

Our Ref: Q184103:BG Contact: Billy Glover

29 October 2021

Chief Executive Officer Douglas Shire Council PO Box 723

Mossman QLD 4870

Deliver via email: enquiries @douglas.qld.gov.au

Attention: Jenny Elphinstone

Cardno (Qld) Pty Ltd ABN 57 051 074 992

15 Scott Street Paramatta Park Cairns QLD 4870 Australia

Phone +61 7 4034 0500 Fax +61 7 4051 0133

www.cardno.com

Dear Jenny,

RESPONSE TO DOUGLAS SHIRE COUNCIL INFORMATION REQUEST: S.13 OF THE DEVELOPMENT ASSESSMENT RULES

DEVELOPMENT APPLICATION OVER LAND AT CAPTAIN COOK HIGHWAY, CRAIGLIE (LOT 2 ON SR431) SEEKING A DEVELOPMENT PERMIT FOR RECONFIGURING A LOT (ONE (1) LOT INTO THIRTY-FOUR (34) RESIDENTIAL LOTS, NEW ROAD AND BALANCE LAND)

COUNCIL REFERENCE: ROL 2021_4012/1

We refer to the abovementioned development application and the associated correspondence from Douglas Shire Council, dated 31 March 2021, constituting an Information Request, pursuant to Section 13 of the Development Assessment Rules (**DA Rules**).

Cardno acts for Port Douglas Land Developments Pty Ltd ('the Applicant') in relation to the abovementioned development application.

In accordance with Section 13.2 (b) of the DA Rules, please accept this correspondence, on behalf the Applicant, as a response to the Information Request providing part of the requested information.

Please note, as part of this response to Council's information request, the Applicant proposes to change the application by way of rearranging the proposed internal lot boundaries of the Stage 2 development to decrease lot sizes and increase yield. The Stage 2 design as originally lodged proposed a yield of 34 residential lots and the revised proposal now seeks to yield a total of 39 residential lots. The revised proposal comprises a variety of lot sizes ranging between 487m² and 726m² in area, providing diversity in residential land and housing options, contributing towards housing affordability in the area and a range of residential lifestyle opportunities.

We request, on behalf of the Applicant, and pursuant to Section 13.3 of the DA Rules, that Douglas Shire Council now proceed with the assessment of the development application.

The following response extracts each part of the Council's request in bold italicised text and provides corresponding responses below.

The response includes the following documentation:

- Revised Stage 2 Proposal Plan, dated 8 October 2021 (Attachment A)
- Master Plan (Preliminary), dated 22 August 2019 (Attachment B)
- Master Plan (Preliminary) (Staged), dated 13 February 2020 (Attachment
 C)
- Traffic Impact Assessment, dated 16 October 2019 (Attachment D)
- Road Safety Assessment, dated 3 July 2019 (Attachment E)





- Traffic Engineering Technical Memorandum, dated 14 June 2021 (Attachment F)
- Flood Impact Assessment, dated 16 October 2019 (Attachment G)
- Stage 2 Flood Impact Assessment Technical Memorandum, dated 30 July 2021 (Attachment H)
- Preliminary Stage 2 Civil Plans (34 lot design) (Attachment I)
- Douglas Shire Council Information Request, dated 31 March 2021 (Attachment J)
- SARA Advice Notice, dated 12 April 2021 (Attachment K)
- Response to SARA Advice Notice, dated 29 June 2021 (Attachment L)
- SARA Response with conditions, dated 12 July 2021 (Attachment M)

Existing Approval and Master Planning

The application has been made for 34 residential lots, road and balance land over the whole of Lot 2 on SR431. The application has not been made for staged development and is made exclusive of the development approved for Stage 1. As the applications are mutually exclusive, all pertinent information needs to be lodged with each application.

The report accompanying the application makes mention of an overall Master Plan. Since the issue of a Development Approval for part of the land (Stage 1) the applicant has acquired further land and it is understood this additional land is also intended to be developed for residential development. It is understood all proposed residential development is to utilise trunk infrastructure and Council's urban services.

It is noted that the trunk road infrastructure is to provide connectivity between estate developments. Where any alternative connectivity to the Captain Cook Highway is proposed, other than what is shown in Council's LGIP, then full explanation is required and agreement be achieved with Council. Note, such access may not fulfill the requirements of consideration that the extension to Warbal Street is trunk infrastructure. The provision of trunk road infrastructure must also include the connection to Andreasen Road for potential subdivision to the south.

General Master Planning

1. Please provide a masterplan for the whole of the land and any other land intended to form part of the residential development of this area held by the applicant. The masterplan is to include an indicative lot layout, stages, road network, park and drainage lots.

The masterplan is to indicate proposed infrastructure. Please provide comments in response to A08 and PO8 of the Reconfiguring of a Lot Code and the respective overlay codes.

Response

As stated within the submitted Town Planning Report, a Master Plan was provided to Council as part of the Stage 1 Reconfiguring a Lot Development Application, and attached to Council's Decision Notice (ROL 2966/2018 – page 3), dated 28 May 2019. The Stage 1 ROL approval is referenced in the submitted DA Form 1 as an associated development approval. The Master Plan was also provided to Council as part of and in support of the Stage 1 Operational Works Development Application (OP 2019_3370/1).

The master planning exercise undertaken as part of Stage 1 provides guidance and a preliminary layout and design of the estate. Proposed Stage 2 presents a logical expansion of the estate, the proposed lot layout and design being pre-determined by the road reserves approved and constructed under Stage 1.

A copy of the Master Plan (Preliminary) provided to Council as part of Stage 1 development is provided at Attachment B and a Master Plan (Preliminary) with indicative staging is provided at Attachment C. However, it must be noted that these Master Plan documents are preliminary only for the purpose of guiding potential future planning outcomes for the site. Future development of the balance land (Lot 2 on SR431) may be subject to changes during further planning and detailed design.

It is considered that proposed Stage 2 is generally consistent with the planning intent for the area and applicable overlays to the land, being located within the western region of the site and away from the coastal processes of the land to the east.

With regard to Trunk Infrastructure designation, the development of the subject site and other land parcels in the area is likely to occur progressively over time and is reliant on the provision of supporting infrastructure. It



is considered unreasonable to expect the delivery of significant trunk infrastructure to be entirely provided up front and at one time, and instead it is considered that such infrastructure must be reasonably delivered and appropriately funded accordingly as urban development progresses over time.

2. Please provide detail of the number of lots intended to be developed prior to the construction and opening of the linking connector road to Andreassen Road and the intended timing of the upgrade to the Captain Cook Highway / Andreassen Road intersection.

Response

Consistent with the response to item 2, the approved and recently constructed Stage 1A and 1B of the estate comprises a total of 32 residential lots. The proposed Stage 2 development as originally proposed comprises of 34 residential lots and the revised Stage 2 development proposal comprises of 39 residential lots. Stage 1A and 1B and proposed Stage 2 comprise a combined total of 71 residential lots.

The previously submitted and attached Traffic Impact Assessment dated 16 October 2019, states Milman Drive is constructed to a FNQROC Minor Collector standard having a 16.5 metre wide road reserve and 7.5m wide seal cross section suitable for 91-300 lots. Considering the existing Port Pacific Estate to the north comprises circa 95 existing lots plus allowing for approximately 22 undeveloped lots, plus the approved and constructed lots as part of Stage 1A and 1B of the New Port Estate comprising 34 lots, Milman Drive has a reserve capacity of approximately 149 lots. Given the proposed Stage 2 development comprises 39 lots, Milman Drive is suitable to cater for the additional proposed Stage 2 development traffic generation.

Further, the Traffic Impact Assessment dated 16 October 2019 states:

As it is unlikely that Milman Drive can be upgraded to a higher order road, it is recommended that the southern Andreassen Drive access is constructed to alleviate the demand on Milman Drive and subsequently the Captain Cook Highway / Milman Drive intersection. These works are recommended to be taken out prior to the construction of **238 lots** in the ultimate design.

On this basis, the southern Andreassen Drive access must be considered as part of further development expansion of the estate at such point where the trigger for this upgrade becomes relevant.

3. Please provide details as to when the buffer to the State-controlled road will be developed for the proposed and balance areas.

Response

It is acknowledged and appreciated that the estate is visible when entering Craiglie / Port Douglas from the south on the Captain Cook Highway and the desire to ensure a high level of amenity is provided for residents of the proposed estate and surrounding area, road users, and visitors to the area, accordingly.

Condition 20 b. of the Stage 1 Development Approval (ROL 2966/2018) states:

Undertake landscaping of the site, including the Park, and street frontages of new roads in accordance with FNQROC Development Manual and in accordance with a landscape plan. The landscape plan must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Work. In particular, the plan must show:

• • •

b. Provision of an earth mound, landscaping and appropriate fencing along the western boundary;

The applicant may be amenable to considering similar reasonable draft conditions in relation to the construction of an earth mound, landscaping and appropriate fencing along the western boundary of the site accordingly.



Road Network

 Please provide a road connectivity masterplan to demonstrate how the prosed road network provides a safe and efficient road alignment and geometry providing connectivity to Andreassen Road.

Response

Proposed Stage 2 proposes to utilise the existing access and egress via Wabul Street / Milman Drive only. A new access and egress via Andreassen Road is not determined to be necessary at this point in time and considering the extent of development proposed. Further road network design consideration and detailed design for the roadway connection to Andreassen Road will be undertaken in the future when necessary and as triggered by further development expansion of the estate.

5. Please provide details on the timing of the connectivity of the development to the Captain Cook Highway via Andreassen Road.

Response

Consistent with the response to item 2, the approved and recently constructed Stage 1A and 1B of the estate comprises a total of 32 residential lots. The proposed Stage 2 development as originally proposed comprises of 34 residential lots and the revised Stage 2 development proposal comprises of 39 residential lots. Stage 1A and 1B and proposed Stage 2 comprise a combined total of 71 residential lots.

The previously submitted and attached Traffic Impact Assessment dated 16 October 2019, states Milman Drive is constructed to a FNQROC Minor Collector standard having a 16.5 metre wide road reserve and 7.5m wide seal cross section suitable for 91-300 lots. Considering the existing Port Pacific Estate to the north comprises circa 95 existing lots plus allowing for approximately 22 undeveloped lots, plus the approved and constructed lots as part of Stage 1A and 1B of the New Port Estate comprising 34 lots, Milman Drive has a reserve capacity of approximately 149 lots. Given the proposed Stage 2 development comprises 39 lots, Milman Drive is suitable to cater for the additional proposed Stage 2 development traffic generation.

Further, the Traffic Impact Assessment dated 16 October 2019 states:

As it is unlikely that Milman Drive can be upgraded to a higher order road, it is recommended that the southern Andreassen Drive access is constructed to alleviate the demand on Milman Drive and subsequently the Captain Cook Highway / Milman Drive intersection. These works are recommended to be taken out prior to the construction of **238 lots** in the ultimate design.

On this basis, the southern Andreassen Drive access must be considered as part of further development expansion of the estate at such point where the trigger for this upgrade becomes relevant.

6. Please provide a Road Safety Assessment by an accredited Road Safety Auditor for the Milman Drive and Wabul Drive road link extending from the new southern drain crossing through to, and including, the intersection with the Captain Cook Highway.

The intersection analysis for the Captain Cook Highway/Milman Drive intersection is to be undertaken in an approved modelling package (SIDRA or equivalent). All upgrades identified in the Road Safety Audit or the intersection analysis will need to be identified in engineering design plans and associated reports.

Consideration of level of service should also have regard to disaster management requirements to evacuate residents in an emergency.

Where the intersection analysis demonstrates that the additional Stage 2 lots create an unacceptable level of service for the intersection operation, the applicant must identify and provide the upgrades necessary to ensure the intersection operates with an acceptable level of service.

These considerations must include both stage 1 of the existing approval and the proposed stage 2.

Response

A Road Safety Audit and Traffic Impact Assessment was undertaken as part of the Stage 1 Operational Works approval and is included at Attachments D and E. The audit and assessment focused on the Stage



1A and 1B development but also considered the ultimate development of the site identified under the Preliminary Master Plan.

As identified within the previously submitted and attached Traffic Impact Assessment dated 16 October 2019, the number of lots comprising Stage 1A and 1B (and now proposed Stage 2) do not warrant a new access and egress connection via Andreassen Road. The Applicant may be amenable to undertaking further detailed analysis as part of the required operational works and further master planning work, if necessary at that time.

7. Where the intersection analysis demonstrates there is a component of existing use that contributes to an unacceptable standard of service, please provide an agreement in writing from the Department of Main Roads and Council regarding the timing, costs and responsibility for the necessary works.

Response

With regard to the existing Captain Cook Highway / Beor Street intersection, please refer to the attached Traffic Impact Assessment dated 16 October 2019 and the Traffic Engineering Technical Memorandum dated 14 June 2021.

The subject development application was referred to SARA (Department of Transport and Main Roads) with regard to *Reconfiguring a lot near a State-controlled road intersection*. SARA provided a response to the proposed Stage 2 development on 12 July 2021 (SARA ref: 2103-21727 SRA) requiring road works comprising of a channelized right-turn treatment with a short turn slot (CHR(S)) to be undertaken on the Captain Cook Highway / Beor Street intersection.

The Applicant may undertake further consideration and discussions on this matter moving forward.

8. Please include the location of proposed pedestrian pathways on the layout plan.

Response

Footpaths will need to be provided within the Stage 2 development, connecting to Stage 1 and the existing external footpath network to the north of the site. The subject application for proposed Stage 2 is required to comply with Schedule 12A of the *Planning Regulation 2017*.

The footpath design will be provided to Council as part of a future Operational Works application. Accordingly, the applicant may be amenable to considering reasonable draft conditions in relation to pedestrian pathways in accordance with the Planning Regulation 2017 and Council requirements.

Flood and storm tide inundation

9. Please provide a site plan detailing contours and expected finish levels having regard to impacts of sea level rise. Please provide a copy of the flood study and flood modelling for the site and the whole of the masterplan area. The flood study must include updated modelling to confirm, hydraulic implications and confirm that no further widening of the exiting drain is required to mitigate hydraulic impact of the development. The updated Stormwater modelling needs to confirm the development footprint (where this has changed) plus confirmation of the detention required to mitigate the peak flows from the development footprint. Information on the location, size, configuration and timing for the detention on site is to be provided for Council's consideration.

Response

Please see attached Flood Impact Assessment Technical Memorandum dated 30 July 2021. The technical memorandum states:

The proposed Stage 2 layout and components of the masterplan were investigated to satisfy items 9 and 10 of Council's Information Request. Modelling has indicated that no actionable nuisance or adverse impacts are anticipated to occur as a result of the addition of Stage 2 to the previously modelled Stage 1 phases.

Although some consideration has been made to the flow regime of futures stages, the assessment was at a conceptual level only and did not incorporate all future design stages or all internal



stormwater networks. As such, it is recommended that a master plan flood study is carried out to investigate the flooding behavior of the entire site. As discussed with council, this is to be progressed after the submission of the Stage 2 DA and will consider aspects such as developed hydrology and post development stormwater management to assess the ultimate flow regime of the site.

Accordingly, it is acknowledged that further detailed master planning work may be necessary to be undertaken over the entire site to guide further stages and development of the land, with regard to flood and stormwater in particular. Further detailed design work may be undertaken as part of the required operational works, as necessary.

10. Please provide details of post development stormwater and the ability of the intended development to cater for the whole of the masterplan area.

Response

Consistent with the response to item 9, please see attached Flood Impact Assessment Technical Memorandum dated 30 July 2021. The technical memorandum states:

The proposed Stage 2 layout and components of the masterplan were investigated to satisfy items 9 and 10 of Council's Information Request. Modelling has indicated that no actionable nuisance or adverse impacts are anticipated to occur as a result of the addition of Stage 2 to the previously modelled Stage 1 phases.

Although some consideration has been made to the flow regime of futures stages, the assessment was at a conceptual level only and did not incorporate all future design stages or all internal stormwater networks. As such, it is recommended that a master plan flood study is carried out to investigate the flooding behavior of the entire site. As discussed with council, this is to be progressed after the submission of the Stage 2 DA and will consider aspects such as developed hydrology and post development stormwater management to assess the ultimate flow regime of the site.

Accordingly, it is acknowledged that further detailed master planning work may be necessary to be undertaken over the entire site to guide further stages and development of the land, with regard to flood and stormwater in particular. Further detailed design work may be undertaken as part of the required operational works, as necessary.

Water Supply

11. Page 43 of the report states the development will connect to the existing water supply infrastructure in Wabul Street. The decision notice for Stage 1 required water supply to include a new main along the Captain Cook Highway and not rely on water supply from the adjacent development to the north, (Wabul Drive). Please update the report comment and provide details of proposed water supply connection having regard to Stage 2 and the intended masterplan. The access to the existing 150mm water main running 407m from Beor Street is not supported and Council anticipates connection to services will require a 300mm main extension from Beor Street down to Andreassen Road to give full reticulation and firefighting flows. Please confirm the proposed connection to Council's services.

In the event that the Master Plan identifies upgrades to the existing Council infrastructure to service the ultimate development, the Master Plan must detail any interim servicing arrangements for the development and identify thresholds (lot yield and timing) associated with those interim and ultimate servicing arrangements.

The Master Plans must also identify any external catchments that will be connected to and/or serviced by the internal water supply and sewer networks.

Response

The Stage 2 Water Supply is anticipated to connect into and be generally consistent with the Water Supply infrastructure approved and constructed as part of Stage 1A and 1B development. It is proposed that the Water Supply infrastructure required to service proposed Stage 2 will be further investigated, analysed and confirmed as part of the detailed design required as part of the subsequent operational works.

Preliminary Stage 2 Civil Plans are provided at Attachment I.



Sewer Connectivity

12. Please provide an updated sewerage master Plan to confirm the sewer reticulation capacity to utilise the trunk sewer pump station relocated to Stage 1 (from Andreasson Road) by the applicant. The Master Plan must demonstrate that the sewerage reticulation provided within the estate achieves the same functionality and, level control and services the same development footprint as was achieved by the LGIP identified pump station on Adreasson Road. This must include sewer reticulation concept plans with levels and capacities nominated through the estate to connect Andreassen Road properties.

Response

The Stage 2 Sewer Connectivity is anticipated to connect into and be generally consistent with the Sewer infrastructure approved and constructed as part of Stage 1A and 1B development. It is proposed that the Sewer infrastructure required to service proposed Stage 2 will be further investigated, analysed and confirmed as part of the detailed design required as part of the subsequent operational works.

Preliminary Stage 2 Civil Plans are provided at Attachment I.

Other Infrastructure Servicing

13. Please provide advice on the applicant's intentions for the considerations of other infrastructure such as the location of padmount electricity substations, telecommunications and NBN infrastructure.

Response

As per preliminary electrical master planning, it is understood a new padmount electricity substation for Stage 2 is required. The location of the Stage 2 substation is indicated in a preliminary location on the eastern side of Wabul Street and opposite the new internal road for Stage 2.

The location of padmount electricity substations, telecommunications and NBN infrastructure will be further investigated, analysed and confirmed as part of the detailed design for the subsequent operational works. As part of the subsequent operational works, further consideration can be given to the exact location of such infrastructure and landscaping details to ensure a positive design outcome and a high-level of amenity is afforded.

Buffer to Agricultural Use

14. Please provide advice on the applicant's intentions for the provision of a suitable buffer to the proposed ongoing agricultural use on the balance land. Supporting information must demonstrate that the buffer provided will alleviate impacts on the new residential use.

Response

Condition 29 a. and b. of the Stage 1 development approval required:

Where the continued agricultural use of the balance land abuts new lots, the lots adjacent to this activity must be provided with a standard timber paling fence of 1.8 metres (approximate) height together with a grassed setback of a further 20 metres (minimum) beyond the fencing.

Where the continued agricultural use of the balance of the land occurs adjacent to the existing Wabul Street a grassed buffer separation of 20 metres (minimum is to be provide on the balance land, beyond the road). Works occurring in this buffer area may include trunk infrastructure.

The Applicant may be amenable to similar conditions to be applied to the proposed Stage 2 development to ensure impacts on the new residential land uses are appropriately mitigated and a high-level of amenity is afforded for residents.



Proposed Lot Sizes (Changed proposal from 34 lots to 39 lots)

The revised Stage 2 development comprises a variety of lot sizes ranging between 487m² to 726m², as follows:

Lot details (excluding balance lots)				
Lot Size	Number of Lots			
400m ² – 499m ²	1			
500m ² – 599m ²	3			
600m ² – 699m ²	33			
700m ² – 799m ²	2			
Total	39			

The above lot size distribution table demonstrates that the revised Stage 2 proposal for the most part complies with the minimum 600m² lot area requirement, except for 1 x 487m² lot, 2 x 500m² lots and 1 x 528m² lot. The majority of proposed lots are between 600m² and 699m² in area.

It is acknowledged and understood that the Low Density Residential Zone Code of the Douglas Shire Planning Scheme 2018 requires new lots to contain a minimum area of 600m² in sewered areas (PO6). It is acknowledged that the relevant provision (PO6) is contained in the Performance Outcomes of the code, and accordingly this non-complying aspect of the proposal (proposed lot sizes less than 600m²) is therefore subject to the purpose of the code which is achieved through the overall outcomes.

It is also acknowledged that advice on this aspect has been provided by Council previously and imposed on Stage 1 of the development. However, Council is respectfully encouraged to closely consider the lot sizes proposed under the revised Stage 2 proposal, as the proposed lot sizes:

- Provide greater diversity of residential land sizes and housing typologies, contributing towards housing options and affordable housing opportunities in the area;
- Encourage a variety of built form styles and character in the area through varying land sizes and frontage widths;
- Appeal to a range of lifestyles and housing needs, contributing towards a diverse and integrated community.

The subject development and estate is located in a greenfield area and as such the proposed lot sizes are not considered to impact on existing residential development and established neighbourhood character, or introduce any overall amenity issues or concerns to existing established areas.

The overall outcomes of the Low Density Residential Zone Code seek a range of housing on a range of lot sizes to be provided, development to maintain a high level of residential amenity, and development to reflect and enhance the low density scale and character of the area. The proposed lot sizes are considered to positively contribute towards achieving the overall outcomes and purpose of the code by providing diversity in lot sizes which will likely translate into providing such outcomes that are sought therein.

The information contained herein and attached provides a response to the matters raised in Council's Information Request.

In addition, as part of this response to information request and in accordance with section 52(1) of the Act, the Applicant has revised the design of proposed Stage 2 by way of rearranging the internal proposed lot boundaries which generally decreases the lot sizes overall and increases the proposed yield from 34 lots to 39 lots, and hereby gives notice to Council accordingly. Notwithstanding, the revised proposal is considered a minor change to the original proposal. An assessment against the definition of a *minor change*, including the 'Substantially Different' Development test, is provided overleaf, demonstrating that the proposed change to the proposed development herein does not result in 'substantially different' development. As such, the proposed change to the development does not affect the development assessment process.



Minor Change Definition

minor change means a change that-

- (a) for a development application—
 - (i) does not result in substantially different development; and

The change to the proposal does not result in substantially different development – please refer to the responses to the 'Substantially Different' Development test provided below.

- (ii) if the application, including the change, were made when the change is made—would not cause—
 - (A) the inclusion of prohibited development in the application; or

The change to the proposal does not include/introduce prohibited development.

(B) referral to a referral agency if there were no referral agencies for the development application; or

The change to the proposal does not include/trigger the requirement for referral to additional referral agencies or referral triggers to what was required and carried out under the original proposal.

(C) referral to extra referral agencies; or

The change to the proposal does not include/trigger the requirement for referral to additional referral agencies or referral triggers.

(D) a referral agency, in assessing the application under section 55(2), to assess the application against, or have regard to, a matter, other than a matter the referral agency must have assessed the application against, or had regard to, when the application was made; or

The response to the information request does not cause a referral agency to assess the application against or have regard to matters other than the matters when the application was made.

(E) public notification if public notification was not required for the development application;

The change to the proposal does not now trigger public notification and remains code assessable.

'Substantially Different' Development Test

A change may be considered to result in a substantially different development if any of the following apply to the proposed change:

(a) involves a new use; or

No new uses are proposed. The proposal remains code assessable for Reconfiguring a Lot.

(b) results in the application applying to a new parcel of land; or

The application does not apply to a new parcel of land. The proposed change is contained within the Stage 2 boundary as originally submitted.

(c) dramatically changes the built form in terms of scale, bulk and appearance; or

No built form is proposed as part of this Development Application seeking a Development Permit for Reconfiguring a Lot. The proposed change to the development by way of rearranging the internal proposed lot boundaries, which overall decreases the lot sizes and increases the proposed yield is considered a minor change and inconsequential overall.

(d) changes the ability of the proposed development to operate as intended;29or

The proposed development is considered to operate as intended and consistent with the original proposal and submission.

(e) removes a component that is integral to the operation of the development; or



It is not considered that any components integral to the operation of the development have been removed.

(f) significantly impacts on traffic flow and the transport network, such as increasing traffic to the site; or

The proposed change to the development increases the development yield from 34 lots to 39 lots and whilst this will increase traffic to the site for the Stage 2 development, the increase is considered negligible and is not expected to significantly impact the external road network.

(g) introduces new impacts or increase the severity of known impacts; or

The proposed change to the development increases the development yield from 34 lots to 39 lots, this does not change the outcomes from the original assessment and the increase in traffic is considered negligible. As the proposed development is under 5% of baseline traffic volumes, the increase as a result of the Stage 2 development is not expected to significantly impact the external road network.

(h) removes an incentive or offset component that would have balanced a negative impact of the development; or

It is not considered that any incentive or offset components that would have balanced a negative impact of the development have been removed.

(i) impacts on infrastructure provisions.

The proposed development is generally consistent with the road network as originally proposed and as identified under Council's LGIP.

In further support of the above and the proposed change being a minor change, Cardno's Senior Traffic Engineer states the following:

The minor change application addresses the proposed change of development yield from 34 dwellings to 39 dwellings. This is an increase of 5 dwellings from the original assessment. The minor change does not propose any changes to the road network and thus it is not expected to change the servicing or road hierarchy. As a result, the only change from the original assessment is the traffic impact to the external road network.

With regards to the increase in trips, assuming a trip rate of 0.85 trips per dwelling in accordance with RMS 2013 surveys, the increase in trips is 5vph. Given the original assessment calculated the Stage 2 traffic generation at 29vph, the new traffic generation as a result of the change is 34vph. Assessing the new traffic generation over the existing background of 735vph in the AM peak at the Captain Cook Highway / Milman Drive / Beor Street intersection, a proportional impact of 4.5% is calculated. Thus, the proposed increase in yield under the revised Stage 2 proposal from 34 lots to 39 lots remains below the 5% trigger and is generally consistent with the findings within the original Technical Memorandum undertaken for the original Stage 2 proposal and dated 14 June 2021. Therefore, from a traffic perspective, the proposed change to the development does not change the outcome of the original assessment, and accordingly, further analysis of the revised proposal and further assessment on the Captain Cook Highway / Boer Street intersection should not be required as a result of the proposed change to the development.

