw.gov.au

To minimise delay in receiving a decision about your application, please ensure you submit all relevant information to the Department. When your application has been assessed, you will receive a notice of determination.

2. Applicant and contact details

Company/organisation/agency: Cardno
ABN: 95 001 145 035

☐ Mr ■ Ms ☐ Mrs ☐ Dr ☐ Other

First name: Jenny
Family name: Smithson

STREET ADDRESS

Unit/street no: Level 9
Street name: 203 Pacific Highway
Suburb or town: St Leonards
State: NSW
Postcode: 2065

POSTAL ADDRESS (or mark 'as above')

P.O. Box 19
Suburb or town: ST LEONARDS
State: NSW
Postcode: 1590

Daytime telephone: 02 9496 7700
Fax: 02 9496 5170
Mobile: 0417 914 889

Email: jenny.smithson@cardno.com.au

3. Property description

Unit/street no. (or lot no. for Kosciuszko ski resorts)

Street or property name: Fern Bay Seaside Village

Suburb, town or locality: Fern Bay

Postcode: 2295

Local government area: Port Stephens

Lot/DP or Lot/Section/DP or Lot/Strata no.
Please ensure that you put a slash (/) between lot, section, DP and strata numbers. If you have more than one piece of land, you will need to separate them with a comma e.g. 123/579, 162/2

See attached Schedule of subject sites

Note: You can find the lot, section, DP or strata number on a map of the land or on the title documents for the land, if title was provided after 30 October 1983. If you have documents older than this, you will need to contact the NSW Department of Lands for updated details. If the subject land is located within the Kosciuszko ski resorts area, DP and strata numbers do not apply.

4. Details of the original development consent

Briefly describe your approved development in the space below. If the development has been modified previously you must list all previous modifications and the relevant determination date(s).

Bulk earthworks & clearing; subdivision to create 473 lots under a community title scheme (including 441 residential lots including 9 duplex lots, 1 triplex lot, 29 superlots, 2 commercial lots and 1 community lot; ecological conservation areas, recreational and open space network; recreational community centre; new road network; stormwater management; landscaping and essential services.
MP No. 06_0250 - Residential subdivision (Approved 28 June 2010)
Modified by 06_0250 Mod 1 (Approved 1 April 2011),
Modified by 06_0250 Mod 3 (Approved 1 May 2012),
Modified by 06_0250 Mod 5 (Approved 1 April 2014).

What was the original development application no.?: 06_0250

What was the date consent was granted?: 28 June 2010

What was the original application fee?:

5. Type of modification

An application under section 96 of the EP&A Act is an application to modify a development consent. Modifications to a development consent can also be made under section 75W of the EP&A Act, or section 96AA for court granted consents.

There are five types of modification applications. Please tick the type of modification application that is being sought.

- ☐ Section 96(1) involving minor error, misdescription or miscalculation.
- ☐ Section 96(1A) involving minimal environmental impact, where the development as originally approved remains substantially the same.
- ☐ Section 96(2) other modification, where the development as originally approved remains substantially the same.
- ☐ Section 96AA modification of consent granted by the Land and Environment Court, where the development as originally approved remains substantially the same.
- ☒ Section 75W modification, involving use of Part 3A processes to modify the Part 4 consent.

Note: If the proposed modification will lead to the consented development being not 'substantially the same' (except in the case of a proposed modification under section 75W) then you will need to submit a new development application.

6. Extent of modification

Will the modified development be substantially the same as the development that was originally approved?

No ☐ ➢ Please submit a new development application.

Yes ■ ➢ Please provide evidence that the development will remain substantially the same. (If you need to attach additional pages, please list below the material attached)

Deletion of 2 conditions. See attached Cardno letter.

Note: Question 6 does not apply to proposed modifications under section 75W.

7. Description of modification

- In the case of a section 96(1) application, indicate the nature of the minor error, misdescription or miscalculation in the space below.
- In the case of a section 96(1A), section 96(2) or section 96AA application describe the impact of the modification in the space below. A statement of environmental effects will need to accompany the application, which includes an assessment of the development as proposed to be modified in accordance with section 79C(1) of the EP&A Act. Provisions of the *Heritage Act 1977* may also apply for works to a heritage item or works adjoining a heritage item.
- In the case of a section 75W application under clause 8J(8) of the Environmental Planning and Assessment Regulation 2000, a development consent in force immediately before the commencement of Part 3A of the Act may be modified under section 75W as if the consent were an approval under that Part. However, approval from the Minister is required to lodge a section 75W application. **Applicants should contact the Department first if they are considering applying for a modification under section 75W.**

Regardless of the type of modification, please state below the specific conditions of consent to be modified, deleted or additional conditions request, and details of any other changes being sought.

Conditions of Consent sought to be deleted:
B4 and B13

Note: If your proposal is within Kosciuszko ski resorts area, please attach a copy of the Interim Lease Variation Approval received from the Department of Environment and Climate Change to your application.

8. General terms of approval from State agencies

If the original development application was classified as integrated development and required approval from one or more State agencies, list them in the space below and their respective general terms of approval. Depending on the type of modification, it may be necessary to refer the modification application to the approval body.

