RESOURCE DESIGN & MANAGEMENT PTY LTD
as Trustee for RDM Unit Trust ABN 53 243 724 089

Our Ref: 16083-LE250520
Contact: Matt Cooper

25 May 2020

Ms Emma Butcher
Regional Assessments
NSW Department of Planning & Environment
GPO BOX 39,
SYDNEY, NSW 2001

Dear Emma

RE: SECTION 75W MODIFICATION – MP06_0143_MOD4
THE GLADES ESTATE, MOONEE BEACH

We refer to the abovementioned application which was lodged with the department on the 24th of November 2017 by Resource Design & Management Pty Ltd (RDM) on behalf of our client, the Rothwell Boys Pty Ltd (Winten Property Group).

Subsequent to your recent meeting with Rothwell Boys Pty Ltd (Mr Bill Sarkis) on the 16th of March 2020, our client seeks to simplify the proposed modification so that it applies to bulk earthworks only. As a consequence of this change, we advise that modications pertaining to the reconfiguration of the subdivision pattern and noise attenuation, (as described in Resource Design & Managements report "Modification under Section 75W", dated the 9th of April 2019) are no longer sought at this time. We wish to advise however, that it is our clients intention to revisit these matters in due course with the relevant planning authority.

With regard to this change, we note that minor adjustments have been made to the proposed bulk earthworks plan which accompanied RDM's submission on the 9th of April 2019, Plan Reference 10046-99 dated 16th January 2018. These minor adjustments have been necessary to retain the central vegegation corridor which was previously identified for development. RDM's final bulk earthworks plan is attached herewith, Plan Reference 16083-SK015.

In response to this change, we have also reviewed our most recent response to the Department dated the 5th of November 2019. To assist the Departments further assessment we provide updated responses to the Departments letter dated the 3rd of September 2019 along with supporting plans SK010,SK011, SK013, and SK020. These documemts are included in Annexure A.

To complete our revised proposal we have also re-examined the conditions of the consent (as modified), and provide our proposed amendents to Conditions A3, D6 and E16 below. Where changes require the deletion of existing text, it has been struckthrough.

CONDITION A3

This condition has been amended to recognise RDM's proposed updated Bulk Earthworks and Noise Attenuation Barriers Plan dated the 13/05/2020. Accordingly, it is proposed that Drawing Reference 'P3' be deleted from the table of drawings prepared by Auspacific Engineers and a new table inserted as shown below.

Project and Engineering Drawings prepared by Auspacific Engineers			
Drawing No.	Revision	Name of Plan	Date
~~P3~~	~~C~~	~~Bulk Earthworks and Noise Attenuation Barriers~~	~~December 2008~~

Project and Engineering Drawings prepared by Resource Design & Management Pty Ltd			
Drawing No.	Revision	Name of Plan	Date
16083-SK015		Bulk Earthworks and Noise Attenuation Barriers	13/05/2020

CONDITION D6 (1)

An amendment to Condition D6 (1) from the current approval is sought as outlined below. RDM's proposed condition is consistent with the Office of Environment and Heritage (OEH), Recommendation No. 3 which is stated in their letter dated the 31st of May 2019 (Ref. DOC19/383085); it is also consistent with Coffs Harbour City Council's development controls which apply to subdivision development. RDM's detailed response regarding the proposed condition as outlined below, is discussed in the accompanying response to submissions.

A copy of OEH's letter and Martens Consulting Engineers Flood Assessment report is included in Annexure B.

~~1) All residential allotments shall be filled to a minimum of the design flood level plus minimum 600mm freeboard, with minimum fill levels of RL 4.75mAHD in accordance with the approved plans.~~

1(a) All parts of residential lots suitable for dwellings must be finished to be above the scenario 5 extents (1% AEP Catchment + 5% AEP Ocean + climate change flood levels) plus 500mm freeboard (between 4.03 and 4.68m AHD).

1(b) All residential roads must be finished to be above the scenario 5 extents (1% AEP Catchment + 5% AEP Ocean + climate change flood levels)

Note: Reference to the "scenario 5 extents (1% AEP Catchment + 5% AEP ocean + climate change' flood levels is made in accordance with drawing PS01-K210 (REV.B) as per the Flood Assessment: The Glades Development, Lot 1 and 2 DP725785, Pacific Highway, Moonee Beach, NSW, prepared by Martens Consulting Engineers.

CONDITION D6 (2)

The removal of Condition D6 (2) from the current approval is sought and this is supported by Coffs Harbour City Council. Council's letter (Ref. 1515900PN) in relation to flooding, states, "*Council has no objection to the current Condition D6.2 being removed*". A copy of Council's letter is included in Annexure B.

CONDITION E16

The removal of the second sentence in Condition E16 from the current approval is sought and this is supported by Coffs Harbour City Council. Council's letter (Ref. 1515900PN), in relation to flooding, states "*Council has no objection to the removal of the second sentence in Condition E16*". A copy of Council's letter is included in Annexure B.

Condition E16 Fill Contour Plan

"Prior to the release of a Subdivision Certificate for the first stage of the project to be released a final contour plan shall be submitted to Council showing the location, depth and type of fill located on the site. ~~This shall include fill platforms of minimum of 2 metres above the 1 in 100 year flood level or the water table (whichever is the higher) in the southern open space areas that contain stormwater infrastructure, in accordance with AusPacific Engineers advice dated 4 April 2008."~~

CONCLUSION

We trust that the proposed amendments as outlined herein in conjunction with the withdrawal of the reconfiguration (i.e. additional 31 allotments) and noise attenuation components will permit the Department to complete their assessment.

Should further information be required, please do not hesitate to contact Mr Bill Sarkis on 9923 9600

Yours faithfully

RESOURCE DESIGN & MANAGEMENT PTY LTD

Matt Cooper
Associate

"The Glades"

N

BUCCA ROAD

HIGHWAY

PACIFIC

HOYS ROAD

Skinners Creek

Moonee Creek

LOT 2
DP 725785
3.59ha

LOT 1
DP 725785
92.55ha

Lot 7
DP 252223

PARK

ROAD 1

ROAD 2

ROAD 3

ROAD 4

ROAD 5

ROAD 6

ROAD 7

ROAD 8

ROAD 9

ROAD 10

8.5m PATHWAY

8.5m PATH

LEGEND:

- EXISTING LOT BOUNDARY
- PROPOSED LOT BOUNDARY
- BULK CUT AREA = 470,000m3
- BULK FILL AREA = 290,000m3
- NOISE ATTENUATION BARRIERS (IN ASSOCIATION WITH NOISE IMPACT STATEMENT PREPARED BY H.K. CLARKE & ASSOCIATES PTY LTD AND ACOUSTIC ADVICE FROM ERM. (REFER DRAWING NO. 04-1600-P3/1 FOR TYPICAL SECTIONS)

Issue	Revision Details	Date	Check
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CLIENT
ROTHWELL BOYS PTY LYD

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RESOURCE DESIGN & MANAGEMENT PTY LTD

>> planning >> engineering >> surveying >> mapping >> environmental management >>

Scale 0 20 40 60 80 100metres
SCALE– 1:2000 HOR.

Survey	Datum
RDM	A.H.D.
Design	Checked
L. PARTRIDGE	W. COOPER
Drawn	Date
B. HAY	13.05.2020

Project
THE GLADES ESTATE

Title
BULK EARTHWORKS AND NOISE ATTENUATION PLAN
GLADES ESTATE MOONEE BEACH

Project ID.	Sheet Size
16083	A1
Drawing No.	Revision
SK015	-
CAD File	
16083-SK010-BEW.DWG	

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PLOTTED: 16 May 2020

Appendix A – Response to DPE Matters

Correspondent	Issues Raised	RDM's Response
Department of Planning, Industry & Environment (DPIE) **(Letter Dated 03/09/19)**	<u>Central Wildlife Corridor</u> The Department considers the proposed rehabilitation works within the eastern corridor would not adequately offset the removal of the central corridor. The Department considers an area equal to or greater in size than the central corridor must be provided on the eastern portion of the site, to offset the loss of the central corridor. Otherwise, the Department would not support the removal of the central corridor.	*The proposed modification (Mod 4) has withdrawn the reconfiguration of the central corridor. Because of same, there will be no impact to the central corridor.* *Consequently, the applicant does not propose any additional rehabilitation work within the eastern corridor.*
	<u>Aboriginal Cultural Heritage</u> The Aboriginal Cultural Heritage Assessment Report must be updated to include details of further consultation with Coffs Harbour & District Local Aboriginal Land Council & Jagun.	*The proposed modification (Mod 4) has withdrawn the reconfiguration of the central corridor. Because of same, there will be no impact to the central corridor.*
	<u>Noise Attenuation</u> The Department considers the proposed removal of the acoustic barrier has not been adequately justified. Additional information is required to: • explain how the road levels of the Pacific Highway would impact on the effectiveness of and need for the acoustic barrier • demonstrate how future dwellings would achieve appropriate level of internal and external acoustic amenity • analyse other similar subdivisions in the area and detail how acoustic impacts have been addressed.	*The proposed modification (Mod 4) has withdrawn from removal of the noise barriers (acoustic wall). The noise attenuation barriers, as originally approved have been included on the proposed Bulk Earthworks & Noise Attenuation Plan, drawing 16083-SK015.*

Correspondent	Issues Raised	RDM's Response
	Site Levels Please provide contour plans showing the approved and proposed levels and demonstrate the proposed levels would: • not adversely impact other land, persons or public infrastructure • preserve levels at site boundaries • preserve significant natural watercourses, riparian vegetation, environmental and topographical features • preserve the visual character of the landform as viewed from within and outside the land site • preserve cross boundary drainage conditions • ensure runoff from upstream or upslope land is not adversely impeded • ensure there are no adverse geotechnical consequences to the site or to other land.	*Site Levels* *The approved earthworks plans (nor any other approved plan) did not show finished surface contours.* *Drawing SK020 is a contour plan of the proposed earthworks. Drawing SK013 Is provided to demonstrate the difference in finished levels between the approved development and the proposed development.* Not adversely impact other land, persons or public infrastructure. *The proposed earthworks footprint has not altered from the approved earthworks footprint. The service corridor along the western boundary of the site remains unchanged, with no earthworks proposed within the corridor, and hence no impact on existing infrastructure.* Preserve significant natural watercourses, riparian vegetation, environmental and topographical features. *The proposed earthworks extends no nearer to the natural watercourses and riparian vegetation than what is approved.* *The Martens Consulting flood study concludes that the proposed earthworks have no impact on upstream or downstream flood levels.* *The approved bulk earthworks plan required the existing ridgelines to be cut by up to approximately 4m and the cut to be placed up to 2m of fill in the lower lying areas of the site. The fill to the lower lying areas is required to ensure the development area was above the 1% AEP flood level.*

Correspondent	Issues Raised	RDM's Response
		The proposed bulk earthworks seeks to cut from the existing ridgelines approximately 5m and the cut to be placed up to 2m of fill in the lower lying areas of the site. *With regard to the above comparisons, it is submitted that the proposed bulk earthworks will retain the environmental and topographical features throughout the approved development footprint.* <u>Preserve the visual character of the landform as viewed from within and outside the land site.</u> *The visual character at the peripheries of the site will remain unchanged as these areas remain outside the development footprint.* *The visual character at the peripheries of the development footprint will remain unchanged. As shown in RDM's Drawing SK013, the low-lying areas are slightly lower in level from the approved plan by up to 1m. This is due to the lowering of the site flood levels as described in Martens Consulting Flood Assessment and identified in their* drawing PS01-K210 (REV.B). *The visual character of the development footprint will remain. The topography of the proposed bulk earthworks footprint is such that site slopes will reduce in elevation from a central spine to the peripheries of the development footprint.* *Given the retention of the above landform characteristics, the visual character of the site will be preserved when viewed from outside the land.*

Correspondent	Issues Raised	RDM's Response
		<u>Preserve cross boundary drainage conditions.</u> *The cross-boundary drainage conditions are unchanged from the previously approved plans.* *The southern boundary adjoining the future neighbouring property generally matches the proposed levels of the neighbouring development.* *The proposed development along the western edge of the site does not modify drainage conditions.* *The remainder of the site is unchanged from natural conditions.* <u>Ensure runoff from upstream or upslope land is not adversely impeded.</u> *Upstream of the site is the Pacific Highway. The Martens Consulting flood study has demonstrated that upstream and downstream flood levels are unchanged.* *The existing site has a ridgeline generally running through the centre of the site, which spreads stormwater runoff to the north, east, and south.* *The proposed development retains a highpoint generally in the same location as the existing ridgeline.* *The proposed development maintains the stormwater runoff flows generally as it exists, to the north, east, and south towards the creek lines.* <u>Ensure there are no adverse geotechnical consequences to the site or to the other land.</u>

Correspondent	Issues Raised	RDM's Response
		The proposed development adheres to the same design philosophy of the approved plans. The proposed development incorporates similar cut and fill slopes. There is no proposed importation of general fill, hence the soil properties will be as per the original geotechnical studies.
	<u>Flooding and Stormwater</u> The Department does not support the proposed changes to the stormwater management system, resulting in the discharge of stormwater through the road network into nearby creeks. The stormwater arrangements should remain as approved, to ensure stormwater is appropriately managed.	*The proposed modification (Mod 4) has withdrawn the reconfiguration of the central corridor.* *Consequently, the applicant does not propose any changes to the approved stormwater management system.*
NSW Rural Fire Service	The proposed amended conditions ***A3 Project in Accordance with Plans*** and ***B16 Asset Protection Zones*** (APZ), that reflect the amended site layout and APZ plans, are accepted on the provision that the proposed APZ within the proposed public reserves will be managed in perpetuity to NSW RFS document *Standards for Asset Protection Zones* requirements.	*The proposed modification (Mod 4) has withdrawn the reconfiguration of the central corridor. Because of same, the proposed changes to Conditions A3 & B16 relevant to bushfire requirements are no longer required.*
NSW Transport **Roads and Maritime Services**	• Council needs to be satisfied that the safety and efficiency of the local road network is not adversely affected by the proposed development. • The impact from the removal of the noise barrier needs to be assessed in accordance with the NSW Roads Noise Policy 2011.	*The proposed modification (Mod 4) has withdrawn the reconfiguration of the central corridor. Consequently, the matters which have been raised are no longer relevant.*

Correspondent	Issues Raised	RDM's Response
Office of Environment and Heritage **(Letter Dated 31/05/19)**	<u>Biodiversity</u> • An area that is equal to or greater in size to the central corridor area (defined as the `subject land' in the Section 75W report dated April 2019) be protected and managed for conservation purposes in the eastern part of The Glades Estate site. • The additional conservation area should maximise the width of the riparian corridor, and, in particular, achieve at least a 100 m width to Moonee Creek and at least 50 m width for Skinners Creek, in accordance with the riparian zone requirements in Section El of the Coffs Harbour City Council Development Control Plan (DCP). • Measures to manage the additional conservation area should be included in the Vegetation Management Plan as required under Condition B15. • Condition B15 (2) should be updated to refer to the Coffs Harbour City Council Development Control Plan Appendix 2 Guideline for Preparing Vegetation Management Plans rather than the former Department of Natural Resources document.	*The proposed modification (Mod 4) has withdrawn the reconfiguration of the central corridor. Because of same, there will be no impact to the central corridor.* *Consequently, the applicant does not propose any additional area for conservation purposes.*
	<u>Aboriginal Cultural Heritage</u> • further consultation be undertaken with the Coffs Harbour & District Local Aboriginal Land Council and Jagun to determine what the ACH values are, and • that errors in the Aboriginal Cultural Heritage Assessment Report (ACHAR) which significantly affect the ability to interpret the information presented be rectified and the final ACHAR resubmitted prior to any final determination in this matter.	*The proposed modification (Mod 4) has withdrawn the reconfiguration of the central corridor. Because of same, there will be no impact to the central corridor.*

Correspondent	Issues Raised	RDM's Response
	<u>Flooding</u> The proposed revised draft condition D6 Filling of the Site be amended as follows: • D6.1 All parts of residential lots suitable for dwellings and all residential roads are to be located above the '1% AEP Catchment + 5% AEP ocean + climate change' flood level in accordance with drawing PS01-K210 (REV.B) as per the Flood Assessment: The Glades Development, Lot 1 and 2 DP725785, Pacific Highway, Moonee Beach, NSW, Martens Consulting, January 2018. This is scenario five (5) in the flood assessment with a predicted flood level varying between 3.5 - 4.2m AHD for the site. • D6.2 All stormwater treatment infrastructure such as swales and basin are to be located above the 5% AEP flood level.	*Accepted. Please refer to further comment provided in the response to Coffs Harbour City Council's submission.* *The removal of Condition D6 (2) from the current approval is sought and this is supported by Coffs Harbour City Council. Council's letter dated the 20th of June 2016 (Ref. 1515900PN) in relation to flooding, states, "Council has no objection to the current Condition D6.2 being removed".*
Coffs Harbour City Council **(Letter Dated 20/06/16)**	<u>Flora and Fauna</u> Council does not support the removal of the Central Wildlife Corridor due to adverse biodiversity impacts and due to its valuable amenity and open space characteristics for the surrounding subdivision. Recommended options to improve the proposal include the following: • An area that is equal to or greater in size to the central wildlife corridor area (shown as 1.75ha) be protected and managed for conservation purposes in the eastern part of the Glades Estate site. • The additional conservation area should maximise the width of the riparian corridor and achieve at least a 100 metre width to Moonee Creek and at least a 50 metre	*The proposed modification (Mod 4) has withdrawn the reconfiguration of the central corridor. Because of same, there will be no impact to the central corridor.* *Consequently, the applicant does not propose any additional area for conservation purposes.*

Correspondent	Issues Raised	RDM's Response
	width for Skinners Creek, in accordance with the riparian zone requirements in Section E1.3 of the Coffs Harbour City Council Development Control Plan 2015. • Measures to manage the additional conservation area should be included in the Vegetation Management Plan as required under Condition 815. • Condition 815 (2) should be updated to refer to the Coffs Harbour City Council Development Control Plan Appendix 2 Guideline for Preparing Vegetation Management Plans rather than the former Department of Natural Resources document.	
	<u>Stormwater</u> Stormwater management should be consistent with the original approval for maintenance purposes.	*The proposed modification (Mod 4) has withdrawn the reconfiguration of the central corridor.* *Consequently, the applicant does not propose any changes to the approved stormwater management system.* .
	<u>Sewerage</u> Council's preferred arrangement for sewerage services is conventional sewer with pump stations. The additional lots that are proposed as part of the subject modification should reflect this preference.	*The proposed modification (Mod 4) has withdrawn the reconfiguration of the central corridor. Because of same, there will be no further requirements for servicing above what has already been approved.*
	<u>Water Supply</u> The proposed arrangement is consistent with Council's requirements and there is capacity in the system for the additional lots that are proposed as part of this modification.	*The proposed modification (Mod 4) has withdrawn the reconfiguration of the central corridor. Because of same, there will be no further requirements for servicing above what has already been approved.*

Correspondent	Issues Raised	RDM's Response
	<u>Earthworks</u> • The cross sections have not changed that approve a maximum 1V:4H batter. No contours have been shown as part of the modification for the site to ascertain if the fill/cut footprint is proposed to be larger than that approved. The submitted drawings would indicate, however, that there is proposed to be more land adjacent to the reserves that have cut or fill.	*The proposed earthworks footprint is identified in Drawing SK015. Drawing SK013 is provided to demonstrate the difference in finished levels between the approved development and the proposed development.* *It is noted that the site levels at the peripheries of the development footprint will be lower than what is currently required. The proposed amendment to Condition D6.1 is sought to establish same.* *The service corridor along the western boundary of the site remains unchanged, with no earthworks proposed within the corridor, and hence no impact on existing infrastructure.*
	• The submitted information indicates that the proposed modifications will reduce the amount of fill that needs to be imported into the site. The submitted plans show 500,000m^3 bulk cut and 300,000m^3 bulk fill, resulting in a surplus of 200,000m^3 of fill. When considering the contours on the fill plan it would appear that the proposed works would not impact the surrounding areas (though it should be noted the WSUD infrastructure is proposed to be located within the reserves surrounding the development).	*The proposed earthworks footprint does not exceed the approved subdivision development footprint.*
	<u>Flooding</u> The results of the flood modelling assessment prepared by Martens Consulting 2018 appears to be consistent with previous modelling. However, Council has some concerns with respect to the Revised Draft Conditions in the Section 75W report. Council recommends the following in relation to flooding:	*The requirement for all residential lots to be finished at or above the scenario 5 extents (1% AEP Catchment + 5%*

Correspondent	Issues Raised	RDM's Response
	• the current proposed amended wording for Condition D6.1 is not supported. The applicant's condition refers to a minimum finished floor level for dwellings. A condition like this is not an appropriate condition for a subdivision of land. Such a condition may be appropriate as an additional 'advisory note' condition. Council would support Condition D6.1 being amended to the following: *all residential lots and roads must be finished to be above the scenario 5 extents (1% AEP Catchment + 5% AEP Ocean + climate change flood levels) plus 500mm freeboard (between 4.03 and 4.68mAHD).*	*AEP Ocean + climate change flood levels) plus 500mm freeboard (between 4.03 and 4.68m AHD) is accepted.* *The requirement for roads to be finished 0.5m above the scenario 5 extents (i.e. '1% AEP Catchment + 5% AEP ocean + climate change' flood level)* ***is not accepted.*** *Council's letter dated the 20th of June 2016 seeks the addition of 500mm of freeboard for all residential lots* ***and roads*** *over and above the '1% AEP Catchment + 5% AEP ocean + climate change' flood level by referencing Clause 7.3 1(b) in the Coffs Harbour Local Environmental Plan 2013.* *In this instance Council has misinterpreted the purpose of Clause 7.3 and the application of the flood planning level.* *The intention of Clause 7.3 is to consider land which is at or below the flood planning level (i.e. 1% AEP plus 500mmm freeboard) and require Council to be satisfied that a development proposal accords with subclauses 3(a) to 3(e). It does not specify or require that all residential lots and roads be above the flood planning level. The specifics of Council's flood planning requirements are instead described in Council's Development Control Plan 2015, Part E, Environmental Controls, E4 Flooding. The relevant flood planning controls are discussed below.* *With reference to Council's flood planning requirements for subdivision development, we note that Council's subdivision development control E4.8(3) states: "Resulting lots zoned for residential purposes under Coffs Harbour LEP are to comprise a minimum building envelope of 400m^2 in area of functional proportions*

Correspondent	Issues Raised	RDM's Response
		above the 100 year Average Recurrence Interval flood level". *With reference to Council's flood planning requirements for infrastructure development, we note that Council's subdivision development control E4.5(1) states: "Infrastructure development may be situated on land at or below the 100 year Average Recurrence Interval flood level where it is impractical to locate it elsewhere".* *In addition to the above, we also note Council's flood planning requirements for residential and tourist accommodation, development control E4.2(4) states: "The minimum finished floor level of all habitable room(s) is to be at the height of the 100 year Average Recurrence Interval flood level plus 0.5m freeboard."* *With regard to the abovementioned controls and RDM's proposed Bulk Earthworks and Noise Attenuation Plan, Drawing SK015, we note the following:* *a) The proposed bulk earthworks levels provide that all residential lots will be finished at or above the scenario 5 extents as referenced in Martens Consulting Engineers Flood Assessment (being described as 1% AEP Catchment + 5% AEP Ocean + climate change flood levels) plus 500mm freeboard (between 4.03 and 4.68m AHD).* Consequently, Council's development control E4.8(3) is satisfied. Further, whilst not applicable to this proposal, it is also the case that Council's development control E4.2(4) is also satisfied with respect to the proposed bulk earthworks.