The Assessment Manager (Douglas Shire Council) must consider as to whether they agree that the proposed change is a minor change or not. Whilst it is not anticipated, should the Assessment Manager consider that the proposed change is not a minor change, the Applicant kindly request's the Assessment Manager provide the opportunity to discuss this further moving forward.

Please be advised, in accordance with Section 25 of the Development Assessment Rules, if an applicant gives a notice to the assessment manager under section 52(1) of the Act to change the application before it is decided, the assessment manager must—

- (a) give a copy of the notice to each referral agency for the original application, and any other referral agency required to be referred the application as a result of the change; and
- (b) advise each referral agency, with a copy to the applicant, of the effect of the change on the development assessment process.



Summary

The revised proposed Stage 2 development is considered to be a minor change to the original proposal and presents a logical expansion of the estate, considering the proposed Stage 2 lot layout and design:

- is consistent with and follows on from the internal roads of approved Stage 1A and 1B;
- is consistent with the preliminary Master Plan for the estate submitted as part of Stage 1A and 1B and acknowledged within the Stage 1 ROL Decision Notice;
- is consistent with the zoning and planning intent for the area.

It is acknowledged that further detailed master planning work may be necessary to be undertaken over the entire site to guide further stages and development of the land, and as part of the subsequent operational works for Stage 2. It is considered that the material included as part of this application (including the response to information request) provides sufficient detail and guidance in support of Stage 2 at a concept design level. Further detailed design work may be required and undertaken as part of the Operational Works Development Application process as necessary prior to Stage 2 construction commencing.

It is therefore considered that the proposed development can be approved, subject to reasonable and relevant conditions.

Prior to the determination of the Development Application it would be greatly appreciated if Council could provide Cardno with a suite of Draft Conditions to facilitate discussion and mutually favourable outcomes.

If you have any queries regarding the development application, please contact Billy Glover on (07) 4034 0506 or via email billy.glover@cardno.com.au

Yours sincerely,

CARDNO



Attachment A

Revised Stage 2 Proposal Plan, dated 8 October 2021





Attachment B

Master Plan – (Preliminary), dated 22 August 2019

MASTER PLAN

PORT DOUGLAS ESTATE CAPTAIN COOK HIGHWAY CRAIGLIE







Attachment C

Master Plan (Staged) – (Preliminary), dated 13 February 2020

MASTER PLAN

PORT DOUGLAS ESTATE CAPTAIN COOK HIGHWAY CRAIGLIE







Attachment D

Traffic Impact Assessment, dated 16 October 2019

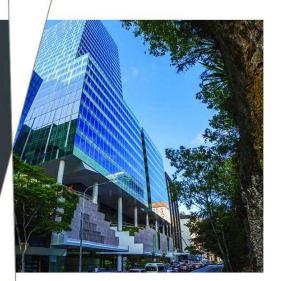
Traffic Impact Assessment

Craiglie Subdivision, Port Douglas

Q184103

Prepared for
Port Douglas Land Development Pty Ltd

16 October 2019







Contact Information Document Information

Cardno (Qld) Pty Ltd Prepared for Port Douglas Land

ABN 57 051 074 992 Development Pty Ltd

Level 11 Project Name Craiglie Subdivision, Port

515 St Paul's Terrace Douglas

Fortitude Valley QLD 4006 File Reference Q184103-REP-

Australia 20191016.docx

www.cardno.com Job Reference Q184103

Phone +61 7 3369 9822

Fax +61 7 3369 9722 Date 16 October 2019

Version Number 03

Author(s):

Madison Elliott Effective Date 16/10/2019

Graduate Traffic Engineer

Approved By:

Harj Singh Date Approved 16/10/2019

Senior Traffic Engineer

Document History

Version	Effective Date	Description of Revision	Prepared by	Reviewed by
01	28/06/2019	Draft for Client Review	Madison Elliott & Jai Patel	Harj Singh
02	03/07/2019	Final	Madison Elliott	Harj Singh
03	16/10/2019	Updated for Council queries	Madison Elliott	Harj Singh

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1 Introduction

1.1 Overview

Cardno Qld Pty Ltd (Cardno) has been engaged by Port Douglas Land Development Pty Ltd to provide traffic and transport engineering advice in relation to the proposed masterplanned residential development located in Craiglie, Port Douglas.

The purpose of this report is to assess the traffic and transport components of the proposed developments against the requirements of the Douglas Shire Council (Council) Planning Scheme. Therefore, the report addresses the following:

- > External traffic impacts
- External and internal road design

1.2 Background

Douglas Shire Council issued a decision notice for the development application ROL 2966/2018 for stages 1A and 1B for the development on Lot 2 SR431 in Craiglie. One of the conditions for the development approval related to traffic and transport engineering, which has reproduced below for reference.

Road Safety Assessment

 Provide a Road Safety Assessment by an accredited Road Safety Auditor for the Milman Drive and Wabul Drive road link extending from the proposed new southern drain crossing through to, and including, the intersection with the Captain Cook Highway.

The intersection analysis for the Captain Cook Highway/Milman Drive intersection is to be undertaken in an approved modelling package (SIDRA or equivalent). All upgrades identified in the Road Safety Audit or the intersection analysis will need to be identified in engineering design plans and associated reports.

a. Where the intersection analysis demonstrates that the additional Stage 1 lots create an unacceptable level of service for the intersection operation, the applicant must identify and provide the upgrades necessary to ensure the intersection operates with an acceptable level of service.

The plan of the works must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Works. The agreed traffic improvement works must be carried out in accordance with the approved plans, to the requirements and satisfaction of the Chief Executive Officer, prior to the lodgement of the Survey Plan with Council for endorsement.

There is to be no cost to Council for these associated works.

And

b. Where the intersection analysis demonstrates there is a component of existing use that contributes to an unacceptable standard of service, then the applicant must obtain an agreement in writing from the Department of Main Roads and Council regarding the timing, costs and responsibility for the necessary works. All works are to be at no cost to Council. The agreement must be to the satisfaction of the Chief Executive Officer and achieved prior to the lodgement of the application for operational work for the subdivision.



1.3 Scope of Work

Cardno has undertaken the following tasks to complete this traffic report:

- > Commission traffic surveys for the Captain Cook Highway / Milman Drive intersection
- > Estimate the traffic generation and timing associated with the proposed development
- > Develop a desktop model to estimate the distribution of the development traffic on the local network
- > Undertake an assessment of the study intersection using SIDRA Intersection for the baseline and with development scenarios
- > Investigate mitigation measures in the event that the operation of the existing intersection forms will be compromised
- > Undertake a review of the existing and proposed road cross sections including Milman Drive leading to the start of the development as well as internal site road layout

1.4 References

The following resources were referred to in the preparation of the report:

- > Australian Standards, AS2890.1:2004 Parking Facilities Part 1: Off-street Car Parking, 2004
- > Roads and Maritime Services (RMS), NSW Government, *Guide to Traffic Generating Developments:* Updated Traffic Surveys, August 2013
- > Douglas Shire Council (DSC), Douglas Shire Council Planning Scheme 2018
- > Queensland Department of Transport and Main Roads (TMR), Guide to Traffic Impact Assessments (GTIA), 2017

1.5 Limitations

Cardno has completed this traffic report in accordance with the usual care and thoroughness of the consulting profession. The assessment is based on accepted traffic engineering practises and standards applicable at the time of undertaking the assessment. The assessment was completed in July 2019, and is based upon the conditions encountered and project information available at the time. Cardno disclaims responsibility for any changes to project planning or road conditions that may occur after completion of the assessment.



2 Site Context

2.1 Site Location

The proposed masterplanned development is located on Lot 2 SR431 in Craiglie, Port Douglas. The site is bound by medium density residential to the north, Captain Cook Highway to the west and open land to the east and south. The site location is illustrated on Figure 2-1.

Figure 2-1 Site Location



Source: Nearmap



2.2 Local Road Network

The site has frontage along Captain Cook Highway to the west and connections to Wabul Street to the north. The key roads related to the development are illustrated on Figure 2-2, with the key characteristics of these roads summarised in Table 2-1.

Figure 2-2 Existing Road Network



Source: Nearmap

Table 2-1 Local Road Network

Road	Authority	Classification	Posted Speed	Typical Form
Captain Cook Highway	TMR	Arterial Road	70km/h	Two lane two way, undivided, sealed
Milman Drive	Council	Access Road	50km/h	Two lane two way, undivided, sealed



2.3 Proposed Development

This report focuses on Stage 1A and 1B of the proposed development in response to the Council condition. However, the ultimate form of the master planned site will also be analysed for completeness, and to inform of the traffic engineering aspects associated with the ultimate development yield.

Stage 1A and 1B comprise 32 lots, a drainage reserve and park area.

In the ultimate form, the subdivision proposes to comprise 282 lots with various parks featured around the development.

The proposed development layout, with Stage 1A and 1B highlighted is included in Figure 2-3.

Figure 2-3 Proposed Development



Source: Nearmap, Cardno drawing Q184109-MP01C

2.4 **Development Staging**

The staging for the full development has not been indicated by the client. Therefore, it has been assumed that Stage 1 will be complete by 2021 and that the ultimate development will be fully built out by 2031. These years have been included into the operational assessment.



3 Traffic Assumptions and Characteristics

3.1 Study Intersection

As per Condition 6 of the Council decision notice, the traffic impact analysis has been conducted on the Captain Cook Highway / Milman Drive intersection. The study intersection is indicated on Figure 3-1.

Figure 3-1 Study intersection



Source: Nearmap

3.2 Background Traffic Volumes

To understand the existing traffic conditions, traffic surveys were undertaken by Austraffic during the 3-hour AM and PM peak periods on Tuesday, 18 June 2019 for the Captain Cook Highway / Milman Drive intersection.

A review of the surveys indicated that the AM peak period was between 8:00-9:00am and the PM peak period was between 3:00-4:00pm.

3.3 Traffic Growth

Cardno has adopted a linear growth of 2% p.a to forecast potential future traffic demands at the key study intersection, in accordance with previous assessments. Based on previous experience in similar projects, Cardno believes this is an appropriate growth rate to adopt.



3.4 Traffic Distribution

The traffic network assignment has been based on the local traffic patterns observed from the traffic surveys. Figure 3-2 and Figure 3-3 illustrate the 'in' movement distribution and the 'out' movement distributions, respectively, which have been assigned to the development traffic.

Figure 3-2 In Movement Traffic Distribution



Source: Nearmap

Figure 3-3 Out Movement Traffic Distribution



Source: Nearmap



In summary the proportion of vehicles travelling north towards Port Douglas is 80% and south towards Cairns is 20%.

3.5 Traffic Generation

The peak generation rates for the land uses have referenced the NSW Roads and Maritime Services (RMS) Guide to Traffic Generating Developments (August 2013 technical direction), as well as the background traffic surveys.

The traffic analysis will consist of two scenarios, the stage 1 of development and the ultimate development. A summary of the peak trip generation has been summarised in Table 3-1.

Table 3-1 Adopted Trip Generation Rates

Scenario La	Land Use	Development	Trip Gene	Trip Ge	Carres		
	Land Use	Yield	AM	PM	AM	PM	Source
Stage 1	Low Density Residential	32 dwellings	0.85 trips per dwelling	0.85 trips per dwelling	27 vph	27 vph	RMS
Ultimate	Low Density Residential	282 dwellings	0.85 trips per dwelling	0.85 trips per dwelling	240 vph	240 vph	RMS

As outlined in Table 3-1, it is estimated that stage 1 of development will generate 27 vph during the peak periods and the ultimate development generating 240 vph in the peak, a net increase of 213 vph in the peak hour. Stage 1 generates 11% of the estimated traffic for the ultimate development.

3.6 **Development Directional Distribution**

The directional distribution has been estimated based on industry standards for residential land uses. This typically follows the pattern of people leaving for work in the morning and arriving home from work in the evening. The distribution has been summarised in Table 3-2.

Table 3-2 Directional Distribution

Land Use	AM I	Peak	Peak	
Lanu USE	In Out		In	Out
Low Density Residential	30%	70%	60%	40%

3.7 **Development Volumes**

Based the above, the peak hour development generated traffic volumes are summarised in Table 3-3.

Table 3-3 Development Volumes

Scenario	Land Use	Yield	AM	AM Peak		PM Peak	
	Lanu USe	rieid	IN	OUT	IN	OUT	
Stage 1	Low Density Residential	32 dwellings	8 vph	19 vph	16 vph	11 vph	
Ultimate	Low Density Residential	282 dwellings	72 vph	168 vph	144 vph	96 vph	



4 Operational Assessment

4.1 Assessment Scenarios

As per Council's request, the study intersection has been assessed for the Stage 1 year of opening and design horizon. Additionally, analysis has been undertaken for the ultimate development yield, to understand how the study intersection will operate once the full build out is complete.

4.2 Assessment Criteria

The performance of the study intersections have been analysed using SIDRA Intersection 8.0 (SIDRA). SIDRA is an industry recognised analysis tool that estimates the capacity and performance of intersections based on input parameters, including geometry and traffic volumes, and provides estimates of an intersection's Degree of Saturation (DOS), queues and delays.

4.2.1 Intersection Delay

The TMR *Guide to Traffic Impact Assessments* (GTIA) recognises the intersection delay as a greater indicator of intersection performance in comparison to the previous TMR *Guidelines for Assessment of Road Impacts of Development* (GARID) significance on the degree of saturation (DOS).

The desired outcome outlined by the GTIA is to ensure that the sum of all intersection delays on the base traffic within the study area does not significantly worsen (i.e. does not increase average delays by more than 5% in aggregate) as a result of the development. The proposed development should seek to achieve no net worsening to efficiency across the impact assessment area.

Intersection mitigation measures (avoid, manage or mitigate) must be considered where the sum of all intersection delays on the base traffic is greater than 5% in aggregate. Furthermore, for priority controlled intersections, where the average peak hour delays for any movement exceeds 42 seconds, the intersection should be upgraded for safety reasons.

4.2.2 Intersection Degree of Saturation

While the movement delay is considered to provide a better indication of intersection performance and safety for priority-controlled intersections and roundabouts, the DOS should still be considered when assessing the performance of the intersection.

Table 4-1 provides the DOS thresholds adopted for the assessment.

Table 4-1 Adopted Intersection Performance Threshold – Degree of Saturation

Intersection Treatment	DOS Threshold
Signalised Intersections	Less than or equal to 0.90
Roundabouts	Less than or equal to 0.85
Priority controlled intersections	Less than or equal to 0.80

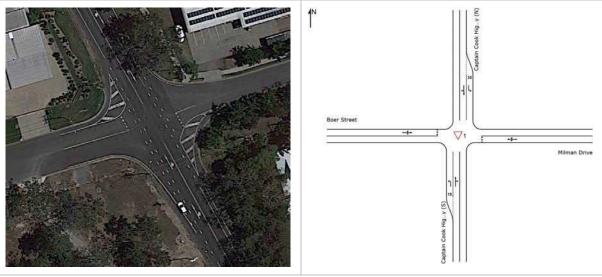
Source: TMR Guidelines for Assessment of Road Impacts Development



4.3 Captain Cook Highway / Milman Drive Intersection

The current configuration of this intersection is a four-way priority controlled arrangement. The aerial and adopted SIDRA layout are illustrated in Figure 4-1.

Figure 4-1 Current and SIDRA assessed layout - Captain Cook Highway / Milman Drive Intersection



Source: Nearmap, SIDRA 8.0

The results of the SIDRA assessment, for all assessed scenarios, are summarised in Table 4-2.

Table 4-2 SIDRA Results – Captain Cook Highway / Milman Drive Intersection

		AM Peak	M Peak PM Peak				
Scenarios	DOS	Critical Mvmt Delay	95 th %ile Queue	DOS	Critical Mvmt Delay	95 th %ile Queue	
2019 BG	0.198	14 sec	5m	0.192	15 sec	4m	
2021 BG	0.204	15 sec	5m	0.199	16 sec	5m	
2031 BG	0.234	18 sec	6m	0.230	19 sec	5m	
2021 BG + Stage 1	0.224	15 sec	6m	0.203	16 sec	5m	
2031 BG + Stage 1	0.273	19 sec	8m	0.243	21 sec	6m	
2031 BG + Ultimate	0.829	43 sec	52m	0.657	36 sec	25m	

The results of the analysis indicate that the four-way priority-controlled arrangement operates within the typical performance thresholds (DOS \leq 0.80 for priority controlled, and delay <42 seconds), for the assessed Stage 1 scenarios. When the ultimate development yield is included in the intersection volumes, the 2031 BG + Ultimate scenario exceeds a DOS of 0.80, and delay <42 seconds in the AM peak period.



4.3.2 Trigger Analysis

At the construction of 238 lots in the ultimate development, the road capacity limits set out by Far North Queensland Regional Organisation of Council (FNQROC) require Milman Drive to be upgraded to meet FNQROC standards, therefore it is recommended that the southern Andreassen Drive access is constructed prior (refer Section 5.2).

Therefore, a preliminary trigger assessment was undertaken to determine at what development yield of the ultimate development the Captain Cook Highway / Milman Drive intersection capacity is triggered to require upgrade.

Table 4-3 summarises the SIDRA results for the trigger analysis to determine at what development yield the intersection will require upgrade.

Table 4-3 SIDRA Results – Trigger Assessment - Captain Cook Highway / Milman Drive Intersection

		AM Peak		PM Peak		
Scenarios	DOS	Critical Mvmt Delay	95 th %ile Queue	DOS	Critical Mvmt Delay	95 th %ile Queue
2031 BG + 270 lots	0.803	40 sec	47m	0.631	35 sec	24m

The results of the SIDRA analysis indicate that when 270 lots are constructed, the four-way priority controlled intersection operates above the typical performance thresholds (DOS \leq 0.80 for priority controlled, and delay \leq 42 seconds), in the AM peak period.

Therefore, based on this assessment, the construction of the Andreassen Drive access will be required based on the trigger of the road capacity of Milman Drive (238 lots), rather than the intersection capacity of the Captain Cook Highway / Milman Drive intersection (270 lots).

4.3.3 Captain Cook Highway / Milman Drive Intersection Reconfiguration

Item 18 of the Cardno's Road Safety Audit Report dated 1 July 2019 indicates that there is an existing safety concern relating to the shared lane use for turning movements leading to queuing with potential risk for rear end crashes. Therefore, potential intersection improvements have been investigated to determine an intersection layout to improve safety and operation.

This safety concern was observed during the site visit in the intersections existing shape and form, therefore it is recommended that this intersection reconfiguration should occur regardless of whether the development of the Craiglie Estate were to be constructed. While the reconfigured form improves the operation of the intersection as summarised in Table 4-4, the timing of this reconfiguration is not dependent on the quantity of lots constructed within the development.

Cardno has investigated the potential form for the reconfigured intersection based on relevant standards. Austroads Guide to Road Design Part 4: Intersections and Crossings indicates that lane widths are desirable to be 3.5m wide. The design requirements of the intersection approaches with proposed changes are discussed below.

Due to the wide lane widths present at the Captain Cook Highway / Milman Drive intersection, the configuration was able to be amended to add a short left/through lane on the eastern approach and western approach and a right turn pocket on the southern approach to improve safety and operation. The northern approach is proposed to remain as existing.

Eastern Approach

The carriageway of the eastern approach to the intersection measures approximately 21m at the intersection and narrows down to a uniform width of 7.0m. Therefore, while the carriageway width is tapering down, it is proposed to include a consistent 3.5m exiting lane and major right turning lane with approximately a 15-20m left/through short lane utilising the extra width at the intersection approach.

Western Approach

Based on aerial imagery, the carriageway width of the western approach to the intersection measures approximately 13m. For the major left turn lane, short through/right lane and the exiting lane, a total desirable width of 10.5m is required, which can be accommodated by the existing carriageway. As this approach is trafficked by heavy vehicles (up to 11% recorded during peak periods in the traffic surveys), it is recommended that the additional carriageway width (2.5m) is allocated to the turning lanes to provide heavy vehicles with extra lane width to perform the turning movements.



Southern Approach

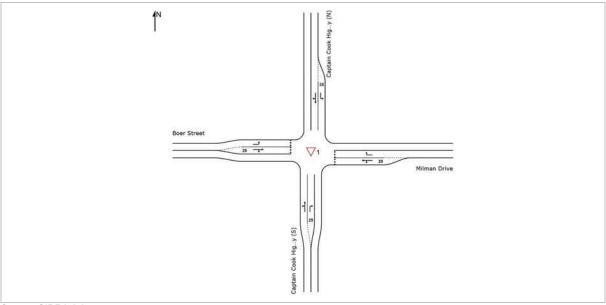
The southern leg of the intersection measures approximately 15m across the carriageway. It is noted that the western side of Captain Cook Highway does not appear to have a sealed kerb. It is proposed to have a continuous left/through lane and a short lane dedicated for right turning traffic. Additionally, there is one exiting lane on this leg. This requires 10.5m carriageway width to accommodate three traffic lanes which can be accommodated with the existing carriageway width. The additional carriageway width may be allocated to cycle provision or shoulders.

The exact functional layout of the intersection should be determined through site survey and detailed design phase to ensure that the intersection is designed according to appropriate standards.

It is recommended to include guidelines for the traffic lanes that do not directly line up as a result of the reconfiguration.

The reconfigured layout, as assessed in SIDRA is shown on Figure 4-2.

Figure 4-2 SIDRA assessed layout - Captain Cook Highway / Milman Drive Intersection - reconfigured



Source: SIDRA 8.0

The results of the SIDRA assessment, for assessed scenario are summarised in Table 4-4.

Table 4-4 SIDRA Results – Captain Cook Highway / Milman Drive Intersection - reconfigured

		AM Peak	k PM Peal			k	
Scenarios	DOS	Critical Mvmt Delay	95 th %ile Queue	DOS	Critical Mvmt Delay	95 th %ile Queue	
2031 BG + Ultimate	0.778	38 sec	39m	0.622	35 sec	22m	

The results of the analysis indicate that the four-way priority-controlled arrangement operates within the typical performance thresholds (DOS ≤ 0.80 for priority controlled, and delay <42 seconds), for the assessed 2031 background with ultimate development traffic scenario utilising a reconfigured layout.

Alternatively, if the southern Andreassen Drive access is constructed prior to the construction of the ultimate yield, it is anticipated that the demand on the Captain Cook Highway / Milman Drive intersection will be reduced, thus improving the operational performance of the intersection in 2031.

It is recommended that the turn treatments indicated in the reconfigured intersection form (Figure 4-2) are incorporated into the layout regardless of the intersection operation, to improve the overall safety at this location.



5 Design Considerations

5.1 Internal Road Network

The proposed internal road design follows a modified grid structure and is accessible via Wabul Street which is expected to be built as part of Stage 1 of the overall development. Wabul Street is the only ingress/egress option residents of Stage 1 have available. Figure 5-1 outlines the proposed internal road network for Stage 1 of development.

The requirements of The Douglas Shire Council indicates road design is compliant to the relevant standards in accordance with FNQROC's Development Manual.

21 15 19 18 Future Park & Drainage Reserve 41546m² 13 32 12 21 22 30 Future Residential 5468m² Future Residential 3928m²

Figure 5-1 Stage 1 Internal Road Network

Source: Nearmap, Cardno drawing Q184109-MP01C

The proposed internal road network has been reviewed against the requirements set out in Table D1.1 of FNQROC's development manual (Design Manual D1 Road Geometry).

Table 5-1 provides a summary of the road characteristics.

Table 5-1 Internal Road Characteristics

Table 5-1	internal road orial acteristics								
Road	Proposed Typical Cross Section Catchments Gaining Access		FNQROC Road Hierarchy FNQROC Requireme Classification		FNQROC Compliant				
Road 1	14.5m	19 lots	Access Place	14.5m (5.5m sealed) cross section for 0-26 lots	✓				
Road 2	15.5m	32 lots	Access Street	15.5m (6.5m sealed) cross section for 26-90 lots	√				
Wabul Street	20.0m	32 lots (stage 1) 282 lots (ultimate)	Major Collector	20.0m (11m sealed) cross section for 301-600 lots	✓				



As indicated in Table 5-1, the traffic carrying capacity and proposed typical cross section of the internal roads is considered generally in accordance with the requirements set out in FNQROC's development manual.

5.2 External Road Network Layout

The external roads which provide access to the development are outlined in Figure 5-2 with their respective characteristics summarised in Table 5-2.

Figure 5-2 Stage 1 External Road Network



Source: Nearmap

Table 5-2 External Road Characteristics

Road	Existing Typical Cross Section	Catchment Lots Gaining Access from Road		FNQROC Road Hierarchy Classification	FNQROC Requirement	FNQROC Compliant
Stage 1		Existing	Proposed			
Milman Drive	16.5m	62 lots	32 lots	Minor Collector	16.5m (7.5m sealed) cross section for 91-300 lots	√ (94 lots)
Ultimate		Existing	Proposed			
Milman Drive	16.5m	62 lots	282 lots	Minor Collector	16.5m (7.5m sealed) cross section for 91-300 lots	× (344 lots)

The proposed external road network has been reviewed against the requirements set out in Table D1.1 of FNQROC's development manual (Design Manual D1 Road Geometry. As indicated in Table 5-2, the traffic carrying capacity and typical cross section of the external roads is considered generally in accordance with the requirements set out in FNQROC's development manual for Stage 1, however in the ultimate form, the catchment size exceeds the road hierarchy classification requirement.

It is noted that Milman Drive exceeds the FNQROC requirement of 91-300 lots for the minor collector when 238 out of the total 282 lots are built for the ultimate staging of the development. Therefore, as it is not likely that the existing carriageway of Milman Drive can be upgraded, it is recommended to have the southern Andreassen Drive access constructed prior to the construction of 238 lots.

Additionally, it is understood that Downing Street, extending north from Boer Street operates as a driveway currently. As traffic volumes increase on Downing Street, it is recommended that this section of road/driveway is delineated as a 'giveway' sign control with Boer Street as the major road. This has been illustrated on Figure 5-3.



Figure 5-3 Recommended Line-marking – Downing Street



Source: Nearmap

5.3 Servicing Facility Design Review

According to the Access, parking and servicing code in the Douglas Shire Planning Scheme (2018), Table 9.4.1.3.b *Access, parking and servicing requirements* indicates a dwelling house has no service vehicle requirement.

However, swept path assessment for a Refuse Collection Vehicle (RCV) has been undertaken for manoeuvres within the Stage 1 area. The swept path assessment reveals all internal roads are successfully serviced by an RCV. It is noted that a reversing movement will be required for Lot 26 in the interim until future internal roads are constructed. This has been shown on Figure 5-4.