9. Number of jobs to be created

Please indicate the number of jobs the proposed development will create. This should be expressed as a proportion of full time jobs over a full year, (e.g. a person employed full time for 6 months would equal 0.5 of a full time equivalent job; six contractors working on and off over 2 weeks equate to 2 people working full time for 2 weeks, which equals approximately 0.08 of an FTE job).

Construction jobs (full time equivalent)	N/A
Operational jobs (full time equivalent)	N/A

10. Application fee

Part 15 of the Environmental Planning and Assessment Regulation 2000 sets out how to calculate the fees for an application for modification of a development consent. If your development needs to be advertised to the public you may also need to include an advertising fee.

Note: Advertising fees attract GST, all other fees do not.

Please contact the Department in order to calculate the fee for your modification application.

Estimated cost of the development	Original application fee	Total fees lodged

11. Political donation disclosure statement

Persons lodging modification applications are required to declare reportable political donations (including donations of or more than $1,000) made in the previous two years. Disclosure statements are to be submitted with your application.

Have you attached a disclosure statement to this application?

Yes ☒

No ☐

Note: For more details about political donation disclosure requirements, including a disclosure form, go to **www.planning.nsw.gov.au/donations**.

12. Owner's consent

The owner(s) of the land to be developed must sign the application. If you are not the owner of the land, you must have all the owners sign the application. If the land is Crown land, an authorised officer of the NSW Department of Lands must sign the application. **An original signature must be provided.**

As the owner(s) of the above property, I/we consent to this application.

Signature

Name: Michael Radovnikovic

Date: 03·11·14

Signature

Name

Date

Note: For applications within the Kosciuszko ski resorts area, the approval of the lessee rather than the owner is required.

13. Applicant's signature

The applicant, or the applicant's agent, must sign the application. Only an original signature will be accepted (photocopies or faxed copies will not be accepted)

Signature

Date: 10·11·14

In what capacity are you signing if you are not the applicant

Name, if you are not the applicant

14. Privacy policy

The information you provide in this application will enable the Department, and any relevant state agency, to assess your application under the *Environmental Planning and Assessment Act 1979* and other applicable state legislation. If the information is not provided, your application may not be accepted.

If your application is for designated development or advertised development, it will be made available for public inspection and copying during a submission period. Written notification of the application will also be provided to the neighbourhood. You have the right to access and have corrected any information provided in your application. Please ensure that the information is accurate and advise the Department of any changes.

Political Donations Disclosure Statement to Minister or the Director-General

If you are required under section 147(3) of the Environmental Planning and Assessment Act 1979 *to disclose any political donations (see Page 1 for details), please fill in this form and sign below.*

Disclosure statement details

Name of person making this disclosure	Planning application reference (e.g. DA number, planning application title or reference, property address or other description)
Fern Bay No. 1 Pty Ltd	

Your interest in the planning application (circle relevant option below)

You are the APPLICANT (YES) / NO OR You are a PERSON MAKING A SUBMISSION IN RELATION TO AN APPLICATION YES / NO

Reportable political donations made by person making this declaration or by other relevant persons

* *State below any reportable political donations* ***you have made*** *over the 'relevant period' (see glossary on page 2). If the donation was made by an entity (and not by you as an individual) include the Australian Business Number (ABN).*

* *If you are the* ***applicant*** *of a relevant planning application state below any reportable political donations that you know, or ought reasonably to know, were made by any persons with a financial interest in the planning application, OR*

* *If you are a* ***person making a submission*** *in relation to an application, state below any reportable political donations that you know, or ought reasonably to know, were made by an associate.*

Name of donor (or ABN if an entity)	Donor's residential address or entity's registered address or other official office of the donor	Name of party or person for whose benefit the donation was made	Date donation made	Amount/ value of donation

Please list all reportable political donations—additional space is provided overleaf if required.

By signing below, I/we hereby declare that all information contained within this statement is accurate at the time of signing.

Signature(s) and Date

Name(s)

LAURENCE W RALSON

Contact: Jenny Smithson
Our Reference: 80215013

10 November, 2014

Cardno (NSW/ACT) Pty Ltd
ABN 95 001 145 035

Level 3
Cardno Building
910 Pacific Highway
Gordon NSW 2072
Australia

Phone: 61 2 9496 7700
Fax: 61 2 9499 3902

www.cardno.com.au

Ms Kate Macdonald
Department of Planning & Environment
GPO Box 39
SYDNEY NSW 2001

Dear Kate,

SECTION 75W REQUEST TO MODIFY THE MINISTER'S APPROVAL OF PROJECT APPLICATION 06_0250 (28 JUNE 2010) – SEASIDE BOULEVARD, FERN BAY MODIFICATION SOUGHT COMPRISES DELETION OF TWO CONDITIONS

Further to Cardno's previous discussions and involvement with the Department on the above project, we hereby submit an Application and Environmental Assessment lodged pursuant to section 75W of the Environmental Planning and Assessment Act, 1979 (the Act). The Application is to modify the above Part 3A Consent on behalf of Rawson Communities, the applicant and relatively new owners of the subject land referred to as the Fern Bay estate or *Seaside Village, Fern Bay*.