Correspondent	Issues Raised	RDM's Response
		b) The proposed bulk earthworks levels provide that all residential roads will be finished at or above the scenario 5 extents as referenced in Martens Consulting Engineers Flood Assessment (being described as 1% AEP Catchment + 5% AEP Ocean + climate change flood levels). Consequently, Council's development control E4.5(1) is satisfied. *With regard to Condition D6.1 and the abovementioned observations, we propose the following revision to Condition D6.1 as follows:* *D6.1(a) - All parts of residential lots suitable for dwellings must be finished to be above the scenario 5 extents (1% AEP Catchment + 5% AEP Ocean + climate change flood levels) plus 500mm freeboard (between 4.03 and 4.68mAHD).* *D6.1(b) - All residential roads must be finished to be above the scenario 5 extents (1% AEP Catchment + 5% AEP Ocean + climate change flood levels)* *Note: Reference to the "scenario 5 extents (1% AEP Catchment + 5% AEP ocean + climate change' flood levels) is made in accordance with drawing PS01-K210 (REV.B) as per the "Flood Assessment: The Glades Development, Lot 1 and 2 DP725785, Pacific Highway, Moonee Beach, NSW", prepared by Martens Consulting Engineers.*

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		Notwithstanding the above we note that results of Martens Consulting Engineers "Flood Assessment, The Glades Development, Lot 1 and 2 DP725785, Pacific Highway, Moonee Beach, NSW" is accepted by both Coffs Harbour City Council and the Office of Environment & Heritage.
	• a condition should be imposed on the title of any of the lots affected by the 1% AEP, restricting the use of this portion of the lot for any habitable building or structure;	*Accepted. The determination of lots affected by the 1% AEP would be undertaken at the Subdivision Certificate Stage.*
	• Council does not support the proposed Condition D6.2. Council has no objection to the current Condition D6.2 being removed; and	*Accepted. For this reason, we have sought the deletion of this condition from the consent.*
	• Council has no objection to the removal of the second sentence in Condition E16.	*Accepted. For this reason, we have sought the deletion of this condition from the consent.*
	<u>Removal of Acoustic Wall</u> • Council does not support the removal of the acoustic wall unless it can be demonstrated that appropriate LAeq levels within future dwellings (as stipulated in S102(3) of State Environmental Planning Policy (Infrastructure) 2007) will not be exceeded within a typical residential dwelling.	*The proposed modification (Mod 4) has withdrawn from seeking the removal of the noise barriers (acoustic wall). The noise attenuation barriers, as originally approved have been included on the proposed Bulk Earthworks & Noise Attenuation Plan, Drawing 16083-SK015 dated 13/05/2020.*
	• In Council's view it would be inappropriate to defer the impost of noise mitigation onto future residential allotment owners if, to achieve acceptable LAeq levels within the dwelling, would require significant or substantial noise mitigation measures within the dwelling itself.	*Noted.*

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	• The applicant may be able to provide further information to support that acceptable LAeq levels, as referred to above, can be achieved.	*The proposed modification (Mod 4) has withdrawn from seeking the removal of the noise barriers (acoustic wall).*
NSW Department of Industry (Lands and Water – Strategic Relations) **(Letter Dated 20/06/19)**	No comments.	*Noted.* *No further action required.*
David and Joy Woodbury (2) **(No Date Provided)**	• Retention of open space • Noise barrier • Traffic	*The intention to remove the 'green space' (central corridor of vegetation) has been withdrawn from this proposal.* *The intention to remove the approved noise barrier is withdrawn from this proposal.* Given the planned traffic strategy for this area, no response is needed.
Graham Cooper **(No Date Provided)**	<u>Removal of green space – 'park' to make 31 lots</u> <u>Noise mitigation barriers</u> <u>Strict controls needed for fill</u> <u>Alternate access required – traffic concerns in incidents such as bushfire</u>	*The removal of the 'green space' (central corridor of vegetation) has been withdrawn from this proposal.* *Refer to response in DPIE's section.* Adequate controls are in place in terms of current conditions of consent. These conditions would be applicable to the proposed modification if approved. Given the planned traffic strategy for this area, and having regard to the response provided by the NSW Rural Fire Service, no further response is needed.

Correspondent	Issues Raised	RDM's Response
	Inclusivity in recreational space	N/A
Janet Simpson	Not happy that RMS have referred all traffic concerns to Coffs Harbour City Council given that their key roles and responsibilities are the safety and efficiency of the road network, traffic management, the integrity of infrastructure assets and the integration of land use and transport.	*Noted.* *Proponent has no control over what matters RMS refer to Coffs Harbour City Council.*

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CLIENT
ROTHWELL BOYS PTY LYD

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Survey	Datum
RDM	A.H.D.
Design	Checked
L. PARTRIDGE	W. COOPER
Drawn	Date
B. HAY	13.05.2020

Project
THE GLADES ESTATE

Title
EXISTING CONTOURS
GLADES ESTATE MOONEE BEACH

Project ID.	Sheet Size
16083	A1
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SK010	A
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CLIENT

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Survey	Datum
RDM	A.H.D.
Design	**Checked**
L. PARTRIDGE	W. COOPER
Drawn	**Date**
B. HAY	13.05.2020

Project **THE GLADES ESTATE**

Title ORIGINALLY APPROVED EARTHWORKS CONTOURS
GLADES ESTATE MOONEE BEACH

Project ID.	Sheet Size
16083	A1
Drawing No.	**Revision**
SK011	A
CAD File	
16083-SK010-BEW.DWG	

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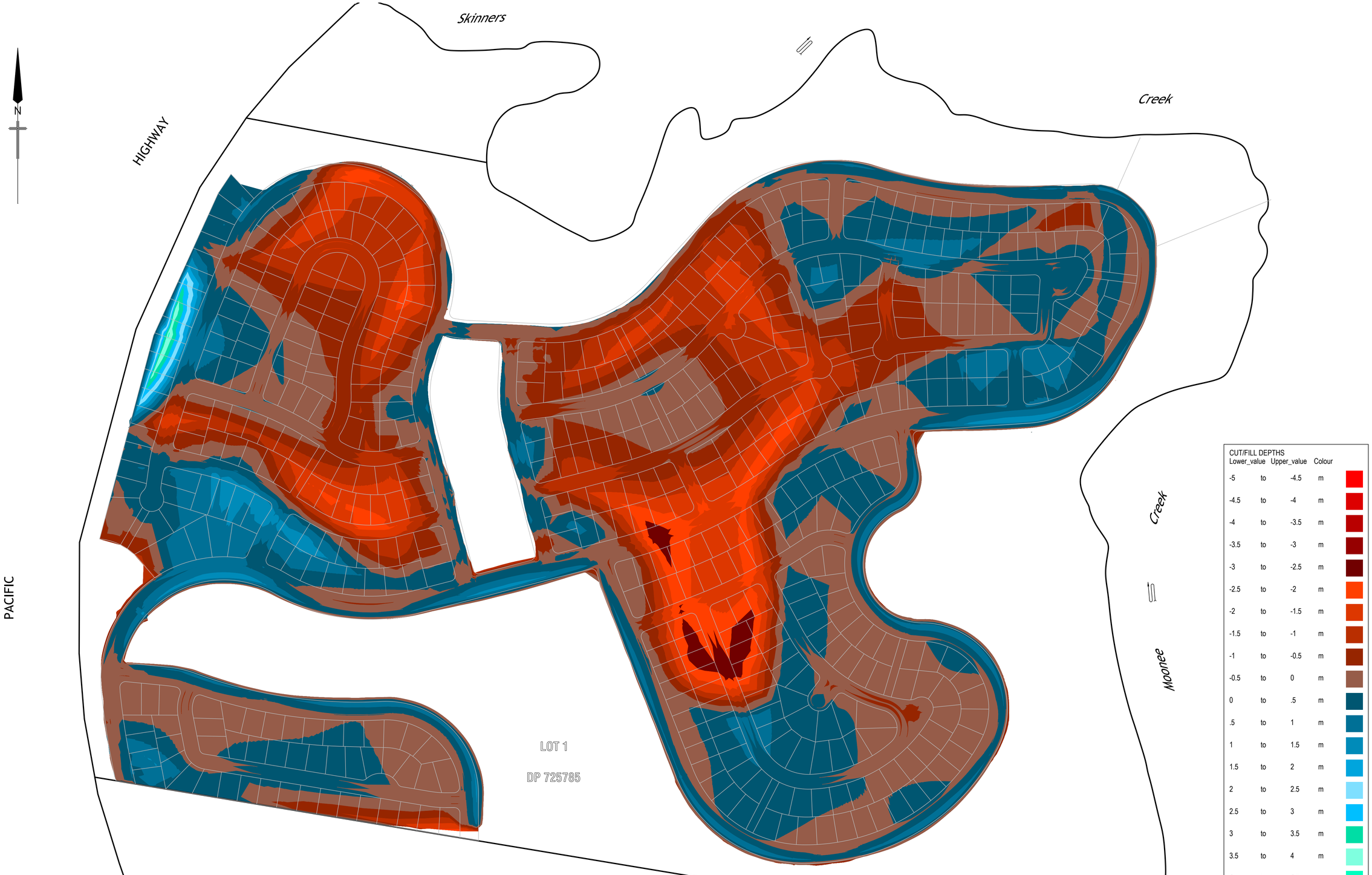
PLOTTED: 15 May 2020



CUT/FILL DEPTHS				
Lower_value		Upper_value	Colour	
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-3	to	-2.5	m	
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-2	to	-1.5	m	
-1.5	to	-1	m	
-1	to	-0.5	m	
-0.5	to	0	m	
0	to	.5	m	
.5	to	1	m	
1	to	1.5	m	
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2.5	to	3	m	
3	to	3.5	m	
3.5	to	4	m	
4	to	4.5	m	

LEGEND:

EXISTING LOT BOUNDARY

PROPOSED LOT BOUNDARY

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PLOTTED: 15 May 2020

Issue	Revision Details	Date	Check
H			
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A	FOR COUNCIL APPROVAL	13.05.20	WMC

CLIENT

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Survey	RDM	Datum	A.H.D.
Design	L. PARTRIDGE	Checked	W. COOPER
Drawn	B. HAY	Date	13.05.2020

Project **THE GLADES ESTATE**

Title LEVEL DIFFERENCE BETWEEN APPROVED PLAN & PROPOSED PLAN GLADES ESTATE MOONEE BEACH

Project ID.	Sheet Size
16083	A1
Drawing No.	Revision
SK013	A
CAD File	
16083-SK010-BEW.DWG	

Issue	Revision Details	Date	Check
H			
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CLIENT

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Scale 0 20 40 60 80 100metres
SCALE- 1:2000 HOR.

Survey	Datum
RDM	A.H.D.
Design	Checked
L. PARTRIDGE	W. COOPER
Drawn	Date
B. HAY	18.05.2020

Project
THE GLADES ESTATE

Title
PROPOSED EARTHWORKS CONTOURS
GLADES ESTATE MOONEE BEACH

Project ID.	Sheet Size
16083	A1
Drawing No.	Revision
SK020	-
CAD File	
16083-SK010-BEW.DWG	

PLOTTED: 18 May 2020

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Appendix B – Correspondence (Submissions)

COFFS HARBOUR CITY COUNCIL

Your ref: MP 06_0143 MOD 4)
Our ref: (1515900PN)

20 June 2016

NSW Department of Planning and Environment
Attention: Ms E Butcher
Emma.Butcher@planning.nsw.gov.au

Dear Sir/Madam,

Response to Notification of Exhibition MP 06_0143 MOD 4 – Glades Estate
Lots 1 and 2 DP 725785, Pacific Highway, Moonee Beach

Reference is made to the above modification to the Glades Estate.

Council has reviewed the information submitted to the Department and the following advice is provided for your consideration:

Flora and Fauna:

It is understood from the submitted documentation that the proposed modification seeks to reconfigure the approved subdivision pattern to create an additional 31 lots, which are proposed in an area approved as part of the Major Project to be retained and protected as open space to provide a wildlife corridor.

The area of vegetation proposed to be removed is understood to be 1.75 hectares. It is noted that the retention of the 'Central Wildlife Corridor' was required as part of a network of open space intended to connect northern and southern buffer zones and habitat areas and which forms part of a regional corridor that was mapped by the NSW Office of Environment and Heritage (NPWS Key Habitats and Corridors database). Together with conditions of consent to consider fauna crossings and the creation of a Vegetation Management Plan (VMP) the Major Project approval clearly intended that the central corridor was part of a comprehensive strategy to retain, protect and rehabilitate wildlife corridors and habitat.

The current application bases much of the justification for the removal of the central wildlife corridor on proposed additional revegetation and rehabilitation works. Condition 815 of the Major Project approval required a detailed VMP be prepared to the satisfaction of the certifying authority. This Plan has yet to be submitted, however, 'Plan 4 Vegetation Management' as submitted in the original DA (see Figure 1 below) gives an indication of the areas proposed to be rehabilitated or replanted.

When compared to the proposed offset areas plan as shown in MP 06_0143 MOD 4 – from Appendix C Flora and Fauna Assessment (see figure 2 below), there is no perceptible difference in

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ABN 79 126 214 487

the areas available for rehabilitation or replanting. As such, the suggestion that additional revegetation and rehabilitation works will occur to account for the additional loss of the central wildlife corridor is not accepted. It is Council view that the proposed rehabilitation outcomes (as put forward in new condition 815A) will not provide any significant habitat or connectivity enhancement in addition to what is already required by the Major Project approval conditions.

Council considers that the only adequate offset for the loss of the central corridor would be to significantly increase the width of the eastern corridor adjoining Skinners and Moonee Creek. This would then also assist to meet the riparian zone requirements in Section E1.3 of the Coffs Harbour City Council Development Control Plan 2015, which specifies a riparian buffer of 50 metres for Skinners Creek and 100 metres for Moonee Creek. It is noted that this would require the loss of residential lots in the eastern part of the subdivision, however, it would assist to maintain water quality, aquatic and terrestrial habitat and provide an adequate and viable wildlife corridor.

In addition to biodiversity impacts, the Central Wildlife Corridor provides a valuable amenity and open space for the surrounding subdivision.

In summary, Council does not support the proposed removal of the central wildlife corridor. If, however, the Department is of the view that this proposal can be supported Council recommends the following:

- An area that is equal to or greater in size to the central wildlife corridor area (shown as 1.75ha) be protected and managed for conservation purposes in the eastern part of the Glades Estate site.
- The additional conservation area should maximise the width of the riparian corridor, and achieve at least a 100 metre width to Moonee Creek and at least a 50 metre width for Skinners Creek, in accordance with the riparian zone requirements in Section E1.3 of the Coffs Harbour City Council Development Control Plan 2015.
- Measures to manage the additional conservation area should be included in the Vegetation Management Plan as required under Condition 815.
- Condition 815 (2) should be updated to refer to the Coffs Harbour City Council Development Control Plan Appendix 2 Guideline for Preparing Vegetation Management Plans rather than the former Department of Natural Resources document.

Stormwater:

While the proposed stormwater management arrangements approved as part of the Major Project Approval (bio swales and vegetation buffers along the boundaries of the residential areas) have been largely carried through to this modified proposal, the current proposal differs to the approval, (which involved these running parallel to the roads), involving an arrangement that includes some exiting through the road system and into nearby creeks.

It is Council's view that this arrangement is likely to create an ongoing maintenance issue for Council. Council would prefer, for maintenance reasons, that the stormwater arrangements remain closer to that originally approved.

Sewerage:

The original application utilised vacuum sewer. It is noted that the current modification proposes conventional sewer with pump stations. This is Council's preferred arrangement and there is capacity in the system for the additional lots that are proposed as part of this modification.

Water Supply:

The proposed arrangement is consistent with Council's requirements and there is capacity in the system for the additional lots that are proposed as part of this modification.

Earthworks:

The cross sections have not changed that approve a maximum 1V:4H batter. No contours have been shown as part of the modification for the site to ascertain if the fill/cut footprint is proposed to be larger than that approved. The submitted drawings would indicate, however, that there is proposed to be more land adjacent to the reserves that have cut or fill.

The submitted information indicates that the proposed modifications will reduce the amount of fill that needs to be imported into the site. The submitted plans show 500,000m^3 bulk cut and 300,000m^3 bulk fill, resulting in a surplus of 200,000m^3 of fill. When considering the contours on the fill plan it would appear that the proposed works would not impact the surrounding areas (though it should be noted the WSUD infrastructure is proposed to be located within the reserves surrounding the development).

Flooding:

It is understood that the modified development seeks to alter Conditions D6 Filling of the Site (D6.1 and D6.2) and E16 Fill Contour Plan, as outlined in Appendix B – Revised Draft Conditions in the Section 75W report.

It is noted that a flood assessment has been prepared by Martens Consulting in support of this. The flood assessment models the 1%, 5% AEP and PMF flood events in various combinations of rainfall durations and tail-water levels. Impacts of climate change utilising a 10% increase in rainfall for the 1% AEP event have also been modelled meeting, which is consistent with Control E4.8 (requirement 2) of Council's Development Control Plan 2015. A tail-water level increase has also been included in the climate change scenario (scenario 5 in the flood assessment).

The results of the flood modelling from Martens 2018 appears to be consistent with previous studies. Scenario 2 with the 1% AEP catchment (9 hour duration) and 5% AEP tail-water has low hazard partial inundation over 3 lots. Scenario 5, which adds climate change to the scenario 2 event, has approximately 7 lots with partial inundation (See Fig 1). The critical 1% AEP event with climate change flood level yields maximum water levels of 3.53 - 4.18 metres AHD.

To ensure that the modified development is consistent with the requirements of the Coffs Harbour Local Environmental Plan 2013 Clause 7.3 1.*B "…to allow development on land that is compatible with the lands flood hazard, taking into account projected changes as a result of climate change*" it is recommended that all residential lots and roads are located above the scenario 5 1% AEP Catchment + 5% AEP Ocean + climate change flood levels + 500mm freeboard (as stipulated in the Coffs Harbour LEP 2013).

Modelling suggests that there is minimal impact to upstream or downstream flood behaviour to the detriment of any other properties, which is consistent with requirement 1 of Control E4.8 of the Coffs Harbour DCP 2015. There is considered to be some impact to 1314A Pacific Highway, Moonee Creek in scenario 5 with climate change, however, there is not enough information in the Martens report to suggest that this is due to the proposed development. The lot may likely be inundated with a climate change scenario in pre-development conditions, however, it is recommended that further modelling results should be interpreted to confirm this.

To meet requirement 4 of Control E4.8 of Councils DCP 2015, it is recommended that conditions be imposed on any modified approval issued that requires the creation of restriction on title for any of the lots affected by the 1% AEP. This restriction should restrict the use of this portion of the lot for any habitable building or structure.

Council does not support the proposed condition D6.2. Any significant changes to the development footprint or design levels could result in impacts that affect adjoining properties and as such should be further assessed.

Council has no objection to the removal of the second sentence in Condition E16 and the current Condition D6.2, as they reference out of date information.

In summary, Council recommends the following in relation to flooding:

- The current proposed amended wording for Condition D6.1 is not supported. The applicant's condition refers to a minimum finished floor level for dwellings. A condition like this is not an appropriate condition for a subdivision of land. Such a condition may be appropriate as an additional 'advisory note' condition. Council would support Condition D6.1 being amended to the following:

  > all residential lots and roads must be finished to be above the scenario 5 extents (1% AEP Catchment + 5% AEP Ocean + climate change flood levels) plus 500mm freeboard (between 4.03 and 4.68mAHD).