80m² 24 (34.0) (34.0) (34.0) (34.0) (34.0) (34.0) (36.0)

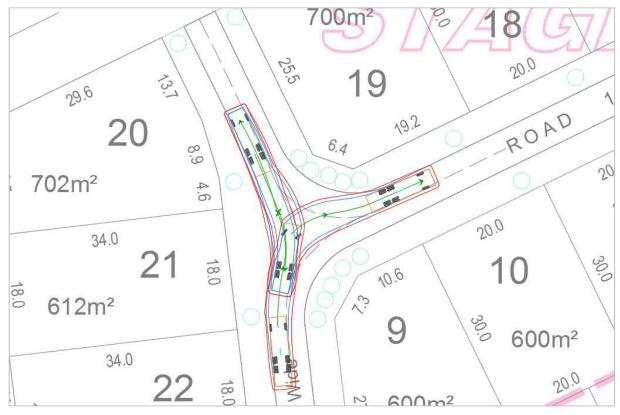
Figure 5-4 Lot 26 Interim RCV Swept Path

Source: Cardno drawing Q184109-MP01C



Additionally, a reversing manoeuvre is required for Lot 20 as this is a stub road arrangement. This has been shown on Figure 5-5.

Figure 5-5 Lot 20 Stub Road RCV Swept Path



Source: Cardno drawing Q184109-MP01C

The detailed swept path drawings are attached in Appendix B.



6 Recommendations and Conclusion

Cardno (Qld) Pty Ltd (Cardno) has been commissioned by Port Douglas Land Development Pty Ltd to prepare a traffic engineering assessment for a proposed master planned residential development located in Craiglie, Port Douglas.

The proposal focuses on Stage 1 of the masterplan and consists of 32 residential dwellings.

This traffic engineering assessment has identified the following:

Traffic Assessment

- > Stage 1 (32 lots) of the development generates a total of 27 vph in the peak period (3.7% proportional impact on the Captain Cook Highway intersection), which is considered to be quite low, therefore the impact on the external network is deemed to be negligible
- > The ultimate development of 282 lots generates a total of 240 vph in the peak period.
- SIDRA analysis of the Captain Cook Highway / Milman Drive intersection indicated that the year of opening and design horizon scenarios for Stage 1 development traffic operated within the typical performance thresholds for a priority controlled intersection with a maximum DOS of 0.273 in the 2031 AM peak period
- > For the ultimate development yield, the assessment of the Captain Cook Highway / Milman Drive intersection revealed the intersection is anticipated above typical thresholds for a priority controlled intersection at the ultimate opening year (2031) in the AM peak period (DOS of 0.829)
- > Based on this, potential reconfiguration forms of the intersection were investigated to improve the intersection operation and safety as informed from the Road Safety Audit as an existing safety concern was observed during the site visit
- > It is recommended to reconfigure the Captain Cook Highway / Milman Drive intersection to include the following, regardless of the development yield:
 - Major right turn lane and minor left/through short lane on the eastern approach
 - Major left/through lane and minor short right turn lane on the southern approach
 - Major left turn and minor short through/right lane on the western approach
 - Northern approach unchanged
- > The SIDRA analysis undertaken on the reconfigured intersection form indicates that the 2031 Background with ultimate development traffic operates with the typical performance thresholds for a priority controlled intersection with a maximum DOS of 0.778 in the 2031 AM peak period
- > Trigger analysis for the ultimate development indicates that at the construction of 270 lots, the Captain Cook Highway / Milman Drive intersection exceeds the typical performance threshold of DOS < 0.80 in the AM peak period



Road Network Assessment

- The proposed internal road network for Stage 1 meets the requirements of the FNQROC for the catchment sizes and road hierarchy classification
- The external road network utilised by the development (Milman Drive) is classified as a minor collector with a maximum catchment size of 300 lots as outlined in the FNQROC. When the Stage 1 development is constructed. Milman Drive will provide access for 94 lots which is within the maximum catchment size.
- > However, when the ultimate development of 282 lots is developed, Milman Drive will provide access to 344 lots which exceeds the maximum catchment size for a Minor Collector
- As it is unlikely that Milman Drive can be upgraded to a higher order road, it is recommended that the southern Andreassen Drive access is constructed to alleviate the demand on Milman Drive and subsequently the Captain Cook Highway / Milman Drive intersection. These works are recommended to be taken out prior to the construction of 238 lots in the ultimate design.
- > It is recommended that the northern section of Downing Street, currently operating as a driveway, is linemarked as 'giveway' control as traffic volumes increase on this section of road.
- Further, based on Council's queries, restrictions may be put on residential parking in the area at the discretion of Council to limit on-street parking. It is noted that Queensland Road Rules apply where no Council enforced parking limits are implemented which allows parking on local roads under certain circumstances

Based on the traffic and road network assessment of the Stage 1 development, the impact to the Captain Cook Highway / Milman Drive intersection and internal and external road network is considered to be appropriate for the development. Following the recommendations outlined in this report, the development is considered to be adequate from a traffic engineering perspective.

Craiglie Subdivision, Port Douglas

APPENDIX



DEVELOPMENT PLANS

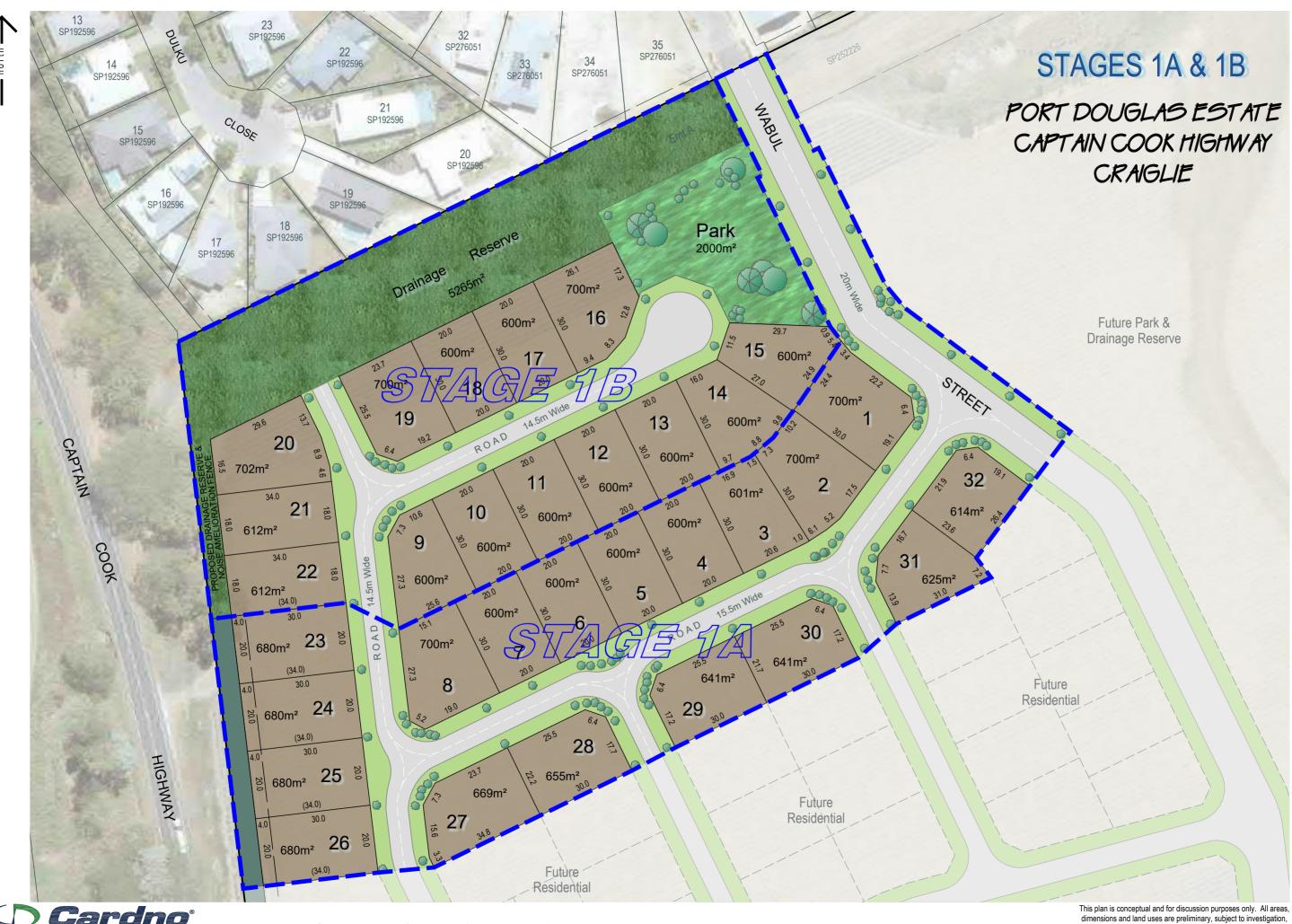


MASTER PLAN

PORT DOUGLAS ESTATE CAPTAIN COOK HIGHWAY CRAIGLIE







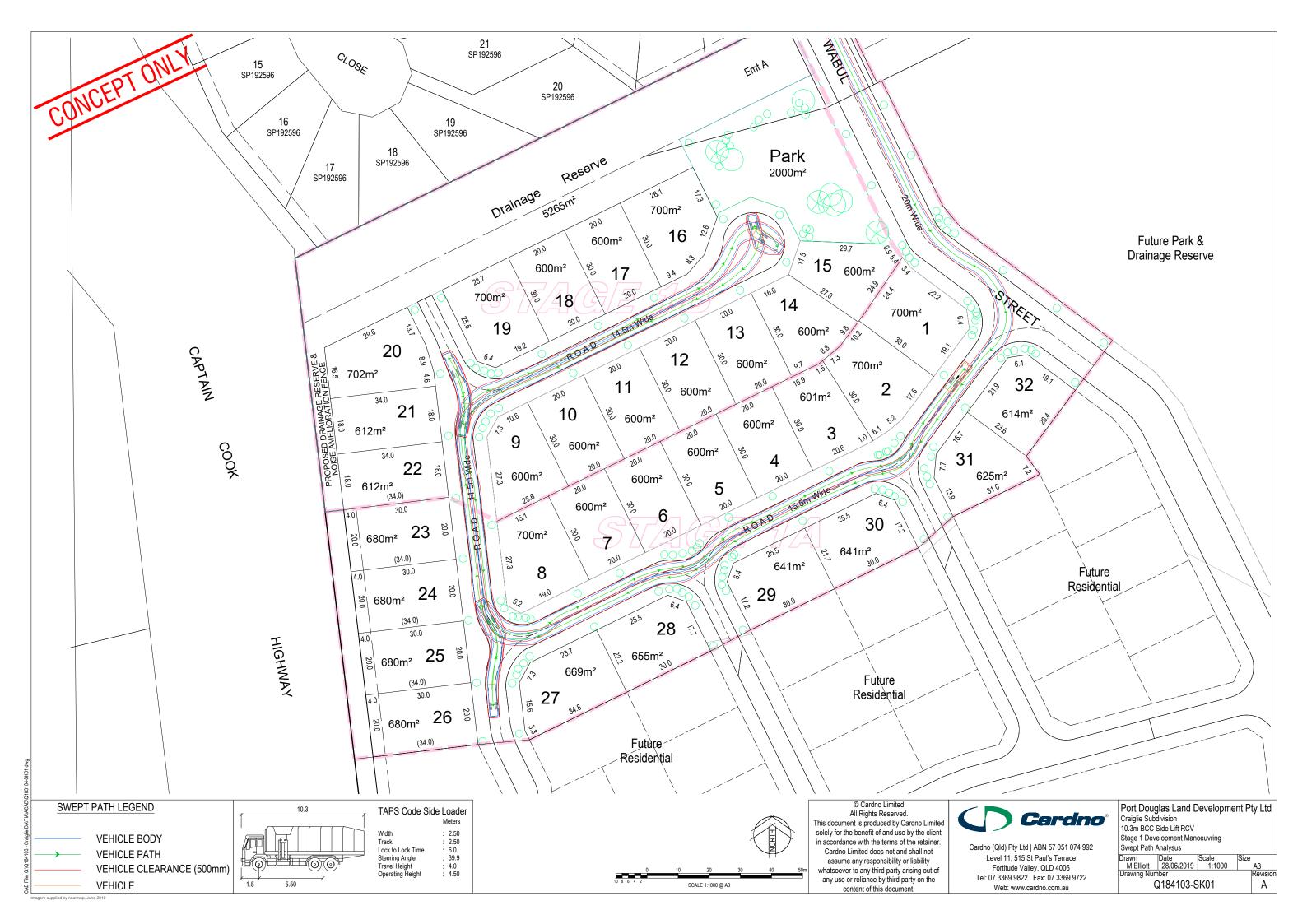
Craiglie Subdivision, Port Douglas

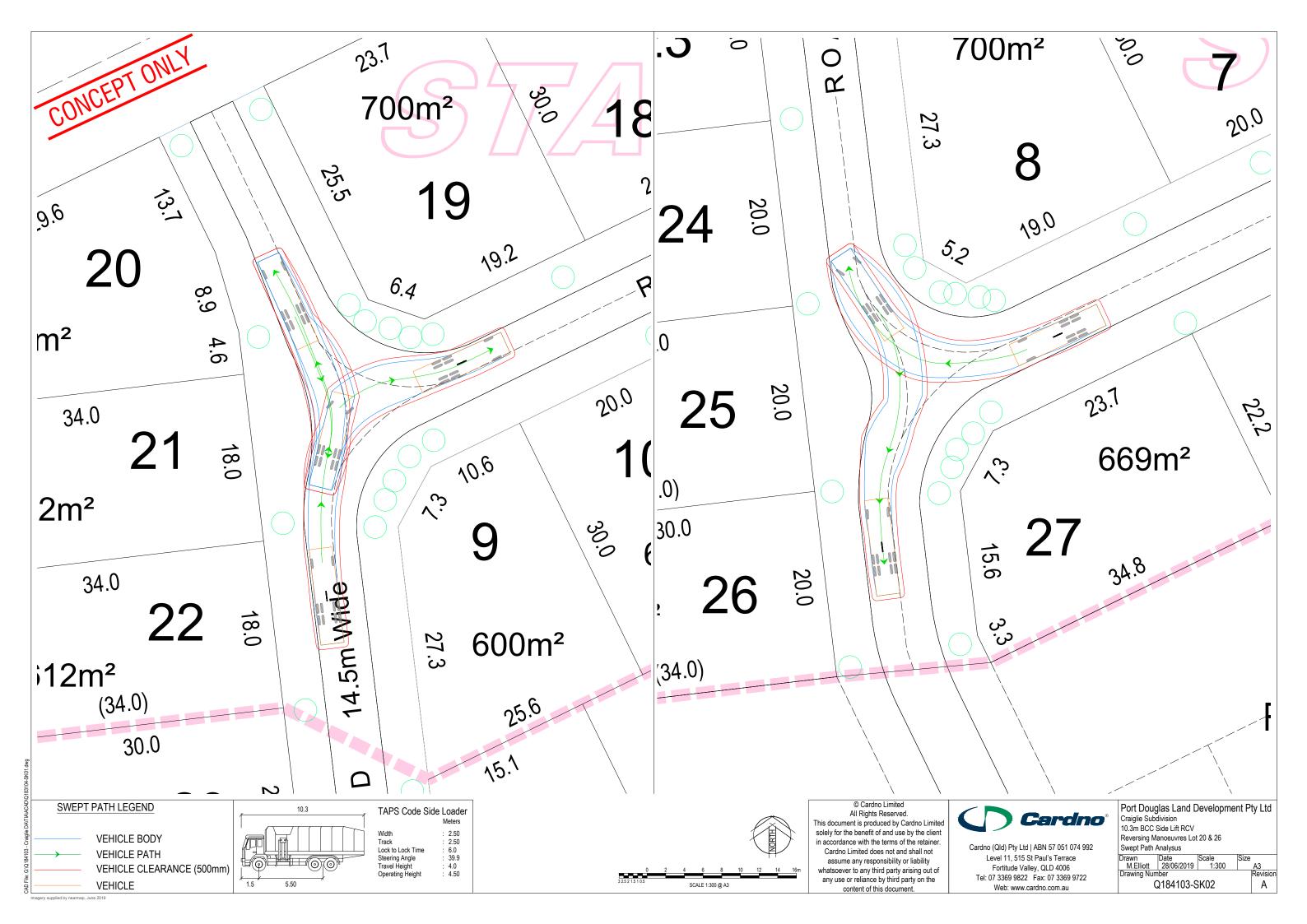
APPENDIX

B

SWEPT PATH ANALYSIS









Attachment E

Road Safety Assessment, dated 3 July 2019

ROAD SAFETY AUDIT (Existing Road)

PORT DOUGLAS ESTATE CRAIGLIE LOT 2 DA

Q184103

Prepared for

Port Douglas Land Development Pty Ltd

3 July 2019







Contact Information

Cardno (Qld) Pty Ltd Prepared for Port Douglas Land

ABN 57 051 074 992 Development Pty Ltd

Level 11 Project Name PORT DOUGLAS ESTATE

Document Information

515 St Paul's Terrace CRAIGLIE LOT 2 DA

Fortitude Valley QLD 4006 Q184103 Existing Road RSA

Australia File Reference V1 20190628 Craiglie DA -

FINAL.docx www.cardno.com

Phone +61 7 3369 9822 Q184103

Fax +61 7 3369 9722 Job Reference 3 July 2019

Date V1

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Author(s):

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Dana Geaboc Effective Date

Senior Road Safety Auditor

Approved By:

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John Peace Date Approved

Senior Road Safety Auditor

Document History

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1 Introduction

The Cardno Road Safety Auditing team has been commissioned by Port Douglas Land Developments Pty Ltd to undertake a Road Safety Audit (RSA) for the existing roads between Captain Cook Highway and Milman Drive and Wabul Drive, comprising the intersection of Captain Cook Highway and Beor Street and the road links and intersections on Beor St east of Captain Cook Highway, Downing Street, Milman Drive and Wabul Drive connection to the proposed development (Lot 2 Captain Cook Highway).

This report identifies possible safety issues and these are noted by the audit team using a combination of onsite investigations and a review of background material. Recommendations for potential remedial treatments will be made in response to each safety issue that is raised as part of this audit process.



2 About the Road Safety Audit

A Road Safety Audit (RSA) is a formal, systematic assessment of the potential road safety risks associated with, in this case, existing roads, conducted by an independent qualified audit team. The assessment considers all road users and suggests measures to eliminate or mitigate any risks identified by the audit.

The Road Safety Audit has been undertaken in accordance with the requirements of Austroads' *Guide to Road Safety Part 6: Managing Road Safety Audits – Edition 1.2 (February 2019)* and *Guide to Road Safety Part 6A: Implementing Road Safety Audits – Edition 1.2 (February 2019)*. The following sections identify the audit findings and recommendations.

All the findings described in Section 4 of this report are considered by the audit team to require action in order to improve the safety of the proposed project and to minimise the risk of crash occurrence and reduce potential crash severity.

2.1 Safe system findings

The aim of 'safe system findings' is to focus the RSA process on considering safe speeds and by providing forgiving roads and roadsides. This is to be delivered through the Road Safety Audit process by accepting that people will always make mistakes and by considering the known limits to crash forces the human body can tolerate. This is to be achieved by focusing the Road Safety Audit on particular crash types that are known to result in higher severity outcomes at relatively lower speed environments to reduce the risk of fatal and serious injury crashes.

The additional annotation "IMPORTANT" is used to provide emphasis to the road safety audit finding that has the potential to result in fatal or serious injury or findings that are likely to result in the following crash types above the related speed environment:

- > head on (>70km/h);
- > right angle (>50km/h);
- > run off road impact object (>40km/h); and
- > crashes involving vulnerable users (>30km/h)

As these crash types are known to result in higher severity outcomes at relatively lower speed environments.

The exposure and likelihood of crash occurrence shall then be considered for all findings deemed "IMPORTANT" and evaluated based on the auditor's professional judgement. Auditors should consider factors as traffic volumes and movements, speed environment, crash history and the road environment and apply road safety engineering and crash investigation experience to determine the likelihood of crash occurrence. The likelihood of crash occurrence shall be considered either VERY HIGH, HIGH, MODERATE or LOW and this additional annotation shall be displayed following the IMPORTANT annotation on applicable findings.

2.2 The audit team

The RSA team comprises the following members:

> **John Peace** Senior Road Safety Auditor (Qld) – CARDNO – Audit Team Leader

Dana Geaboc Senior Road Safety Auditor (Qld), RPEQ – CARDNO – Audit Team Member

This Road Safety Audit has been carried out by the audit team based in Brisbane. Whilst both the audit team and the traffic engineering team are parts of Cardno, the team members responsible for the RSA will have no involvement with the traffic impact assessment, therefore impartiality (integrity) of the audit will be maintained.

2.3 Responding to the audit report

As set out in the road safety audit guidelines, responsibility for the road design always rests with the client, and not with the auditing team. A client is under no obligation to accept all the audit recommendations. Also, it is not the role of the auditor to agree or approve of the client's response to the audit. Rather, the audit provides the opportunity to highlight potential problems and have them formally considered by the client, in conjunction with all the other project considerations.



This formal road safety audit report should be responded in writing, giving reasons for each rejection of an audit finding or recommendation. Acceptance of a recommendation may require no further comment, but explanation of how or when the action will be taken may be useful.

2.4 Disclaimer

The RSA carried out for the existing roads has adhered to the procedures set out in *Austroads Guide to Road Safety Part 6A: Implementing Road Safety Audit (2019)*. The audit covers physical features of the project which may affect road user safety and it has sought to identify potential safety hazards. However, the auditors point out that no guarantee is made that every deficiency has been identified. Further, if all the recommendations in this report were to be followed, this would not guarantee that the site is safe; rather, adoption of the recommendations should improve the level of safety.



3 Audit background

3.1 The project

Douglas Shire Council issued a decision notice for the development application ROL 2966/2018 for stages 1A and 1B for the development on Lot 2 SR431 in Craiglie. One of the conditions for the development approval related to traffic and transport engineering, which has reproduced below for reference.

Road Safety Assessment

6. Provide a Road Safety Assessment by an accredited Road Safety Auditor for the Milman Drive and Wabul Drive road link extending from the proposed new southern drain crossing through to, and including, the intersection with the Captain Cook Highway.

The proposed masterplanned development is located on Lot 2 SR431 in Craiglie, Port Douglas. The site is bound by medium density residential to the north, Captain Cook Highway to the west and open land to the east and south. The site location is illustrated on Figure 3-1.

Figure 3-1 Site Location



Source: Nearmap

This RSA focuses on the existing road condition but taking into account the possibility of the Stage 1A and 1B and of the proposed development having an impact on the existing roads, in response to the Council condition.

Stage 1A and 1B comprise 32 lots, a drainage reserve and park area.

In the ultimate form, the subdivision proposes to comprise 282 lots with various parks featured around the development.

The proposed development layout, with Stage 1A and 1B highlighted is included in Figure 3-2.



Figure 3-2 Proposed development



Source: Nearmap, Cardno drawing Q184109-MP01C



3.2 RSA study extent

The location of the Port Douglas Estate Craiglie is off Captain Cook Highway, south west of Port Douglas, North Queensland. The RSA extent is highlighted in Figure 3-3.

Figure 3-3 RSA study extent



Source: Nearmap

3.2.1 Captain Cook Highway

Captain Cook Highway is a state-controlled road (SCR) under the jurisdiction of Department of Transport and Main Roads (TMR), which connects Cairns to Mossman in North Queensland. Captain Cook Highway is a B-doubles 23 and 25 metre approved route.

The highway is frequently trafficked by general public for tourism purpose. Other road users are local residents, tourism operators, commercial operators, buses, pedestrians, cyclists, motorcyclists, agricultural machinery, emergency services, etc.

Speed limit on Captain Cook Highway on both approaches to Beor Street intersection is 70km/h.

3.2.2 Beor Street

Beor Street is a local road under the Douglas Shire jurisdiction. It is a two-lane two-way road connecting to a few residential and commercial properties with no through route to the west and providing a connection to the Craiglie development through Downing Street/Milman Drive. There is no through fare or further links on the eastern side of Beor Street. Speed limit on Beor Street is 50km/h.

3.2.3 Downing Street and Milman Drive

Downing Street and Milman Drive are local residential roads with a speed limit of 50km/h. The geometry and layout of the roads are appropriate for this type of road and have been designed to discourage driving at higher speeds. Width of the road is minimum 7.0m and footpath is provided on one side of the road throughout the audit area.

3.2.4 Captain Cook Highway/Beor Street intersection

At Captain Cook Highway/Beor Street intersection (the study intersection), the Captain Cook Highway has one lane in each direction on both approaches to the intersection. The speed limit on the northbound direction is generally 80km/h but decreases to 70km/h approximately 300m south of the intersection. In southbound direction, the speed limit on the Captain Cook Highway the intersection approach is 70km/h.

Beor Street approaches to the intersection are two-way, two lanes at 50km/h.

Basic left turns treatments (BAL) are provided at Beor Street left turns into Captain Cook Highway and at Captain Cook Highway turn into Beor Street. An auxiliary left turn treatment (AUL) is provided at Captain Cook Highway southbound approach.



The right turns at the intersection are allocated on shared right turn/through lanes on Captain Cook Highway and all movements on Beor Street.

Figure 3-4 Captain Cook Highway/Beor Street intersection layout



Source: Nearmap

3.2.5 Adjoining land uses

Within the RSA study area, prevalent land uses are commercial and a BP petrol station at the north-eastern side of Captain Cook Highway/Beor Street intersection, a resort hotel at the south-eastern side, a local park at the south-western corner and a commercial development at the north-west.

The BP petrol station has been recently built (late 2018). In order to provide access to the petrol station, a right turn auxiliary lane and widening of the pavement to accommodate an additional lane for left turning into the petrol station have been included on Captain Cook Highway southbound, north of the study intersection.

3.3 Previous Road Safety Audits

None available.

3.4 Crash history

A study of the recent crash history has been conducted in the vicinity of the proposed project for the five-year period to June 2018 (from Webcrash database). The results off the investigation showed that there was one reported crash within the study area data. The crash was 'Intersection from adjacent approaches' type (DCA 101), which required medical treatment.

3.5 Traffic volume data

Traffic data collected by TMR in 2018 shows that the Annual Average Daily Traffic (AADT) on Captain Cook Highway at a location 500m north of Port Douglas is approximately 6,500 vehicles per day, with the percentage of heavy vehicles being 9.1%.

Cardno obtained traffic counts at the Captain Cook Highway intersection undertaken on 18 June 2019. The results for AM peak hour total volumes (Figure 3-5), AM peak hour Heavy Vehicles volumes and percentage of total volumes (Figure 3-6), PM peak hour total volumes (Figure 3-7) and PM peak hour Heavy Vehicles volumes and percentage of total volumes (Figure 3-8) are shown below.