The requested modifications include:

- Deletion of Condition of Approval No.B4 – Construction of Shared Footpath / Cycleway along Nelson Bay Road; and
- Deletion of Condition of Approval No.B13 – Dune Restoration / Stabilisation Management Plan.

On the basis that the proposed modifications will result in no change in lot yield or the development footprint and have no impact on any conservation land, or on any s94 contribution amount proposed to be charged, we consider the proposed modifications to be minor. Accordingly, we believe there is no requirement to notify the proposal with the exception of the relevant referral agencies in this case.

In addition to the required completed s75W Form and Political Donations Declaration Form (attached), the application comprises this letter which contains explanations and justifications for the proposed deletion of the abovementioned 2 existing Conditions of Approval as follows.

Condition B4 – Construction of Shared Footpath / Cycleway along Nelson Bay Road
Condition B4 currently reads as follows:

The shared footpath / cycleway along Nelson Bay Road must be constructed prior to the issue of any subdivision certificate that creates the two hundred and fiftieth (sic) of the development. It shall be designed and constructed at the cost of the Proponent, in

accordance with the requirements of Council. The Roads and Traffic Authority must be consulted where there is a potential interface between the road pavement and the shared footpath / cycleway. Detailed plans for the footpath / cycleway (extending from the existing roundabout at the intersection of Nelson Bay Road and Fullerton Cove Road to the bus shelter at Bayview Village to the south) shall be approved by Council, prior to the issue of the Construction Certificate for the civil works that create the two hundred and fiftieth lot of the development (clearing and / or Bulk Earthworks Construction Certificates may be issued prior to the approval of a Construction Certificate for the civil works).

Grounds for removal of the Condition

The proposed route of the shared footpath / cycleway is illustrated in the attached plan by North Point Surveys – *Footpath & Cycleway Rev F* (sheet 20 of 23 of the approved drawings dated 20/12/2013). The Plan illustrates that the route passes adjacent to and partially through land owned by Bayway Village Retirement Park.

The grounds for seeking removal of the condition are based on the following factors:

- It is understand that Nelson Bay Road is a road under the control of RMS. There is insufficient width in the existing reserve to accommodate a shared footpath/cycleway and its provision is not accommodated in RMS's designs for the road.
- The Port Stephens Council originally sought for the condition to be imposed assuming construction of the facility would be relatively straightforward.
- Rawson Communities recently met with representatives of Port Stephens Council, namely the Mayor and Matthew Brown (Manager Development Assessment and Compliance) to discuss the requirements to meet the condition. It was agreed at the meeting that, for Rawson Communities to be able to deliver the footpath/cycleway and thus comply with the condition, Council would need to acquire some land from an adjoining landowner, Bayway Village Holiday Park. Bayway Village does not wish to sell this land to the Council and are not supportive of the cycleway.
- Both the developer and the Council have attempted many times to acquire the land off Bayway Village but these negotiations have been unsuccessful. The Council does not wish to compulsorily acquire the land simply to accommodate this section of pathway.
- The Council acknowledges that the ability to comply with this condition of approval is therefore out of the control of Rawson Communities and that it is unreasonable to delay future stages of the Fern Bay estate because of this inability to deliver the shared footpath/cycleway.
- Rawson Communities sought Council's views on the condition being removed. It was agreed that the condition would be removed and that the Council would support this by way of a s75W modification accordingly.
- Cardno notes that there is a shared pathway already constructed for part of this section of Nelson Bay Road but it is located on the opposite (ie northern) side of the road to Seaside Village Estate.

Given that Rawson Communities are unable to comply with this condition due to circumstances beyond their control, and the fact that the Council who sought the original condition now supports its removal, deletion of the condition is requested. Immediate removal is sought as Rawson Communities are soon to construct the 250th lot referenced in the condition at which time the requirement to meet the condition is triggered.

Condition B13 – Dune Restoration / Stabilisation Management Plan

The Condition reads:

A Dune Restoration / Stabilisation Plan is to be prepared prior to the issue of the Construction Certificate for Stage 6. The plan is to include dune restoration / stabilisation measures to limit the expected transgressive

dune movement, being an update of those proposed in the Fern Bay Dune Stabilisation Submission Paper (prepared by Australian Water and Coastal Studies Pty Ltd, dated 1993, provided in Annex K of the EA). The Duse Restoration / Stabilisation works can be programmed in such a way that stabilisation is achieved progressively to match the progression of development. All restoration works shall be conducted prior to the issue of the Subdivision Certificate for Stage 20 (the final stage of development).

Grounds for removal of the Condition

It is understood that this condition was imposed in response to a possible concern that the transgressive movement of the dune system could encroach upon and therefore adversely affect the Fern Bay Seaside development and as such a dune restoration/stabilisation plan and program needed to be implemented to ensure that mobile sand did not encroach on the development.