- a condition should be imposed on the title of any of the lots affected by the 1% AEP, restricting the use of this portion of the lot for any habitable building or structure;
- Council does not support the proposed Condition D6.2 for reasons outlined above;
- Council has no objection to the current Condition D6.2 being removed; and
- Council has no objection to the removal of the second sentence in Condition E16.

Removal of Acoustic Wall:

Council does not support the removal of the acoustic wall unless it can be demonstrated that appropriate LAeq levels within future dwellings (as stipulated in S102(3) of State Environmental Planning Policy (Infrastructure) 2007) will not be exceeded within a typical residential dwelling.

In Council's view it would be inappropriate to defer the impost of noise mitigation onto future residential allotment owners if, to achieve acceptable LAeq levels within the dwelling, would require significant or substantial noise mitigation measures within the dwelling itself. The applicant may be able to provide further information to support that acceptable LAeq levels, as referred to above, can be achieved.

Council is happy to discuss the above matters with the Department further at your convenience.

For further information please contact Gilbert Blackburn on 6648 4652.

Yours faithfully

Gilbert Blackburn
Development Assessment Coordinator

NSW GOVERNMENT | Office of Environment & Heritage

Our Ref: DOC19/383085
Your Ref: MP 06_0143 MOD 4

Director Regional Assessments
Department of Planning and Environment
GPO Box 39
Sydney NSW 2001

Attention: Ms Emma Butcher, Planning Officer

Dear Mr Witherdin

Re: Glades Estate Residential Subdivision (MP 06_0143 MOD 4)

Thank you for your email dated 7 May 2019 about the Glades Estate Residential Subdivision (MP 06_0143 MOD 4) seeking comments from the Office of Environment and Heritage (OEH). I appreciate the opportunity to provide input.

The OEH has statutory responsibilities relating to biodiversity (including threatened species, populations, ecological communities, or their habitats), Aboriginal and historic heritage, National Parks and Wildlife Service estate, flooding and estuary management.

We have reviewed the documents supplied and advise that, although we have no issues to raise about NPWS estate or historic heritage, several issues are apparent with the assessments for estuaries and flooding, biodiversity, and Aboriginal cultural heritage. These issues are discussed in detail in **Attachment 1** to this letter.

In summary, the OEH does not support the removal of the central corridor vegetation and rejects the argument that this would be adequately compensated by the 'embellishment' works that have been proposed. The only adequate offset for the loss of the central corridor would be to significantly increase the width of the eastern corridor protected area. This would require the loss of residential lots in the eastern part of the subdivision.

If the proposed modification is supported by the Department of Planning and Environment, the OEH recommends:

1. For biodiversity matters:

    a. An area that is equal to or greater in size to the central corridor area (defined as the 'subject land' in the Section 75W report dated April 2019) be protected and managed for conservation purposes in the eastern part of The Glades Estate site.

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b. The additional conservation area should maximise the width of the riparian corridor, and, in particular, achieve at least a 100 m width to Moonee Creek and at least 50 m width for Skinners Creek, in accordance with the riparian zone requirements in Section E1 of the Coffs Harbour City Council Development Control Plan (DCP).

c. Measures to manage the additional conservation area should be included in the Vegetation Management Plan as required under Condition B15.

d. Condition B15 (2) should be updated to refer to the Coffs Harbour City Council Development Control Plan Appendix 2 Guideline for Preparing Vegetation Management Plans rather than the former Department of Natural Resources document.

2. For Aboriginal cultural heritage (ACH) matters:

   a. further consultation be undertaken with the Coffs Harbour & District Local Aboriginal Land Council and Jagun to determine what the ACH values are, and

   b. that errors in the Aboriginal Cultural Heritage Assessment Report (ACHAR) which significantly affect the ability to interpret the information presented be rectified and the final ACHAR resubmitted prior to any final determination in this matter.

3. For flooding matters the proposed revised draft condition D6 Filling of the Site be amended as follows:

   D6.1 All parts of residential lots suitable for dwellings and all residential roads are to be located above the '1% AEP Catchment + 5% AEP ocean + climate change' flood level in accordance with drawing PS01-K210 as per the Flood Assessment: The Glades Development, Lot 1 and 2 DP725785, Pacific Highway, Moonee Beach, NSW, Martens Consulting, January 2018. This is scenario five (5) in the flood assessment with a predicted flood level varying between 3.5 - 4.2m AHD for the site.

   D6.2 All stormwater treatment infrastructure such as swales and basin are to be located above the 5% AEP flood level.

If you have any further questions about this issue, Ms Rachel Lonie, Senior Conservation Planning Officer, Conservation and Regional Delivery, OEH, can be contacted on 6650 7130 or at rachel.lonie@environment.nsw.gov.au.

Yours sincerely

Dimitri Young 31 May 2019

DIMITRI YOUNG
Senior Team Leader Planning, North East Branch
Conservation and Regional Delivery

Contact officer: RACHEL LONIE
6650 7130

Enclosure: Detailed OEH Comments – Glades Estate Residential Subdivision (MP 06_0143 MOD 4)

Attachment 1: Detailed OEH Comments – Glades Estate Residential Subdivision (MP 06_0143 MOD 4)

The subject land is Lot 1 and Lot 2 DP 725785 at the Pacific Highway, Moonee Beach. The proposed modification seeks to reconfigure the subdivision pattern to change the residential development from 524 lots to a total of 555 lots within eleven stages and reduce the open space areas from 45 ha to 43 ha. The additional 31 lots are proposed in an area that was identified to be retained and protected as open space to provide a wildlife corridor in the original Major Project development. The modification also involves modifying site levels and noise mitigation measures.

1.0 Biodiversity

The modification proposes to remove an area of 1.75 ha of native vegetation to create the additional 31 residential lots. This area was identified to be Open Space - Category 1 Natural Areas where the development and management of open space is directed at environmental protection, vegetation rehabilitation and improving habitat ecology. The Flora and Fauna Assessment (FFA) prepared by JWA dated February 2018 assesses the environmental impact of this proposal.

The OEH does not accept the argument outlined in the FFA that the 'significant habitat enhancement works' that are proposed to offset the loss of native vegetation adequately offsets the loss of biodiversity values arising from this clearing and the associated impacts of an additional 31 residential lots.

Major Project approval conditions

Retention of the 'Central Wildlife Corridor' was required as part of a network of open space intended to connect northern and southern buffer zones and habitat areas and which forms part of a regional corridor that was mapped by the OEH (NPWS Key Habitats and Corridors database). Together with conditions such as B5 (7) to consider fauna crossings & B15 (3) (vii) that specified the Vegetation Management Plan (VMP) consider the retention and rehabilitation of wildlife corridors and wildlife crossings, the Major Project approval clearly intended that the central corridor was part of a comprehensive strategy to retain, protect and rehabilitate wildlife corridors and habitat.

Condition B15 of the Major Project approval required a detailed VMP be prepared to the satisfaction of the certifying authority. In particular, condition B15 was to include:

- Identification and mapping of all native vegetation, including abundance codes and outline the methodology for ongoing management of all native vegetation, detailing the Initial and Follow Up Maintenance works required.
- Identification and mapping of all noxious and environmental weeds as listed on Council's web site, including abundance codes and outline the methodology of removal
- and ongoing management of all such listed weeds, detailing the Initial and Follow Up Maintenance works required.
- Detail of revegetation and compensation (koala feed trees, riparian and wetland species) treatment including cross sections, use local provenance plant species, densities, quantities, and protection of retained vegetation.
- Rehabilitation works and longer-term habitat management and maintenance measures to create and manage Wallum froglet habitat areas
- Riparian and stream rehabilitation requirements
- Identification and detail of fire and drought refuge areas along the creeks; retention and rehabilitation of wildlife corridors; wildlife crossings; and related traffic calming and speed control devices. Detail of exclusion fencing arrangements to provide barriers (where required) to koala movement, as well as detail of koala warning signage and street lighting arrangements for early detection of koalas in movement corridors/roadways.
- Compensatory koala habitat revegetation is to be provided on site for secondary koala habitat to be removed from the site

- Maintenance, monitoring and reporting schedule
- Information regarding the timing of the works.

The one-page document labelled *Annex H Plan 4 Vegetation Management* that was part of the original Major Project package does not satisfy condition B15. It does not appear that this condition has yet been triggered with a construction certificate application to the Coffs Harbour City Council.

Proposed offset measures duplicate existing conditions

The proposed new condition B15(A) includes actions that are already required under B15 such as assisted natural regeneration, planting of native shrubs and ground covers, measures to monitor and control weeds and fauna exclusion fencing. The proposed rehabilitation and revegetation offset areas as described in Figure 16 dated 22 February 2018 also duplicate offset areas and actions that are already identified in *Annex H Plan 4 Vegetation Management.* For example, existing forest, swamp and mangrove communities (mapped as dark green) were already required to be protected and enhanced and fenced to allow rehabilitation to occur in the earlier plan. Areas mapped in olive green were already required to be rehabilitated with revegetation utilising existing seed source and fencing to aid re-establishment, and heath communities mapped with an olive hatching were already required to be revegetated and slashing cease to allow natural recovery.

The OEH has concluded that the proposed rehabilitation outcomes (new condition B15A) will not provide any significant habitat or connectivity enhancement in addition to what is already required by the Major Project approval conditions.

Use of BBAM

The consultant has applied the BioBanking Assessment Methodology (BBAM) to calculate possible offset requirements for the loss of vegetation. The results have indicated that 74 ecosystem credits would be required to offset the loss of this vegetation. However, the assessment has only partially applied the BBAM as no assessment of patch sizes or vegetation condition assessment or consideration of species credit species was included. It would be expected that a complete BBAM assessment would generate species credit species requirements as well as the ecosystem credit requirements that are discussed.

Further, the paperbark swamp forest is a red flag area. Under the BBAM this required the Director General (now Secretary) to be satisfied that all reasonable measures to avoid impacts on red flag areas had been considered. The main issue however, in relation to using the BBAM, is that the areas that have been assessed as creating ecosystem credits are areas that are already required to be protected and rehabilitated through the implementation of a VMP as required by the Major Project approval.

Offset requirements

In conclusion, and as previously advised, the OEH does not support the removal of the central corridor vegetation and rejects the argument that this would be adequately compensated by the 'embellishment' works that have been proposed. The only adequate offset for the loss of the central corridor would be to significantly increase the width of the eastern corridor. This would require the loss of residential lots in the eastern part of the subdivision.

Should the proposal to remove the central corridor be supported by the Department of Planning and Environment (DPE), the OEH's preferred configuration for the proposed residential subdivision is to retain and protect more vegetation along Moonee Creek and Skinners Creek to protect water quality, aquatic and terrestrial habitat and to provide an adequate and viable wildlife corridor.

To offset the loss of the central corridor at area of at least the same size as the additional area to be for residential use (and preferably larger) should be required to be protected and managed for conservation purposes in the eastern part of the subdivision. This would ideally seek to maximise the width of the riparian corridor, and, in particular, achieve at least a 100 m width to Moonee Creek and

at least 50 m width for Skinners Creek, in accordance with the riparian zone requirements in Section E1 of the Coffs Harbour City Council Development Control Plan (DCP). An alternative subdivision configuration should aim to achieve these widths as a minimum. This would require a commensurate reduction of residential lots in the eastern edge of the subdivision.

Recommendation

1. If the proposed modification is supported by the DPE, the OEH recommends:

   a. An area that is equal to or greater in size to the central corridor area (defined as the 'subject land' in the Section 75W report dated April 2019) be protected and managed for conservation purposes in the eastern part of The Glades Estate site.

   b. The additional conservation area should maximise the width of the riparian corridor, and ,in particular, achieve at least a 100 m width to Moonee Creek and at least 50 m width for Skinners Creek, in accordance with the riparian zone requirements in Section E1 of the Coffs Harbour City Council Development Control Plan (DCP).

   c. Measures to manage the additional conservation area should be included in the Vegetation Management Plan as required under Condition B15.

   d. Condition B15 (2) should be updated to refer to the Coffs Harbour City Council Development Control Plan Appendix 2 Guideline for Preparing Vegetation Management Plans rather than the former Department of Natural Resources document.

2.0 Aboriginal cultural heritage

The OEH has reviewed the documentation provided in support of the 75W modification application and notes the inclusion of an Aboriginal Cultural Heritage Assessment Report (ACHAR) (ERM 9 January 2019). We have reviewed the ACHAR and note that the assessment process included field survey and consultation with local Aboriginal community members compliant with clause 80C of the *National Parks & Wildlife Regulation 2009.*

The OEH further notes that the results of the Aboriginal cultural heritage assessment process provided in the report indicate that no tangible evidence of traditional Aboriginal subsistence activities or occupation (Aboriginal objects) were located within the lands subject to assessment. However, we also note that concerns were raised by members of the Jagun Aged & Community Care (Jagun) Aboriginal organisation who are one of the Registered Aboriginal Parties (RAPs) for the project. We note that the ACHAR contains several typographical and referencing errors. Many of these do not affect the reader's ability to understand the outcomes of the assessment process.

We note that Section 3.4 of the ACHAR provides details of the RAP comments on the proposed assessment methodology. The OEH notes that Jagun expressed concerns regarding the fact that the project area is "surrounded by highly significant cultural areas". We also note that Jagun requested specific information regarding the locations of cut and fill activities within the project area. Section 3.4 indicates that these concerns have been addressed elsewhere in the report however the references to the sections where these concerns have been addressed are missing. In its review of the ACHAR the OEH could find no place where these concerns were further discussed or addressed.

We have reviewed the proposal and subject lands with reference to the 2017/18 ACH landscape mapping project for Coffs Harbour City Council and note that a large section of the subject lands falls within a 'known' area of Aboriginal Cultural Heritage (ACH) significance. We also note reference in the ACHAR review of previous archaeological studies (Section 5.4.1) that the area is known to be part of a traditional Aboriginal travel route. This information, combined with the concerns regarding significant cultural values surrounding the subject lands raised by Jagun, warrants further investigation of the likely non-tangible ACH values which may form constraints to the proposed inclusion of these lands in the broader 'Glades Estate' development.

We further note that several emails included in Appendix H as evidence of provision of the draft assessment methodology appear to have gone from Stephanie Moore (ERM) to Stephanie Moore (ERM) with no other addresses.

The OEH considers that unless evidence that these emails, with an attached proposed survey methodology, were actually sent to RAPs ,then they should be removed from the report as they do not constitute evidence of consultation. We also note that the proposed survey methodology in question is missing Figure 2.1 with only a heading describing the figure. This effectively means that the proposed survey methodology, if sent to the RAPs at all, was sent incomplete. The OEH further notes final comments by Jagun on the Draft ACHAR further reinforce their concerns over highly culturally significant areas which do not appear to have been addressed.

In summary, the OEH notes several typographical and formatting errors which affect the readers ability to determine the extent of consultation and how RAP concerns have been addressed.
We also note that the 2017/18 ACH landscape mapping project for Coffs Harbour City Council data, comments from some RAPs and previous archaeological assessments indicate known ACH values within the subject lands. These values do not appear to have been identified or addressed in the ACHAR.

Recommendation

2. The OEH recommends that:

a. further consultation with Coffs Harbour & District Local Aboriginal Land Council and Jagun be undertaken to determine what the ACH values are, and

b. that errors in the ACHAR which significantly affect the ability to interpret the information presented be rectified and the final ACHAR be resubmitted prior to any final determination in this matter.

3.0 Flood risk management

The following assessment and comments relate to the modification to site levels (bulk earthworks) and associated proposed changes to development conditions D6 Filling of the Site (D6.1 and D6.2) and E16 Fill Contour Plan as outlined in Appendix B Revised Draft Conditions in the Modification under Section 75W Report. The proposed changes are:

D6 Filling of the Site

~~1) All residential allotments shall be filled to a minimum of the design flood level plus minimum 600mm freeboard, with minimum fill levels of RL 4.75mAHD in accordance with the approved plans.~~ 1.) All proposed dwellings are to have a finished floor levels at 4.03 – 4.68 m AHD (0.5m higher than determined flood levels), in accordance with drawing PS01-K210 produced in the Martens Consulting Engineers Flood Assessment report dated January 2018.

~~2) Fill platforms must be set at a minimum of 2 metres above the 1 in 100 year flood level or the water table (whichever is the higher) in the southern open space areas that contain stormwater infrastructure, in accordance with AusPacific Engineers advice dated 4 April 2008. Finished levels must be to the satisfaction of Council.~~ 2) Should the proposed development footprint change, or significant changes to the proposed design levels and/or culvert design occur (as shown on Drawing PS01-A050), an updated flood model with detailed earthworks should be prepared at Construction Certificate stage.

Siteworks E16 Fill Contour Plan

Prior to the release of a Subdivision Certificate for the first stage of the project to be released a final contour plan shall be submitted to Council showing the location, depth and type of fill located on the site. ~~This shall include fill platforms of minimum of 2 metres above the 1 in 100 year flood level or the water table (whichever is the higher) in the southern open space areas that contain stormwater infrastructure, in accordance with AusPacific Engineers advice dated 4 April 2008~~

The Flood Assessment: The Glades Development, Lot 1 and 2 DP725785, Pacific Highway, Moonee Beach, NSW report (Martens Consulting, January 2018) assesses flooding of the site for the existing undeveloped condition and for the proposed developed condition modifying the bulk earthworks and fill levels in accord with the Modification 4 application.

The flood assessment models 1%, 5% AEP and PMF flood events in various combinations of rainfall and tailwater level. The results are consistent with existing flood modelling and modelling undertaken for adjoining development areas. Impacts of climate change have also been modelled for the 1% AEP flood with a 10% increase in rainfall and 0.9m increase in tailwater level (scenario 5 in the flood assessment) with a predicted flood level varying between 3.5 - 4.2m AHD for the site.

The proposed development should have residential lots and roads located above the 1% AEP climate change flood level. Stormwater treatment infrastructure, such as swales and basin, are to be located above the 5% AEP flood level.

The OEH does not support the proposed condition D6.2. Any significant changes to development footprint or design levels could result in impacts that affect adjoining properties and as such need to be assessed prior to the Construction Certificate stage.

The OEH does not have an objection to the removal of the second sentence of condition E16.

Recommendation

3. The OEH recommends amending draft condition D6 Filling of the Site as follows:

D6.1 All parts of residential lots suitable for dwellings and all residential roads are to be located above the '1% AEP Catchment + 5% AEP ocean + climate change' flood level in accordance with drawing PS01-K210 as per the Flood Assessment: The Glades Development, Lot 1 and 2 DP725785, Pacific Highway, Moonee Beach, NSW, Martens Consulting, January 2018. This is scenario five (5) in the flood assessment with a predicted flood level varying between 3.5 - 4.2m AHD for the site.

D6.2 All stormwater treatment infrastructure such as swales and basin are to be located above the 5% AEP flood level.

OUT19/6158

Emma Butcher
Planning Officer
Regional Assessments
NSW Department of Planning and Environment

Emma.Butcher@planning.nsw.gov.au

Dear Ms Butcher

Glades Estate Residential Subdivision MOD 4 (06_0143)
Environmental Assesment

I refer to your email of 7 May 2019 to the Department of Industry (DoI) about the above matter.

The department has reviewed the proposal and has no comments.

Please send any further referrals to Department of Industry by email to landuse.enquiries@dpi.nsw.gov.au.

Yours sincerely

Liz Rogers
Manager, Assessments
Lands and Water – Strategic Relations
20th June 2019

NSW RURAL FIRE SERVICE

The Secretary
NSW Planning & Environment
GPO Box 39
Sydney NSW 2001

Your Ref: MP 06_0143 MOD4
Our Ref: D19/1529
DA19051018601 AB

ATTENTION: Emma Butcher

30 May 2019

Agency Comment: The Glades Residential Subdivision; Pacific Hwy Moonee Beach

I refer to your correspondence dated 8 May 2019 seeking comments and recommended conditions from the NSW Rural Fire Service (NSW RFS) with respect to the proposed Part 3a Project Approval Mod 4 application.

The NSW RFS has reviewed the plans/documents and understands that the modification proposes:

1. *Reconfiguration of the subdivision pattern to include 31 additional lots;*
2. *Modify site levels (bulk earthworks – cut and fill);*
3. *Modify noise mitigation measures (sound barrier).*

The NSW RFS has considered the information provided and provides the following advice:

1. The proposed amended conditions ***A3 Project in Accordance with Plans*** and ***B16 Asset Protection Zones*** (APZ), that reflect the amended site layout and APZ plans, are accepted on the provision that the proposed APZ within the proposed public reserves will be managed in perpetuity to NSW RFS document *Standards for Asset Protection Zones* requirements.

For any queries regarding this correspondence please contact Alan Bawden on 1300 NSW RFS.

Yours Sincerely

Kalpana Varghese
Team leader – Development Assessment and Planning
Planning and Environment Services (East)
The RFS has made getting information easier. For general information on 'Planning for Bush Fire Protection, 2006' , visit the RFS web page at www.rfs.nsw.gov.au and search under 'Planning for Bush Fire Protection, 2006'.

Postal address
Records
NSW Rural Fire Service
Locked Bag 17
GRANVILLE NSW 2142

Street address
NSW Rural Fire Service
Planning and Environment Services (North)
Suite 1, 129 West High Street
COFFS HARBOUR NSW 2450

T (02) 6691 0400
F (02) 6691 0499
www.rfs.nsw.gov.au
Email: pes@rfs.nsw.gov.au

Transport
Roads & Maritime
Services

File No: NTH05/00267/MOD 4
Your Ref: MP 06_0143 MOD 4

The Director
Regional Assessments
NSW Planning & Environment
GPO Box 39
SYDNEY NSW 2001

Attention: Emma Butcher
Emma.butcher@planning.nsw.gov.au

Dear Madam,

SEARS Request – MP 06_0143: MOD 4 - Glades Estate Residential Subdivision, Pacific Highway Moonee Beach - Additional 31 residential lots.