Figure 3-5 Captain Cook Highway/Beor Street AM peak total traffic volumes

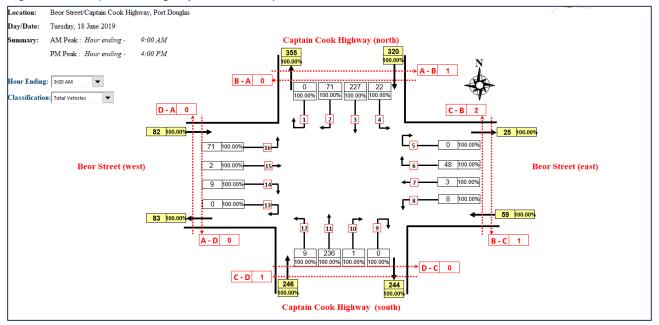


Figure 3-6 Captain Cook Highway/Beor Street AM peak heavy vehicles traffic volumes and percentage of total volumes

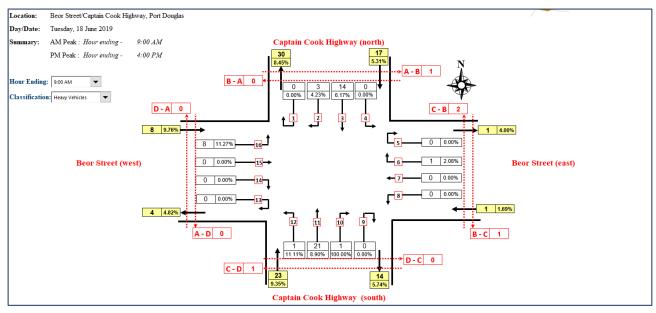




Figure 3-7 Captain Cook Highway/Beor Street PM peak total traffic volumes

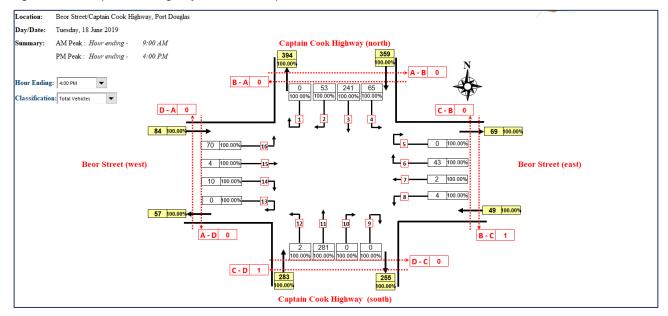
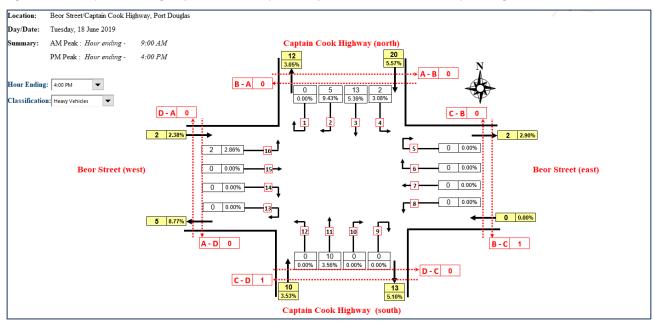


Figure 3-8 Captain Cook Highway/Beor Street PM peak heavy vehicles traffic volumes and percentage of total volumes



The analysis of the traffic counts confirmed the observations made on site, in terms of major movements and the traffic mix through the intersection.



4 Audit findings

4.1 Site visit

Several site inspections of the audit area were conducted on 11 and 12 June 2019, as follows:

- > 11 June 2019 daytime (including PM peak) and night inspections. Weather condition during the inspection was dry but cloudy and the road surface wet in places.
- > 12 June 2019 daytime (including AM peak) inspection. Weather condition was rainy and the road wet.

The inspections were carried out on foot and vehicle. Video recording and photographs of the site highlights were taken during day and night inspections.

4.2 Audit criteria

A ranking system for each of the issues has been adopted using the following priority rating (Table 4-1).

Table 4-1 RSA – priority ranking

Priority	Suggested treatment approach						
High	Highest priority for action from a safety view point						
Medium	Action needs to be taken from safety view point						
Low	Action is desirable from a safety view point						
Comment	An observation which may improve overall performance or safety, be of wider significance and possibly outside the scope of this RSA, but where action should be considered						

It is noted that the priority ranking is based on the subjective assessment of the audit team.

4.3 Specific issues and recommendations

Audit findings were established and comments are provided based on a desktop review of the design plans, and the information gathered during the site visit. The findings focus on road safety for all road users, from a road use and network issues perspective, auditing the road safety elements as set out in the Austroads Guide to Road Safety Part 6A: Implementing Road Safety Audits (2019).

The findings are presented by general location; hence the findings are not presented in order of relative safety importance or priority for treatment. The Road Safety Audit has documented its findings by numbered issues referenced to locations within the study area. Recommendations for potential remedial treatments have been identified and each issue is allocated with a priority.

Locations of the issues identified have been referenced in the relevant maps included in Appendix A.



Table 4-2 Specific issues and recommendations

Item/	Ap	proximate Location	Description of the identified	Photo	Recommendations	Priority
Reference	· .		issue	riloto	Recommendations	FIIOTILY
1	Captain Cook Highway Northbound	Approximately 400m north of Captain Cook Highway/Beor Street intersection	Bicycle path terminates abruptly, with no advance signage		Install bicycle path signage according to current standards	MEDIUM
2	Captain Cook Highway Southbound	Approximately 300m north of Captain Cook Highway/Beor Street intersection, left side of the road	Unprotected creek/big tree/non- frangible power pole with no slip base, culvert head wall within clear zone		Install protection barriers	HIGH IMPORTAN
3	Captain Cook Highway Southbound	Approximately 200m north of Captain Cook Highway/Beor Street intersection, left side of the road	Unprotected creek – approximately 1.0 -1.5m depth		Install protection barriers	HIGH IMPORTANT



Item/ Reference	Ар	proximate Location	Description of the identified issue	Photo	Recommendations	Priority
4	Captain Cook Highway Southbound	Approximately 200m north of Captain Cook Highway/Beor Street intersection, left side of the road	Mature tree (non-frangible vegetation) within clear zone and reduced shoulder width. The tree is located at the beginning of the left turn lane from Captain Cook Highway into Beor Street. The area is dark during night time and the tree is barely visible to the drivers		Install warning devices as a minimum short-term solution but install protection barriers as long-term solution.	HIGH IMPORTANT



Item/ Reference	Ар	proximate Location	Description of the identified issue	Photo	Recommendations	Priority
5	Captain Cook Highway Southbound	Extending 300m from the Captain Cook Highway/Beor Street intersection on the left side of the road	Mature trees (non-frangible vegetation) and non-frangible power poles within the clear zone		Install protection barriers	HIGH IMPORTANT
6	Captain Cook Highway Southbound	BP petrol station	Entry and exit movements into/from the petrol station are segregated by the provision of two driveways but there is not sign within the petrol station to restrict exit through the entry driveway		Install 'no exit' sign within the petrol station, at the entry driveway	LOW
7	Captain Cook Highway Northbound and Southbound	Several locations along Captain Cook Highway within the audit area	Blocked drainages/culverts		Clean drainages during maintenance and replaced damaged areas/equipment	MEDIUM



Item/	Арр	proximate Location	Description of the identified issue	Photo	Recommendations	Priority
8	Captain Cook Highway/Beor Street intersection	At Beor Street crossing east side of the intersection	Footpath leads pedestrians to crossing the Beor Street but no pedestrian connection is provided on the other side	MIC MARKID	Redesign footpath end at Beor Street crossing in order to discourage pedestrians to cross the street at this location	LOW
9	Captain Cook Highway/Beor Street intersection	At Beor Street westbound approach to the intersection	Give Way sign obstructed by vegetation		Cut back vegetation during routine maintenance	MEDIUM
10	Captain Cook Highway/Beor Street intersection	Throughout the intersection	Pavement linemarking worn out and missing RRPMs		Reinstate pavement linemarking and install missing RRPMs	MEDIUM



Item/ Reference	Ар	proximate Location	Description of the identified issue	Photo	Recommendations	Priority
11	Captain Cook Highway	Captain Cook Highway northbound approach to the intersection	No advance signs on Captain Cook Highway to advise on approaching the intersection. The intersection can be easily missed, particularly during night time, considering that the approach speed is 70km/h (or higher)		Install 'intersection ahead' signage	MEDIUM
12	Captain Cook Highway/Beor Street intersection	Captain Cook Highway northbound departure from the intersection	Provisions for a bike path have been included sparsely within the study area, on Captain Cook Highway and through Captain Cook Highway/Beor Street intersection but signage and linemarking for bicycle paths have not included as required by current standards		Install bicycle path signage and linemarking in accordance to current standards and specifications, including painted bicycle lanes	MEDIUM IMPORTANT



Item/	Арр	proximate Location	Description of the identified issue	Photo	Recommendations	Priority
13	Captain Cook Highway Northbound	Approximately 100m south of the Captain Cook Highway/Beor Street intersection, at the rest area entry driveway	Unprotected culvert at the rest area entrance driveway within the clear zone		Install protection barriers or install trafficable headwall	HGH IMPORTANT
14	Captain Cook Highway Northbound	Approximately 100m south of the Captain Cook Highway/Beor Street intersection, at the rest area entry	Rest area identification sign is located very close to the rest area entry. Sudden breaking can occur when drivers observe the sign and decide to access the area.		Relocate the existing rest area sign at a distance which allow drivers to indicate the intention and turn into the rest area	MEDIUM



Item/ Reference	Арр	proximate Location	Description of the iden issue	tified	Photo	Recommendations	Priority
15	Captain Cook Highway Northbound	Approximately 50m south of the Captain Cook Highway/Beor Street intersection	Unprotected water meter within the clear zone	located		Install protection barriers or relocate the water meter outside the clear zone	HGH IMPORTANT
16	Captain Cook Highway/Beor Street intersection	Left and right side of Beor Street, at the eastbound approach to the intersection	Unprotected non-frangible poles within the clear zone	power		Replace existing power poles with frangible poles or provide protection barrier for the existing	HIGH IMPORTANT



Item/ Reference	Арլ	proximate Location	Description of the identified issue	Photo	Recommendations	Priority
17	Beor Street, Downing Street and Milman Drive	Beor Street, Downing Street and Milman Drive	No linemarking provided beyond intersection (e.g. dividing line).		Install dividing line, particularly on Beor Street on both approaches to the Captain Cook Highway/Beor Street intersection	MEDIUM
18	Captain Cook Highway/Beor Street intersection	Turning facilities	Right turn from Captain Cook Highway into Beor Street on both approaches to Captain Cook Highway/Beor Street intersection are performed from a shared through/right turn shared lane. It's been observed during the site inspections that some queuing occurs on this lane and occasional sudden breakings occur in order to avoid the end of queue crashes. Left turn and right into Captain Cook Highway northbound from Beor Street are the main movements for both AM and PM peak. Queuing on Beor Street have been observed on both approaches to the intersection.		It is recommended to undertake turn warrant and intersection assessment (using current and future demands) to determine appropriate safe intersection form.	HIGH



Item/ Reference	Ар	proximate Location	Description of the identified issue	Photo	Recommendations	Priority
19	Captain Cook Highway Southbound	At Port Irrigation driveway	Unprotected culvert headwall		Consider protecting the headwall or install trafficable headwall	MEDIUM
20	Captain Cook Highway Northbound	Approximately 200m north of Captain Cook Highway/Beor Street intersection, left side of the road	Unprotected culvert >1m depth		Consider installing protection barriers	HIGH IMPORTANT



Item/ Reference	Approximate Location		Description of the identified issue	Photo	Recommendations	Priority
21	Captain Cook Highway/Beor Street intersection	Beor Street approaches to the intersection	Beor Street is not sufficiently illuminated at both approaches to the intersection. The westbound to approach to Captain Cook Highway/Beor Street intersection seems particularly dark		Consider improving illumination at Beor Street, at the approaches to Captain Cook Highway/Beor Street intersection in particular. Investigate the illumination provided to Captain Cook Highway/Beor Street intersection and ensure it is according to current requirements	MEDIUM
22	Beor Street	Eastbound and westbound approach to the right angle curve	No indication of the bent approach, no linemarking and no hazard markers. Dark in the night	See	Install appropriate signage to indicate the presence of the curve	COMMENT – outside the study area



5 Audit team statement

I hereby certify that the audit team have examined the documents provided to us by Port Douglas Land Development Pty Ltd (the Client) and undertaken a site investigation for the purpose of this RSA. I also confirm that the audit has been carried out independently of the design team following the general principles detailed in *Austroads 'Guide to Road Safety Part 6A: Implementing Road Safety Audits'* (AGRS06A-19 Published: 20 February 2019).

The audit has been carried out for the sole purpose of identifying any features of the existing roads which could be altered or removed to improve the safety of the proposal. The identified issues have been noted in the report. The accompanying findings and recommendations are put forward for consideration by the Client.

Dana Geaboc
Senior Traffic Engineer
CARDNO
dana.geaboc@cardno.com.au

Phone +61 7 3100 2201

Direct +61 7 3369 9822

Mobile +61 400 100 126

Signature/Date		

Disclaimer

This report contains findings and recommendations based on examination of the site and/or relevant documentation. The report is based on the drawings provided to Cardno and is relevant at the time of production of the report. Information and data contained within this report is prepared with due care by the Road Safety Team. While the Road Safety Audit Team seeks to ensure accuracy of the data, it cannot guarantee its accuracy.

Readers should not solely rely on the contents of this report or draw inferences to other sites. Users must seek appropriate expert advice in relation to their own particular circumstances.

The Road Safety Team does not warrant, guarantee or represent that this report is free from errors or omissions or that the information is exhaustive. Information contained within may become inaccurate without notice and may be wholly or partially incomplete or incorrect. Before relying on the information in this report, users should carefully evaluate the accuracy, completeness and relevance of the data for their purpose.

Subject to any responsibilities implied in law which cannot be excluded, the Road Safety Audit Team is not liable to any party for any losses, expenses, damages, liabilities or claims whatsoever, whether direct in contract, tort, statute or otherwise.

APPENDIX

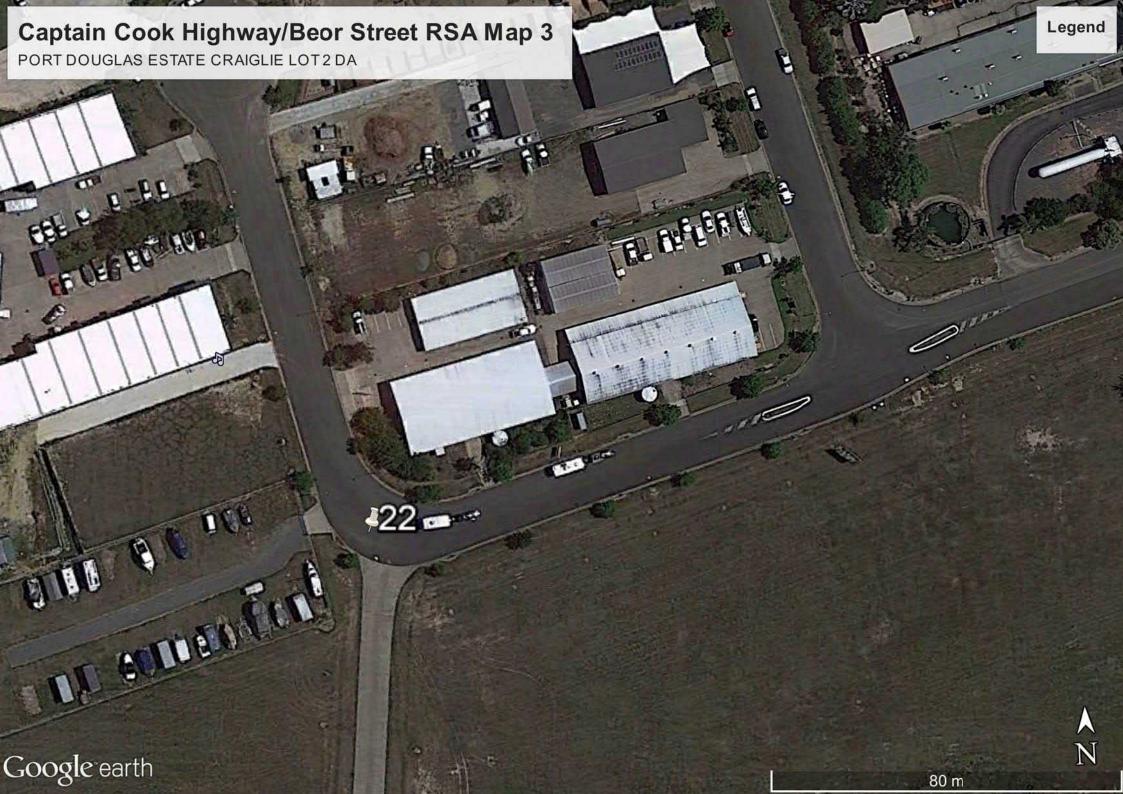
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RSA FINDINGS LOCATION









About Cardno

Cardno is a professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

Contact

Level 11 515 St Paul's Terrace Fortitude Valley QLD 4006 Australia

Phone +61 7 3369 9822 Fax +61 7 3369 9722

Web Address www.cardno.com





Attachment F

Traffic Impact Engineering Technical Memorandum, dated 14 June 2021





14 June 2021

Port Douglas Land Developments Pty Ltd C/o Cardno (Qld) Pty Ltd PO Box 1619 Cairns QLD 4870

Attention: Billy Glover

Dear Billy,

Cardno (Qld) Pty Ltd ABN 57 051 074 992

Level 11 515 St Paul's Terrace Fortitude Valley QLD 4006 Australia

Phone +61 7 3369 9822 Fax +61 7 3369 9722

www.cardno.com

RE: NEW PORT ESTATE STAGE 2
PHASE 2A: TRAFFIC ENGINEERING TECHNICAL MEMORANDUM

Introduction

Cardno Qld Pty Ltd (Cardno) has been engaged by Port Douglas Land Development Pty Ltd to provide traffic and transport engineering advice in relation to the proposed master planned residential development located in Craiglie, Port Douglas. The plan of the proposed development can be found in Appendix A.

The proposed development of the area will occur in stages. This letter assesses Stage 2 of the master planned development, which consists of approximately 35,000 sq.m developable area and 34 residential dwellings. The aim of this traffic statement is to address the following:

- > Traffic generated by the proposed Stage 2 development
- Net increase in traffic generated by Stage 2 and whether the development triggers the 5% threshold
- > Expected impact on surrounding road network by net increase in traffic generation.

Background

Cardno previously completed a Traffic Impact Assessment in 2019 assessing the proposed development against the requirements of the Douglas Shire Council (Council) Planning Scheme. The report specifically addressed Stage 1 and the Ultimate configuration of New Port Estate.

Stage 1 comprises of 32 lots, a drainage reserve and park area. In the ultimate form, the subdivision proposed to comprise 282 lots with various parks featured around the development. Since then, the newly developed plans indicate a reduction in the number of overall lots from 282 to 272.

An Advice Notice (AN) was issued for on the 12 April 2021 (Reference 2103-21727 SRA) for the Stage 2 development which proposes 34 residential lots and new internal roads. This letter is in response to the traffic engineering related to the traffic impact assessment items of Council's IR. The relevant item has been reproduced below for ease of reference.





IR Item 1

Issue:

In accordance with SDAP, State code 1: Development in state-controlled road environment, Performance outcome 20, it has not been adequately demonstrated that the existing Captain Cook Highway / Boer Street intersection can accommodate the accumulative traffic generation from Stage 1 and proposed Stage 2, without resulting in a worsening of operating conditions on the state-controlled road network.

The Traffic Impact Assessment (TIA) report prepared by Cardno, dated 16 October 2019, confirmed that the Stage 1 development (32 residential lots) would generate 27 vehicles per hour (vph) in the peak period. The 27vph is proportional to a 3.7% increase in traffic generation via the Captain Cook Highway / Boer Street intersection.

The proposed Stage 2 development proposes 34 residential lots. The accumulative traffic generation at the state-controlled intersection from both Stage 1 and proposed Stage 2 is expected to be above 5%.

In accordance with the Guide to Traffic Impact Assessment (GTIA), a development must not exceed 5% of the base traffic for any movement in the design peak periods in the year of opening of each stage.

Action:

Provide the following:

- A TIA report in accordance with the GTIA with reference to section 6.4 of the GTIA.
- The TIA report must be prepared by a qualified professional and certified by a Registered Professional Engineer
 of Queensland (RPEQ).
- The TIA report is required to demonstrate compliance with PO20 PO22 Network Impacts of SDAP, State Code 1: Development in a state-controlled road environment.

The Department of Transport and Main Roads has advised to ensure the operating conditions of the state-controlled road network are maintained, the existing Captain Cook Highway / Boer Street intersection may be required to be upgraded to accommodate the accumulative traffic generation from the proposed development. The minimum upgrades required are likely to be a channelised right-turn (CHR) on Captain Cook Highway.



Proposed Development

The proposed Stage 2 development comprises of the following land use:

> 34 residential lots

Refer to Appendix A for site specific information and boundary lines.

The proposed development is to take place as Stage 2 of the New Port Estate in Port Douglas. The site will gain access via Wabul Road, which leads onto the Captain Cook Highway / Milman Drive intersection. Figure 1-1 illustrates the proposed development location in relation to its site context.

Figure 1-1 Proposed Development Context



Source: Nearmap



Road Hierarchy

The site has frontage along Captain Cook Highway to the west and connections to Milman Drive and Wabul Close to the north. The key roads related to the development are illustrated on Figure 1-2, with the key characteristics of these roads summarised in Table 1-1.

Figure 1-2 Existing Road Network



Source: Nearmap

Table 1-1 Local Road Network

Road	Authority	Classification	Posted Speed	Typical Form
Captain Cook Highway	TMR	Arterial Road	70km/h	Two lane two way, undivided, sealed
Milman Drive	Council	Access Road	50km/h	Two lane two way, undivided, sealed
Wabul Close	Council	Access Road	50km/h	Two lane two way, undivided, sealed

Servicing Arrangement

Cardno has undertaken a swept path analysis to demonstrate the suitability of a Refuse Collection Vehicle (RCV) manoeuvring through the internal road network of the proposed development.

The swept path indicates that the RCV can safely and efficiently manoeuvre through the site. The detailed swept path drawings are attached in Appendix B.

It is noted that turnaround provisions for a refuse collection vehicle have not been provided as part of the Stage 2 subdivision, thus it is recommended that temporary turn treatments as part of the Stage 2 development as illustrated in Q184103-SK04-A.



Trip Generation

The traffic impact assessment prepared by Cardno in 2019 outlined that at the construction of 270 lots, the operation of the Captain Cook Highway / Milman Drive intersection will exceed typical performance thresholds. As a result, it is expected that the provision of development lots up to 270 will not compromise the operation of the Captain Cook Highway / Milman Drive intersection. Considering the Stage 2 development is proposing 34 lots, it is expected that development traffic will be accommodated by the existing network.

The peak generation rates for the land uses have referenced the NSW Roads and Maritime Services (RMS) Guide to Traffic Generating Developments (August 2013 technical direction).

The traffic analysis will consist of two scenarios, the Stage 2 of development and the ultimate development. A summary of the peak trip generation has been summarised in Table 1-2.

Table 1-2 Adopted Trip Generation Rates

	Scenario	Land Use	Development Yield	Trip Generation Rate		Trip Generation		
				AM	PM	AM	PM	Source
	Stage 1	Low Density Residential	34 dwellings	0.85 trips per dwelling	0.85 trips per dwelling	27 vph	27 vph	RMS
	Stage 2	Low Density Residential	34 dwellings	0.85 trips per dwelling	0.85 trips per dwelling	29 vph	29 vph	RMS
•	Ultimate	Low Density Residential	272 dwellings	0.85 trips per dwelling	0.85 trips per dwelling	231 vph	231 vph	RMS

As outlined in Table 1-2, it is estimated that Stage 1 of the development will generate 27 vph, Stage 2 of development will generate 29 vph and the ultimate development will generate 231 vph in the peak periods.

Table 1-3 below summarises the Stage 2 peak hour traffic generation.

Table 1-3 Peak Hour Traffic Generation – Stage 2

Scenario	АМ	РМ
Stage 1	27 vph	27 vph
Stage 2	29 vph	29 vph
Ultimate	231 vph	231 vph

As the Stage 1 and ultimate traffic generation was assessed as part of the 2019 Traffic Impact Assessment and the ultimate generation is less than what was previously assessed in the 2019 Traffic Impact Assessment, this report will focus on the Stage 2 development.

Stage 2 Development Timing

The staging of the Stage 2 development has not been indicated by the client. Therefore, it has been assumed that Stage 2 will be complete in 2022. This is utilised in the operational assessment.

Traffic Growth

Cardno has adopted a linear growth of 2% p.a to forecast potential future traffic demands at the key study intersection, in accordance with previous assessments. Based on previous experience in similar projects, Cardno believes this is an appropriate growth rate to adopt.

Applying the 2% p.a. growth rate to the 2019 background volumes, the 2022 volumes for the Captain Cook Highway / Milman Drive / Beor Street intersection were found and are shown in Table 1-4 below.



Table 1-4 Total Intersection Volume for Captain Cook Highway / Milman Drive / Beor Street

Year	Traffic Generation		
i eai	АМ	PM	
2022	735	806	

With regards to the increase in trips, the proportionate impact of the Stage 2 traffic generation has been calculated based on the total background trips for the year 2022. Considering Stage 2 will be delivered in 2022, by this time Stage 1 of the development will be constructed and operational. As a result, the Stage 1 trips will be considered existing trips and have been included in the background traffic. This is shown in Table 1-5 below.

Table 1-5 Stage 2 Traffic Generation Impact

Year	Trip Generatio	n Rate
r ear	АМ	PM
Stage 2	29	29
2022 Background	762	833
Impact	+3.8%	+3.5%

As indicated, the proposed Stage 2 development will result in a 3.8% increase in trips during the AM peak and a 3.5% increase in trips during the PM peak. As the impact is less than a 5% increase, the traffic impact is not considered to be significant and detailed analysis is not required.



Summary

Cardno was engaged by Port Douglas Land Development Pty Ltd to provide traffic and transport engineering advice in relation to the proposed master planned residential development located in Craiglie, Port Douglas. This letter assesses the traffic generated by Stage 2 of the development and the expected impact on the surrounding network caused by this increase in traffic generation.

Upon review of the development plans and traffic generation analysis:

- > Stage 2 of the proposed development is comprised of 34 residential lots.
- A swept path analysis has been undertaken with an RCV to demonstrate the suitability of an RCV manoeuvring through the proposed development. The design vehicle can safely and efficiently manoeuvre through the site.
- > The Stage 2 development plans do not provide turn around provisions for an RCV. Thus, it is recommended that temporary turnaround provisions are provided until the next stage of the development.
- > The additional trips generated by Stage 2 of the master planned residential development <u>would not</u> produce a significant increase in trips, as a maximum increase in trips of only 3.8% above the existing intersection volume is expected at most. Therefore, further traffic analysis is not considered to be required.

On the basis of the above, Stage 2 of the proposed development is considered to be suitable from a traffic perspective. The increase in traffic generation will not have significant impact on the existing intersection volume, therefore no further traffic analysis is required.