Recently, a review of the historical behaviour of the dune system was undertaken by Umwelt (see attached letter dated 31 October 2014). Umwelt collected data on dune movement and beach recession in 2007 and 2010 and also had regard to parameters used in coastal hazard zone assessment by the NSW Government (including sea level rise) to determine dune movement between 1994 and 2007. Their findings as outlined in the attached letter are that:

> *"Based on the ...analysis, it appears that changes made to the dune system during heavy mineral sand mining, combined with shoreline aggrading and natural slowing of the rate of transgression of the mobile dune system, has significantly slowed the rate of dune progression. It is estimated based on the above analysis that if landward progression of the mobile dunes continue at the current rate of 2.3 metres per year, it would be in excess of 140 years before mobile sand reached Fern Bay Seaside development and well outside the 100 year planning period adopted at the time development consent was granted. On this basis it is considered unlikely that additional works will be required within the 100 year planning period to stabilise or rehabilitate the dune system to prevent it from inundating Fern Bay Seaside development.*
>
> *It is considered that dune stabilisation or restoration, if it were undertaken, is unlikely to be successful due to the continued landward movement of sand from the adjoining unvegetated Worimi Conservation Lands and Worimi National Park."*

Specifically, Unwelt noted that shoreline recession is considerably less that was predicted in 1992 as is the rate of landward dune transgression concluding that the estate was unlikely to be affected by the inundation of dune sand within the 100 year planning timeframe that was considered at the time the development was originally approved (and condition B13 imposed). Umwelt also noted that, at the time the development consent was granted, there were proposals to inject wastewater into the sand dunes adjacent to Fern Bay village and revegetate the mobile dune systems. The Dune Restoration and Stabilisation Plan at the time reflected this management approach. However, *"since the early 1990's, government thinking has changed with the adjoining mobile dunes now being part of the Worimi Conservation Area and Worimi National Park with the dunes to now be left as mobile dunes in the current vegetated state".*

Given the recent scientific research findings from Umwelt that dune transgression is now not likely to adversely impact the estate, that dune restoration/stabilisation is therefore not necessary and is unlikely to be successful in any event, and the fact that not undertaking the works would have less of an environmental impact on the dune system than undertaking them, the condition should be removed.

In summary, there is no longer a need for an updated Dune Restoration/Stabilisation Plan as dune works are likely to be both unnecessary and ineffectual. Therefore removal of Condition B13 is considered to be justified, and is sought accordingly. As the requirement for an updated Restoration/Stabilisation Plan is triggered prior to the issue of a Construction Certificate for Stage 6, expeditious approval to remove the condition is requested.

This letter summarises the extent of the modifications now sought to the existing project approval. Given the simplicity of the modifications sought (deletion of 2 conditions), the justification provided for seeking the modifications, and the fact that they only affect works associated with the estate, timely issuing of a modified approval is sought accordingly.

Thank you for your attention to this matter. If you have any queries or require additional information, please do not hesitate to contact me at your convenience.