I refer to your email dated 7 May 2019 requesting comments from Roads and Maritime in relation to the proposed modification of the consent for the subject residential development.

Roles and Responsibilities

The key interests for Roads and Maritime Services are the safety and efficiency of the road network, traffic management, the integrity of infrastructure assets and the integration of land use and transport.

Roads and Maritime Response

It is noted that a Traffic Impact Assessment (TIA) was provided with the application to modify the consent. That Assessment concluded that the additional 31 lots will have an insignificant impact on the interchange levels of service; and on the road safety, amenity and levels of service on the surrounding road network. Given that the additional 31 lots will take access from a local road network; it is up to Council to be satisfied that the safety and efficiency of the network is not adversely affected by the proposed development.

In respect to the removal of the noise barrier, Council is responsible for considering the impact of road traffic noise on the future dwellings in accordance with the NSW Road Noise Policy 2011. Therefore, Council needs to be satisfied that appropriate noise attenuation measures will be accommodated within the architectural features of future housing stock, and where the noise wall provided attenuation for outdoor areas, consideration is given for the impact on those areas external to the buildings. Any required mitigation measures are the responsibility for the developer and will be at no cost to Roads and Maritime Services.

If you have any further enquiries regarding the above comments please do not hesitate to contact Cheryl Sisson, Development Assessment Officer on (02) 6640 1362 or via email at: development.northern@rms.nsw.gov.au

Yours faithfully,

Matthew Adams
A/Manager Land Use Assessment, Northern

21 May 2019

Hi Emma
Further to our previous email, an alternative to providing access to and from the Pacific Highway would be to provide a collector road from the development to the north, over Skinners Creek, and connect to Solitary Islands way adjacent to Tiki Road.
Regards
David & Joy Woodbury

[redacted]

Attention: Commissioner Fiona Morrison

Attention: Emma Butcher

MP06_0143 MOD 4 - Glades Estate Subdivision Glades Estate, Pacific Hwy, Moonee Beach

Response to application for the proposed removal of greenspace to yield an additional 31 lots in the approved residential subdivision of 524 lots

Thank you for the opportunity to comment on the application by Rothwell Boys for three significant amendments proposed for an approved residential subdivision which will see the removal of greenspace to yield an additional 31 lots on the already approved site of 524 lots, removal of sound barriers and an increase of landfill. We understand opportunity for comments close on the 31 May, 2019.

http://www.majorprojects.planning.nsw.gov.au/index.pl?action=view_job&job_id=8928

To put the 524 lot Glades development in perspective, it is adjacent to Moonee Creek, the first estuarine creek to form part of a marine park in NSW, the Solitary Islands Marine Park. The proposed 31 lot increase is around 10 percent of the current residential population of Moonee Beach village, situated east of the Pacific Highway. The Glade is approximately twice the footprint of the existing village. Our small community has become fatigued by the constant need to address proposed developments not in keeping with the coastal amenity, driven by economic gain for the developer, with seemingly minimal, if any, consideration to social or environmental impacts (in relation to triple bottom line).

1. **Proposed removal of green space – 'park' to make 31 lots**

We oppose the proposed removal of the intact native vegetation for the development of 31 lots additional to the 524 approved lots in the Glades development. The 31 allotments are proposed in place of the central vegetated corridor identified as 'park' (outlined in yellow on map below) in the Approved Preliminary Lot Layout under MP06_0143. Although there is 'greenspace' on the map below, it is generally riparian and much of it subject to tidal inundation and/ or 100year flooding (as consistent with maps in the report accompanying the application), with parts we believe to be wallum froglet habitat.

Figure 11: Approved Preliminary Lot Layout – MP06_0143
Represents the extent of "Park"

The ‘park’ (boundary shown in yellow) will provide visual amenity, is aesthetically pleasing, acts as a visual screen from the Pacific Highway for houses that will lay east of it, acts as an essential wildlife corridor, reduces urban heat island effect and lessens the extent of stormwater runoff from hard surfaces, compared to if it were otherwise developed.

In the Applicant’s Report (Appendix K)
https://majorprojects.accelo.com/public/d2cbc6cb3ee6b1454cfb1e1173e6ce7b/S75W%20Report.pdf letters appear from the Office of Environment and Heritage posted in relation to this development application modification 4, detailing the developer obligations in retaining this corridor, and that they were already committed to rehabilitate the site to meet the conditions of their original application. This was also our recollection, but given the community consultation was some years back, it was good to see it confirmed in writing, and the huge compromises reached. It is preposterous to propose the rehabilitation of areas already required to be rehabilitated, put up as an offset for a mature stand of trees. It makes a mockery of the planning process undertaken to date. There do not appear to be adequate checks and balances in place.

We oppose the removal of this green space (pictured below). There is no justifiable reason given by the applicant, Rothwell Brothers, for removing the vegetation. The mature trees, seen below in a Google map satellite image, are significant and appear already sculpted in readiness to fit the street

plan. Removal of the proposed approx. 60m x 260m stand of mature trees would generate ill will in the community, particularly given the mature stand are integral in the streetscape and street design of an already approved development that went through a lengthy community consultation process. Sadly, the trees (seen above) represent what was once a more significant corridor. These remaining trees are currently integral to the development, and to our understanding, part of a current condition of consent for the development.

We expect the NSW Government to uphold their commitment and stand by their policies to become a greener NSW and to maintain or improve the quality of lives of Moonee residents through their ‘unprecedented ‘commitment to green, open spaces as reflected in the following links:

- https://www.planning.nsw.gov.au/News/2017/NSW-to-become-a-greener-state
- https://www.governmentarchitect.nsw.gov.au/policies/greener-places
- https://www.planning.nsw.gov.au/Policy-and-Legislation/Housing-supply/More-open-space
  ‘The development of new communities provides opportunities for increasing open space. We will ensure high quality parklands and open spaces are part of our plans. We’re also working with councils to preserve and enrich our vibrant neighbourhoods.

'The newly appointed Open Space and Parklands Commissioner, Fiona Morrison and her team are ensuring that well-designed parks, and planning for open spaces are a priority in state's growth areas, planned precincts and in all major projects.'
We are committed to including new or retained hectares of open space in its land releases and precinct plans.

From a video on the above site it states the NSW Government is:

- Committed to ensuring our communities have easy access to high quality open spaces
- Working closely with councils to ensure preserving and enriching local character of our neighbourhoods
- Access to open space means better mental and physical health
- Improved sustainability through cleaner air, cooler temperatures in summer and reduced energy costs
- Our commitment to this will ensure NSW towns and cities remain liveable and sustainable as they grow

As a final observation, removal of the tree corridor would result in loss of the pedestrian pathway through the trees (below left) connecting the eastern and western portions. Proposed (below right) does not connect through. There is no easement.

2. **We argue the 'noise mitigation barriers' should be retained.** During the most recent upgrade of the Pacific Highway, communities were consulted and noise mitigation barriers installed. While the report stated noise mitigation measures (sound barriers) would not be as effective as first calculated, when other sections of the highway were upgraded, similar claims were made, however, the mounds and barriers installed have had an additional advantage of acting as privacy screens, and creating a sense of community within the sites. We argue the inclusion of screening material is imperative for the health and well-being of residents within the development. Any materials chosen should dampen sound waves and have limited capacity to reflect sound, as well as having a pleasant visual amenity. Any noise mitigation measures that enable energy efficient design of homes (non-airconditioned) are preferred and consistent with government policy and community expectations.

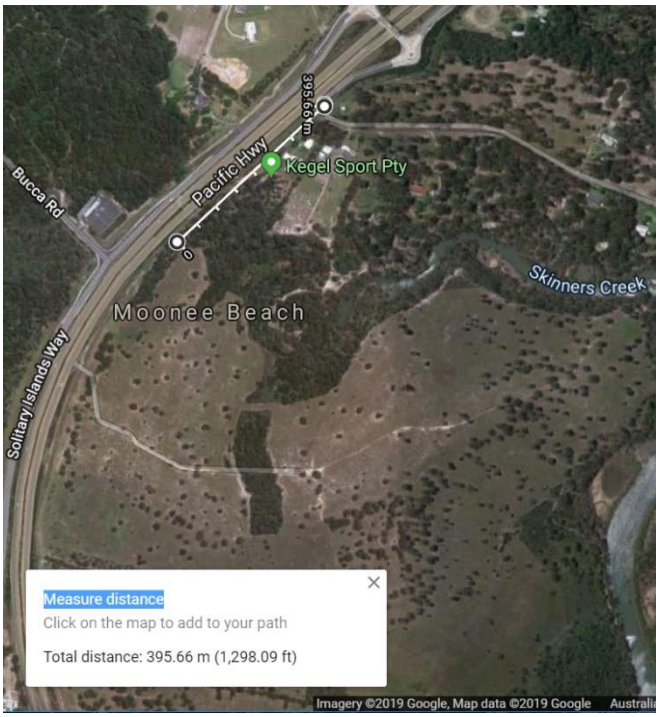
3. **Strict controls needed for fill** - Given the development is on a floodplain subject to inundation in a 100-year flood, it is no surprise additional landfill / earthworks is being requested. We request the developer be made accountable in the long term for the following based on the close proximity to the adjacent creeks, Moonee Nature Reserve and Solitary Islands Marine Park.

    - A plan for dealing with potential weed infestation as a result of seed dispersal in landfill

- Soil must not be contaminated
- Adequate retention/restraint methods to stop it spilling beyond the permitted footprint or washed away in stormwater. Retention basins are inspected and cleaned regularly, particularly after rain.

4. **Alternate access required - traffic concerns in incidents such as bushfire**
   This application for modification presents an opportunity to raise a community concern regarding access to / from the proposed Glades residential site. Although not currently being proposed, we believe an alternate access is in urgent need of addressing. During the Pacific Highway upgrade community consultation, the Roads and Maritime said there would be no more accesses on/off the highway permitted. However, the community did not know a local road would be coming down as far as Tiki Road, near the northern end of the development. A feeder road currently stops short of the development site. It is currently a dead end, and potentially available to continue through the new development.

Currently there is only one way in or out for the entire Moonee Beach village community east of the Pacific Highway, via Moonee Beach Road (see below). Despite the traffic report (Appendix H) stating the roundabout on Moonee Beach Road being adequate, it is not. Having personally experienced a critical bushfire situation in an urban setting elsewhere in 1994, where there was only one road in / out and we became trapped by vehicles, we plead for an alternate route to be championed on behalf of the community. The current exit from the north west corner of the development is approx. 2.4km (following left). From the tiki Road feeder road it is 400 metres (followingright).



The sheer volume of what will eventually be thousands of residents and hundreds of shoppers through one access point is a recipe for disaster, albeit fire or flood, particularly given how flood prone the land is in the new development. We request that Planning NSW make representation to have another access created coming from Tiki Road to the north. An access road around 400 metres long could join to the local road adjoining the highway overpass, and would be contiguous with the local route to the future proposed school and playing fields on the western side of the highway.

It is important this is acted upon as soon as possible, as the location of the proposed feeder road is consistent with the location of a proposed noise mitigation barrier and / or one of the two proposed recreation areas. (see following map with location of barriers).

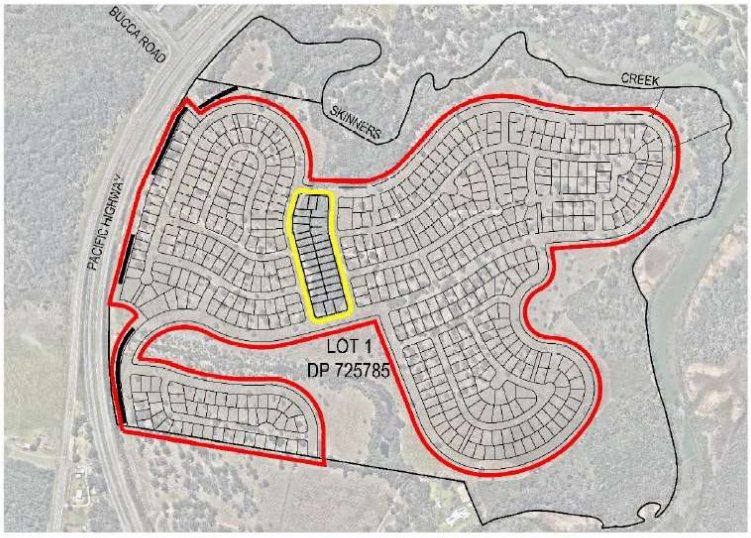


Figure 2: The Subject Land
Source: CHCC

5. **Inclusivity in recreational space** - Please make the applicant aware of the 'Everyone can play' guidelines for inclusivity in play spaces. It is an excellent initiative. We argue the two recreation nodes should not be considered an 'offset' for the proposed green space loss.

https://www.planning.nsw.gov.au/-/media/Files/DPE/Guidelines/everyone-can-play-draft-for-exhibition-guideline-2018-08.pdf?la=en

Thank you for this opportunity to comment.

Yours

Dr G Cooper and on behalf of Mrs K Cooper

Rothwell Boys Pty Ltd
C/- Resource Design and Management

Flood Assessment:
The Glades Development,
Lot 1 and 2 DP725785, Pacific Highway,
Moonee Beach, NSW

ENVIRONMENTAL

WATER

WASTEWATER

GEOTECHNICAL

CIVIL

PROJECT MANAGEMENT

P1706361JR01V01
January 2018

Limitations Statement

The sole purpose of this report and the associated services performed by Martens & Associates Pty Ltd is to provide a flood assessment at the subject site in accordance with the scope of services set out in the contract / quotation between Martens & Associates Pty Ltd and Rothwell Boys Pty Ltd C/- Resource Design and Management (hereafter known as the Client). That scope of works and services were defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to the site.

Martens & Associates Pty Ltd derived the data in this report primarily from a number of sources which included site inspections, correspondence regarding the proposal, examination of records in the public domain, interviews with individuals with information about the site or the project, and field explorations conducted on the dates indicated. The passage of time, manifestation of latent conditions or impacts of future events may require further examination / exploration of the site and subsequent data analyses, together with a re-evaluation of the findings, observations and conclusions expressed in this report.

In preparing this report, Martens & Associates Pty Ltd may have relied upon and presumed accurate certain information (or absence thereof) relative to the site. Except as otherwise stated in the report, Martens & Associates Pty Ltd has not attempted to verify the accuracy of completeness of any such information (including for example survey data supplied by others).

The findings, observations and conclusions expressed by Martens & Associates Pty Ltd in this report are not, and should not be considered an opinion concerning the completeness and accuracy of information supplied by others. No warranty or guarantee, whether express or implied, is made with respect to the data reported or to the findings, observations and conclusions expressed in this report. Further, such data, findings and conclusions are based solely upon site conditions, information and drawings supplied by the Client *etc*. in existence at the time of the investigation.

This report has been prepared on behalf of and for the exclusive use of the Client, and is subject to and issued in connection with the provisions of the agreement between Martens & Associates Pty Ltd and the Client. Martens & Associates Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

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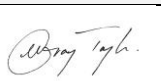
Paul Dinh	Daniel Dhiacou Daniel Martens	Gray Taylor	

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1	Development Application	FINAL	25.01.2017	1P, 1E	1P		

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All enquiries regarding this project are to be directed to the Project Manager.

Executive Summary

Martens & Associates Pty Ltd (MA) have prepared this flood assessment to support a development application (DA) for a proposed low density residential subdivision at Lot 1 and 2 DP 725785 (the site). This report documents the procedures and findings of hydrologic and hydraulic modelling of the site in existing and proposed conditions.

Modelling concluded that:

1. Proposed flood characteristics are largely consistent with existing conditions, and differences due to the proposed development are negligible.

2. The proposed residential development footprint within the site is predominantly flood free in all 1% AEP flood events modelled.

3. The proposed development would have negligible offsite flood impacts.

4. Compliance with Council flood planning level requirements for buildings will be achievable.

5. The proposed development is compatible with the existing floodplain environment.

Contents

1 Introduction

1.1 Overview

Martens & Associates Pty Ltd (MA) have prepared this flood assessment to support a development application (DA) for a proposed residential subdivision at Lot 1 and 2 DP 725785, Pacific Highway, Moonee Beach, NSW (the site, 'The Glades'). Refer to Attachment A for site survey and proposed development layout.

MA previously prepared a flood assessment for this region to support a sub-division at Lot 1 DP1097743, Pacific Highway, Moonee Beach, NSW, which is the lot immediately south of the site. The flood assessment for Lot 1 DP1097743 is documented in MA report P1002663JR08V02 (MA, August 2015). That flood assessment was subject to peer review and has since been approved by Coffs Harbour City Council (CHCC). The hydrologic and hydraulic models used for that assessment have been included and updated to inform the flood assessment at the site.

1.2 Project Scope and Objectives

Project scope and objectives are:

1. Update the previously prepared hydrologic model (RAFTS) for the adjacent site determine the peak flow of the 5% annual exceedance probability (AEP) flood, 1% AEP flood, 1% AEP flood with climate change, and the probable maximum flood (PMF) events.

2. Update the previous hydraulic model (TUFLOW) for the site under existing and proposed conditions.

3. Prepare relevant flood maps including flood extents, depths, levels, velocities, hazards and impacts for the critical 1% AEP flood event.

4. Comment on flood characteristics and model outcomes in existing and proposed conditions.

1.3 Relevant Guidelines

This report has been prepared in accordance with the following guidelines and policies:

1. Coffs Harbour Council (2008), *Climate Change Policy*.

2. Coffs Harbour Council (2009), *Coffs Harbour Engineering Design Guidelines – Stormwater Drainage*.

3. Coffs Harbour Council (2013), *Coffs Harbour Local Environmental Plan (LEP)*.

4. Coffs Harbour Council (2015), *Coffs Harbour Development Control Plan (DCP)*.

5. NSW Department of Environment and Climate Change (2007), *Floodplain Risk Management Guideline Practical Consideration of Climate Change*.

6. NSW Department of Environment and Climate Change (2010), *Flood Risk Management Guide*.

7. NSW Department of Infrastructure, Planning and Natural Resources (2005), *Floodplain Development Manual*.

1.4 Definitions

AEP	Annual exceedance probability: the probability of a flood event occurring within a year. A 1% AEP flood has a 1% chance of occurring in any given year.
ARI	Average recurrence interval: the average time between flood events occurring. A 100 year ARI flood occurs on average once every 100 years.
ARR	Australian Rainfall & Runoff
BOM	Bureau of Meteorology
Council	Coffs Harbour City Council (CHCC)
DA	Development application
IFD	Intensity frequency duration – design rainfall data for frequent and infrequent storm events.
MA	Martens & Associates Pty Ltd
PMF	Probable maximum flood – the most extreme flood event possible for a certain location, with an approximate ARI of 100,000 to 1,000,000 years.
PMP	Probable maximum precipitation – design rainfall data for extreme storm events.

2 Site Description and Background Data

2.1 Location and Site Description

Existing site description summary is provided in Table 1.

Table 1: Existing site description summary.

Address	Lot 1 and 2 DP 725785, Pacific Highway, Moonee Beach, NSW
Lot / DP	Lot 1 and 2 DP 725785
Site Area	Approximately 92.55 ha
Local Government Area (LGA)	Coffs Harbour City Council (CHCC)
Current Land Use	Vacant
Current Zoning	This land is currently zoned Residential 2A Low Density under Coffs Harbour Local Environmental Plan 2000.
Site Description	The site is currently mostly cleared with some bushland. No structures or intensive land use are currently seen on the site.
Surrounding Land Uses	The site is bordered by the Pacific Highway to the west, partially cleared land to the south, bushland to the north and Moonee Creek to the east.
Site Elevation	Approximately 16 mAHD at western site boundary falling to sea level at the northern and eastern boundaries.
Site Grading & Aspect	Raised in centre of site at 12 mAHD, falling to approximately 4% in northern, eastern, and southern directions.
Site Drainage	Skinners Creek runs along the northern boundary of the site. Bucca Creek runs through the southern portion of the site. Moonee Creek runs along the eastern site boundary.

2.2 Catchment Description

We note the following regarding the catchment upstream of the site:

- The site is located within the Moonee Creek catchment.
- Upstream catchments are primarily bushland and rural residential areas, and include the suburbs of Moonee Beach, Sapphire Beach and Emerald Beach.
- The total upstream catchment area is approximately 4,181 ha, and is shown in Attachment B K000.

2.3 Site Flood Mechanisms

The site is likely affected by the following flood mechanisms:

- Overland flows from the local upstream catchment (refer Section 2.2).

- High tailwater conditions in Moonee Creek causing upstream flows to back up onto the site.

- Storm surge causing high ocean levels and upstream flows to back up onto the site.

2.4 Previous Flood Studies

A review of previous flood investigations was undertaken to assess likely local flood behaviour and characteristics for the site and the Moonee Creek catchment. Review identified four previous flood studies which would be relevant to this assessment.

2.4.1 Paterson Consultants (1998) Moonee Creek Flood Study

Paterson Consultants conducted a flood assessment for this catchment on behalf of Coffs Harbour Council, and summarised the assessment in the report *Moonee Creek Flood Study* (1998), hereafter referred to as the Paterson flood study. As part of their study, Paterson used RORB for hydrologic modelling and MIKE 11 for hydraulic modelling.