Conclusion

Based on the above review, Stage 2 of the proposed development is compliant with local council and national standards, and the increased traffic generation is deemed negligible on the existing intersection volume.

Should you have any questions regarding the above, please contact Harj Singh on 33102352.

Yours sincerely,

4 Sough

Harj Singh

Senior Traffic Engineer (RPEQ 22364)

for Cardno

Direct Line: +61 7 33102352 Email: harj.singh@cardno.com.au APPENDIX

A

DEVELOPMENT PLANS



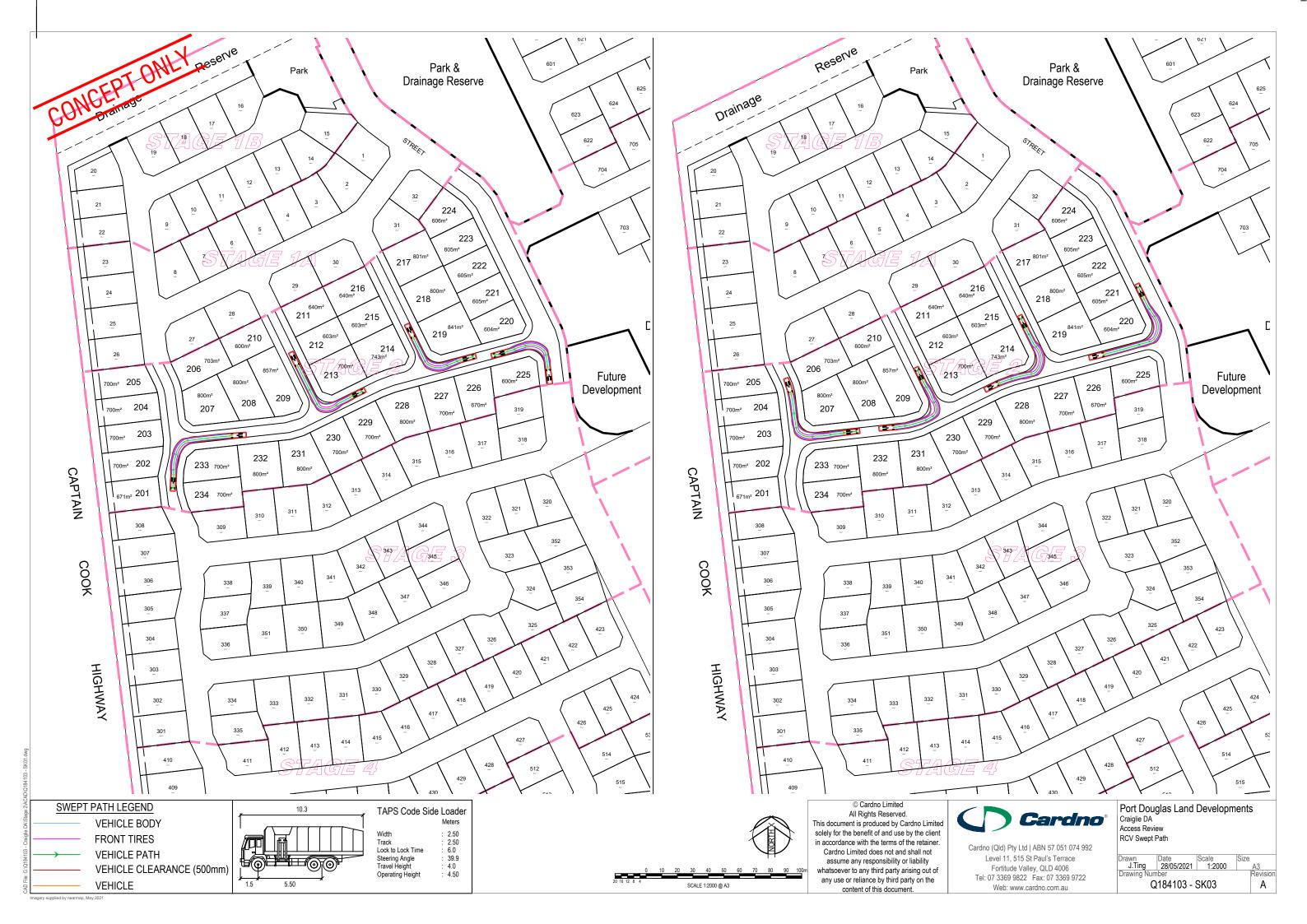


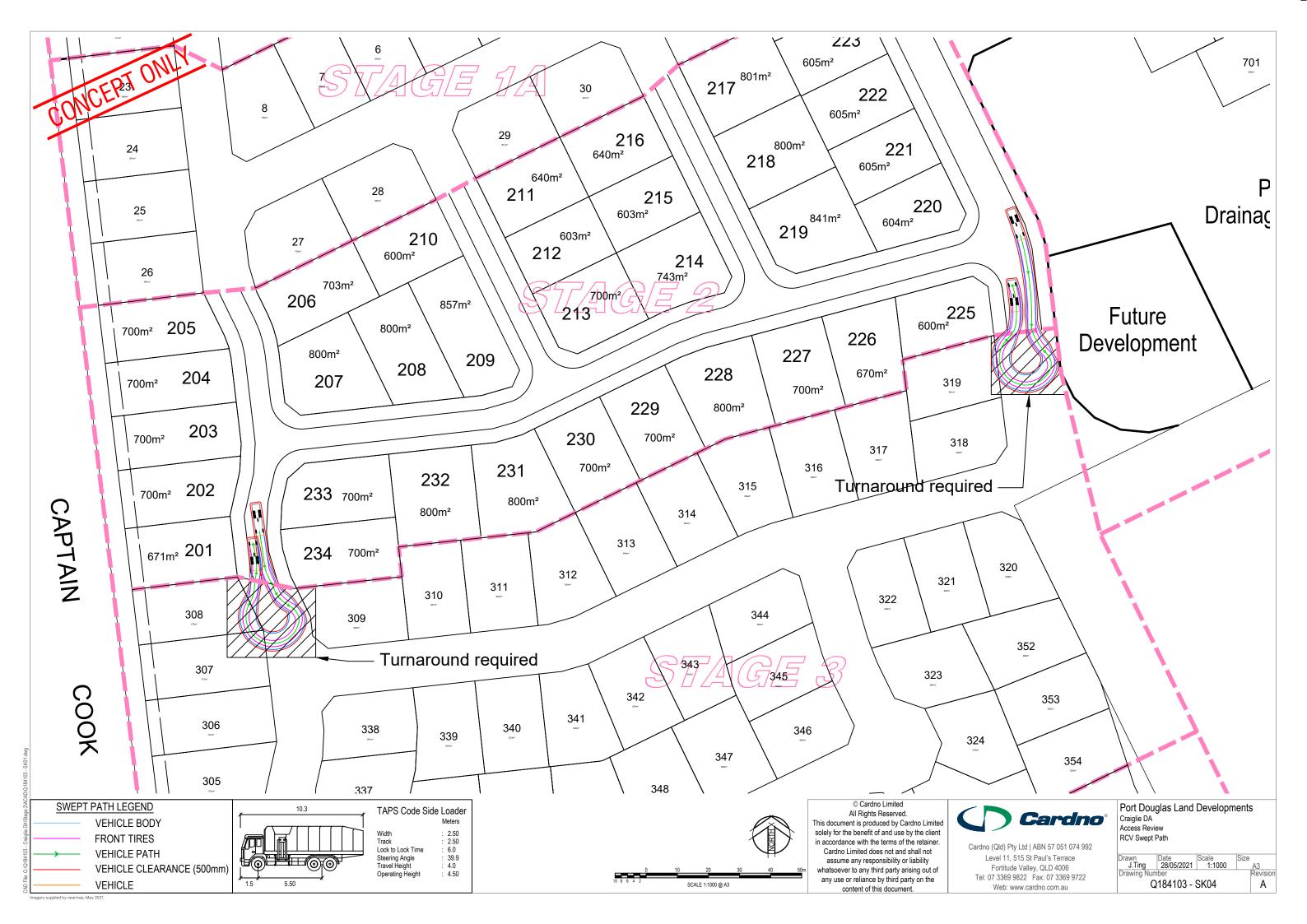
APPENDIX

B

SWEPT PATH ASSESSMENT









Attachment G

Flood Impact Assessment, dated 16 October 2019

Flood Impact Assessment

Port Douglas Estate – Stage 1A and 1B

Q184103

Prepared for Port Douglas Land Developments

16 October 2019







Contact Information

Document Information

Cardno (Qld) Pty Ltd Prepared for Port Douglas Land

ABN 57 051 074 992 Developments

Level 12 Project Name 0B5B6BPort Douglas Estate

515 St Paul's Terrace – Stage 1A and 1B

Fortitude Valley QLD 4006 File Reference Q184103_Port_Douglas_Est

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www.cardno.com Job Reference Q184103

Phone +61 7 3369 9822

Fax +61 7 3369 9722 Date 16 October 2019

Version Number 3

Author(s):

Australia

Zac McCosker Effective Date 16/10/2019

Flooding & Stormwater Engineer

ele Dobert

Approved:

Helen Doherty Date Approved 16/10/2019

Senior Engineer

Document History

Version	Effective Date	Description of Revision	Prepared by	Reviewed by
1	24/01/2019	Initial Report	GP	DW
2	04/04/2019	Revised Layout	GP	DW
3	16/10/2019	Revision after Council feedback	ZM	HD

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1 Introduction

Cardno was commissioned by Port Douglas Land Developments to undertake a Flood Impact Assessment (FIA) of the proposed Port Douglas Estate residential development located on Lot 2 of Plan SR431 off the Captain Cook Highway, Craiglie, QLD. Figure 1-1 below displays the locality of the proposed development.

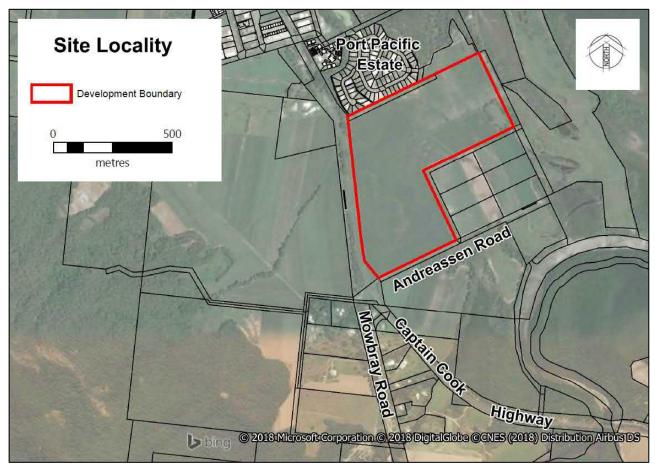


Figure 1-1 Site Locality – Port Douglas Estate

The aim of this FIA is to support a Development Application (DA) for Lot 2 on SR431 in regards to the reconfiguration of the lot into 32 lots plus a new road, balance lot, drainage lot and park. This DA will facilitate the first stage of the residential development, defined as Stage 1A and 1B, (Stage 1). Figure 1-2 displays the Proposed Plan of Reconfiguration.





Figure 1-2 Proposed Plan of Reconfiguration

Stage 1 is located outside of the Storm Tide, 100 Year AEP flood extent and the Floodplain Assessment Overlay as prescribed in Councils Flood and Storm Tide Inundation Overlay Map (ref. Sheet – FST-020). However, as the future development area falls within all of these overlay areas, the following document has been completed to demonstrate the proposed Stage 1A and 1B are in compliance with the Douglas Shire Planning Scheme - Flood and Storm Tide Hazard Overlay Code.

The design allotment levels in Stage 1 of the Port Douglas Estate development will be designed to account for the impacts of Climate Change on the Craiglie Creek flood levels. Due consideration will be provided in regards to increases in rainfall intensities and increases in tidal tail water levels.

Access to Stage 1 is to be provided via Wabul Street across a multi-culvert bridge spanning the overland drainage reserve to the north. Additional future access to Stage 1 is to be provided with a connection through to Andreassen Road to the south. The site as a whole, is generally bounded by the Captain Cook Highway to the west, Port Pacific Estate to the north and farming land to the south.

Existing ground levels onsite range from approximately 8.2 mAHD in the south west corner grading down to 2.2 mAHD in the north east corner. There is a drainage gully traversing north across the site in which a majority of the onsite runoff is discharged north into the drainage corridor through the Port Pacific Estate. The site is currently utilised as crop farming land.

The Wabul Street crossing requires widening of the existing drainage reserve at the crossing location to accommodate the proposed culvert structures and ensure the smooth transition of flow into the culverts. Reference Drawing Q184103-CI-1262 (Appendix D), provides an indication of the channel widening required and details the proposed culvert structures.

The park area, identified in Figure 1-2 above, is to be used as flood storage to mitigate any volume lost through the development of Stage 1. For the purpose of this assessment, all residential lots and roads are to be filled above the 1% AEP flood level and the park area at the 20% AEP flood level in accordance with the Douglas Shire Planning Scheme - Flood and Storm Tide Hazard Overlay Code.



It is noted that development has occurred within the Port Pacific Estate site to the north on Lot 120 of Plan SP276038 of the drainage reserve and as such, it is vital that the proposed Port Douglas Estate does not adversely impact on the set freeboards of the southernmost lots. It was deemed necessary that all future development areas discharging into the northern drainage reserve be adequately represented within the Stage 1A and 1B hydraulic modelling to ensure appropriate freeboard for neighbouring lots could be maintained.



2 Decision Notice

2.1 Background

On the 28th May 2019, Douglas Shire Council issued a decision notice of approval subject to conditions being met. These conditions are detailed below, along with responses to each item.

2.2 Information Required

Further Drainage Study

- 13. The applicant is to update the stormwater modelling and reporting in accordance with the following requirements:
- Provide further information on the model input parameters for review by its external stormwater reviewers;
- b. Provide a further assessment of the check flow assessed using the rational method based on alternative time of concentration methods and provide commentary on any variance between the methods;
- c. Undertake a sensitivity analysis for the peak flows in the model based on the upper bound assessment from the above check (or 15% increase in peak flows whichever is the greater). Note the assessment of peak flow rates is to enable assessment of the implications for the drain and culvert (and the flood level relative to existing housing);
- d. It is unclear how the ground levels for the existing lots have been entered into the flood model and whether the current model set up excludes flow from entering existing lots. In order to properly understand the proposed drain and culverts operation and impacts, cross sections of the drain profile at regular intervals upstream and downstream from the culverts are required. The sections should show:
 - i. the proposed drain profile, including the need for a finish to stabilise the drain banks, such as rock lining;
 - ii. existing lot levels on the north side and proposed development levels on the south;
 - iii. the modelled peak flood level for the 5, 10- and 100-year AEP events, and
 - iv. the resulting freeboard;
- e. In addition to the colour coding of the flood modelling outputs, flood levels are to be reported with 100mm contours or spot levels at maximum 50m intervals. This requirement is only for the 1% AEP model outputs but applies to both the existing and developed cases; and
- f. The proposed culvert design concept is not supported as there is no capacity for overtopping within the drainage corridor. The flood modelling is to be revised for a culvert concept that has a road surface level a minimum of 250mm below the existing road level on the northern side.

Any ramping of the road levels is to occur outside the alignment of the drainage corridor. Modelling of the blockage scenarios is to be confirmed.

Because the culvert will not be able to achieve significant overtopping capacity, the modelling and reporting needs to clearly address blockage scenarios, sensitivity analysis and assessments of the severe storm impact as set out in QUDM Sections 7.23, &.24 and &.25.

The updated flood model and report together with an amended culvert design must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Works. All works must be carried out in accordance with the approved plan prior to the lodgement of the Survey Plan with Council for endorsement.



Response

Section 5 of the Flood Impact Assessment has been updated to provide further information on the hydraulic model input parameters.

Alternative methods of assessing time of concentration have been assessed. Section 4.1 details the methodology and results of assessment.

A climate change scenario has been assessed which accounts for a 20% increase in peak flows. This scenario was used as the sensitivity analysis to assess the impacts to existing houses and the proposed drain and culvert configuration.

Cross sections of the proposed drain detailing relevant information have been provided and are shown in Appendix D, drawing no. Q184103-CI-1262.

Contours of the peak flood levels within the 1% AEP event at 100mm intervals have been added to the output mapping shown in Appendices A and B for both the existing and developed cases.

As part of the new road design no ramping occurs inside the alignment of the drainage corridor. As part of the flood modelling, several blockage scenarios have been modelled. On the 22nd August 2019, Council accepted that the proposed configuration using 900mm high box culverts was an acceptable solution based on the proposed 20% blockage factor subject to a final review of this flood impact assessment (Appendix F). Refer to Section 5.5 for further details regarding the proposed culvert configuration.

Drainage Construction

14. The applicant / owner must undertake the development of the land in accordance with the findings of the updated Drainage Study.

Associated earthworks and landscaping must be completed in accordance with the approved plans prior to the lodgement of the Survey Plan with Council for endorsement.

Response

The earthworks design has been undertaken in accordance with the findings of this Flood Impact Assessment.

Reserves Over Drain

15. A Drainage Reserve containing all land below the top of the high bank and the area of additional drainage reserve (as outlined in Condition 3 above) adjacent to the top of the bank or the limit of the Q100 AEP event, whichever is the greater must be transferred to the Crown for Drainage Purposes. The land (reserve) must be transferred in conjunction with registration of the Plan of Survey for any lot release under Stage 1B. The existing drainage easement, over the part of the stormwater drain that is to be within the new Drainage Reserve, is to be rescinded at no cost to Council.

Response

See civil plans for proposed reserves (Appendix D).

Southern Diversion Drain

16. Where drainage channel improvements are identified in the flood study and or as a result of performance issues identified with the current drain, these works are to be identified on engineering drawings and included in the application for Operational Works.

Existing scouring\ring of the drain batters and banks is to be investigated and advice is to be provided on the soil type, lining and upgrades necessary to address the long-term stability of the channel. It is expected that a revised flatter batter profile will need to be considered. Information on the selected batter profile, lining type or vegetation stabilisation and soil types together with advice on the stream flow velocities will be required to support the proposed drain design.

Access ramps suitable for maintenance plant and equipment are to be provided on each side of the culvert structure to enable maintenance access the drain and culverts.

A plan of the drain improvement works must be endorsed by the Chief Executive Officer prior to the issue of a Development Permit for Operational Works.

All works must be carried out in accordance with the approved plans, to the requirements and satisfaction of the Chief Executive Officer, prior to the lodgement of the Survey Plan with Council for endorsement.



Response

Drainage channel improvements as a result of performance issues within the existing drain areas are shown on engineering drawings.

Stream flow velocities within the southern diversion drain have been provided within the report to assist in addressing the long term stability of the channel. Consideration will be given to these velocities during detailed design.



3 Background

3.1 Existing Modelling

Cardno has previously undertaken a flood study with regards to the Port Pacific Estate, located to the north of the proposed Port Douglas Estate. The purpose of this flood study was to investigate hydraulic conditions within the Port Pacific site and recommend mitigation options to alleviate adverse flooding within the surrounding catchment. The assessment was detailed within the report "Port Pacific Estate, Port Douglas – Flood Study (dated 11 August 2009)". The construction of Port Pacific Estate was divided into five development stages and to date, only stages one to four have been constructed.

The flood study consisted of a detailed hydrological Watershed Bounded Network Model (WBNM) that assessed peak design flows from the local upstream catchment. A two-dimensional hydraulic TULOW model was also created to assess flooding conditions within the Port Pacific Estate and surrounding catchment.

Due to the close proximity of the Port Douglas Estate development, it is proposed to adopt the modelling created within the Port Pacific Estate flood study to assess flooding conditions within the subject site and determine flooding impacts resulting from the proposed development.

3.2 Limitations of Existing Modelling

A review of the existing modelling data identified a number of key limitations that needed to be addressed before assessing flooding conditions within the Port Douglas Estate site. The identified limitations are as follows:

<u>Catchment Delineation</u>; The upstream local catchments assessed within the existing WBNM modelling were delineated based on rough contour data. Since this time, newer, 2010 LiDAR data has become available and thus the catchment boundaries were redrawn based on the more recent dataset.

<u>Model Extent</u>: It was identified that the existing hydrologic and hydraulic models did not extend far enough to the south to fully capture the Port Douglas Estate development and its associated catchment. As such, both the hydrologic and hydraulic model were extended to fully encapsulate this area.



4 Hydrologic Analysis

4.1 Time of Concentration

The time of concentration for the two main catchments was calculated using two different methodologies, as described in the Queensland Urban Drainage Manual (QUDM), Section 4.06.11: the Bransby-Williams' Equation and the Modified Friend's Equation.

The formula for the Bransby-Williams' Equation is:

$$t_c = \frac{58L}{A^{0.1}S^{0.2}}$$

where:

 t_c = time of concentration of the catchment (min)

L = length of flowpath from the outlet to the catchment divide (km)

A = catchment area (ha) S = equal area slope (%)

The formula for the Modified Friend's Equation is:

$$t_c = \frac{800L}{ChA^{0.1}S^{0.4}}$$

where:

 t_c = time of concentration of the catchment (min)

L = length of flowpath from the outlet to the catchment divide (km)

Ch = Chezy's coefficient at the site = $R^{1/6}/n$

 $R = \text{hydraulic radius} = 0.65 R_s$ (where the slope varies along the stream)

 R_s = hydraulic radius at the site (m)

n = average Manning's n roughness along the stream

A = catchment area (ha)

S = equal area slope (%)

Using these equations, the time of concentration for two selected catchments were compared, as shown in Table 4-1. The peak flows generated using the different time of concentration values were calculated using the rational method and are shown in Table 4-2. As shown there is no major difference between the two methods.

Table 4-1 Time of Concentration

Parameter	Catchment Y	Catchment Q
Stream Length (m)	1800	2060
Catchment Area (ha)	107	121.3
Equal Area Slope (%)	2.3	4.9
Hydraulic Radius at Outlet (m)	1	0.75
Average Manning's n	0.08	0.08
Time of Concentration – Bransby Williams (min)	55.6	54.2
Time of Concentration – Modified Friends (min)	55.8	49.1



Table 4-2 Time of Concentration Peak Discharge Comparison

Time of Concentration Method	Catchment Y- Rational Method Peak Discharge (m³/s)	Catchment Q- Rational Method Peak Discharge (m³/s)
Bransby Williams	29.8	34.2
Modified Friends	29.8	35.9
Difference (m³/s)	0.0	1.8

4.2 Coefficient of Runoff

The coefficient of runoff for the catchment was determined in accordance with the FNQROC Development Manual (Version No. 03/17) and the Queensland Urban Drainage Manual (2013.

The catchments are generally undeveloped, thus a 10 year coefficient of runoff of 0.70 was adopted with the coefficient of runoff for the 100 year AEP event 0.84.

4.3 WBNM Model

A WBNM hydrologic model of the catchments was established. The layout of the model is shown in Figure 4-

In accordance with the existing flood study for the area, design rainfall data for the catchment was determined in accordance with Australian Rainfall & Runoff (ARR1987). The information used is as follows:

- 2 Year AEP, 1-hour Intensity 60 mm/h
- 2 Year AEP, 12-hour Intensity 13 mm/h
- 2 Year AEP, 72-hour Intensity 5.0 mm/h
- 50 Year AEP, 1-hour Intensity 100 mm/h
- 50 Year AEP, 12-hour Intensity 27.5 mm/h
- 50 Year AEP, 72-hour Intensity 9.5 mm/h
- Regional Skewness 0.15
- Geographical Factor F2 3.86
- Geographical Factor F50 17.1

The design rainfall losses adopted for the analysis were:

Pervious Area Initial Loss = 0 mm

Continuing Loss = 2.5 mm/h

Impervious Area Initial Loss = 0 mm

Continuing Loss = 0 mm/h

A Lag Parameter of 1.50 was used in the WBNM model. Studies carried out using WBNM have found that the average value of the Lag Parameter across a wide range of catchments is between 1.30 and 1.80 (ref. WBNM User Manual). Thus, the adopted value of 1.50 is within the accepted bounds. A non-linearity exponent of 0.77 was also used and each catchment was assumed completely pervious.

The WBNM model was run for a range of storm durations, from 25 minutes to 3 hours, with the 1.5 hour event producing the peak discharge from each catchment. The peak 100 year discharges calculated by the WBNM model are:

Catchment Y - $29.7 \text{ m}^3\text{/s}$ Catchment Q - $38.6 \text{ m}^3\text{/s}$ Catchment V - $14.9 \text{ m}^3\text{/s}$



This result shows that the peak flows calculated by the WBNM model agree well with those from the Rational Method (refer Section 3). As discussed above, the existing Cardno WBNM model for the area was adopted to assess peak design discharges from the local upstream catchment. Figure 4-1 summarises the revised catchment delineation and WBNM model layout. Catchment X discharges directly into the drainage reserve to the north of the Stage 1 and Catchment V discharges to the south of the site boundary.

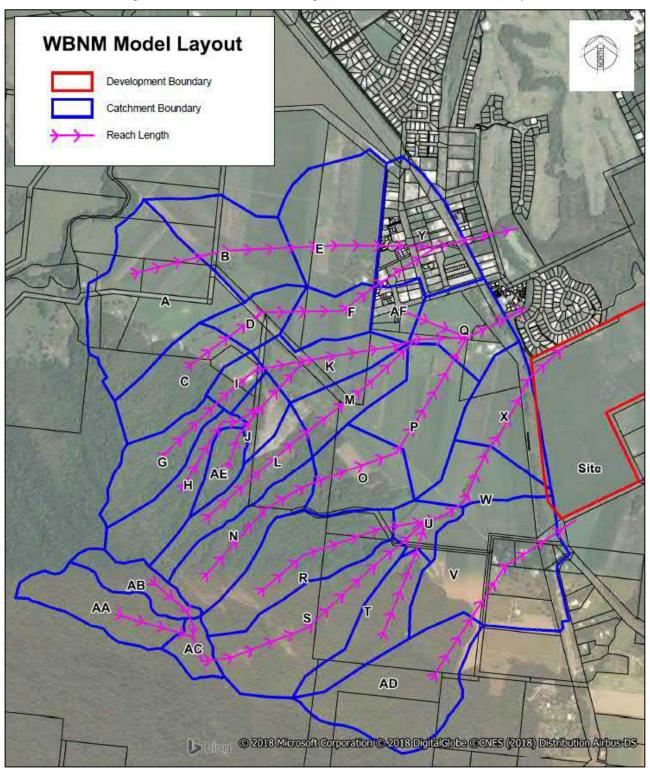


Figure 4-1 WBNM Model Layout



Table 4-3 below summarises the catchment areas adopted within the WBNM model.