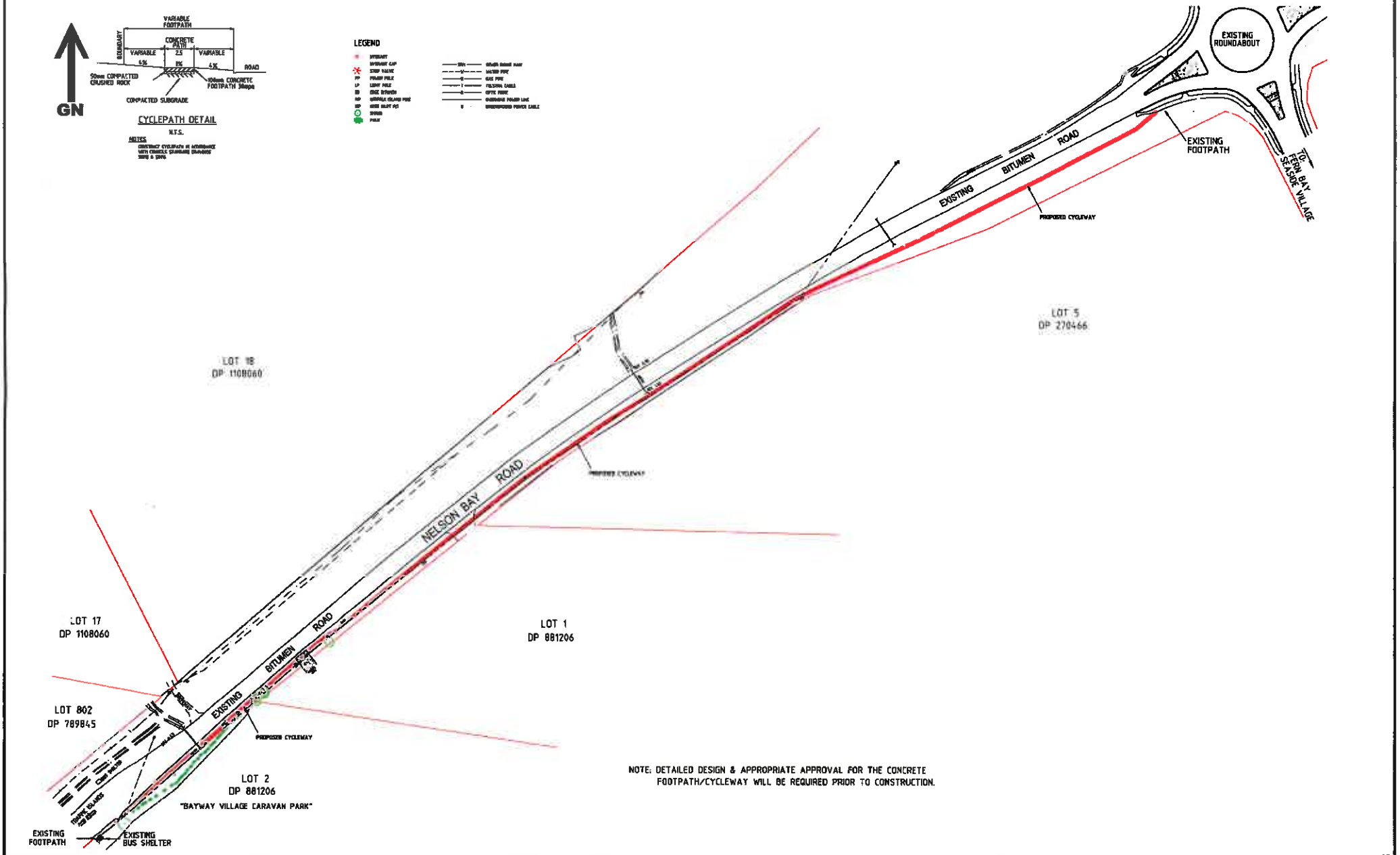
Yours faithfully

Jenny Smithson
Senior Principal – Planning

for Cardno
Enc:

Cc:
Mr Michael Radovnikovic – Rawson Communities
Mr Brent Annis-Brown (Project Manager)

ATTACHMENT 1
– PLAN SHOWING LOCATION OF PATHWAY ON NELSON BAY ROAD



A2

SCALE 1: 1500	DATUM AHD	DRAWING TITLE	FOOTPATH & CYCLEWAY REV-F
REVISION DATE 20/12/2013	CONTOURS X m	DEVELOPMENT	PROJECT PLAN F FERN BAY SEASIDE VILLAGE NELSON BAY ROAD, FERN BAY
PLOT DATE 20/12/2013	DRAWN/CHKD BY IMc / AED		
DA NUMBER	CC NUMBER	CLIENT	RAWSON COMMUNITIES PTY LIMITED

NORTH POINT SURVEYS (NSW) PTY LTD
ATF NORTH POINT SURVEYS TRUST ABN 52 001 962 075
SURVEYING AND LAND DEVELOPMENT CONSULTANTS
5 KOALA PLACE, ONE MILE BEACH
PH: 0248 842608
PO BOX 378 NELSON BAY, NSW, 2315
EMAIL: admin@northpointsurveys.com.au

29850 F

ATTACHMENT 2
– UMWELT LETTER ON DUNE RESTORATION/STABILISATION

umwelt

Inspired People.
Dedicated Team.
Quality Outcomes.

Our Ref: 3405/PJ/FD/311014

31 October 2014

Fern Bay No 1
c/- Yarraman Developments Pty Limited
PO Box 492
FORESTVILLE NSW 2087
Email: au.scottlennon71@gmail.com
Attention: Scott Lennon

Dear Scott

Re: Fern Bay Seaside Development Dune Restoration/Stabilisation

Background

Umwelt (Australia) Pty Limited (Umwelt) has been requested by Scott Lennon, acting on behalf of Yarraman Developments Pty Ltd, to review and comment on the requirements for the preparation of a Dune Restoration/Stabilisation Plan as required by Condition B13 in relation to the Fern Bay Seaside Development.

Condition B13 states:

> A Dune Restoration/Stabilisation Plan is to be prepared prior to the issue of a Construction Certificate for Stage 6. The plan is to include dune restoration/stabilisation measures to limit the expected transgressive dune movement, being an update of those proposed in the *Fern Bay Dune Stabilisation Position Paper* (prepared by Australian Water and Coastal Studies Pty Ltd, dated 1993, provided in Annex K of the EA).
>
> The dune Restoration/Stabilisation works can be programmed in such a way that stabilisation is achieved progressively to match the progression of the development. All restoration works shall be conducted prior to the issue of a Subdivision Certificate for Stage 20 (the final Stage of the development).

Fern Bay Dune Stabilisation Position Paper was prepared by Australian Water and Coastal Studies Pty Ltd (AWACS) in 1992 and 1993 and indicated the mobile dunes on Stockton Bight seaward of Fern Bay Seaside Development may encroach on the development over time. Condition 13B was included in the consent for the development to ensure that mobile sand did not encroach on the development. Since this time additional data on dune movement and beach recession has been collected. In addition, the mobile dune system adjacent to Fern Bay Seaside development has been moved approximately 50 to 80 metres seaward as part of a heavy mineral sand mining operation. Mining and relocation of the dune system in this area was undertaken between 1997 and 2002.

Umwelt has reviewed the available information on the movement of the dune system in proximity to Fern Bay Seaside development in 2007 and in 2010. This included a review of the parameters used in coastal hazard zone assessment that was undertaken, including considerations of sea level rise. This review included analysis of dune movement between 1994 and 2007 using ground survey, aerial photogrammetry and LiDAR that was collected by NSW government in January 2007.