A series of flood maps showing flood characteristics for the 1% AEP flood (heights and hazards) were produced that show a peak flood level of approximately 2.8 mAHD in Moonee Creek adjacent to the site. Hazard mapping showed the subject site to be largely outside of existing 1% AEP flood extents, with some portions of the site identified as having a 'Low Hazard' rating. These figures are provided as Figure 1 (flood levels) and Figure 2 (flood hazard).

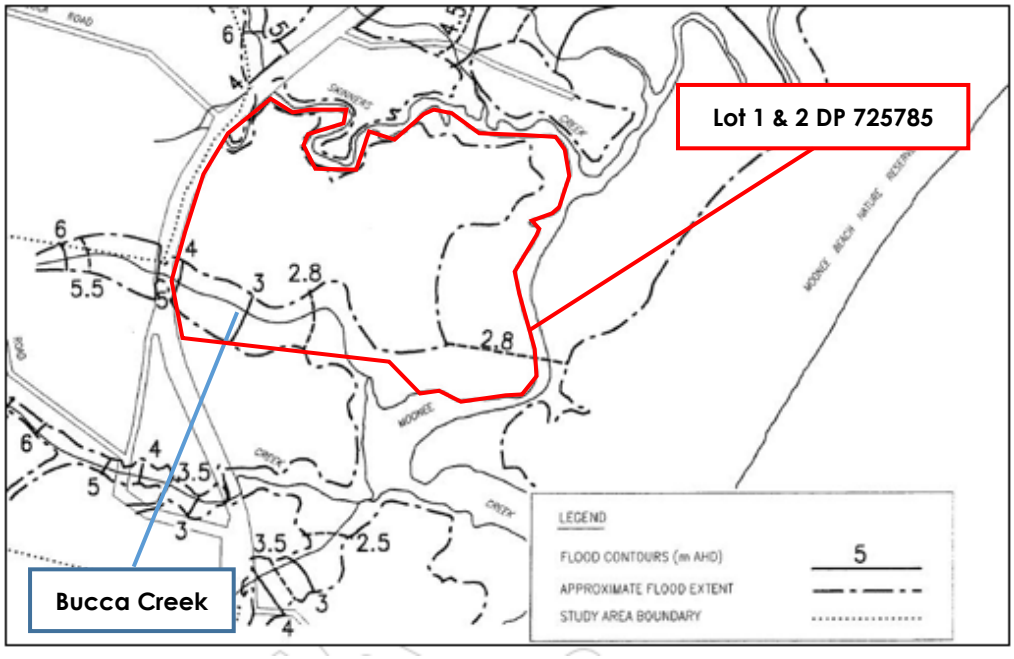

Figure 1: 1% AEP flood level map for Moonee Creek and Bucca Creek in the vicinity of the subject site (Paterson Consultants, 1998).

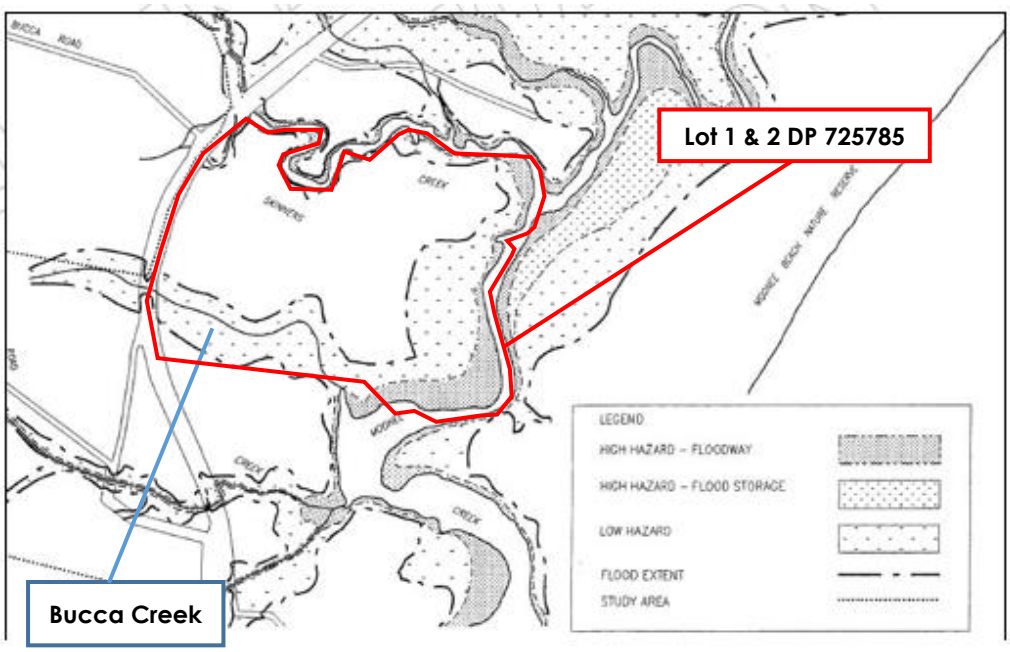

Figure 2: 1% AEP flood hazard map for Moonee Creek and Bucca Creek in the vicinity of the subject site (Paterson Consultants, 1998).

2.4.2 *Bewsher Consulting (2005) Coffs Creek Floodplain Risk Management Plan*

This assessment was completed by Bewsher Consulting on behalf of Coffs Harbour City Council and provides details a floodplain risk management plan for Coffs Creek. Whilst Moonee Creek and its tributaries were not included in this assessment, a flooding and hazard extents map was prepared for areas to the north of Coffs Creek, based on the previous assessment conducted by Paterson Consultants (1998). This map (Figure 3) shows that a portion of the site is affected by the 1 in 100 year ARI peak flood extents.

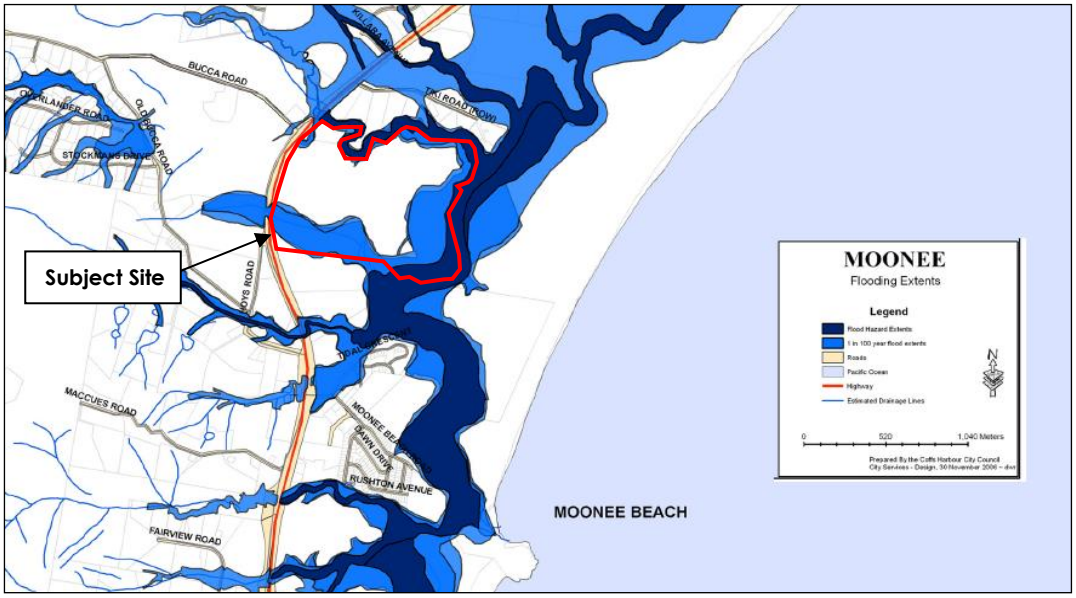

Figure 3: Flood extents mapping for Moonee Creek and tributaries (Bewsher Consulting, 2005).

2.4.3 *Cardno Lawson Treloar (2007) The Glades, Moonee Beach – Hydraulic Assessment*

Cardno Lawson Treloar (CLT) previously developed a detailed MIKE 11 model for the 'The Glades' development (the site).

Full details of the CLT model are provided in the report, *The Glades, Moonee Beach – Hydraulic Assessment,* (Cardno Lawson Treloar, 2007). As part of their study, CLT extended the Paterson Model which utilised RORB for hydrologic modelling and MIKE 11 for hydraulic modelling, updated to the latest version and supplemented with additional cross-sections and the addition of the Pacific Highway bridge over Skinners Creek to improve model accuracy in the vicinity of the development.

The assessment considered three flood simulations (i.e. flood envelope) to determine the 1% AEP flood event envelope curve as follows:

- 1% AEP flood event flows with normal high tide level as boundary conditions (0.6 mAHD).
- 5% AEP flood event flows with 5% AEP tide level as boundary conditions (adopted as 2.3 mAHD).
- 20% AEP flood event flows with 1% AEP tide level as boundary conditions (adopted as 2.6 mAHD).

The development was modelled by assuming that all developed areas would be filled to be above the 1% AEP flood level.

Modelling results for flood levels showed that the effects of the adjacent development on local flooding levels were contained within the relevant site (Lot 1 DP 725785). Modelling results indicated that downslope of Moonee Creek section 6580, peak flood levels resulted from the high tailwater scenarios rather than the peak flood flow scenario.

The CLT model and report have been verified and accepted by Coffs Harbour City Council and has been reviewed by MA. The Cardno report has been evaluated and will be superseded by this report.

2.4.4 Martens and Associates (2015) Flood Assessment: Moonee Beach Sub-division of Lot 1 DP 1097743

Martens and Associates conducted a flood assessment for the area, and summarised the assessment in the report *Flood Assessment: Moonee Beach Sub-division of Lot 1 DP 1097743* (2015), hereafter referred to as the previous MA flood assessment (MA, 2015). As part of the study, MA used XP-RAFTS for hydrologic modelling and TUFLOW for hydraulic modelling. This flood assessment was subject o a peer review and has since been approved by Coffs Harbour City Council (CCHC).

MA have used the previous MA flood assessment as a basis for the preparation of the 'existing conditions' hydraulic model for the site in this study.

2.5 Proposed Development

2.5.1 Subdivision Details

Proposed site subdivision is provided in Attachment A and includes:

- Creation of 555 residential lots with lot sizes ranging from 600 to1,842 m^2.
- A series of internal roads connecting the various stages of the development and linking the site to future developments to the south.

- Parks and recreational areas.

2.5.2 Earthworks Design Details

Proposed site earthworks includes:

- Grading of proposed internals roads.
- Fill for proposed residential areas above flood plain.

2.5.3 Flood design details

Attachment B P1706361PS01 A050 shows 3 x 1.8 m x 2.4 m box culverts are to be provided under 'Road 4' to convey flows from Bucca Creek through the southern portion of the site. These culverts have been sized to minimize offsite flood impacts and maximise flood free areas in the site.

3 Hydrology Modelling

3.1 Overview

The RAFTS software package was used to assess the 5% AEP flood, 1% AEP flood, 1% AEP flood with climate change and PMF peak flow rates for a range of storm durations between 10 minutes and 24 hours.

3.2 Model Setup

Parameters used in the model are provided in Table 2 and Table 3. Model inputs are as follows:

1. Sub-catchment delineation, flow paths and slopes were developed using the 1:25,000 Moonee Beach topographic map from Land and Property Information (2001). Refer to Attachment B PS01-K000 for catchment plan. The unidentified creek line south of Cunninghams Creek is labelled Cunninghams Creek South for the remainder of this report.

2. Sub-catchment impervious areas were adopted based on zoning maps and recent catchment aerials obtained from Nearmaps (2017).

3. Roughness coefficients (PERN) were determined using a weighted average based on the XP-RAFTS (1996) *User's Manual* and each sub-catchment's land use based on recent site aerials obtained from Nearmaps (2017).

4. RAFTS parameters have been derived from the suggested values in the XP-RAFTS (1996) *User Manual*. Sub-catchment surface soils are assumed to be clay loam, based on the NSW Government Environment & Heritage (2017) *eSPADE – NSW Soil and Land Information* website.

5. Intensity Frequency Duration (IFD) data was obtained from Australian Rainfall and Runoff (1987). BOM IFD data is consistent with the previous MA flood model (MA, 2015).

6. 1% AEP rainfall intensities were increased by 10% for the worst-case climate change scenario in accordance with the *Floodplain Risk Management Guideline – Practical Consideration of Climate Change* (2007) for catchments within the Northern Rivers, as was adopted for the previous MA flood study (MA, 2015).

7. Probable Maximum Precipitation (PMP) intensities and temporal distributions were determined using the BOM (2003) *Generalised Short-Duration Method* and BOM (2003) *Generalised Tropical Storm*

Method. Rainfall data are consistent with the previous MA flood model (MA, 2015).

Table 2: Details of sub-catchments used in RAFTS modelling.

Sub-catchment [1]	Area (ha) [1]	Impervious Area (ha) [2]	Pervious Area (ha) [2]	Impervious PERN [3]	Pervious PERN [3]	Slope (%) [1]
Moonee Upper	1,804.9	38.4	1,766.4	0.015	0.089	2.2
Moonee Lower	224.4	16.7	207.7	0.015	0.087	0.3
Skinners Ck	785.6	21.7	763.9	0.015	0.089	3.8
Bucca Ck	78.6	13.5	65.1	0.015	0.062	2.0
Cunninghams Ck	278.0	6.7	271.3	0.015	0.090	4.4
Cunninghams Ck South	82.6	19.0	63.6	0.015	0.063	6.4
Sugar Mill Ck	926.9	70.4	856.6	0.015	0.075	6.3
Total	**4,181.0**	**186.4**	**3,994.6**	**0.015**		

Notes

1. Obtained based on 1:25,000 Moonee Beach topographic map. Refer to Attachment B plan PS01-K000 for site catchment plan.
2. Adopted based on recent catchment aerials obtained from Nearmaps (2017).
3. Obtained from the weighted average land use based on recent catchment aerial photographs obtained from Nearmaps (2017) and the XP-RAFTS User Manual (1996).

Table 3: Probable maximum precipitation data used in RAFTS modelling

PMP Data [1]	Unit	Value
PMP 15 min rainfall intensity	mm/hr	136.1
PMP 30 min rainfall intensity	mm/hr	200.1
PMP 45 min rainfall intensity	mm/hr	254.1
PMP 1 hour rainfall intensity	mm/hr	302.1
PMP 1.5 hour rainfall intensity	mm/hr	353.6
PMP 2 hour rainfall intensity	mm/hr	400.5
PMP 3 hour rainfall intensity	mm/hr	457.8
PMP 6 hour rainfall intensity	mm/hr	588.5
PMP 9 hour rainfall intensity	mm/hr	725.0
PMP 12 hour rainfall intensity	mm/hr	860.0
PMP 18 hour rainfall intensity	mm/hr	1100.0

Notes

1. Obtained using the BOM (2003) Generalised Short-Duration Method and BOM (2003) Generalised Tropical Storm Method.

3.3 Results

Results of peak flow rates for catchments arriving at the site for the critical duration 5% AEP flood event, 1% AEP flood event, 1% AEP flood event with climate change and PMF events are summarised in Table 4.

Additional storm durations were modelled to determine the critical storm duration for the Bucca Creek catchment, in line with the peer reviewer comments from the previous MA flood study (BMT WBM). RAFTS model results for critical storm durations are provided in Table 4 and Table 5.

The critical storm duration for the Moonee Creek catchment was determined to be 9 hours for all modelled flood events. The critical storm duration for the Bucca Creek catchment was determined to be 1.5 hours for all modelled flood events. Results for critical storm duration peak flow rates are provided in Table 4 and Table 5.

Table 4: Peak design storm flow rates for critical duration storms for the Monee Creek catchment estimated by RAFTS modelling for sub-catchment flows.

Event	5% AEP	1% AEP	1% AEP (CC [1])	PMF
Storm Duration Total (hr)	9.0 [2]	9.0 [2]	9.0 [2]	9.0 [2]
Sub-catchment	**Peak Sub-catchment Flow Rates (m^3/s)**			
Moonee Creek Upper	127.5	193.4	215.5	605.5
Moonee Creek Lower	9.3	14.8	16.7	53.3
Skinners Creek	79.5	113.7	125.4	336.9
Bucca Creek	11.3	15.3	16.8	42.5
Cunninghams North	34.0	47.0	51.7	137.1
Cunninghams South	14.2	18.9	20.7	53.1
Sugar Mill Creek	119.6	164.1	180.3	471.6
Total [3]	380.2	548.0	607.8	1,682.8

Notes

1. Based on 10% increased rainfall intensity in accordance with the *Floodplain Risk Management Guideline – Practical Consideration of Climate Change* (2007) for catchments within the Northern Rivers.
2. The 9 hr storm duration is for critical Moonee Creek for all flood events modelled.
3. The offset of the timing of each catchment's hydrograph means the total flow rate is not always equal to the sum of all catchment peak flow rates.

Table 5: Peak design storm flow rates for critical duration storms for the Bucca Creek catchment estimated by RAFTS modelling for sub-catchment flows.

Event	5% AEP	1% AEP	1% AEP (CC [1])	PMF
Storm Duration Total (hr)	1.5 [2]	1.5 [2]	1.5 [2]	1.5 [2]
Sub-catchment	**Peak Sub-catchment Flow Rates (m^3/s)**			
Moonee Creek Upper	50.1	79.8	91.0	375.2
Moonee Creek Lower	12.6	16.0	17.5	49.0
Skinners Creek	41.7	65.5	74.9	295.6
Bucca Creek	12.3	16.4	18.1	58.0
Cunninghams North	21.9	33.8	38.5	141.9
Cunninghams South	20.2	27.1	30.5	101.6
Sugar Mill Creek	80.9	119.4	135.2	494.5
Total [3]	219.6	322.6	366.3	1373.4

Notes

1. Based on 10% increased rainfall intensity in accordance with the *Floodplain Risk Management Guideline – Practical Consideration of Climate Change* (2007) for catchments within the Northern Rivers.
2. The 1.5 hour storm is critical for Bucca Creek for all flood events modelled.
3. The offset of the timing of each catchment's hydrograph means the total flow rate is not always equal to the sum of all catchment peak flow rates.

4 Hydraulic Modelling

4.1 Overview

The TUFLOW hydraulic model was used to determine flood characteristics including flood extents, levels, depths, velocities and hydraulic hazard for the 1% AEP flood (envelope analysis), 1% AEP flood with climate change and probable maximum flood (PMF) events for existing and proposed conditions.

4.2 Scenarios

The hydraulic model was setup to represent the following flood condition scenarios:

1. Existing condition: the catchment and site in their current state as described in Sections 2.1, 2.2 and 2.3.

2. Proposed condition: the catchment in its current state and the site in its proposed state as described in Section 2.5.

The site is subject to storm surge and high ocean levels as described in Section 2.3. Combinations of catchment flooding and high ocean levels were adopted from Department of Environment, Climate Change & Water (DECC, 2010). Determining the joint probability of each of these events coinciding at the site is outside the scope of this assessment. Each of these scenarios was simulated in the hydraulic model to represent an envelope analysis of possible site flood conditions.

As part of this envelope analysis, critical storm durations for the Moonee Creek catchment and the local Bucca Creek catchment were assessed in line with the peer reviewer's comments from the previous MA flood study (MA, 2015). Details of critical storm durations for these catchments are provided in Section 3.

In addition, climate change scenarios were assessed in accordance with the NSW Department of Environment and Climate Change (2007), *Floodplain Risk Management Guideline Practical Consideration of Climate Change*. This included an increased rainfall intensity of 10% and an increased ocean level of 0.91 m. The combinations of those flood event scenarios were assessed in the hydraulic model as summarised in Table 6.

Table 6: Combinations of catchment and ocean flood events adopted for modelling.

Scenario	Catchment Event [1]	Ocean Event [2]	Peak Ocean Level (mAHD) [2]
1	5% AEP (9 Hour)	1% AEP	2.60
2	1% AEP (9 Hour)	5% AEP	2.25
3	1% AEP (9 Hour)	Neap tide	0.60
4	PMF (9 Hour)	Neap tide	0.60
5	1% AEP + CC [3] (9 hour)	5% AEP (CC [3])	3.16 [3]
6	5% AEP (1.5 hour)	1% AEP	2.60
7	1% AEP (1.5 hour)	5% AEP	2.25
8	1% AEP (1.5 hour)	Neap tide	0.60
9	PMF (1.5 hour)	Neap tide	0.60
10	1% AEP + CC [3] (1.5 hour)	5% AEP (CC [3])	3.16 [3]

Notes

1. Critical duration flood events for Moonee Creek and Bucca Creek catchments as determined by RAFTS modelling, refer Section 3.
2. Ocean levels obtained from Department of Environment, Climate Change & Water (2010), *Flood Risk Management Guide: Incorporating sea level rise benchmarks in flood risk assessments*.
3. Climate change analysis included a 10% increased rainfall intensity and a 0.91 m increased ocean level, in accordance with NSW Department of Environment and Climate Change (2007), *Floodplain Risk Management Guideline Practical Consideration of Climate Change*.

In summary, a total of 20 scenarios were modelled as part of this assessment (2 flood condition scenarios and 10 flood events each). The proposed conditions surface also included site design grading provided by RDM (2017).

4.3 Terrain Data

3D surfaces for the local floodplain environment used in the TUFLOW model are based on LIDAR provided by LPI (2013) and survey/LIDAR data provided by Resource Design & Management (RDM, 2017) for 'The Glades' development.