Table 4-3 WBNM Catchment Areas

Catchment ID	Area (ha)	Catchment ID	Area (ha)
A	27.80	N	13.21
В	15.72	0	12.44
E	20.35	Р	16.87
С	13.36	Q	10.91
D	5.99	R	19.25
F	7.30	AA	11.83
AF	4.46	AB	6.16
Υ	16.38	AC	3.59
G	10.36	S	22.83
1	3.38	Т	10.89
Н	10.76	U	4.49
AE	4.25	W	8.74
J	4.56	X	12.60
K	10.00	AD	22.34
L	11.11	V	29.33
M	8.56		

4.4 Verification

A Rational Method calculation was completed to verify that the WBNM peak discharges were of the correct order of magnitude. The time of concentration was calculated and verified using two different methodologies, as described in the Queensland Urban Drainage Manual (QUDM). Table 4-4 below summarises the Rational Method parameters adopted in the calculation. A C₁₀ value of 0.7 was adopted in accordance with Section 4 of QUDM. Design rainfall intensities for Port Douglas were obtained using the Intensity-Frequency-Duration data contained in FNQROC Development Manual (Version No. 03/17).

Table 4-4 Rational Method Parameters

Catchment ID	Area (ha)	Reach Length (m)	Equal Area Slope (%)	Time of Concentration (min)
Catchment Y	107.30	1800	2.34	56
Catchment Q	121.30	2060	4.92	50
Catchment X	100.70	2810	9.97	57
Catchment V	52.17	1630	5.76	45

Table 4-5 summarises the peak 1% AEP rational discharges and the peak 1% AEP WBNM discharges at each of the catchments outlets.



Table 4-5 Peak Discharge Comparison

Catchment ID	Rational Method Peak Discharge (m³/s)	WBNM Peak Discharge (m³/s)	Difference (m³/s)
Catchment Y	29.8	29.72	-0.08
Catchment Q	35.9	38.59	2.69
Catchment X	28.34	29.55	1.22
Catchment V	16.92	14.95	-1.97

The results show that the peak flows calculated by the WBNM model agree well with those from the Rational Method (Refer Section 3.4). Thus, it was considered that the WBNM model could be used to calculate the discharge hydrographs from the upstream catchments.



5 Hydraulics

As previously discussed, the existing Cardno two dimensional TUFLOW hydraulic model for the areas was adapted to model flooding conditions within the Port Douglas Estate development. It was identified that the existing hydraulic model did not extend far enough to the south to fully capture the site and as such, the hydraulic model was extended to fully encapsulate this area. Figure 5-1 displays the TUFLOW model extent and setup. The following section discusses the TUFLOW model setup.



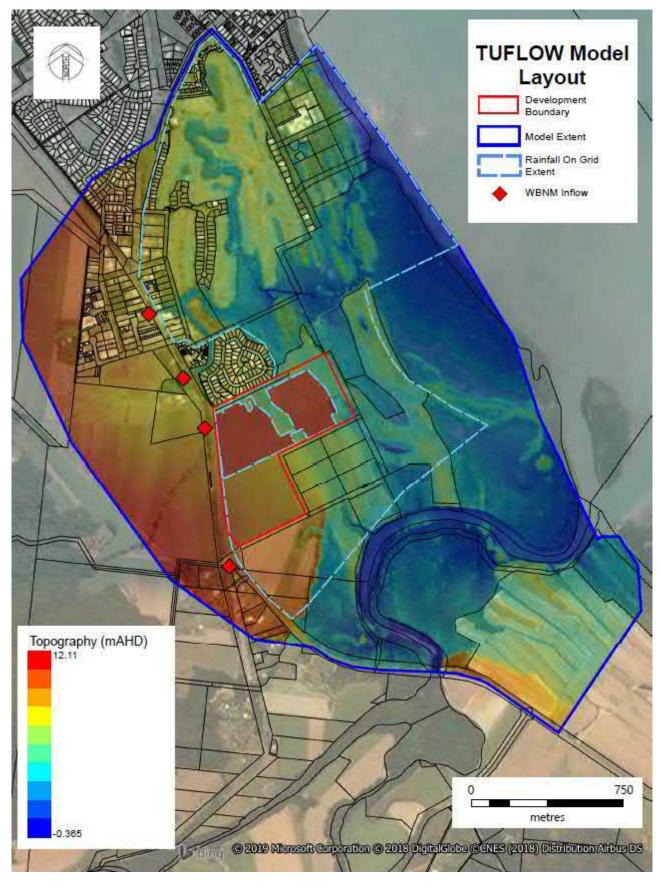


Figure 5-1 TUFLOW Model Layout



5.2 Model Extent

The hydraulic model extent was setup to represent the local catchment flooding from the upstream catchment system. Model inflows and boundaries were set a sufficient distance from the development extent to allow for the accurate representation of flow paths and to avoid instabilities. Figure 5-1 displays the TUFLOW model extent.

5.3 Topographic Data, Grid Cell Size and Time Step

A digital terrain model (DTM) of the study area was set up based on the following data:

- 2010 LiDAR survey (acquired from the Department of Natural Resources and Mines (DNRM))
- 2019 Detailed Survey
- Port Pacific Stage 4 and Stage 5

To provide an appropriate level of detail and achieve reasonable run times, the study area was represented by a 5 metre grid. A time step of 2.5 seconds was adopted to maintain stability and appropriate run times. Figure 5-1 displays the topography surface utilised in the TUFLOW model.

5.4 Model Inflows

Inflow into the hydraulic TUFLOW model was achieved using a split of design storm hydrographs from the WBNM model and rainfall on grid. The upstream inflows were represented as point inflows, inserted to the west of the Captain Cook Highway an appropriate distance upstream of the site. Inflows within and downstream of the site were represented using a rainfall on grid modelling approach. Refer to Figure 5-1 for detail regarding the location of the upstream WBNM inflows and the area represented using rainfall on grid techniques.

In the developed scenario, inflows within the site were concentrated as SA_RF polygons, discharging the rainfall volume directly to the respective discharge locations of the development. Figure 5-2 highlights the discharge locations and concentrated areas.



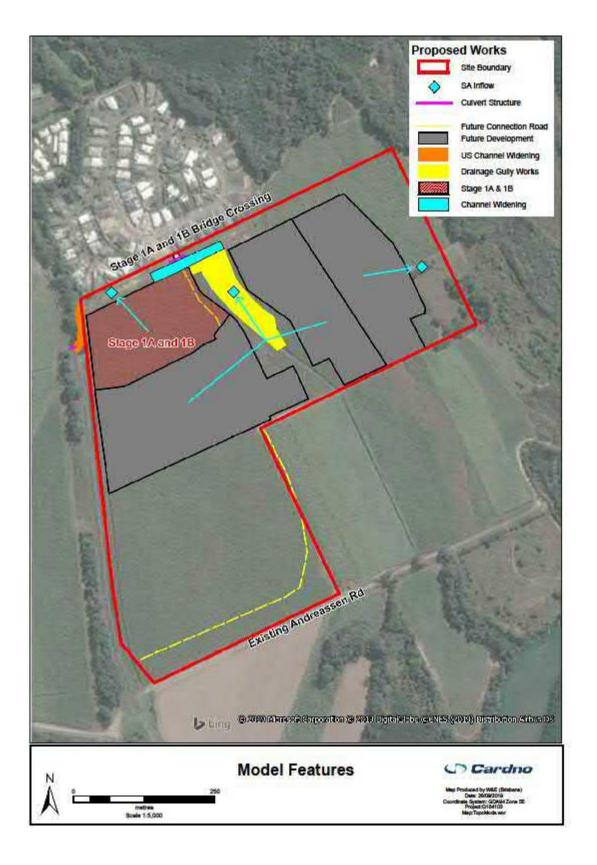


Figure 5-2 TUFLOW Model Detail



5.5 1D Links

Culverts were input into the TUFLOW model as 1-dimensional flow links. Inlet and outlet loss coefficients of 0.5 and 1.0 respectively were used for all structures. The TUFLOW model checks the operation of culverts under both inlet and outlet flow control, for Class 1 (free water surface) and Class 2 (submerged entrance) conditions. Figure 5-2 displays the culverts adopted within the TUFLOW modelling.

Of particular interest is the culvert being used underneath the extension to Wabul Drive. Table 5-1 shows the details of the proposed culvert configuration. Several sizes and blockage factors were tested to assess the impacts to existing lots and the trafficability of the road for various recurrence intervals. The likelihood of the culverts being blocked beyond 20% was deemed unlikely due to the upstream culverts (Captain Cook Highway) having a less overall aperture area of 7.5m² when compared to the proposed 17m² culvert configuration. As such the 20% blockage was considered adequate. 0.9 m high RCBC's were used due to smaller size RCBC's causing impacts to surrounding areas as well as the inability to maintain smaller culverts.

Table 5-1 Wabul Extension Proposed Culvert Configuration

TUFLOW ID	Туре	Manning's Number	Upstream Invert (mAHD)	Downstream Invert (mAHD)	Number of	Size (m)	Blockage Factor
Mit_K	RCBC	0.014	1.8	1.75	7	2.7 X 0.9	20%

Details of the proposed drain including culvert details, relevant lot levels and relevant flood levels are shown in Appendix D (Civil Drawings Q184103-CI-1263 and Q184103-CI-1264.

5.6 Floodplain Roughness

The Manning's n roughness values applicable to the study area were determined from site inspections and aerial photography. The values used are summarised in Table 5-2.

Table 5-2 Manning's n Values

Location	Manning's n		
Road Reserves	0.02		
Golf Course	0.035		
Heavily Grassed or Vegetated Areas	0.08		
Densely Treed/Mangrove Areas	0.15		
Commercial Precincts	0.20		

5.7 Downstream Boundary Condition

The downstream boundary of the TUFLOW model is located at the outfall of Craiglie Creek to the Pacific Ocean, near Port Douglas. Relevant ocean levels are as follows.

- The Highest Astronomical Tide (HAT) level at Port Douglas is 1.78 mAHD (ref. Queensland Tide Tables 2012, Queensland Government).
- The 100 year storm tide level in the vicinity of Port Douglas (i.e. at Oak Beach) is 1.9 mAHD (ref. Queensland Climate Change and Community Vulnerability to Tropical Cyclones Ocean Hazards Assessment Stage 3, Queensland Government, July 2004). An allowance of 300 mm was added to this level to account for wave setup at the coastline.

Based on these levels, a 100 year storm tide level of 2.2 mAHD was adopted for the existing 100 year event, and a Highest Astronomical Tide level of 1.78 mAHD was adopted for the smaller events.



5.8 Climate Change

The allotment fill levels in the Port Douglas Estate development will be designed to account for the impacts of Climate Change on the Craiglie Creek flood levels.

Recent climate change investigations (ref. Increasing Queensland's resilience to inland flooding in a changing climate: Final Scientific Advisory Group report – Derivation of a rainfall intensity figure to inform an effective interim policy approach to managing inland flooding risks in a changing climate, Department of Environment and Resource Management, 2010) recommend that an allowance for a 20% increase in design rainfall intensities should be adopted for climate change.

The current projection for sea level rise by the International Panel on Climate Change (IPCC, 2007) is 800 mm by the Year 2100.

An analysis was therefore carried out for the 100 year AEP event, incorporating the following elements of climate change:

- increase in rainfall intensity of 20%; and
- sea level rise of 800 mm (i.e. giving a tailwater level = 3.0 mAHD).

5.9 Modelling Scenarios

To assess flooding impacts resulting from the proposed Stage 1A and 1B (Stage 1) of the Port Douglas Estate, the following modelling scenarios were assessed:

Existing Case - An existing case model simulation representing current hydraulic conditions. This scenario adopts the existing modelling created for the neighbouring Port Pacific development with minor revisions to the model extent and hydrologic inflows. Existing lots to the north of the proposed development were modelled using survey provided.

Developed Case - A developed case model simulation representing the development of Stage 1 of the Port Douglas Estate. For the purpose of this assessment, the Stage 1 area was modelled using a design surface DEM.

The proposed bridge crossing on Wabul Street, providing access to Stage 1 was also detailed within the hydraulic model. The crossing was represented with seven 2700 x 900 mm Reinforced Concrete Box Culverts (RCBC's). Refer to Appendix D Reference Drawing Q184103-CI-1262 (attached to this document) for design detail regarding the culvert sizing and layout. Earthworks to widen the drainage channel both upstream and downstream of the crossing structure to accommodate the proposed culverts and allow for the smooth transition of flow was required. The road level across the structure was set to approximately 3.28 mAHD as shown in Q184103-CI-1263.

Stage 1 was represented in the model with a design DEM surface. Rough fill was included for the future development areas that will likely drain to the north of the site. It was deemed necessary to represent all future runoff into the drainage reserve when assessing Stage 1A and 1B development to ensure adequate freeboard of the adjacent residential properties was maintained.

It was noted that the drainage channel profile immediately upstream of the site was not adequately represented in the LiDAR surface. This was likely due to the heavy vegetation in the drainage reserve at this location. As such, the channel was modified in this area (refer Figure 5-2) to ensure adequate conveyance into the northern drainage channel. This drainage detail was included in the Stage 1 design DEM.

Earthworks within the drainage gully/reserve immediately east of Wabul Street were required to allow for the free drainage and attenuation of the future development areas. The base of the gully was set to an elevation of 2.4 mAHD for the purposes of this assessment however it is noted that optimization of the earthworks required will be undertaken during the design of the future development areas (refer Figure 5-2)

The hydraulic model was then simulated for the 2 year to 100 year event for the 60, 90 and 120 minute critical storm durations. The 100 year + climate change event was assessed.

A 100yr + climate change extreme event was also modelled to identify possible impacts. During this event the proposed culverts on Wabul Street were modelled with 100% blockage with results shown in Appendix E.



6 Model Results

Detailed mapping of peak flood level, depth and velocity has been provided for both existing and developed scenarios in Appendix A and B of this report. Detailed impact mapping has been provided in Appendix C.

6.1 Existing Scenario – Model Results

The existing modelling results show minor inundation of the Stage 1A and 1B development area in the design 1% AEP flood event. A majority of the inundation observed can be attributed to pockets present in the topographic surface due the existing cropping land use. The deeper body of flooding present in the north west corner of the Stage 1B area has been identified as storage offset from the adjacent drainage reserve. It is acknowledged that additional flood storage will need to be provided elsewhere within the Stage 1B area to offset any losses resulting from the filling of this storage volume.

The area of proposed fill within Stage 1A and 1B do not coincide with any existing overland conveyance paths through the site. The existing modelling shows all conveyance flows to be contained within the drainage reserve to the north and as such, the filling of the Stage 1A and 1B area should result in minimal impact to existing flooding conditions within the drainage reserve.

Peak velocities within the drainage reserve varying from 2 m/s at the north west corner of the site down to 1 m/s at the proposed Wabul Street bridge crossing were evident in the 1% AEP event.

Vehicle access into Wabul Street "stub" road is restricted as water depth is up to 300 mm deep during the 1% AEP flood event, this reduces in the developed scenario.

6.2 Developed Scenario – Model Results

The flood impact mapping provided in Appendix C demonstrates the proposed Stage 1 works do not result in actionable nuisance flooding external to the site. The design achieves flood level reductions within the drainage channel to the north west of Stage 1 maintaining the freeboard of adjacent properties. Slight increases in flood levels can be seen within the drainage reserve to the north east of the site however this are minor in nature and are contained within the existing channel.

Minor increases in flood level (11-15 mm) are apparent on Lot 119 on SP276040 and Lot 20 on SP 144728 to the north east during the 1%CC AEP event. Impacts are also noted to the East on Lot 5, AP13754. It must be noted that these impacts are likely resulting from the concentration of post development flow from the future development areas. The concentration of discharge from the future development areas was incorporated into the Stage 1 modelling to represent a realistic tail water level in the northern drainage reserve, ensuring the Wabul Street culverts were adequately sized. The flooding afflux observed occurs in currently undeveloped areas or is designated reserve. These impacts are minor in nature, occur in areas where the existing flood levels are up to 2 metres deep and future stages of development will ensure these impacts are minimised. Further, the majority of impacts noted are on reserve or state land.

Peak velocities less than 1.5 m/s are indicated within the drainage reserve during the 1% AEP design event. A velocity of approximately 1.3 m/s can be seen at the downstream face of the Wabul Street culvert structures. Minor increases in channel velocity are apparent within the drainage reserve at the north east corner of the site and it is recommended that scour protection be assessed at this location during the detailed design stage of this assessment.

Vehicle access across the Wabul Street crossing is limited in the 1% AEP flood event (flooding depth up to 400mm). Flood level reductions of up to 40 mm can be observed on Milman Drive to the north of the Wabul Street crossing. As such, Milman Drive is not impacted by the proposed Port Douglas Estate design.



7 Conclusion

Cardno was commissioned by Port Douglas Land Developments to undertake a Flood Impact Assessment (FIA) of the proposed Stage 1A and 1B of the Port Douglas Estate residential development located on Lot 2 of Plan SR431 off the Captain Cook Highway, Craiglie, QLD.

Cardno has undertaken detailed flood modelling of the catchment during the design of the neighbouring Port Pacific Estate and it was proposed to adopt the existing modelling for use in the Port Douglas Estate assessment. A review of the existing modelling identified a number of key limitations that needed to be addressed before assessing flooding conditions within the Port Douglas Estate including the delineation of upstream catchments and the model extent. The limitations were addressed and the model was simulated for a range of design storm events up to and including the 1% AEP + Climate Change.

The modelling results demonstrate the proposed Stage 1A and 1B (Stage 1) development, designed as discussed in the above report, do not result in any actionable nuisance flooding external to the site and are in accordance with the *Douglas Shire Planning Scheme - Flood and Storm Tide Hazard Overlay Code*.

Minor increases in flood level (11-15 mm) are also apparent on Lot 119 on SP276040 and Lot 20 on SP 144728 to the north east during the 1%CC AEP event. It must be noted that these impacts are likely resulting from the concentration of post development flow from the future development areas. The concentration of discharge from the future development areas was incorporated into the Stage 1 modelling to represent a realistic tail water level in the northern drainage reserve, ensuring the Wabul Street culverts were adequately sized. Further, the flooding afflux observed occurs in currently undeveloped. The impacts are minor in nature, occur in areas where the existing flood levels are up to 2 metres deep and the majority of the impacts shown are located on reserve or state land.

There is a localised area of impact at the north west of the development that is contained within the road reserve. This increase in water level is offset by reductions in water levels directly upstream, suggesting that it is a result of channel improvements at this location.

Vehicle access across the Wabul Street crossing is limited in the 1% AEP flood event (flooding depth up to 400mm). Flood level reductions of up to 30 mm can be observed on Milman Drive to the north of the Wabul Street crossing. As such, Milman Drive is not impacted by the proposed Port Douglas Estate design.

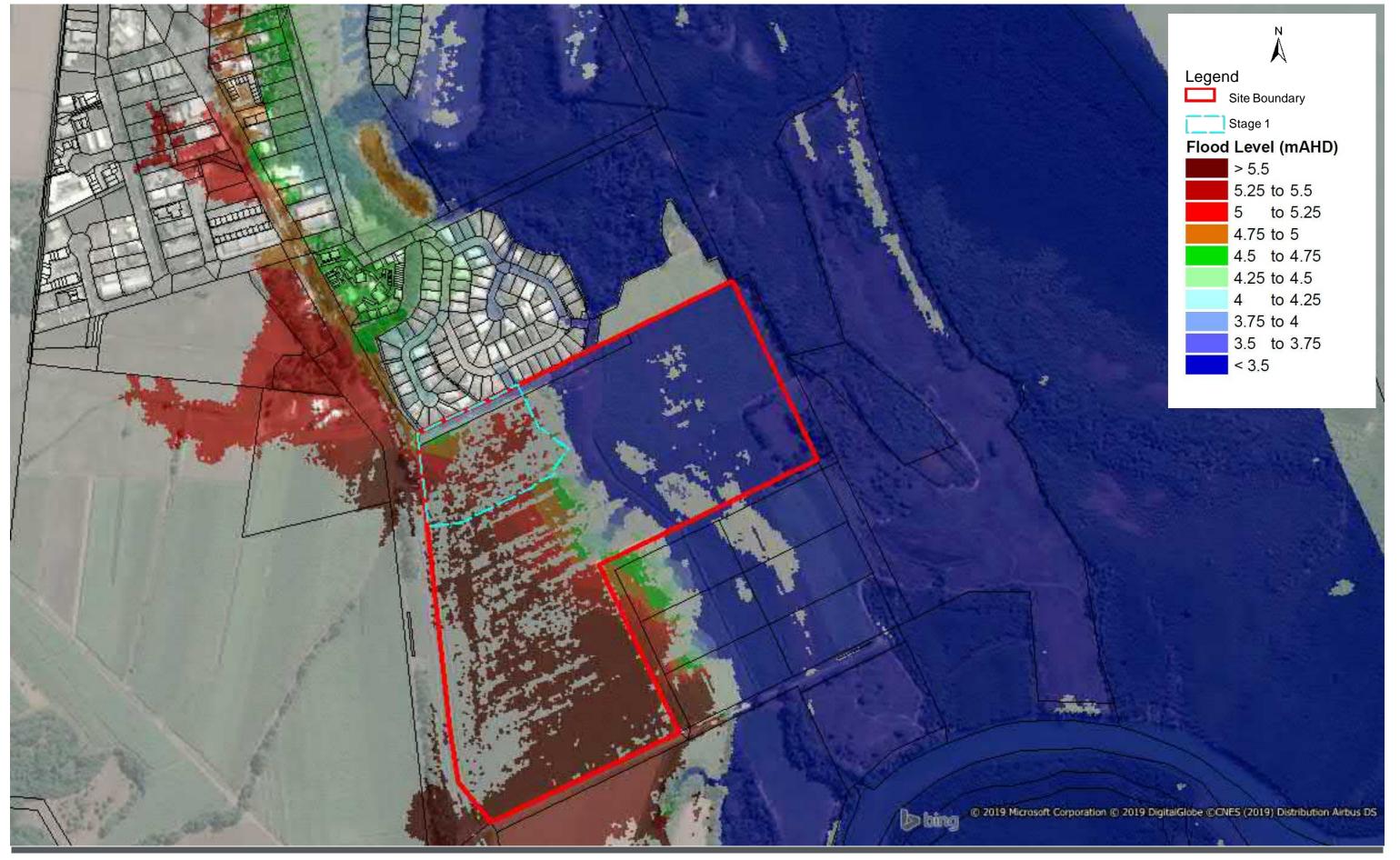
Detailed mapping of peak flood level, depth and velocity has been provided for both existing and developed scenarios in Appendix A and B of this report. Detailed impact mapping has been provided in Appendix C.

APPENDIX

A

EXISTING FLOODING

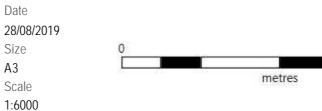






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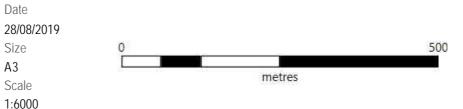
APPENDIX A.1.1 EXISTING 1% AEP CC EVENT - PEAK FLOOD LEVEL





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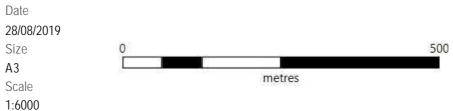
APPENDIX A.1.2 EXISTING 1% AEP EVENT - PEAK FLOOD LEVEL





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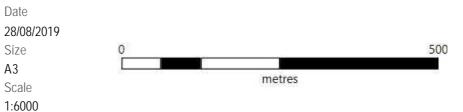
APPENDIX A.1.3 EXISTING 2% AEP EVENT - PEAK FLOOD LEVEL





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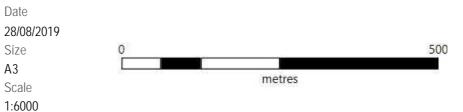
APPENDIX A.1.4 EXISTING 5% AEP EVENT - PEAK FLOOD LEVEL





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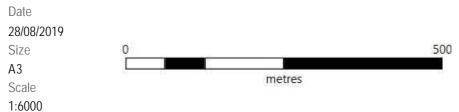
APPENDIX A.1.5 EXISTING 10% AEP EVENT - PEAK FLOOD LEVEL





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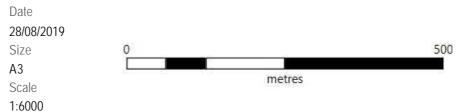
APPENDIX A.1.6 EXISTING 20% AEP EVENT - PEAK FLOOD LEVEL





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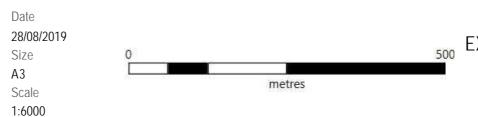
APPENDIX A.1.7 EXISTING 39% AEP EVENT - PEAK FLOOD LEVEL



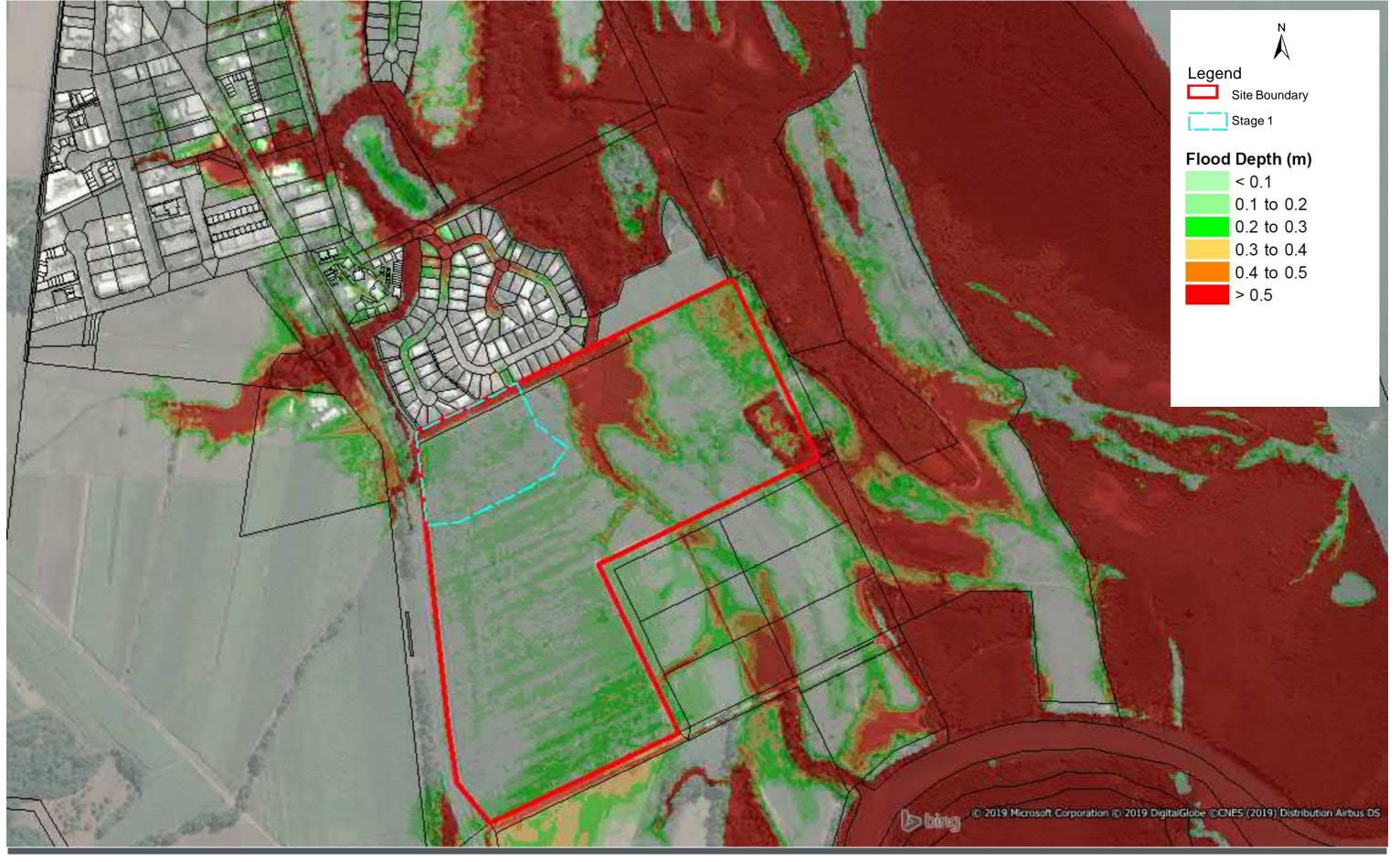


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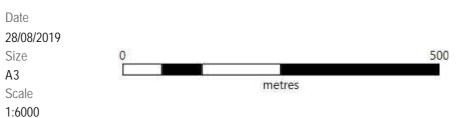
APPENDIX A.2.1 EXISTING 1% AEP CC EVENT - PEAK FLOOD DEPTH