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www.umwelt.com.au

Umwelt (Australia) Pty Limited
ABN: 18 059 519 041

In June and July 2013, additional LiDAR information for the site was collected by Land and Property Information on behalf of NSW government.

The layout and location of Fern Bay Seaside development and proximity to the 100 Year Dune Hazard Line is shown on **Figure 1**.

Figure 1 – Proximity of Fern Bay Seaside Development to 100 Year Dune Hazard Line as predicted by AWACS (1992)

Coastal Hazard Zone

The results of the AWACS (1992) studies in regard to delineation of the Coastal Hazard Zone are summarised in **Table 1**. It is understood that the 100 Year Dune Hazard Line shown on **Figure 1** was derived by AWACS.

Table 1 – Coastal Hazard Zone Widths (AWACS 1992)

Hazard Zone Component	Coastal Hazard Zone Widths (m)	
	30 Year Return Period	100 Year Return Period
Beach Recession	36	120
Storm Cut	20	20
Greenhouse Effect	14	60
Total	**70**	**200**

Since the AWACS report was prepared, sea level rise predictions by 2100 have increased from 0.6 metres to 0.9 metres. Using the Bruun Rule and a bed slope of 1 in 100 as used by AWACS (1992), the 100 year hazard component due to Greenhouse Effect in **Table 1** would increase from 60 metres to 90 metres i.e. an increase of 30 metres.

Analysis of available LiDAR derived topographic data for Stockton Bight adjacent to the Fern Bay Seaside development provided on **Figure 2** shows that the shoreline has aggraded (i.e. moved seaward) between 1954 and 1994 and remained in approximately the same location between 1994 and 2007. Analysis (see **Figure 2**) shows that 2007 shoreline at 1.5 mAHD (approximately high water mark) is shoreward of the 1954 location by approximately 20 to 50 metres. Analysis of the 2013 LiDAR data shows that the shoreline has in places receded since 2007 but is still typically 25 metres seaward of the shoreline location in 1954. This indicates the beach has aggraded by approximately 25 metres over the 60 year period since 1954 which equates to an average rate of approximately -0.4 metres per year. This is compared to the 1.2 metres per year beach recession rate predicted in the AWACS 1992 report and used in deriving the estimate of beach recession set out in **Table 1**. Based on this analysis, the 100 year beach recession component set out in **Table 1** could be reduced to between 0 metres and -20 metres rather than the +120 metres that was used by AWACS (1992) in deriving the 100 Year Dune Hazard Line shown on **Figure 1**.

Table 2 – Coastal Hazard Zone Widths (Revised Based on 2013 LiDAR)

Hazard Zone Component	Coastal Hazard Zone Widths (m)	
	30 Year Return Period	100 Year Return Period
Beach Recession	0	0
Storm Cut	20	20
Greenhouse Effect	21	90
Total	**41**	**110**

The analysis discussed above indicates that shoreline recession is considerably less than was predicted by AWACS 1992 as is the rate of landward dune transgression. On this basis it is considered that the subdivision may not be affected by the inundation of dune sand within the 100 year planning timeframe that was considered at the time the development was approved.

Hind Dune Hazard Zone

As shown on **Figures 2** and **3**, LiDAR data from January 2007 and June 2013 has been used to plot the landward edge of the transgressive dune system. The location of the landward edge of the transgressive dune system was compared to the August 1991 location plotted by AWACS. This information was then used to determine average annual rate of transgressive dune movement over a 2400 metre length of the dune system adjacent to Fern Bay Seaside development. Based on this analysis the average annual rate of landward movement of the transgressive dune system between August 1991 and January 2007 was approximately 1.1 metres per year. As noted above, during this period (i.e. between 1997 and 2002) mining operations moved the dune system approximately 50 metres to 80 metres seaward.

Comparison of the landward edge of the dune system in January 2007 and June 2013 indicates that the dune system has moved on average approximately 2.3 metres per year over the 2400 metre length of the dune system adjacent to Fern Bay Seaside development that was analysed.

The analysis provided on **Figure 2** shows that the rate of landward dune transgression has reduced with the current landward edge of the unvegetated mobile dune system in approximately the same location as plotted by AWACS in 1992. In addition, the heavy mineral sand mining activities that occurred between 1997 and 2002 moved the mobile dune mass seaward of its 1994 location. At the same time, the height of the major hind dune system was lowered by approximately 2 to 3 metres and the small dune system between the hind dune and the Fern Bay Seaside development site was also lowered by approximately 5 metres. As a result of these changes that were undertaken as part of the heavy mineral sand mining activities, the potential for sand to be transported onto the Fern Bay Seaside development site has been substantially reduced.