4.4 Detailed Existing Model Setup

4.4.1 Existing Conditions Model Setup

TUFLOW model construction for existing conditions consisted of:

1. Development of a 5.0 m topographic grid based on the available data provided in Section 4.3.

2. Establishment of model extents defined from 350 m upstream of Pacific Highway to the east of the site, to upstream of the confluence of Skinners Creek and Moonee Creek approximately 250 m north of the site, to the ocean approximately 2.3 km downstream of the site. Boundary extents were generally located

along catchment ridgelines and connecting catchment high points surrounding the study area.

3. Inclusion of inflow boundary conditions based on the critical duration 5% AEP, 1% AEP, 1% AEP with climate change, and PMF hydrographs from RAFTS for each sub-catchment in Table 4 (see page 16); with inflow locations shown in Attachment B: Flood Assessment Planset.

4. Inclusion of varying ocean water levels for downstream model extent boundary conditions based on DECC (2010) as described in Section 4.2. The tidal events for the 5% AEP, 1% AEP, and 1% AEP with climate change were conservatively modelled with a constant peak water level.

5. Assigning manning's roughness coefficients based on Nearmap Aerials (2017) for hydraulic modelling as shown in Table 7.

6. Inclusion of two bridge crossings under the Pacific Highway as layered flow constrictions. Levels were adopted from RDM survey (2017) and LIDAR, and AECOM SMEC JV (2011), *Bridge Waterway Crossings – Hydrology and Hydraulics study* (BWCHHS). A structural blockage of 0% was adopted based on the assessment procedure in Australian Rainfall and Runoff (Weeks & Rigby, 2016) and as per Council correspondence and recommendation.

7. Inclusion of 2 x 1500 mm concrete pipes at the crossing of Pacific Highway over Bucca Creek. Leveled were adopted from RDM survey (2017). A culvert blockage of 25% was adopted based on the assessment procedure in Australian Rainfall and Runoff (Weeks & Rigby, 2016).

Table 7: Manning's roughness values for TUFLOW modelling.

Catchment Material Type	Manning's Roughness Coefficient [1]
Beach	0.025
Buildings	0.200
Creek	0.04 when depth ≤ 0.3 m
	0.01 when depth > 0.6 m
Bushland / Riparian	0.100
Roads / Concrete	0.013
Rural Residential / Agricultural	0.035
Urban	0.015

Notes
1. Based on typical values from similar catchments and review of Nearmap images (2017).

4.4.2 Proposed Conditions

The following changes were made to the existing conditions flood model to enable detailed modelling of proposed site conditions:

1. Inclusion of the RDM 'Glades' proposed site grading, including internal roads.

2. Updating manning's roughness coefficients for the site to reflect proposed development surfaces.

3. Inclusion of proposed culverts (3 x 1.8 m x 2.4 m rectangular box culverts) at the crossing of Road 4 over Bucca Creek. A culvert blockage of 25% was adopted based on the assessment procedure in Australian Rainfall and Runoff (Weeks & Rigby, 2016). Culvert location is provided in Attachment B: Flood Assessment Planset.

All other model construction elements remained consistent with the existing conditions model.

4.5 Results

Flood mapping results (flood levels, depths, velocities and provisional hazard categories) for the critical duration 1% AEP flood (Scenario 2) in existing and proposed conditions are provided in Attachment B: Flood Assessment Planset, with drawing references summarised in Table 8. These results are provided as they represent the scenario with the worst-case offsite impacts. An additional flood map for the critical duration 1% AEP flood with climate change is also provided as this controls proposed flood planning levels.

Table 8: Flood map drawing references in Attachment B (MA planset P1706361PS01).

Scenario	Flood Event	Water Level & Depth (m)	Water Velocity (m/s)	Provisional Hydraulic Hazard Categories [1]	Water Level Impact (m)
Existing	Scenario 2 [2]	K100	K101	K102	–
Proposed	Scenario 2 [2]	K200	K201	K202	K300
	Scenario 2 [2]	K210	–	–	–

Notes

1. Provisional hydraulic hazard categories are based on NSW Floodplain Development Manual (2005) definitions and are shown in Figure 4.
2. Scenario 2 is the critical duration (9hr) Moonee Creek 1% AEP catchment flood with the 5% AEP ocean level, as described in Table 6.
3. Scenario 5 is the critical duration (9hr) Moonee Creek 1% AEP with climate change event, as described in Table 6. Climate change scenario based on 10% increased rainfall intensity in accordance with the *Floodplain Risk Management Guideline – Practical Consideration of Climate Change* (2007) for catchments within the Northern Rivers.

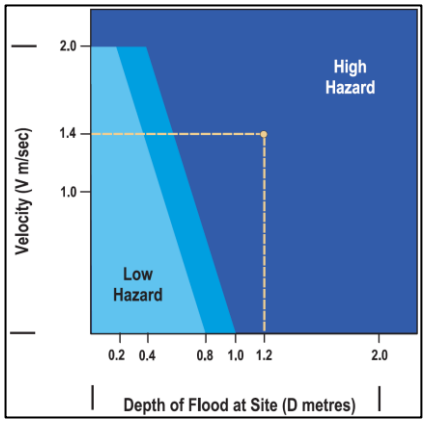

Figure 4: Provisional hydraulic hazard categories (*NSW Floodplain Development Manual*, 2005).

4.6 Discussion

We note the following regarding modelled flood behaviour:

4.6.1 Existing Conditions

1. The primary source of flood affectation at the site is due to the high tailwater condition in Moonee Creek.

2. Flood waters primarily flow through the southwest section of site from west to east in the flow direction of Bucca Creek.

3. Overland flows from the Bucca Creek catchment back up behind Pacific Highway due to the insufficient capacity of the existing 2 x 1,500 mm concrete pipes.

4. Maximum water levels and impacts for all scenarios modelled are governed by the critical duration Moonee Creek events (9 hour

storm) as opposed to the critical duration Bucca creek events (1.5 hour storm).

5. During the critical 1% AEP flood event there are overland flow depths of up to 1.0 m within Bucca Creek. This transitions to ponding at a distance of approximately 130 m downstream of the creek exiting the site, with depths up to 0.8 m. The area immediately adjacent to Bucca Creek is subject to overland flooding and have higher flood levels in the area.

6. Flood velocities for all events up to the critical 1% AEP flood event are generally:

    a. Moderate (<1.0 m/s) in Bucca Creek.

    b. Low (<0.2 m/s) in the area of the site north of Bucca Creek.

    c. Low (<0.4 m/s) in the area of the site south of Bucca Creek.

7. Hydraulic hazard is intermediate to high within the centre of Bucca Creek but is low for all areas outside of creek banks for all events up to the critical 1% AEP flood event.

4.6.2 Proposed Conditions

1. Proposed conditions adjacent to Bucca Creek reduce the area of flood affectation, however the local floodplain characteristics remain largely unchanged from existing conditions.

2. Flow through the existing 2 x 1500 mm concrete pipes in Bucca Creek below Pacific Highway arrive at the site and flow through the 3 x 2.4 x 1.8 m box culverts below proposed Road 4. These culverts are sized to ensure that only a minor degree of overland flow backs up behind the culverts in the critical 1% AEP flood event.

3. The proposed earthworks render the residential footprint largely flood free in the critical 1% AEP flood event. The proposed Road 4 crossing over Bucca Creek is flood free in the 1% AEP flood event, with the road level (5.0 mAHD) 850 mm above the adjacent 1% AEP flood level (4.15 mAHD).

4. None of the proposed roads are affected by flood water in the critical 1% AEP flood event. Of the 555 proposed lots, only 3 are affected by flood waters in the critical 1% AEP flood event – lots 1, 20 and 24 (refer Attachment A). These 3 lots are large (>1000 m^2) and only a small portion of each are affected by shallow, low hazard flood waters. We consider that flood flooding will not be a

major constraint for these lots, as building footprints can be located clear of critical 1% AEP flood extents.

5. The critical 1% AEP flood level ranges from 2.94 to 4.15 mAHD, and proposed earthworks are largely flood free.

6. Flood velocities for all events up to the critical 1% AEP flood event are generally:

    a. Moderate (<1.0 m/s) in Bucca Creek.

    b. Less than 1.7 m/s in the proposed culverts under Road 4.

    c. Eliminated from the development footprint due to the proposed earthworks being above the critical 1% AEP flood event.

7. Hydraulic hazard is intermediate to high within Bucca Creek and is outside the development footprint due to the proposed earthworks. Hydraulic hazard is low within the site up to the 1% AEP flood event with climate change.

8. The PMF flood level varies from 4.5-5.2 mAHD across the site. A shelter-in-place evacuation strategy is recommended for future proposed dwellings with a second story for each building.

4.6.3 Offsite Flood Impacts

1. The proposed development does not have material offsite impacts on water levels. There is a small area of approximately 58 m^2 impact within the Bucca Creek creekline of up to 70 mm in the critical 1% AEP flood event at the sites' western boundary adjacent to Pacific Highway. This impact is negligible considering its small area and its' location within the existing creek.

2. There are no other offsite water level impacts in the critical 1% AEP flood event, and no residential properties are negatively affected. The proposed development therefore has an acceptable impact on the local floodplain environment.

4.6.4 Climate Change Analysis

1. The critical 1% AEP with climate change flood level yields maximum water levels of 3.53 - 4.18 mAHD. To comply with Council's freeboard controls, the proposed flood planning level (FPL) will be 500 mm above the 1% AEP with climate change flood level of 4.03 - 4.68.

2. With the exception of the 3 lots discussed in section 4.6.2, the proposed earthworks are flood free up to the critical 1% AEP flood event with climate change.

3. Table 9 summarises flood levels and the recommended flood planning levels for the proposed development.

Table 9: Flood levels and recommended flood planning level

Scenario	Duration (hr)	Rainfall	Ocean	Flood Level[1] (mAHD)	FPL[1] (mAHD)
2	9.0	1% AEP	5% AEP	2.94 – 4.15	3.44 – 4.65
4	9.0	PMF	Neap Tide	4.51 – 5.22	–
5	9.0	1% AEP + Climate Change	5% AEP + Climate Change	3.53 – 4.18	4.03 – 4.68
7	1.5	1% AEP	5% AEP	2.49 – 4.03	2.99 – 4.53
9	1.5	PMF	Neap Tide	3.76 – 4.66	–
10	1.5	1% AEP + Climate Change	5% AEP + Climate Change	3.29 – 4.06	3.79 – 4.56
				Recommended FPL	4.03 – 4.68 [2]

Notes

1. Flood level and therefore recommended flood planning levels vary across the site. Refer to Attachment B: Flood Assessment Planset for details.
2. We note this is marginally higher than the 4.00 mAHD FPL adopted to the south in the MA 2015 flood report, because this study has adopted slightly higher ocean boundary conditions.

5 Summary and Recommendations

A detailed hydrologic and hydraulic model has been prepared for the site consistent with Council's accepted MA 2015 TUFLOW model provided in MA P1002663JR08V01, with additional site survey and proposed design elements to assess local flood characteristics.

The models were used to determine the existing and proposed flood conditions in the 1% AEP envelope analysis (with and without climate change), and PMF events. Modelling concluded that:

1. The proposed development does not have any material offsite water level impacts.

2. The proposed development area is flood free in the critical 1% AEP flood event with climate change.

3. Compliance with Council flood planning level requirements for future buildings and roads are achievable.

The following recommendations are made:

1. All proposed dwellings are to have a finished floor levels at 4.03 – 4.68 mAHD (0.5m higher than determined flood levels), in accordance with drawing PS01-K210 produced in this report.

2. Should the proposed development footprint change, or significant changes to the proposed design levels and/or culvert design occur (as shown on Drawing PS01-A050), an updated flood model with detailed earthworks should be prepared at Construction Certificate stage.

The proposed development has been designed to ensure compatibility with the existing floodplain environment. As the proposed development has been designed to achieve Council requirements, no further recommendations are considered necessary.

6 References

AECOM SMEC JV (2011), *Bridge Waterway Crossings – Hydrology and Hydraulics Study (BWCHHS)*.

Bewsher Consulting (2005), Coffs Creek Floodplain Risk Management Plan.

Bureau of Meteorology (2003), *The Estimation of Probable Maximum Precipitation in Australia: Generalised Short-Duration Method*.

Bureau of Meteorology (2003), *Generalised Tropical Storm Method.*

Cardno Lawson Treloar (2007) The Glades, Moonee Beach – Hydraulic Assessment.

Coffs Harbour Council (2008), *Climate Change Policy.*

Coffs Harbour Council (2015), *Coffs Harbour Development Control Plan (DCP).*

Coffs Harbour Council (2009), *Coffs Harbour Engineering Design Guidelines – Stormwater Drainage.*

Coffs Harbour Council (2013), *Coffs Harbour Local Environmental Plan (LEP).*

Institute of Engineer's Australia (1987), *Australian Rainfall and Runoff.*

Land and Property Information (2001)*, 1:25,000 Topographic Map, Moonee Beach 9537-4-S.*

Martens & Associates (2015), *Flood Assessment: Proposed Sub-division, Lot 1 DP1097743, Pacific Highway, Moonee Beach, NSW.*

NSW Department of Environment and Climate Change (2007), *Floodplain Risk Management Guideline Practical Consideration of Climate Change.*

NSW Department of Environment, Climate Change & Water (2010), *Flood Risk Management Guide: Incorporating sea level rise benchmarks in flood risk assessments.*

NSW Department of Infrastructure, Planning and Natural Resources (2005), *Floodplain Development Manual*.

NSW Government Environment & Heritage (2017) *eSPADE – NSW Soil and Land Information,* www.environment.nsw.gov.au/eSpade2WebApp.

Paterson Consultants (1998), *Moonee Creek Flood Study.*

Weeks, W and Rigby, T (2016), *Blockage of Hydraulic Structures,* Chapter 6 of Book 6 in *Australian Rainfall and Runoff – A Guide to Flood Estimation*.

XP-RAFTS (1996), User's Manual.

7 Attachment A: Site Survey and Lot Layout

"The Glades"

BUCCA ROAD

HIGHWAY

PACIFIC

HOYS RD

LOT 2 on DP 725785
(Area = 3.359 ha)

LOT 1 on DP 725785
(Area = 92.550 ha)

LOT 7
DP 252223

HIGHWAY ACCESS FOR CONSTRUCTION ONLY

POTENTIAL CORNER STORE / RESIDENTIAL SITE

PARK

Skinners Creek

Moonee Creek

Road 1
Road 2
Road 3
Road 4
Road 5
Road 6
Road 7
Road 8
Road 9
Road 10

Access Path Way

1 2 3 4 5 6 7 8 9 10 11

LEGEND

524 — LOT NUMBER
620sq m — LOT AREA
20.0 — LOT LENGTH

RECREATION NODE
(REFER PLAN 6 PATH NETWORK & DEVELOPMENT FACILITIES BY ANNE HARRISON LANDSCAPE ARCHITECTS.)

MAJOR PEDESTRIAN / CYCLE (SHAREWAY)
(REFER PLAN 6 PATH NETWORK & DEVELOPMENT FACILITIES BY ANNE HARRISON LANDSCAPE ARCHITECTS.)

MAJOR PEDESTRIAN / CYCLE BOULEVARD
(REFER PLAN 6 PATH NETWORK & DEVELOPMENT FACILITIES BY ANNE HARRISON LANDSCAPE ARCHITECTS.)

LOCAL CONNECTION PATHWAY
(REFER PLAN 6 PATH NETWORK & DEVELOPMENT FACILITIES BY ANNE HARRISON LANDSCAPE ARCHITECTS.)

updated plan
Issued Jan 2018

Stage	No of Lots
1	67
2	40
3	59
4	61
5	51
6	61
7	48
8	48
9	50
10	42
11	28
TOTAL	**555**

0 20 40 60 80 100 200 metres
1 : 2000 (at A1 before reduction)

amdt no.	date	amendment
F	FEB 09	TEMPORARY INTERSECTION AMENDED
E	DEC 08	PATH NETWORK AND FACILITIES ADDED
D	MAY 08	TOTAL SITE APPLICATION
C	APRIL 08	ENTRY AMENDED
B	OCT 07	DRAWING TITLE AMENDMENT
A	SEPT 07	CONCEPT PLAN & PRECINCT NOTED

PRELIMINARY LOT LAYOUT

AUSPACIFIC ENGINEERS

AUSPACIFIC ENGINEERS PTY LTD
development consultants, civil, structural and hydraulic engineers
3 / 20 Nerang Street
NERANG QLD 4211
T 07 5596 5377
F 07 5596 3443
E auspacifik@austarnet.com.au

scales	AS SHOWN
design	RKH
drawn	JM
date	NOV 2006
signed	

client: THE ROTHWELL BOYS PTY LTD

project: PROPOSED RESIDENTIAL SUBDIVISION MOONEE BEACH COFFS HARBOUR

dwg no. P1

amendment F

8 Attachment B: Flood Assessment Planset

PROJECT: ENGINEERING SERVICES FOR DA - FLOOD ASSESSMENT

PLANSET: FLOOD ASSESSMENT

CLIENT: RESOURCE DESIGN & MANAGEMENT C/- ROTHWELL BOYS

LOCALITY PLAN
N.T.S.

DRAWING LIST		
DWG NO.	REV	DWG TITLE
GENERAL		
PS01-A000	B	COVER SHEET
PS01-A050	B	OVERVIEW PLAN
FLOODING		
PS01-K000	A	CATCHMENT PLAN
PS01-K100	B	1% AEP CATCHMENT + 5% AEP OCEAN EXISTING CONDITION WATER LEVEL (mAHD) & WATER DEPTH (m)
PS01-K101	A	1% AEP CATCHMENT + 5% AEP OCEAN EXISTING CONDITION WATER VELOCITY (m/s)
PS01-K102	A	1% AEP CATCHMENT + 5% AEP OCEAN EXISTING CONDITION PROVISIONAL HYDRAULIC HAZARD CATEGORIES
PS01-K200	B	1% AEP CATCHMENT + 5% AEP OCEAN PROPOSED CONDITION WATER LEVEL (mAHD) & WATER DEPTH (m)
PS01-K201	A	1% AEP CATCHMENT + 5% AEP OCEAN PROPOSED CONDITION WATER VELOCITY (m/s)
PS01-K202	A	1% AEP CATCHMENT + 5% AEP OCEAN PROPOSED CONDITION PROVISIONAL HYDRAULIC HAZARD CATEGORIES
PS01-K210	B	1% AEP CATCHMENT + 5% AEP OCEAN + CLIMATE CHANGE PROPOSED CONDITION WATER LEVEL (mAHD) & WATER DEPTH (m)
PS01-K220	B	PMF CATCHMENT + NEAP OCEAN PROPOSED CONDITION WATER LEVEL (mAHD) & WATER DEPTH (m)
PS01-K300	A	1% AEP CATCHMENT + 5% AEP OCEAN PROPOSED CONDITION WATER LEVEL IMPACT (m)

LGA: COFFS HARBOUR CITY COUNCIL

'GLADES', PACIFIC HIGHWAY, MOONEE BEACH, NSW
LOT 1 & 2 DP 725785

DEVELOPMENT APPLICATION

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
B	**MINOR AMENDMENTS**	**25/01/2018**	**PD**	**PD**	**DD**	**DD**
A	INITIAL RELEASE	24/01/2018	RK	PD	DD	DD

SCALE

PRINTED: --- - USER DPMM

A1 / A3 LANDSCAPE (A1LC_v02.0.01)

GRID | DATUM | PROJECT MANAGER: GT

CLIENT: RESOURCE DESIGN & MANAGEMENT

PROJECT NAME/PLANSET TITLE
ENGINEERING SERVICES FOR DA
FLOOD ASSESSMENT
PACIFIC HIGHWAY, MOONEE BEACH, NSW
LOT 1 & 2 DP 725785

martens & Associates Pty Ltd
Consulting Engineers
Environment
Water
Geotechnical
Civil
Suite 201, 20 George St, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767
Email: mail@martens.com.au Internet: www.martens.com.au

DRAWING TITLE: COVER SHEET

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706361	PS01	R02	PS01-A000	B

DRAWING ID: P1706361-PS01-R02-A000

KEY

SITE BOUNDARY

PROPOSED LOT BOUNDARIES

PROPOSED CONTOUR —12—

DEVELOPMENT APPLICATION

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
B	MINOR AMENDMENTS	25/01/2018	PD	PD	DD	DD
A	INITIAL RELEASE	24/01/2018	KW	PD	DD	DD

SCALE
0 25 50 75 100 125 150 175 200 225 250 METRES
A1 (A3) 1:2,500 (1:5,000)

GRID	DATUM	PROJECT MANAGER
MGA	mAHD	GT

CLIENT
RESOURCE DESIGN & MANAGEMENT

PROJECT NAME/PLANSET TITLE
ENGINEERING SERVICES FOR DA
FLOOD ASSESSMENT
PACIFIC HIGHWAY, MOONEE BEACH, NSW
LOT 1 & 2 DP 725785

martens & Associates Pty Ltd
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Water
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Civil
Suite 201, 20 George St, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767
Email: mail@martens.com.au Internet: www.martens.com.au

DRAWING TITLE
OVERVIEW PLAN

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706361	PS01	R02	PS01-A050	B

PRINTED: --- USER: PDWH
A1 / A3 LANDSCAPE (A1LC_v02.0.01)
DRAWING ID: P1706361-PS01-R02-A050

KEY

SITE BOUNDARY

CATCHMENT BOUNDARIES

DEVELOPMENT APPLICATION

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
A	INITIAL RELEASE	24/01/2018	KW	PD	DD	DD

SCALE

0 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50 KILOMETRES

A1 (A3) 1:25,000 (1:50,000)