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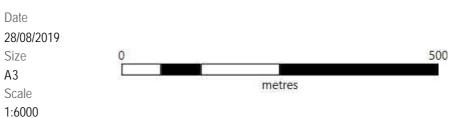
APPENDIX A.2.2 EXISTING 1% AEP EVENT - PEAK FLOOD DEPTH





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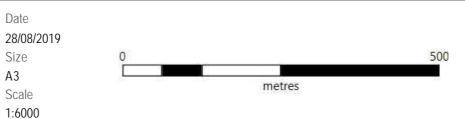
APPENDIX A.2.3 EXISTING 2% AEP EVENT - PEAK FLOOD DEPTH





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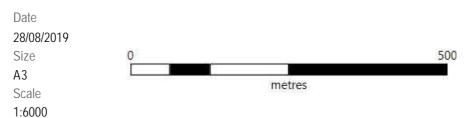
APPENDIX A.2.4 EXISTING 5% AEP EVENT - PEAK FLOOD DEPTH





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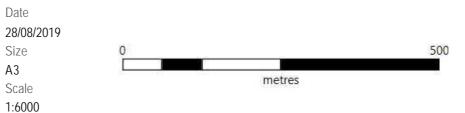
APPENDIX A.2.5 EXISTING 10% AEP EVENT - PEAK FLOOD DEPTH





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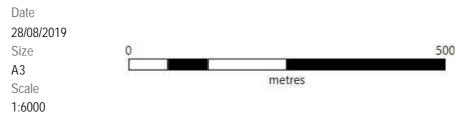
APPENDIX A.2.6 EXISTING 20% AEP EVENT - PEAK FLOOD DEPTH





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APPENDIX A.2.7 EXISTING 39% AEP EVENT - PEAK FLOOD DEPTH





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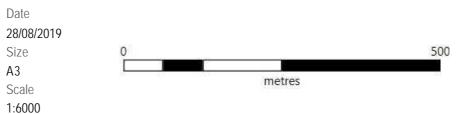
APPENDIX A.3.1 EXISTING 1% AEP CC EVENT - PEAK FLOOD VELOCITY





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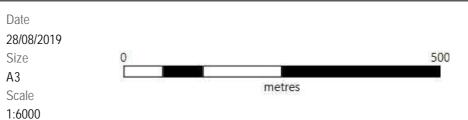
APPENDIX A.3.2 EXISTING 1% AEP EVENT - PEAK FLOOD VELOCITY





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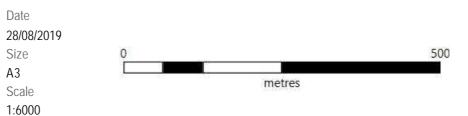
APPENDIX A.3.3 EXISTING 2% AEP EVENT - PEAK FLOOD VELOCITY





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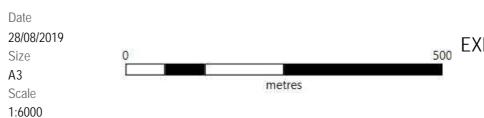
APPENDIX A.3.4 EXISTING 5% AEP EVENT - PEAK FLOOD VELOCITY





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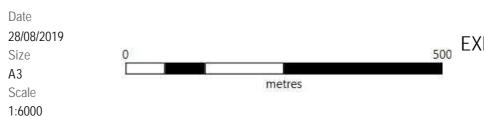
APPENDIX A.3.5 EXISTING 10% AEP EVENT - PEAK FLOOD VELOCITY





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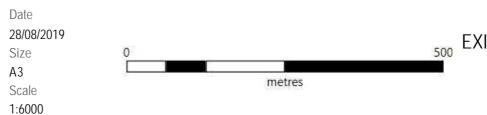
APPENDIX A.3.6 EXISTING 20% AEP EVENT - PEAK FLOOD VELOCITY





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APPENDIX A.3.7 EXISTING 50% AEP EVENT - PEAK FLOOD VELOCITY

APPENDIX

В

DEVELOPED FLOODING





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AppB.1





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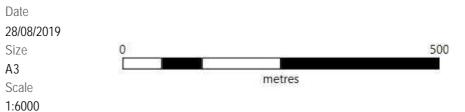
APPENDIX B.1.2 DEVELOPED 1% AEP EVENT - PEAK FLOOD LEVEL





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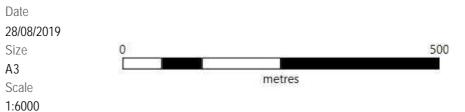
APPENDIX B.1.3 DEVELOPED 2% AEP EVENT - PEAK FLOOD LEVEL





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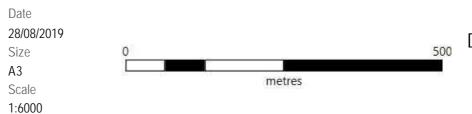
APPENDIX B.1.4 DEVELOPED 5% AEP EVENT - PEAK FLOOD LEVEL





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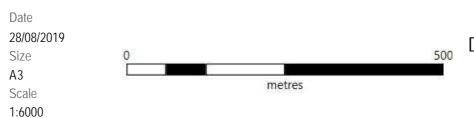
APPENDIX B.1.5 DEVELOPED 10% AEP EVENT - PEAK FLOOD LEVEL





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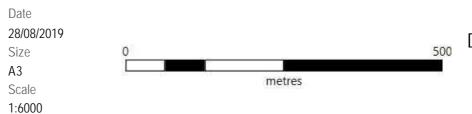
APPENDIX B.1.6 DEVELOPED 20% AEP EVENT - PEAK FLOOD LEVEL





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APPENDIX B.1.7 DEVELOPED 39% AEP EVENT - PEAK FLOOD LEVEL





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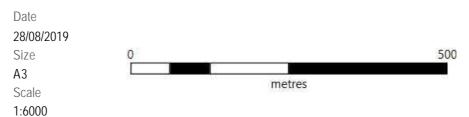






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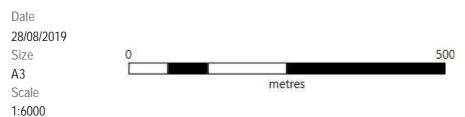
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APPENDIX B.2.2 DEVELOPED 1% AEP EVENT - PEAK FLOOD DEPTH



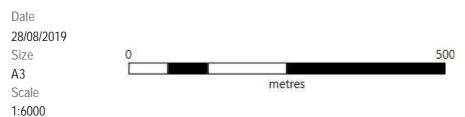




APPENDIX B.2.3 DEVELOPED 2% AEP EVENT - PEAK FLOOD DEPTH



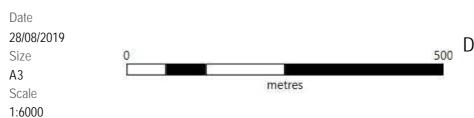




APPENDIX B.2.4 DEVELOPED 5% AEP EVENT - PEAK FLOOD DEPTH



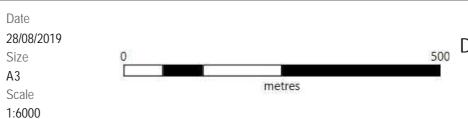




APPENDIX B.2.5
DEVELOPED 10% AEP EVENT - PEAK FLOOD DEPTH







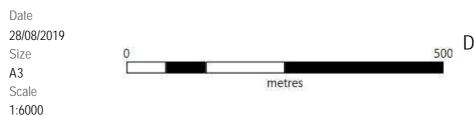
APPENDIX B.2.6
DEVELOPED 20% AEP EVENT - PEAK FLOOD DEPTH





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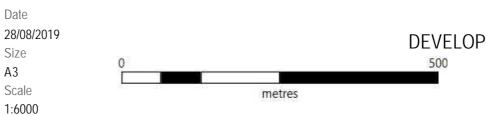
APPENDIX B.2.7
DEVELOPED 39% AEP EVENT - PEAK FLOOD DEPTH





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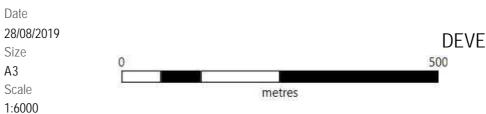
APPENDIX B.3.1 DEVELOPED 1% AEP CC EVENT - PEAK FLOOD VELOCITY





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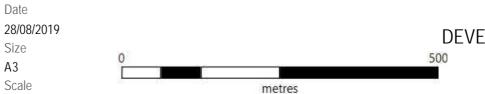
APPENDIX B.3.2 DEVELOPED 1% AEP EVENT - PEAK FLOOD VELOCITY





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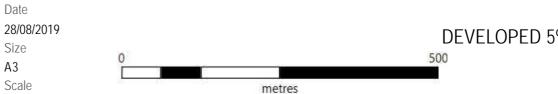
APPENDIX B.3.3 DEVELOPED 2% AEP EVENT - PEAK FLOOD VELOCITY





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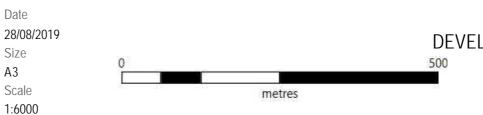
APPENDIX B.3.4 DEVELOPED 5% AEP EVENT - PEAK FLOOD VELOCITY





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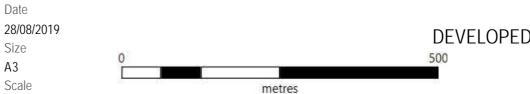
APPENDIX B.3.5 DEVELOPED 10% AEP EVENT - PEAK FLOOD VELOCITY





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DEVELOPED 20% AEP EVENT - PEAK FLOOD VELOCITY

Flood Impact Assessment
Port Douglas Estate
AppB.3

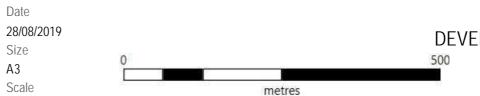
APPENDIX B.3.6





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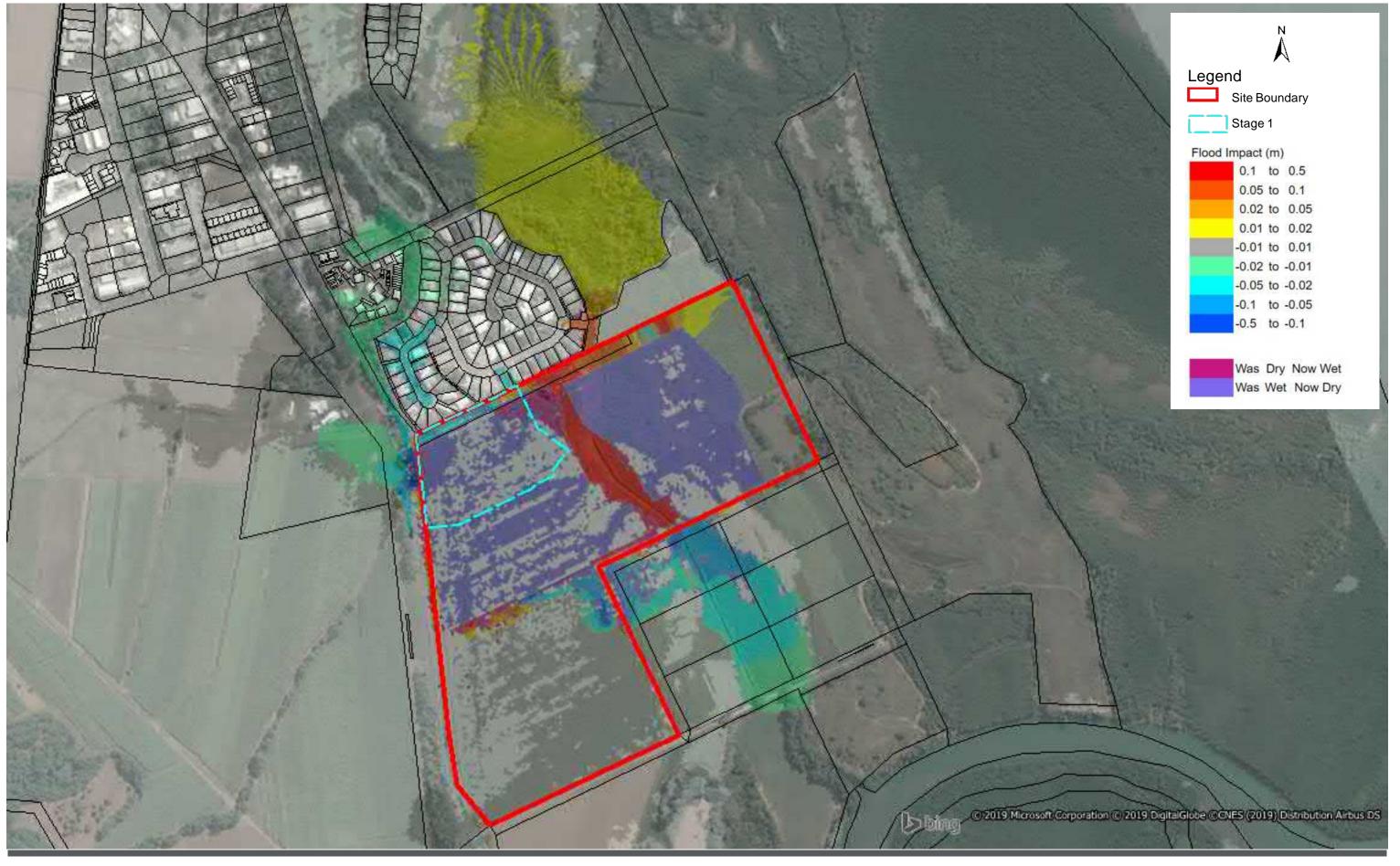
APPENDIX B.3.7 DEVELOPED 39% AEP EVENT - PEAK FLOOD VELOCITY

APPENDIX

C

FLOODING IMPACT

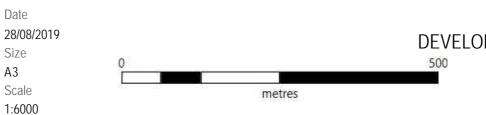




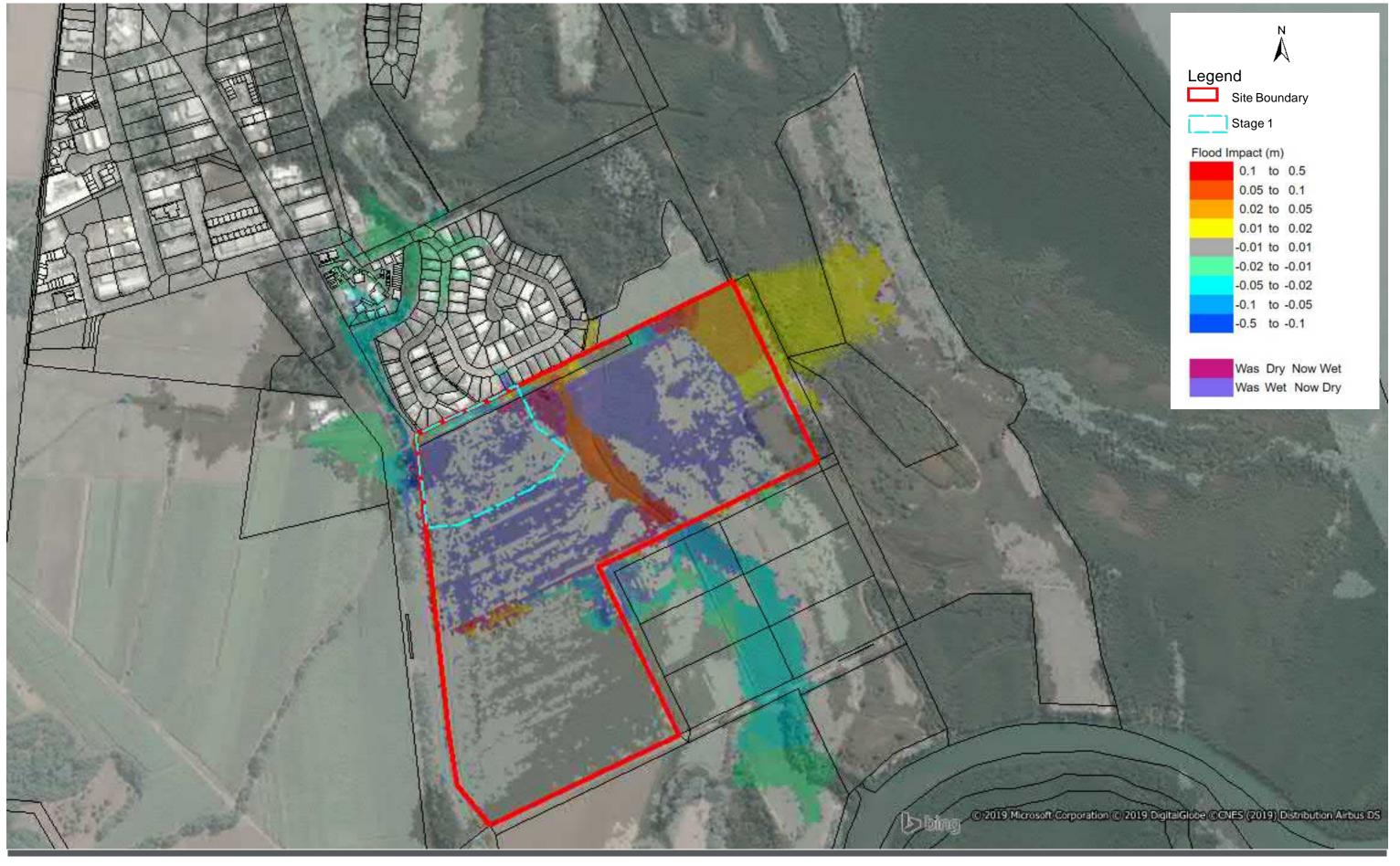


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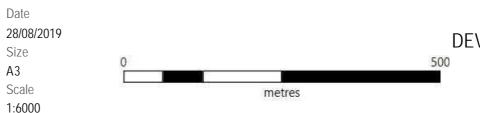
APPENDIX C.1 DEVELOPED 1% AEP CC EVENT - PEAK FLOOD IMPACTS



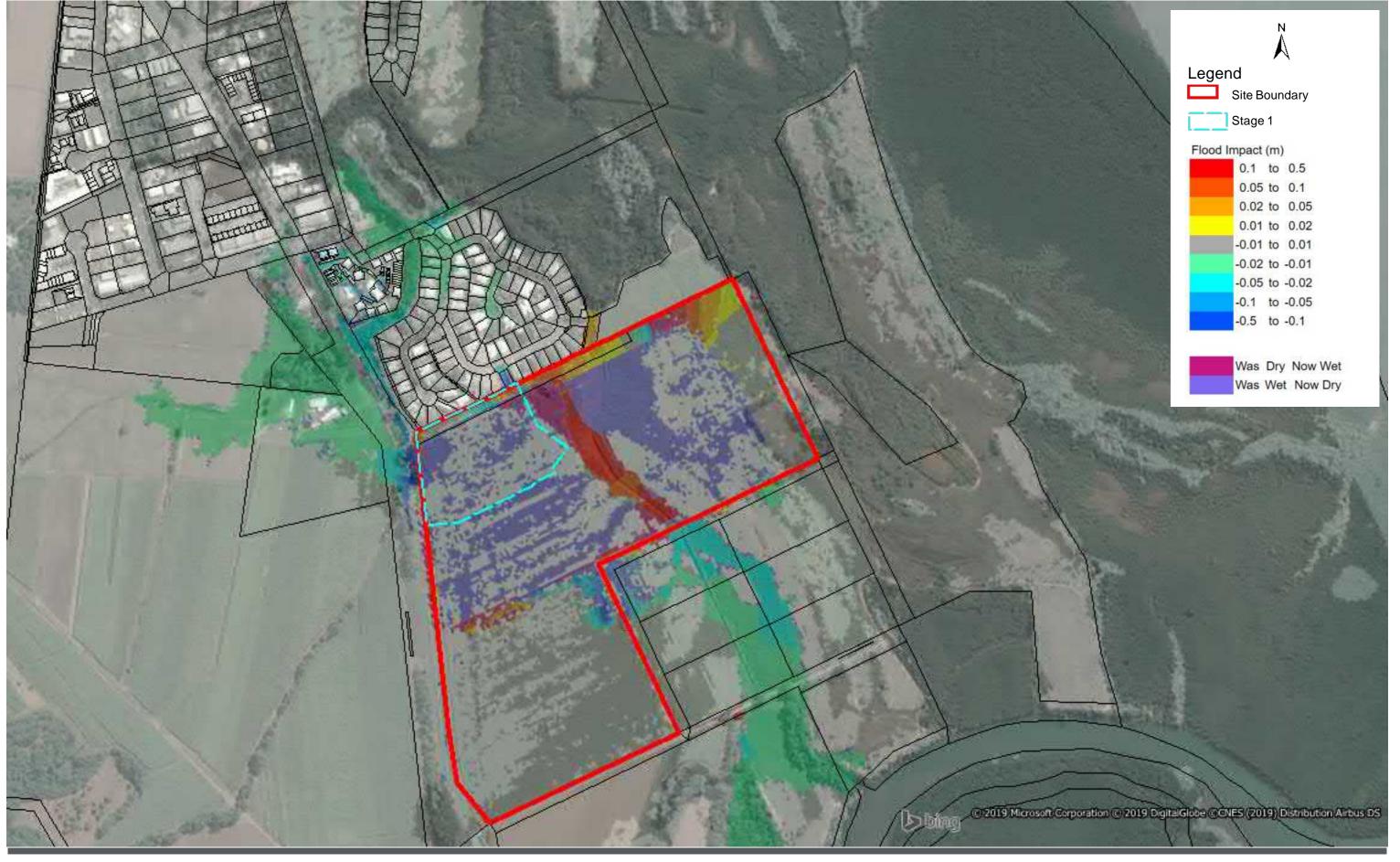


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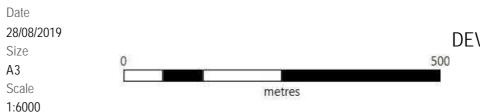
APPENDIX C.2 DEVELOPED 1% AEP EVENT - PEAK FLOOD IMPACTS



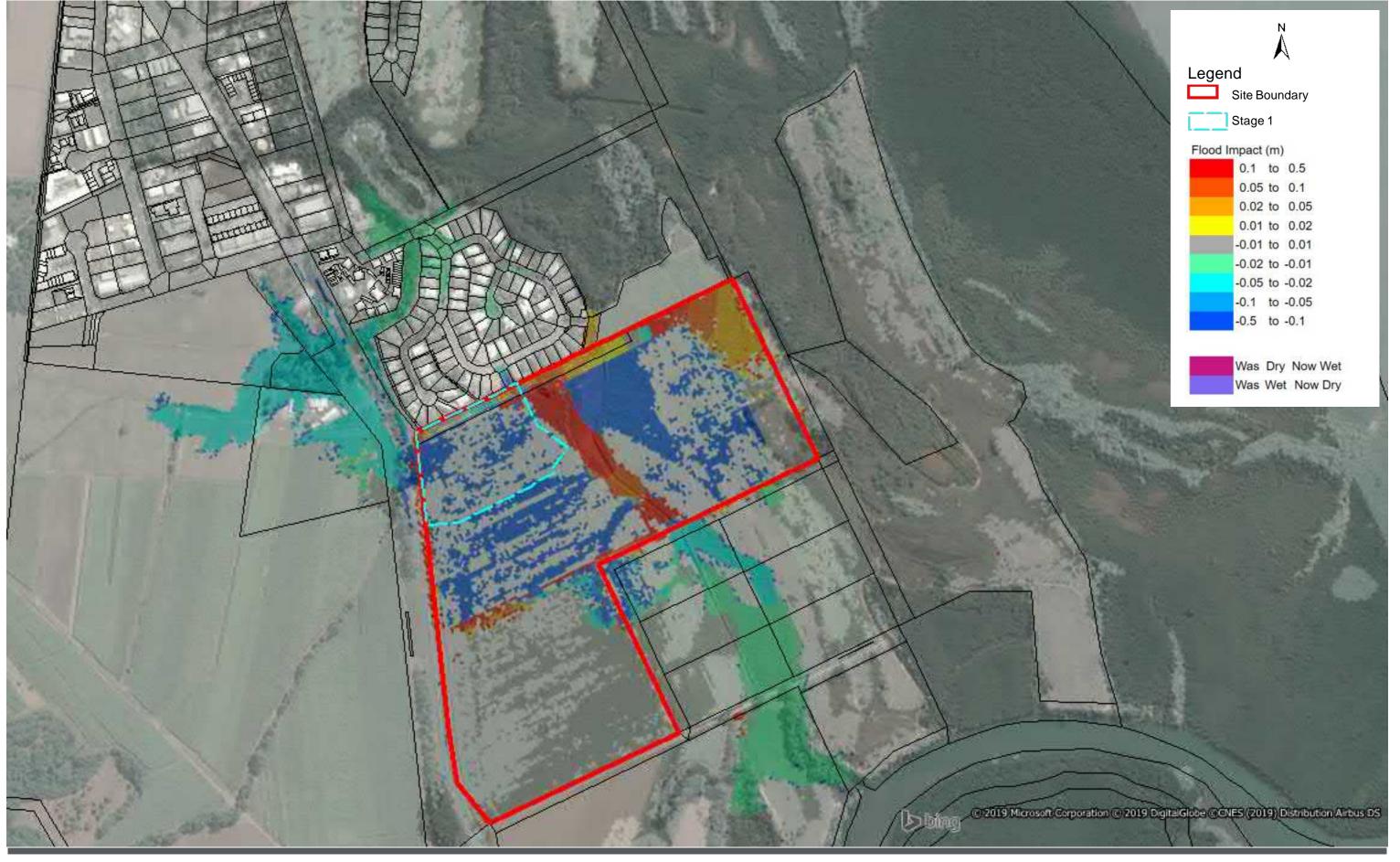


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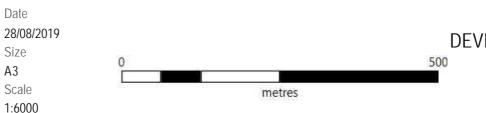
APPENDIX C.3 DEVELOPED 2% AEP EVENT - PEAK FLOOD IMPACTS