Analysis of DLWC (1995) detailed photogrammetry of the dune transgression between 1954 and 1994 indicates that the average rate of landward progression of the mobile dune system adjacent to Fern Bay Seaside development for the period 1954 to 1994 was approximately 3 metres per year with the average rate of landward progression between 1983 and 1994 reducing to approximately 2.3 metres per year. Analysis of the January 2007 and 2013 LiDAR data as discussed above indicates that the rate of landward mobile dune

Image Source: Virtual Earth Image

0 100 250 500m
1:10 000

Legend

Dune Progression:
- 1954
- 1965
- 1972
- 1975
- 1977
- 1983
- 1990
- 1994
- 2007
- 2013

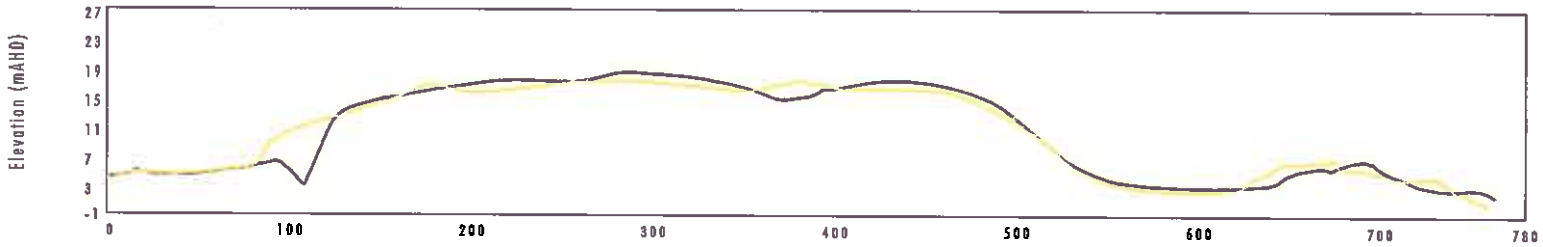
Shoreline Progression:
1.5mAHD Contour line -
- 1954
- 1994
- 2007
- 2013

- AWACS approx edge of transgressive dune (aerial photo Aug 1991)
- AWACS 30 year hind dune hazard line
- AWACS 100 year hind dune hazard line
- AWACS 100 year coastal hazard line

FIGURE 2

Historic Dune and Shoreline Progession

File Name (A4): R02/3405_006.dgn
20140901 16.17



Cross Section 50

Legend

2007

2013

0 12.5 25 50m
Vertical Scale 1:1000

0 50 100 200m
Horizontal Scale 1:4000

FIGURE 3

Typical Dune Cross Section, LiDAR Survey 2007 and 2013

progression between 2007 and 2013 was on average 2.3 metres per year which is consistent with that observed between 1983 and 1994.

The results of the AWACS (1992) studies in regard to Hind Dune Hazard Zone Width are summarised in **Table 3.**

Table 3 – Hind Dune Hazard Zone Widths (AWACS 1992)

Hazard Zone Component	Hind Dune Hazard Zone Widths (m)		
	0 year	30 Year Development Period	100 Year Planning Period
Historic Transgression	0	95	320
Long Term Wind Climate	0	15	50
Nuisance Inundation/Safety Zone	50	50	50
Total	**50**	**160**	**420**

The historic transgression component of the Hind Dune Hazard Zone width determined by AWACS (1992) was based on an average dune transgression rate adjacent to the Fern Bay Seaside development between 1951 and 1983 of 3.2 metres per year.

As set out above, not taking into account the 50 metre to 80 metre seaward relocation of the transgressive dune system by the heavy mineral sand mining operation, the average landward dune transgression rate between 1983 and 1994 and 2007 and 2013 was approximately 2.3 metres per year. As set out in **Table 4,** revision of the 100 Year Planning Period Hind Dune Hazard Zone using current average annual dune movement of 2.3 metres per year rather than 3.2 metres per year places the 100 Year Planning Period Hind Dune Hazard Zone approximately 90 metres seaward of the location shown on **Figure 1** that was used in developing the consent and condition 13B for Fern Bay Seaside development.

Table 4 – Hind Dune Hazard Zone Widths Revised Using 2.3 metres per year

Hazard Zone Component	Hind Dune Hazard Zone Widths (m)		
	0 year	30 Year Development Period	100 Year Planning Period
Historic Transgression	0	69	230
Long Term Wind Climate	0	15	50
Nuisance Inundation/Safety Zone	50	50	50
Total	**50**	**134**	**330**

As discussed, in addition to this, heavy mineral sand mining between 1997 and 2002 moved the transgressive dune system approximately 50 to 80 metres seaward of its pre-mining location which would effectively move the 100 Year Hind dune Hazard Zone an additional 50 metres+ seaward.

The analysis of the available topographic data discussed in this report indicates that the rate of landward transgression of the mobile dune system is less than predicted by AWACS in 1992 and is less than the predicted rates considered when approval for the Seaside Village subdivision was approved. As a result the location of the 100 Year Hind Dune Hazard Zone is likely to be in excess of 76 metres and 140 metres respectively seaward of the 30 year and 100 year dune hazard zones derived by AWACS in 1992 as set out in **Table 3**.

Dune Restoration/Stabilisation Considerations

At the time development consent was granted for Fern Bay Seaside development, there were proposals to inject wastewater into the sand dunes adjacent to Fern Bay Village and revegetate the mobile dune system. The Dune Restoration and Stabilisation Plan required by Condition 13B was consistent with this management approach.