GRID	DATUM	PROJECT MANAGER
		GT

CLIENT

RESOURCE DESIGN & MANAGEMENT

PROJECT NAME/PLANSET TITLE

ENGINEERING SERVICES FOR DA

FLOOD ASSESSMENT

PACIFIC HIGHWAY, MOONEE BEACH, NSW
LOT 1 & 2 DP 725785

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DRAWING TITLE

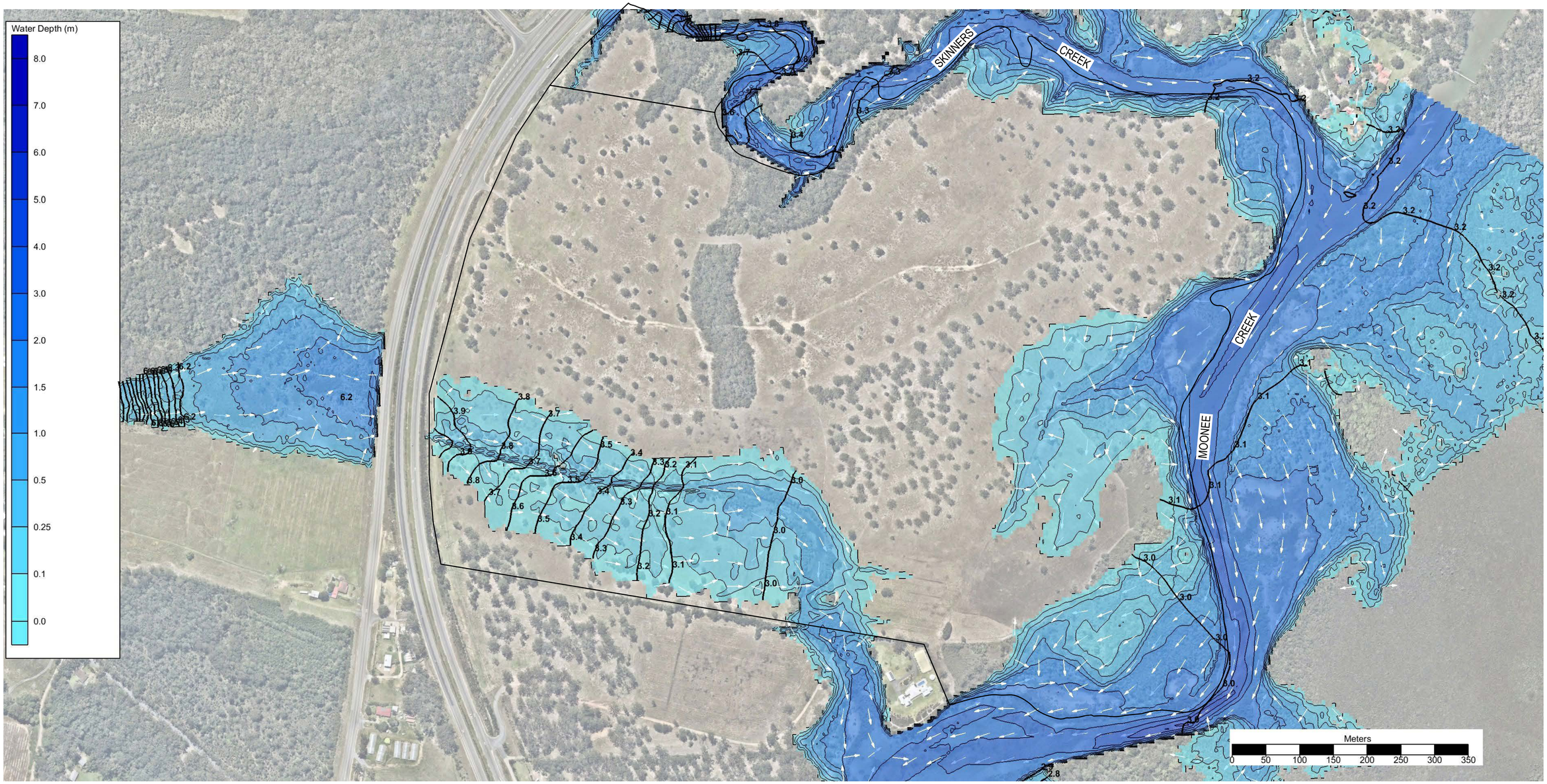
CATCHMENT PLAN

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706361	PS01	R02	PS01-K000	A

DRAWING ID: P1706361-PS01-R02-K000

PRINTED: --- USER: PDNH

A1 / A3 LANDSCAPE (A1LC_v02.0.01)



KEY

SITE BOUNDARY

CADASTRE BOUNDARIES

DEVELOPMENT APPLICATION

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
B	MINOR AMENDMENTS	25/01/2018	PD	PD	DD	DD
A	INITIAL RELEASE	24/01/2018	RK	PD	DD	DD

SCALE: A1 (A3) 1:3,000 (1:6,000) — 0 30 60 90 120 150 180 210 240 270 300 METRES

GRID	DATUM	PROJECT MANAGER
MGA	mAHD	GT

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PACIFIC HIGHWAY, MOONEE BEACH, NSW
LOT 1 & 2 DP 725785

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Civil
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Email: mail@martens.com.au Internet: www.martens.com.au

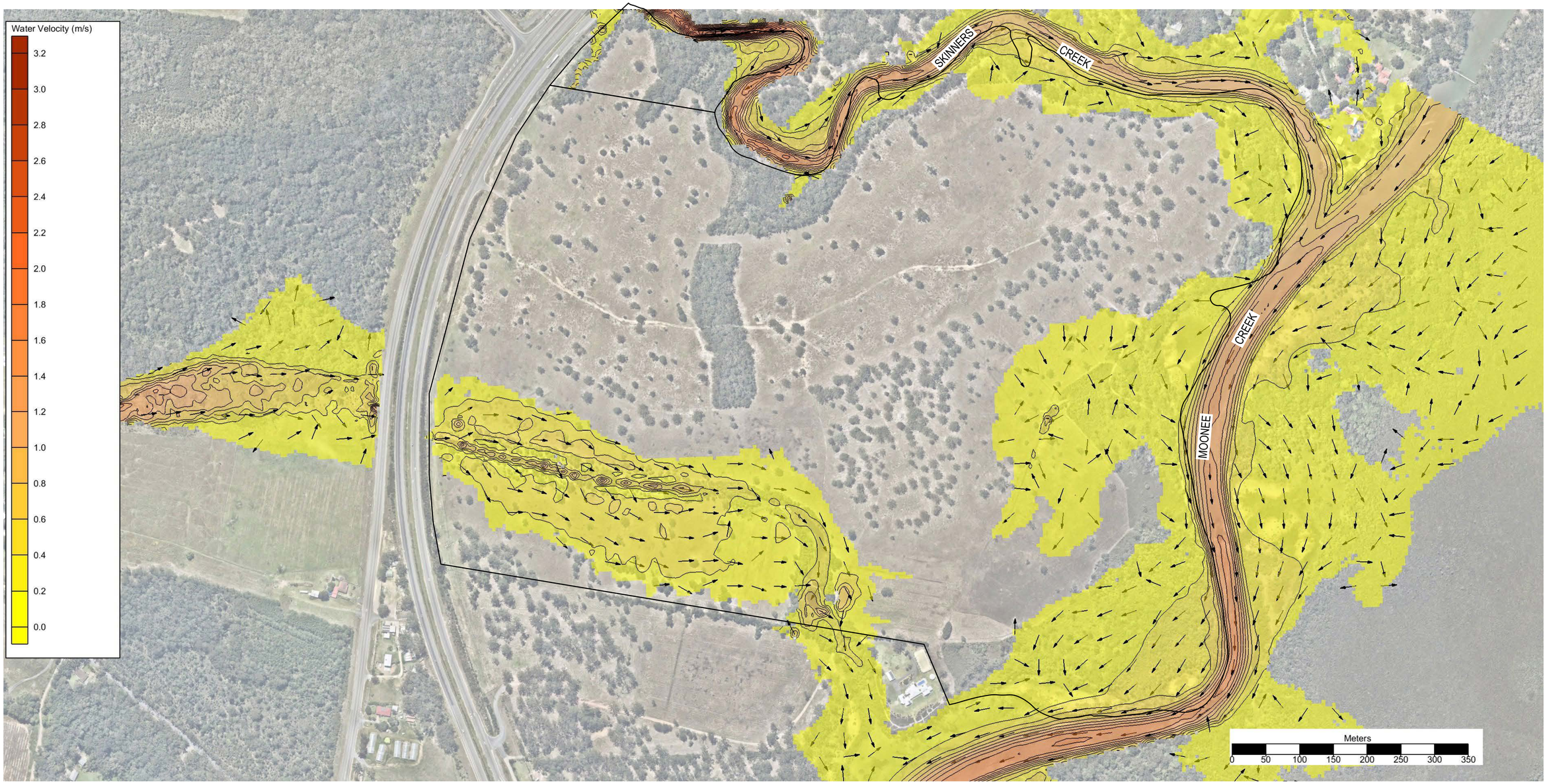
DRAWING TITLE
1% AEP CATCHMENT + 5% AEP OCEAN
EXISTING CONDITION
WATER LEVEL (mAHD) & WATER DEPTH (m)

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706361	PS01	R02	PS01-K100	B

DRAWING ID: P1706361-PS01-R02-K100

PRINTED: --- USER: RPAH

A1 / A3 LANDSCAPE (A1LC_v02.0.01)



KEY

SITE BOUNDARY

CADASTRE BOUNDARIES

DEVELOPMENT APPLICATION

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
A	INITIAL RELEASE	24/01/2018	RK	PD	DD	DD

SCALE: 0 30 60 90 120 150 180 210 240 270 300 METRES
A1 (A3) 1:3,000 (1:6,000)

GRID	DATUM	PROJECT MANAGER
MGA	mAHD	GT

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CLIENT: RESOURCE DESIGN & MANAGEMENT

PROJECT NAME/PLANSET TITLE: ENGINEERING SERVICES FOR DA
FLOOD ASSESSMENT
PACIFIC HIGHWAY, MOONEE BEACH, NSW
LOT 1 & 2 DP 725785

martens & Associates Pty Ltd
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Email: mail@martens.com.au Internet: www.martens.com.au

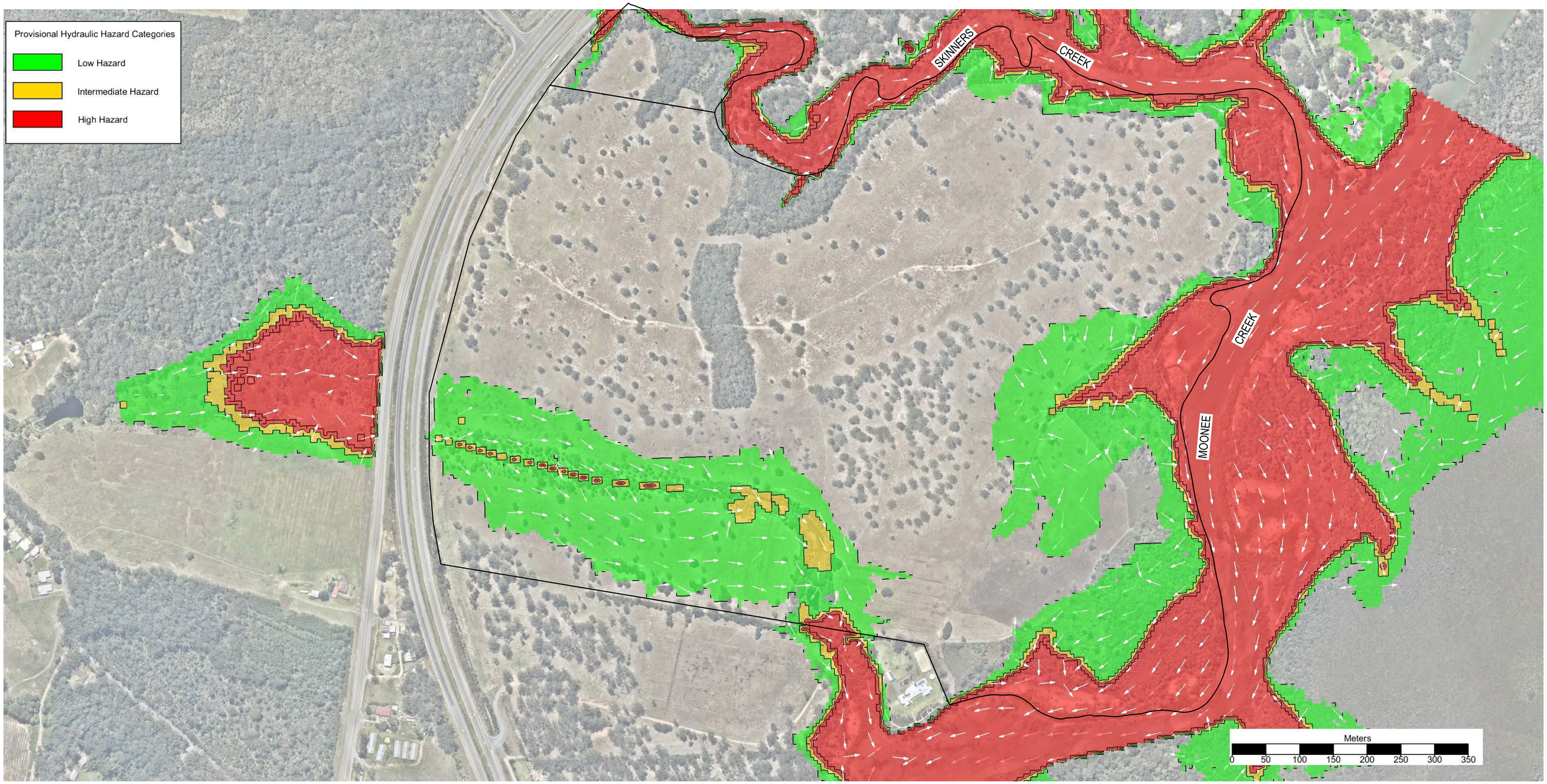
DRAWING TITLE
1% AEP CATCHMENT + 5% AEP OCEAN
EXISTING CONDITION
WATER VELOCITY (m/s)

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706361	PS01	R02	PS01-K101	A

DRAWING ID: P1706361-PS01-R02-K101

PRINTED: --- - USER: PDWH

A1 / A3 LANDSCAPE (A1LC_v02.0.01)



KEY

SITE BOUNDARY

CADASTRE BOUNDARIES

NOTE: HYDRAULIC HAZARD BASED ON NSW GOVERNMENT (2005)
FLOODPLAIN DEVELOPMENT MANUAL PROVISIONAL HYDRAULIC HAZARD CATEGORIES

DEVELOPMENT APPLICATION

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
A	INITIAL RELEASE	24/01/2018	RK	PD	DD	DD

SCALE
0 30 60 90 120 150 180 210 240 270 300 METRES
A1 (A3) 1:3,000 (1:6,000)

GRID	DATUM	PROJECT MANAGER
MGA	mAHD	GT

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CLIENT
RESOURCE DESIGN & MANAGEMENT

PROJECT NAME/PLANSET TITLE
ENGINEERING SERVICES FOR DA
FLOOD ASSESSMENT
PACIFIC HIGHWAY, MOONEE BEACH, NSW
LOT 1 & 2 DP 725785

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Email: mail@martens.com.au Internet: www.martens.com.au

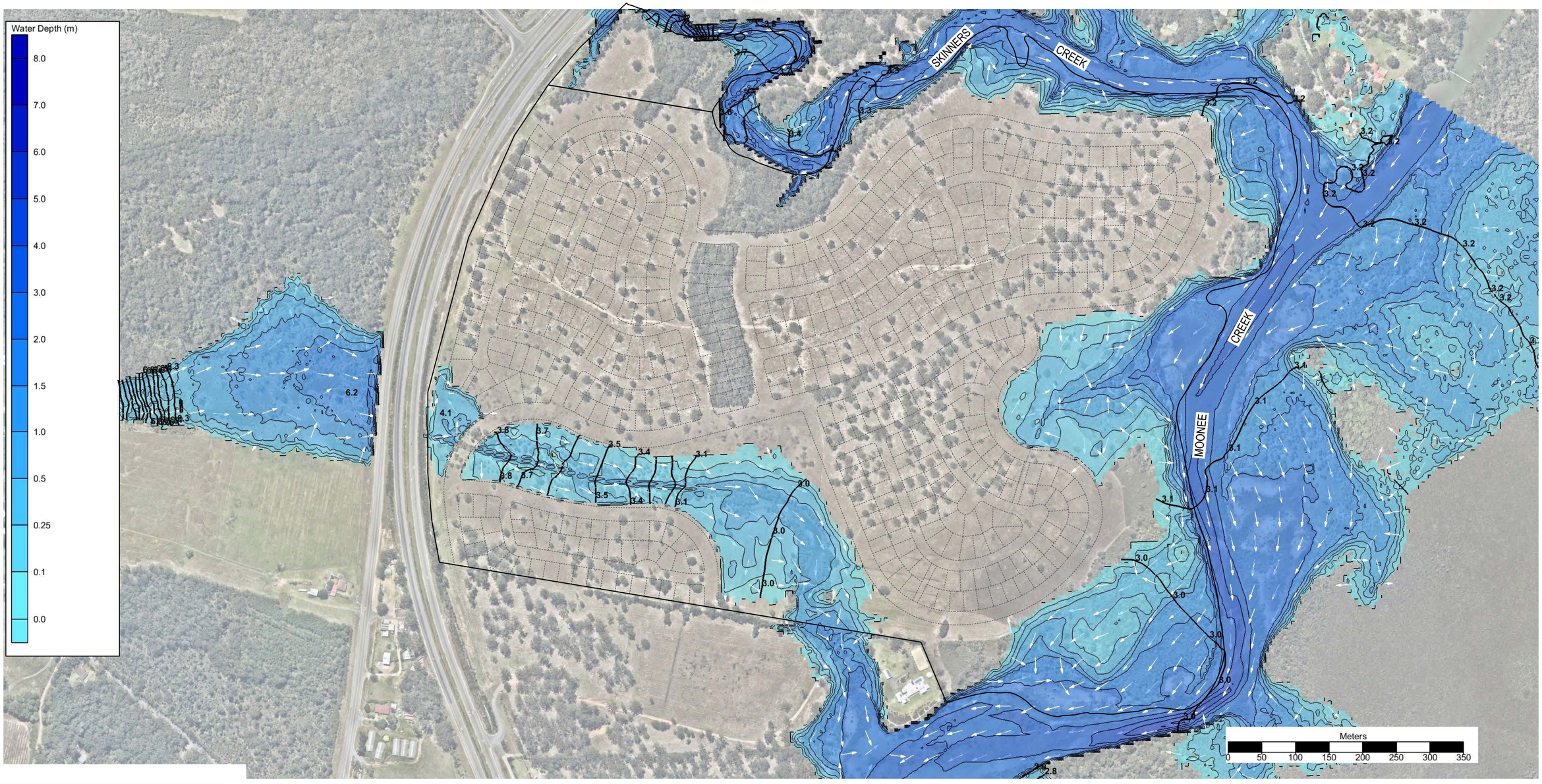
DRAWING TITLE
1% AEP CATCHMENT + 5% AEP OCEAN
EXISTING CONDITION
PROVISIONAL HYDRAULIC HAZARD CATEGORIES

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706361	PS01	R02	PS01-K102	A

DRAWING ID: P1706361-PS01-R02-K102

PRINTED: --- --- USER: PDWI

A1 / A3 LANDSCAPE (A1LC_v02.0.01)



KEY

SITE BOUNDARY

CADASTRE BOUNDARIES

PROPOSED LOT LAYOUT

DEVELOPMENT APPLICATION

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
B	MINOR AMENDMENTS	25/01/2018	PD	PD	DD	DD
A	INITIAL RELEASE	24/01/2018	RK	PD	DD	DD

SCALE: A1 (A3) 1:3,000 (1:6,000) METRES

GRID	DATUM	PROJECT MANAGER
MGA	mAHD	GT

CLIENT: RESOURCE DESIGN & MANAGEMENT

PROJECT NAME/PLANSET TITLE: ENGINEERING SERVICES FOR DA
FLOOD ASSESSMENT
PACIFIC HIGHWAY, MOONEE BEACH, NSW
LOT 1 & 2 DP 725785

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Suite 201, 20 George St, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767
Email: mail@martens.com.au Internet: www.martens.com.au

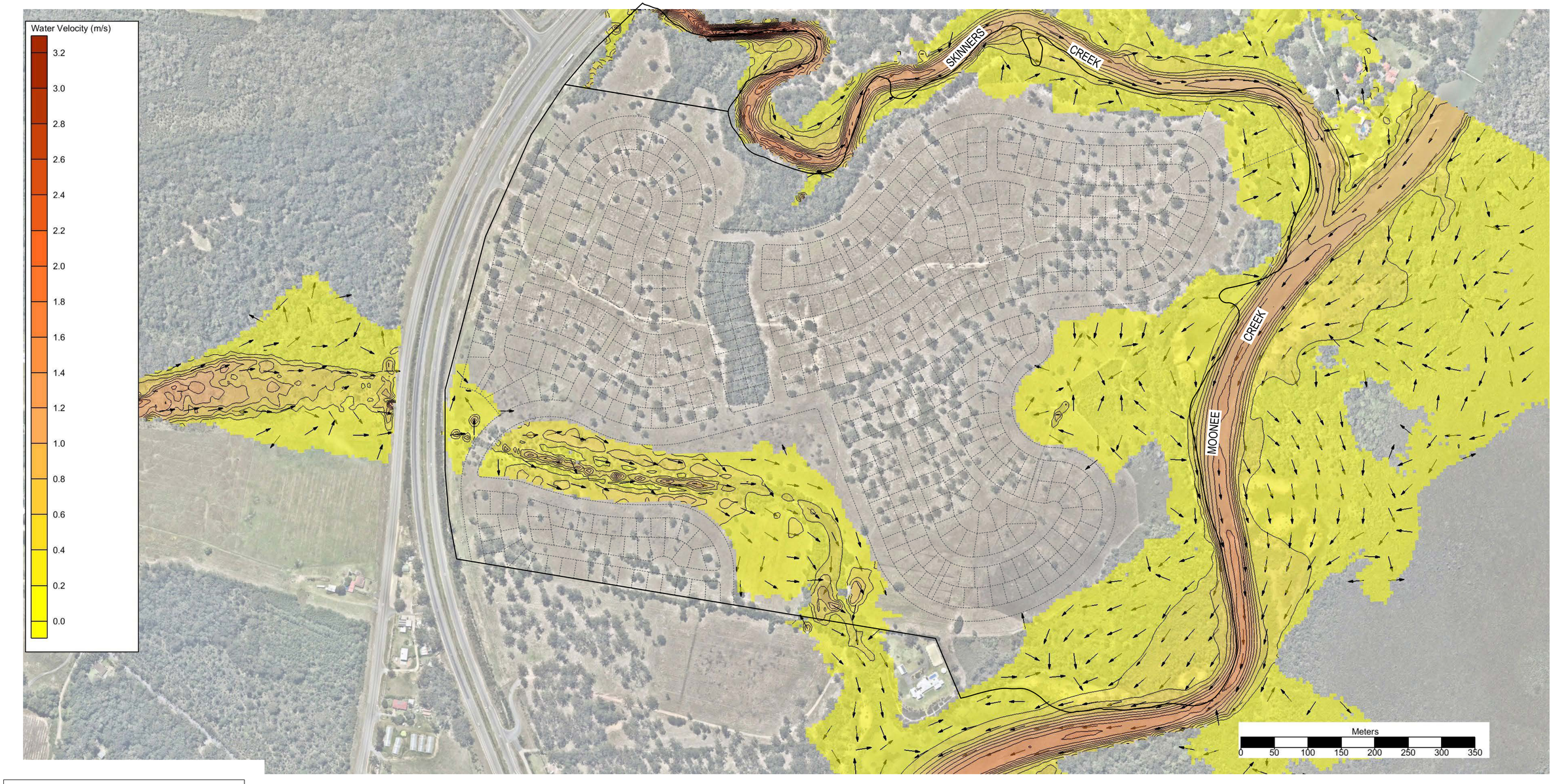
DRAWING TITLE
1% AEP CATCHMENT + 5% AEP OCEAN
PROPOSED CONDITION
WATER LEVEL (mAHD) & WATER DEPTH (m)

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706361	PS01	R02	PS01-K200	B

DRAWING ID: P1706361-PS01-R02-K200

PRINTED ---- USER: PDNH

A1 / A3 LANDSCAPE (A1LC_v02.0.01)



KEY

SITE BOUNDARY

CADASTRE BOUNDARIES

PROPOSED LOT LAYOUT

DEVELOPMENT APPLICATION

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
A	INITIAL RELEASE	24/01/2018	RK	PD	DD	DD

SCALE
0 30 60 90 120 150 180 210 240 270 300 METRES
A1 (A3) 1:3,000 (1:6,000)

GRID	DATUM	PROJECT MANAGER
MGA	mAHD	GT

CLIENT
RESOURCE DESIGN & MANAGEMENT

PROJECT NAME/PLANSET TITLE
ENGINEERING SERVICES FOR DA
FLOOD ASSESSMENT
PACIFIC HIGHWAY, MOONEE BEACH, NSW
LOT 1 & 2 DP 725785

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Environment
Water
Geotechnical
Civil
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Email: mail@martens.com.au Internet: www.martens.com.au

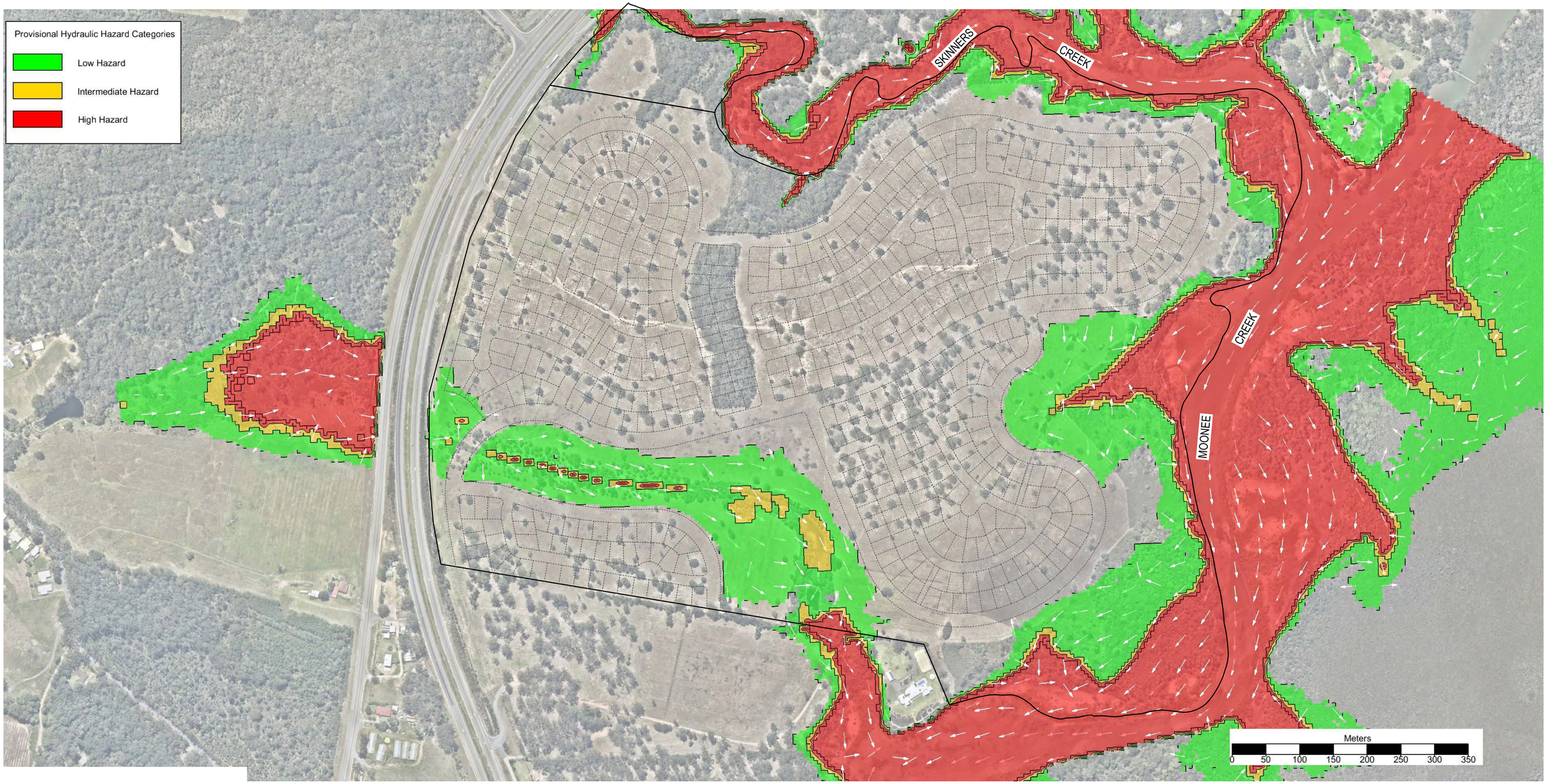
DRAWING TITLE
1% AEP CATCHMENT + 5% AEP OCEAN
PROPOSED CONDITION
WATER VELOCITY (m/s)

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706361	PS01	R02	PS01-K201	A

DRAWING ID: P1706361-PS01-R02-K201

PRINTED ---- USER: PDINH

A1 / A3 LANDSCAPE (A1LC_v02.0.01)



KEY

SITE BOUNDARY

CADASTRE BOUNDARIES

PROPOSED LOT LAYOUT

NOTE: HYDRAULIC HAZARD BASED ON NSW GOVERNMENT (2005)
FLOODPLAIN DEVELOPMENT MANUAL PROVISIONAL HYDRAULIC HAZARD CATEGORIES

DEVELOPMENT APPLICATION

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
A	INITIAL RELEASE	24/01/2018	RK	PD	DD	DD

SCALE
0 30 60 90 120 150 180 210 240 270 300 METRES
A1 (A3) 1:3,000 (1:6,000)

GRID	DATUM	PROJECT MANAGER
MGA	mAHD	GT

CLIENT
RESOURCE DESIGN & MANAGEMENT

PROJECT NAME/PLANSET TITLE
ENGINEERING SERVICES FOR DA
FLOOD ASSESSMENT
PACIFIC HIGHWAY, MOONEE BEACH, NSW
LOT 1 & 2 DP 725785

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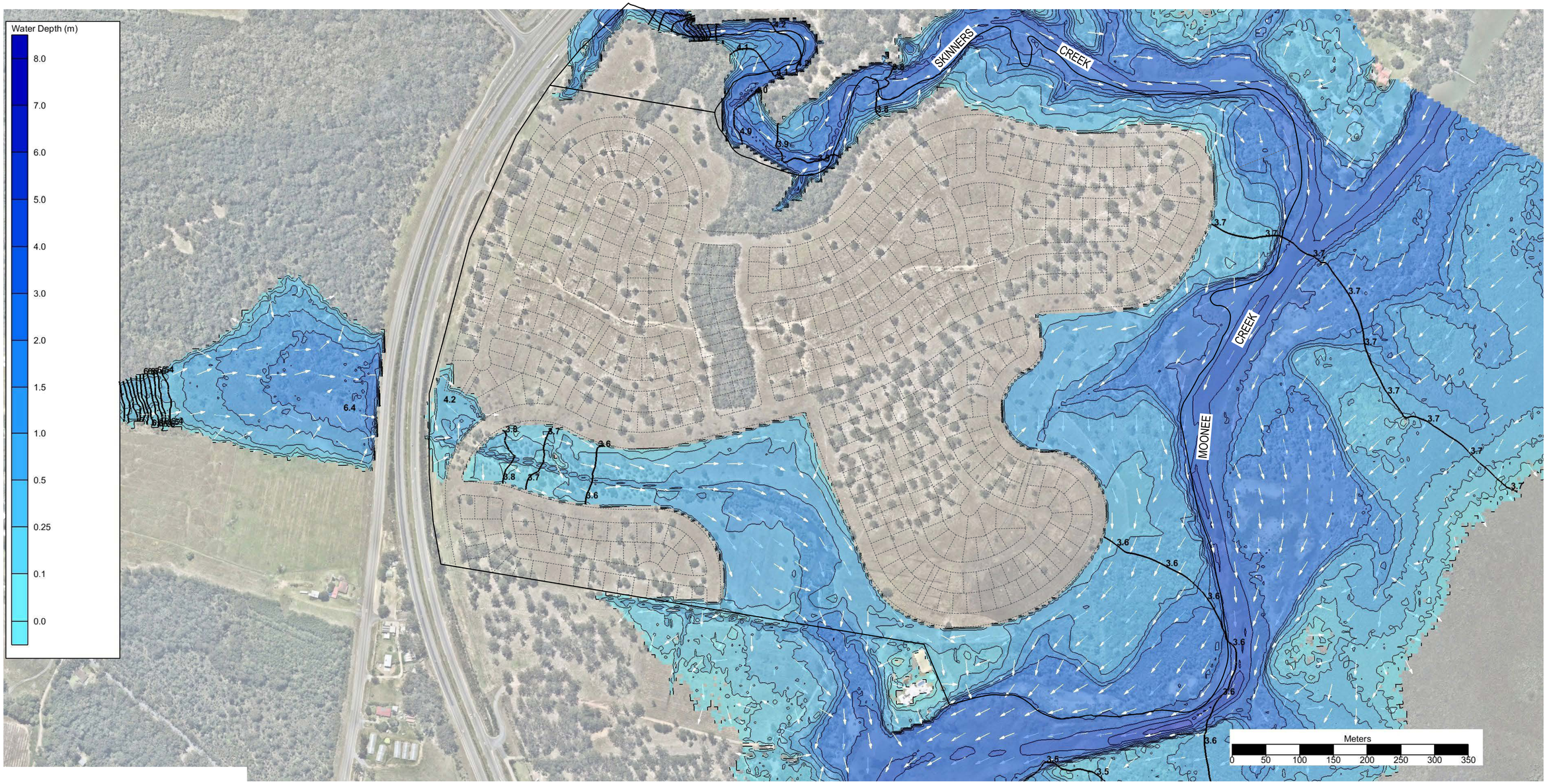
Suite 201, 20 George St, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767
Email: mail@martens.com.au Internet: www.martens.com.au

DRAWING TITLE
1% AEP CATCHMENT + 5% AEP OCEAN
PROPOSED CONDITION
PROVISIONAL HYDRAULIC HAZARD CATEGORIES

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706361	PS01	R02	PS01-K202	A

PRINTED: --- - USER: PDWI
A1 / A3 LANDSCAPE (A1LC_v02.0.01)
DRAWING ID: P1706361-PS01-R02-K202



KEY

SITE BOUNDARY

CADASTRE BOUNDARIES

PROPOSED LOT LAYOUT

DEVELOPMENT APPLICATION

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
B	**MINOR AMENDMENTS**	**25/01/2018**	**PD**	**PD**	**DD**	**DD**
A	INITIAL RELEASE	24/01/2018	RK	PD	DD	DD

SCALE: 0 30 60 90 120 150 180 210 240 270 300 METRES
A1 (A3) 1:3,000 (1:6,000)

GRID	DATUM	PROJECT MANAGER
MGA	mAHD	GT

CLIENT: RESOURCE DESIGN & MANAGEMENT

PROJECT NAME/PLANSET TITLE: ENGINEERING SERVICES FOR DA
FLOOD ASSESSMENT
PACIFIC HIGHWAY, MOONEE BEACH, NSW
LOT 1 & 2 DP 725785

martens & Associates Pty Ltd
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Environment
Water
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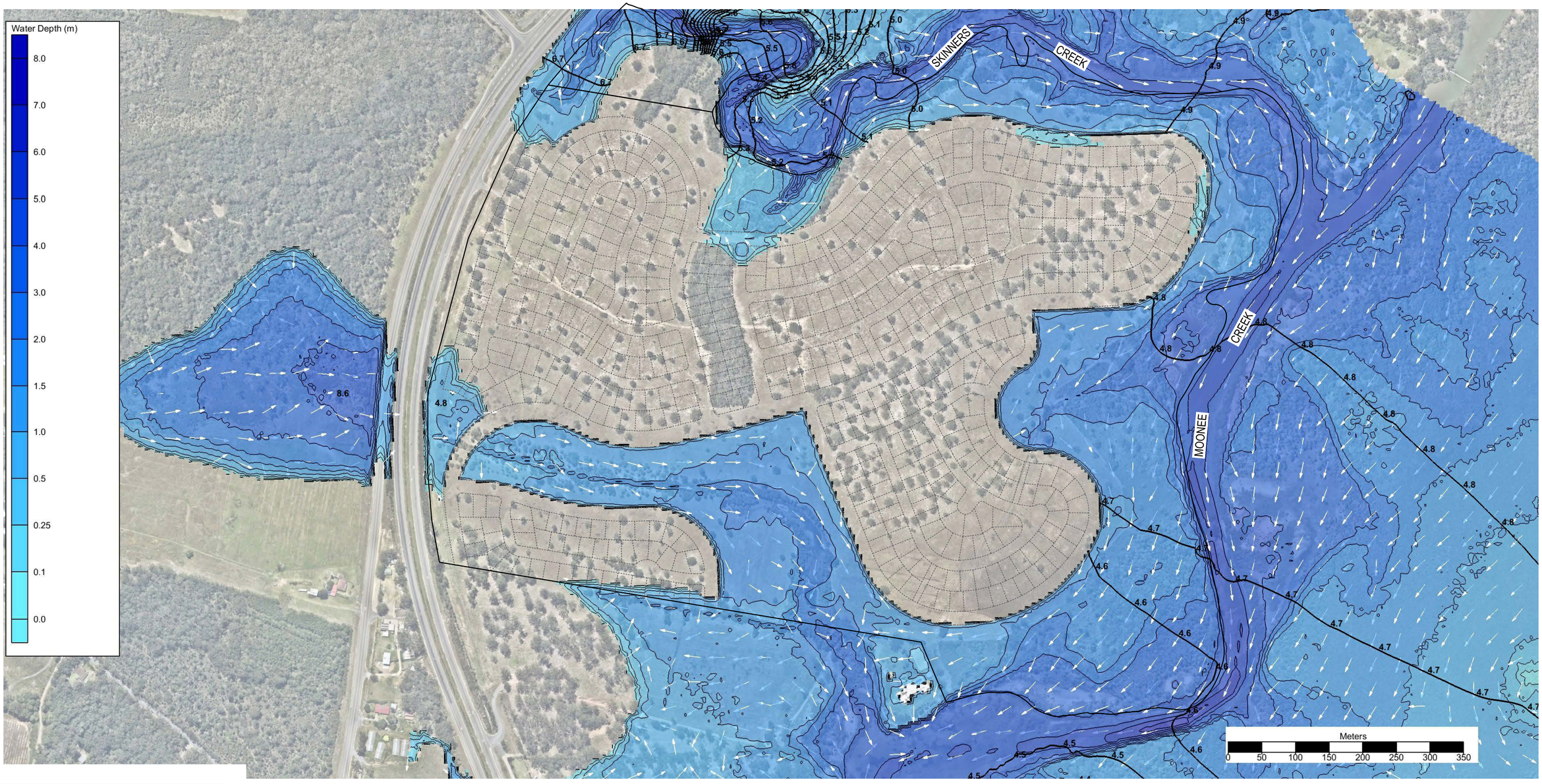
Civil
Suite 201, 20 George St, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767
Email: mail@martens.com.au Internet: www.martens.com.au

DRAWING TITLE
1% AEP CATCHMENT + 5% AEP OCEAN + CLIMATE CHANGE
PROPOSED CONDITION
WATER LEVEL (mAHD) & WATER DEPTH (m)

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706361	PS01	R02	PS01-K210	B

PRINTED: ---- - USER DPMM
A1 / A3 LANDSCAPE (A1LC__v02.0.01)
DRAWING ID: P1706361-PS01-R02-K210



KEY

SITE BOUNDARY

CADASTRE BOUNDARIES

PROPOSED LOT LAYOUT

DEVELOPMENT APPLICATION

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
B	MINOR AMENDMENTS	25/01/2018	PD	PD	DD	DD
A	INITIAL RELEASE	24/01/2018	RK	PD	DD	DD

SCALE
0 30 60 90 120 150 180 210 240 270 300 METRES
A1 (A3) 1:3,000 (1:6,000)

GRID	DATUM	PROJECT MANAGER
MGA	mAHD	GT

CLIENT
RESOURCE DESIGN & MANAGEMENT

PROJECT NAME/PLANSET TITLE
ENGINEERING SERVICES FOR DA
FLOOD ASSESSMENT
PACIFIC HIGHWAY, MOONEE BEACH, NSW
LOT 1 & 2 DP 725785

martens & Associates Pty Ltd
Consulting Engineers
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Water
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Civil
Suite 201, 20 George St, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767
Email: mail@martens.com.au Internet: www.martens.com.au

DRAWING TITLE
PMF CATCHMENT + NEAP OCEAN
PROPOSED CONDITION
WATER LEVEL (mAHD) & WATER DEPTH (m)

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706361	PS01	R02	PS01-K220	B

DRAWING ID: P1706361-PS01-R02-K220

PRINTED: ---- USER: PINNI
A1 / A3 LANDSCAPE (A1LC_v02.0.01)

KEY

SITE BOUNDARY

CADASTRE BOUNDARIES

PROPOSED LOT LAYOUT

NOTE: AREAS COLOURED WHITE REPRESENT NEGLIGIBLE CHANGE
AREAS COLOURED YELLOW/RED REPRESENT WATER LEVEL INCREASE

DEVELOPMENT APPLICATION

REV	DESCRIPTION	DATE	DRAWN	DESIGNED	CHECKED	APPRVD
A	INITIAL RELEASE	24/01/2018	RK	PD	DD	DD

SCALE
0 30 60 90 120 150 180 210 240 270 300 METRES
A1 (A3) 1:3,000 (1:6,000)

GRID: MGA | DATUM: mAHD | PROJECT MANAGER: GT

CLIENT: RESOURCE DESIGN & MANAGEMENT

PROJECT NAME/PLANSET TITLE
ENGINEERING SERVICES FOR DA
FLOOD ASSESSMENT
PACIFIC HIGHWAY, MOONEE BEACH, NSW
LOT 1 & 2 DP 725785

martens & Associates Pty Ltd
Consulting Engineers
Environment
Water
Geotechnical
Civil
Suite 201, 20 George St, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767
Email: mail@martens.com.au Internet: www.martens.com.au

DRAWING TITLE
1% AEP CATCHMENT + 5% AEP OCEAN
PROPOSED CONDITION
WATER LEVEL IMPACT (m)

PROJECT NO.	PLANSET NO.	RELEASE NO.	DRAWING NO.	REVISION
P1706361	PS01	R02	PS01-K300	A

DRAWING ID: P1706361-PS01-R02-K300

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A1 / A3 LANDSCAPE (A1LC_v02.0.01)