Since the early 1990s, government thinking has changed with the adjoining mobile dunes now being part of the Worimi Conservation Area and Worimi National Park with the dunes to now be left as mobile dunes in the current unvegetated state.

Initially the heavy mineral sand mining operation on the mobile dune system that was approved in 1995 was required as part of rehabilitation conditions to establish vegetation on the reshaped dunes. Experience from trials showed that this was difficult to achieve due to the expanse of the mobile dune system and significant supply of sand that smothered any vegetation that was planted and covered or undermined any protective structures and fences that we established to protect the revegetation areas. In the end the structures and fences that had been established to protect the revegetation areas had to be removed due to the safety risk they posed to those who traversed or used the dune system. To help offset the natural landward movement of the dune system, it was instead decided as part of the mining operation to replace the mined sand 50 metres to 80 metres seaward of its location at the time of mining. In addition, the section of the mined landform to the north-east of Fern Bay Seaside development was shaped to enhance the capture of sand and possible harvesting of sand from the 'encroachment control zones' that were constructed within the areas that now form part of Worimi Conservation Area and Worimi National Park.

As discussed above, between 1951 and 1983, the average rate of landward progression of the mobile or transgressive dune system was measured to be approximately 3.2 metres per year. Analysis indicates that the rate of dune progression has slowed since that time to approximately 2.3 metres per year with the rate of landward progression likely to reduce even further as the mobile dune face gets further and further from the shoreline due to wind energy decreasing with distance from the shoreline. As a result, the mobile dune system may not traverse as far landward as Fern Bay Seaside development.

Based on 2013 LiDAR information, the landward edge of the transgressive dune system is approximately 330 metres from the 1 in 100 Year Hind Dune Hazard Zone line as mapped by AWACS in 1992. At an average dune progression rate of 2.3 metres per year (assuming the rate of progression does not reduce with distance from the coast) it will take approximately 140 years for the mobile dune system to start to encroach on residential properties at Fern Bay Seaside development. This assumes that the rate of dune movement remains on average constant of the 140 year period. As discussed above, not taking into consideration the 50 m+ seaward relocation of the transgressive dune system during heavy mineral sand mining, the rate of dune landward mobile progression has slowed from 3.2 metres between 1951 and 1983 to approximately 2.3 metres between 1983 and 2013. It is expected that the rate of landward progression of the mobile dune system will continue to decrease with increased distance from the shoreline due to the reduction in on-shore wind energy with distance from the shoreline. As a result, it is likely to be significantly more than 140 years before the dune system would encroach on Fern Bay Seaside development and well outside the 100 year planning horizon adopted when consent was granted for the development.

If dune progression does continue and in sometime in the future (i.e. in excess of 140 years) the mobile sand from the dunes looks like it may threaten homes, the sand is a valuable resource that could be effectively controlled by harvesting sand from the encroaching dune face. To achieve this, an encroachment control zone could be established on private land between the mobile dune system and Fern Bay Seaside development. The encroaching sand could then be harvested and used as it moves into the encroachment control zone.

Conclusions

Based on the above analysis, it is considered that the 30 year and 100 year return period Coastal Hazard Lines will be in excess of 76 metres and 140 metres seaward of the respective 30 year and 100 year Dune Hazard Zone lines shown on Figure 4.2 of AWACS 1992 assuming an average annual rate of dune progression of 2.3 metres per year. Analysis shows that the ongoing rate of dune progression has reduced from 3.2 metres per year between 1951 and 1983 to approximately 2.3 metres per year between 1983 and 2013. It is considered likely that the rate of dune progression will continue to decrease with increased distance from the shoreline due to reductions in wind energy. In addition the mass of the mobile dune system was lowered and moved seaward by in excess of 50 metres during heavy mineral sand mining adjacent to Fern Bay Seaside development which occurred between 1997 and 2002.

In 1992 AWACS estimated the rate of shoreline recession to be 1.2 metres per year. Analysis based on available aerial photogrammetry and 2007 and 2013 LiDAR data indicate that between 1954 and 2013 the shore line has aggraded rather than receded at an average rate for the period of 0.4 metres per year.

Based on the above analysis, it appears that changes made to the dune system during heavy mineral sand mining, combined with shoreline aggrading and natural slowing of the rate of transgression of the mobile dune system, has significantly slowed the rate of dune progression. It is estimated based on the above analysis that if landward progression of the mobile dunes continue at the current rate of 2.3 metres per year, it would be in excess of 140 years before mobile sand reached Fern Bay Seaside development and well outside the 100 year planning period adopted at the time development consent was granted. On this basis it is considered unlikely that additional works will be required within the 100 year planning period to stabilise or rehabilitate the dune system to prevent it from inundating Fern Bay Seaside development.

It is considered that dune stabilisation or restoration, if it were undertaken, is unlikely to be successful due to the continued landward movement of sand from the adjoining unvegetated Worimi Conservation Lands and Worimi National Park.

If you require any further information in regard to this matter, please don't hesitate to contact Peter Jamieson on (02) 4950 5322.

Yours sincerely

Peter Jamieson
Director

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