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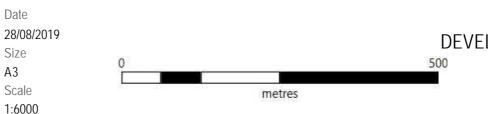
APPENDIX C.4 DEVELOPED 5% AEP EVENT - PEAK FLOOD IMPACTS





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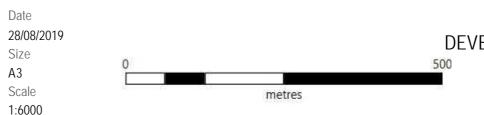
APPENDIX C.5 DEVELOPED 10% AEP EVENT - PEAK FLOOD IMPACTS





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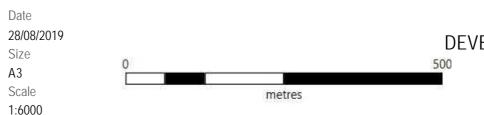
APPENDIX C.6 DEVELOPED 20% AEP EVENT - PEAK FLOOD IMPACTS





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APPENDIX C.7 DEVELOPED 39% AEP EVENT - PEAK FLOOD IMPACTS

APPENDIX

REFERENCE DRAWINGS



APPENDIX

Е

1% AEP CC BLOCKAGE IMPACTS







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APPENDIX E.1

Flood Impact Assessment

Port Douglas Estate

AppD





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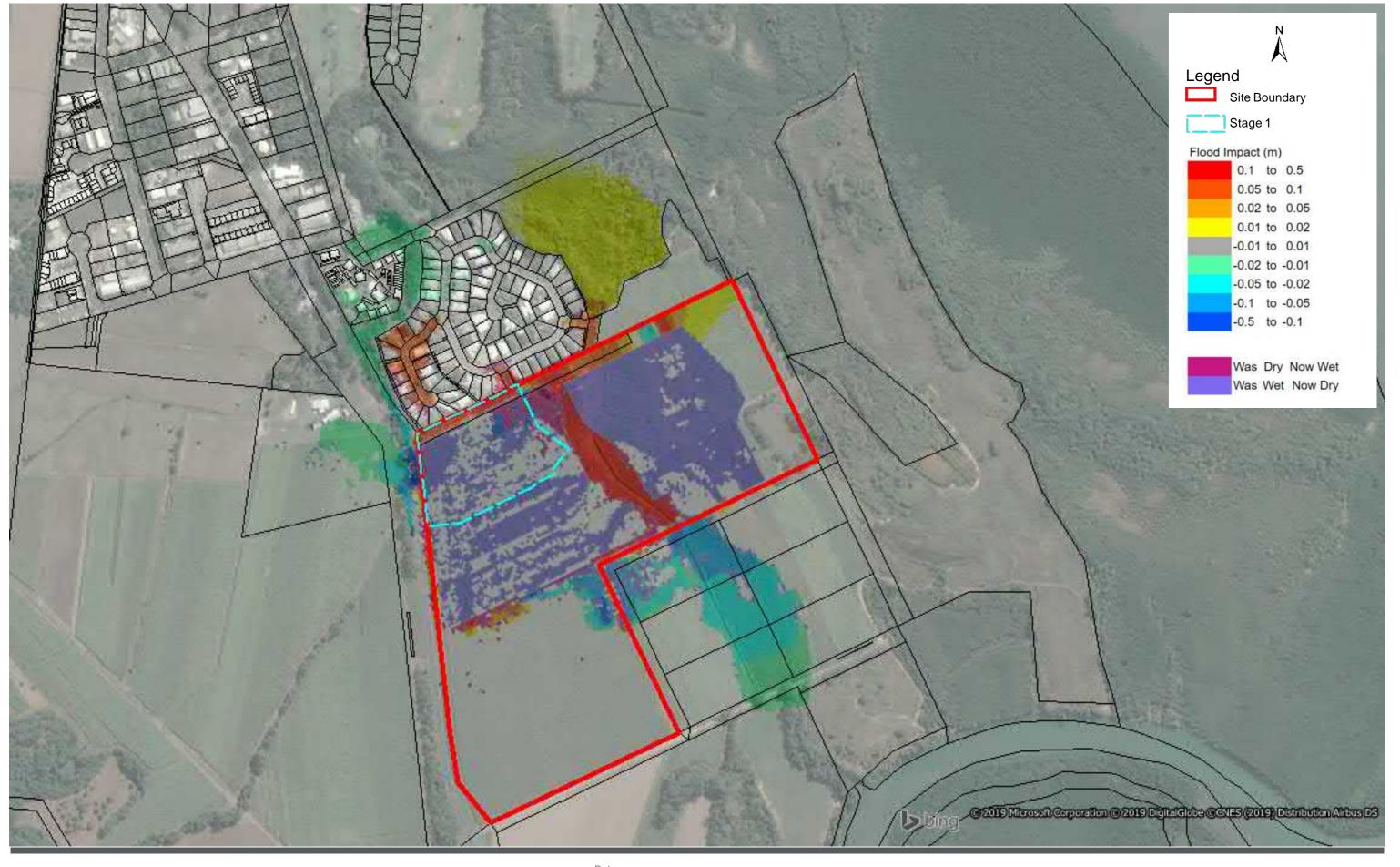
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metres

Port Douglas Estate





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APPENDIX

F

COUNCIL RESPONSE



Zac McCosker

Subject: FW: Douglas Shire Council Advice RE: Craiglie Subdivision ROL 2966/2018

From: Jenny Elphinstone < Jenny. Elphinstone@douglas.qld.gov.au >

Sent: Thursday, 22 August 2019 2:08 PM

To: Maurice Sheehan < <u>maurice.sheehan@cardno.com.au</u>>

Subject: Douglas Shire Council Advice RE: Craiglie Subdivision ROL 2966/2018

operational factors with the upstream DTMR culvert array;

Hi Maurice,

Based on Cardno's modelling outputs and advices to date, Council Officers accept that the proposed 900mm high box culverts represents the preferred solution for the extension of Wabul Drive.

Council notes that the above statement is subject to Council's review of the final report and design drawings as part to the Operational Works approval process.

Advice statement:

Council has been provided with provided selected model outputs and has not had the opportunity to review the model inputs (particularly the channel geometry data).

Accordingly, Council notes that it has not fully assessed the modelling process. Until the final report is provided, Council officers can only comment on the information presented.

Additional commentary:

- Council Officers understand that the 900mm high box culvert array is Cardno's preferred scenario and that lower (600mm high) boxes or higher (1200mm high) boxes do not improved the flooding impacts;
- Cardno's advice is that the 900mm high boxes are an appropriate design response and the advice backs this up with overtopping scenarios for various recurrence interval events;
- Council Officers understand that for a 20% culvert blockage, the operation of the network road for events up to and including the 10 year ARI appear to be consistent with the FNQROC requirements.
- From Cardno's table of results, (20 % culvert blockage), the crossing would generally be considered trafficable to all vehicles during the peak flows of the 20 year event.
 Trafficability to larger vehicles trucks/SES vehicles would appear to be possible during the 100 year ARI event (non-climate change). Note, higher blockage factors would impact the advised trafficability during the peak depth and flow scenario. Council notes and accepts Cardno's representations regarding the
- Council notes Cardno's advice that its updated model shows the existing lots on the north side of the drain are not inundated (even after the future development of Lot X);
- The preliminary model outputs provided to date show the "Impacts" and do not currently report actual water levels. Council understands that this additional information will be provided in the final report and will confirm flow depths;
- The model inputs for channel sections must be included in the final report so Council Officers can assess whether the model appropriately reflects the final drain profiles;

It is appropriate for Cardno to finalise its reporting and documentation of the culvert design for the purposes of the operational works application.

Should you require further assistance please do not hesitate to call or email via the contacts below.

Kind Regards

Jenny Elphinstone | Senior Planning Officer

Environment & Planning | Douglas Shire Council

P: 07 4099 9482 | F: 07 4098 2902

E: enquiries@douglas.qld.gov.au | W: www.douglas.qld.gov.au

Mail: PO Box 723, Mossman Q 4873 | Office: 64-66 Front St, Mossman Q 4873

From: Maurice Sheehan < maurice.sheehan@cardno.com.au >

Sent: Thursday, 22 August 2019 10:58 AM

To: Jenny Elphinstone < <u>Jenny.Elphinstone@douglas.qld.gov.au</u>>

Subject: Craiglie Subdivision

Hi Jenny,

Just checking if we have any updates from Council regarding the proposed culvert configuration for the Wabul St Crossing?

Maurice Sheehan

SENIOR CIVIL ENGINEER **CARDNO**



Phone +61 7 4034 0500 Direct +61 7 4034 0522 Address 15 Scott Street, Parramatta Park, Cairns, Queensland 4870 Australia

Email maurice.sheehan@cardno.com.au Web www.cardno.com

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Attachment H

Stage 2 Flood Impact Assessment Technical Memorandum, dated 30 July 2021

Technical Memorandum



То	Port Douglas Land Developments	From	Zac McCosker, Cardno
СС	Billy Glover, Cardno	Date	30th, July, 2021
Project	Port Douglas Estate – Stage 2	Location/Time	
Subject	Flood Impact Assessment		
Action Required		Attachments	Flood Mapping

Background

Cardno was commissioned by Port Douglas Land Developments to undertake the Flood Impact Assessment (FIA) for Stage 2 of Port Douglas Estate, located on Lot 2 of Plan SR431 off the Captain Cook Highway, Craiglie, QLD. This assessment has been prepared in response to Items 9 and 10 of Douglas Shire Council's Information Request (Ref: ID1003437) for Application ROL 2021_4012/1.

It is noted that Cardno has previously undertaken modelling for Stage 1 of the Development Application, as documented within Q184103_Port_Douglas_Estate_FIA_v3. This Stage 2 assessment has utilised the developed case Stage 1 TUFLOW model for the basis of this investigation. As such, refer to the above-mentioned document for any information regarding the original hydrologic analysis and hydraulic model development.

The proposed Stage 2 layout is located to the south of Stage 1 and illustrated in Figure 1-1.



Figure 1-1 Proposed Stage 2 Layout

Technical Memorandum



Hydraulic Modelling

1.2 Existing Model Updates

The existing base case model was maintained as previously reported in Q184103_Port_Douglas_Estate_FIA v3 and updated to the latest TUFLOW executable 2020-10-AA.

The existing model was simulated for the 1%CC, 1%, 2%, 5%, 10%, 20% and 39% AEP events for the 60min, 90min and 120min durations.

It is noted that there was no difference between existing case model outcomes as a result of upgrading to the latest TUFLOW build.

1.3 Developed Model Updated

In order to progress Stage 2 modelling in the absence of a master plan design surface and to demonstrate consideration of the master plan approach in accordance with INREQ Items 9 and 10, the following assumptions were made;

- > Stage 1, 2, 6, 7 and a portion of stage 3 drains to the north of the site (as seen in Figure 1-2, shown in blue). These catchments have been accounted for in the 2d_sa_rf inflow polygons which discharge flow to the designated northern outlet locations. Topography modifications to represent the anticipated levels of the site, considering sea level rise, have also been incorporated into the model.
- > The remaining portions of the master development are anticipated to drain to the south, as illustrated within Figure 1-2, shown in orange. As the outlet locations for the southern portions of the site are yet to be determined, this section has been modeled as rain on grid.

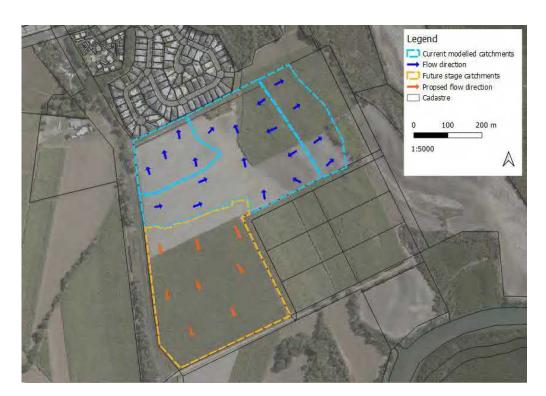


Figure 1-2 Port Douglas Catchment Plan

The following modifications were made to the Stage 1 model to reflect the proposed Stage 2 and master plan layout with the information currently available;

Technical Memorandum



- Update TUFLOW executable to 2020-10-AA.
- > Stamp Stage 2 surface onto previously developed Stage 1 DEM.
- > Adjustment of topography external to Stage 2 for stages 6 and 7 using z shapes to represent future stages of development. The topography was raised to above the anticipated Q100+CC levels.
- > Increase capacity of drainage channel running along northern site frontage (Stages 6&7), by cutting to a level of 2.75 mAHD. This has assisted in providing storage and an overland flowpath during blockage scenarios. It has also reduced the level of flooding that backs up adjacent to northern adjoining lots.
- > Addition of a noise bund along western portion of Stage 2, set 2m above the highway level in line with the Stage 1 noise bund.
- The existing hydrograph inflow data remained the same as reported in the Stage 1 model. It is noted that the sa_rf polygons used to represent the developed runoff from the Stage 1 development already incorporated some of the area associated with the Stage 2 lots and as such, no changes were deemed necessary.
- > A 20% global blockage value was incorporated into any internal 1d stormwater networks.

It is noted that the Stage 2 1d internal stormwater network was not incorporated into the model, however it is not anticipated that the addition of the network will significantly influence the outcomes of this impact assessment.

The developed model was simulated for the 1%CC, 1%, 2%, 5%, 10%, 20% and 39% AEP events for the 60min, 90min and 120min durations. The developed flood maps are illustrated in Attachment 1.

Flood Results

Flood Impact Mapping results are illustrated in Attachment 2. The results demonstrate that the proposed Stage 2 works do not result in any actionable nuisance flooding external to the site.

The design achieves flood level reductions within the majority of the northern drainage channel that runs along the site frontage, and maintains the freeboard of adjacent properties. There are also flood level reductions to the north west of the site along Captain Cook Highway, Dulku Cl and Milman Drive, situated to the north of the subject site. This is attributed to the increased capacity modelled within the northern drainage channel, with the additional storage reducing the magnitude of flows that back up into the lots to the north and Captain Cook highway.

Slight increases in flood levels (11-15mm) are experienced to the north east of the site however as these are within designated drainage reserve/state land, the impacts are not deemed to cause any adverse impacts on surrounding properties or infrastructure and are therefore deemed acceptable. Any other increases in flood level are constrained within the subject site.

Peak velocities less than 1.5 m/s are indicated within the northern drainage reserve during the 1% AEP design event. A velocity of approximately 1.3 m/s can be seen at the downstream face of the Wabul Street culvert structures. Minor increases in channel velocity are apparent within the drainage reserve at the north east corner of the site and it is recommended that scour protection be assessed at this location during the detailed design stage of this assessment if this was not addressed during Stage 1 works.

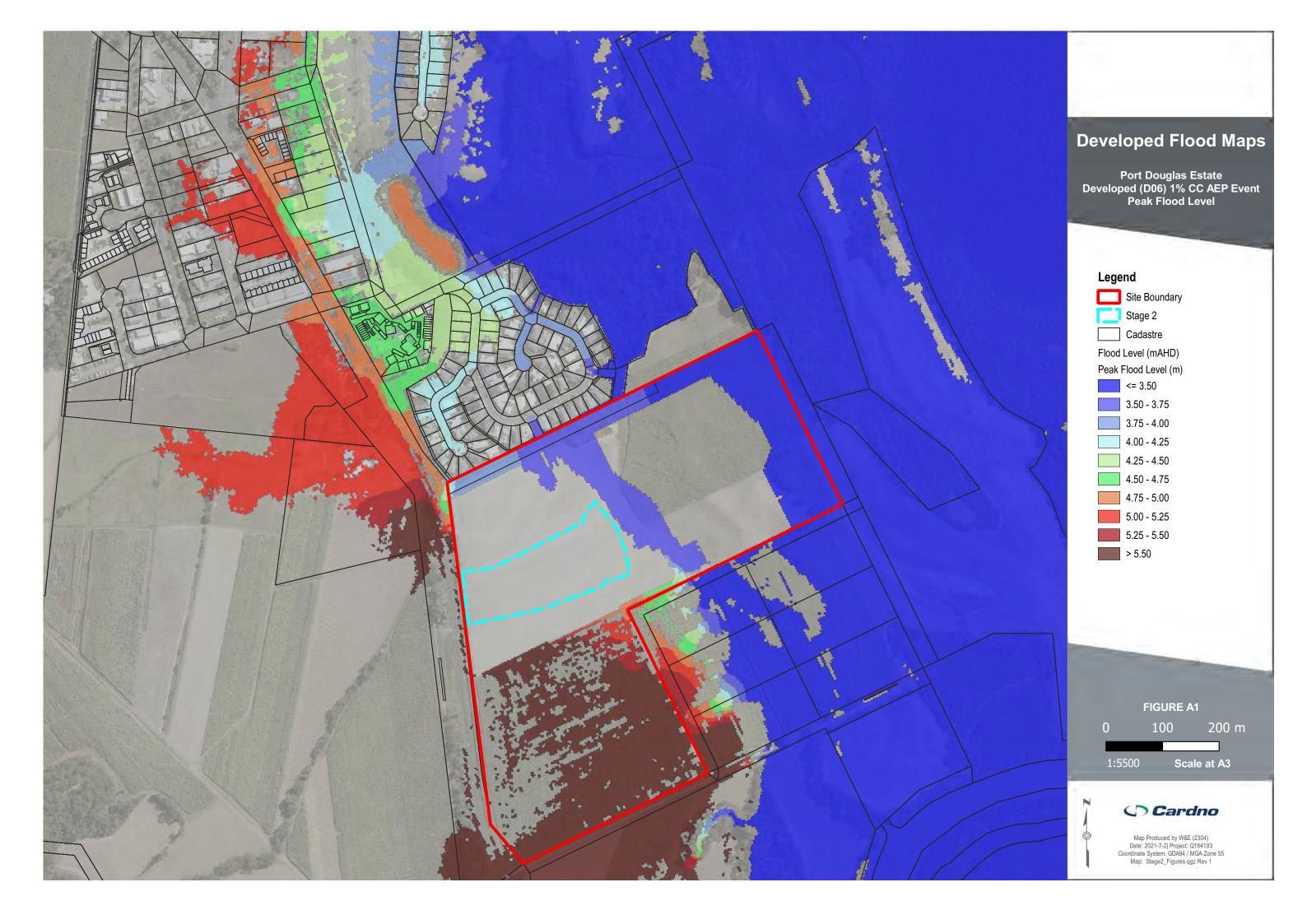
Technical Memorandum

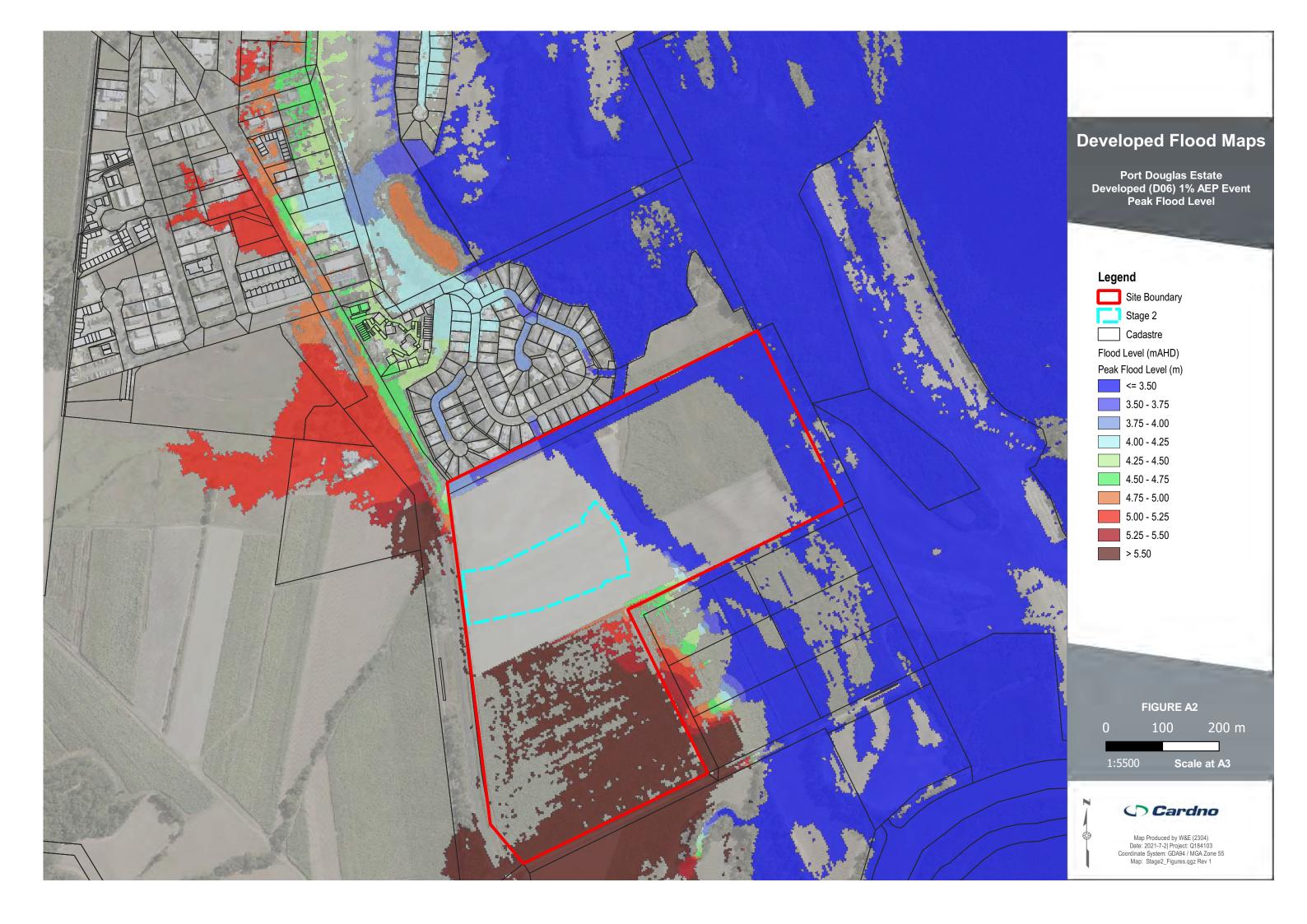


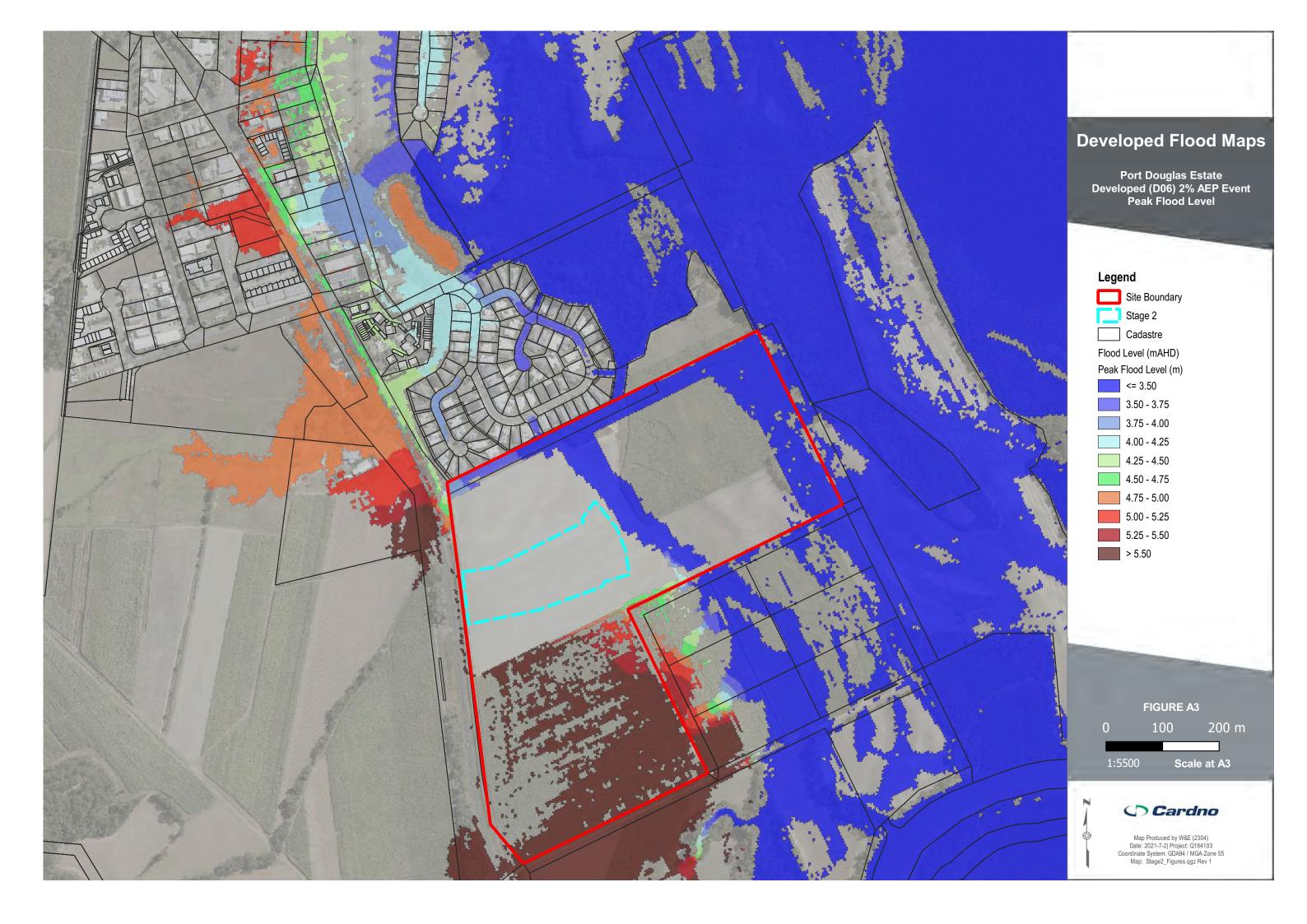
Summary

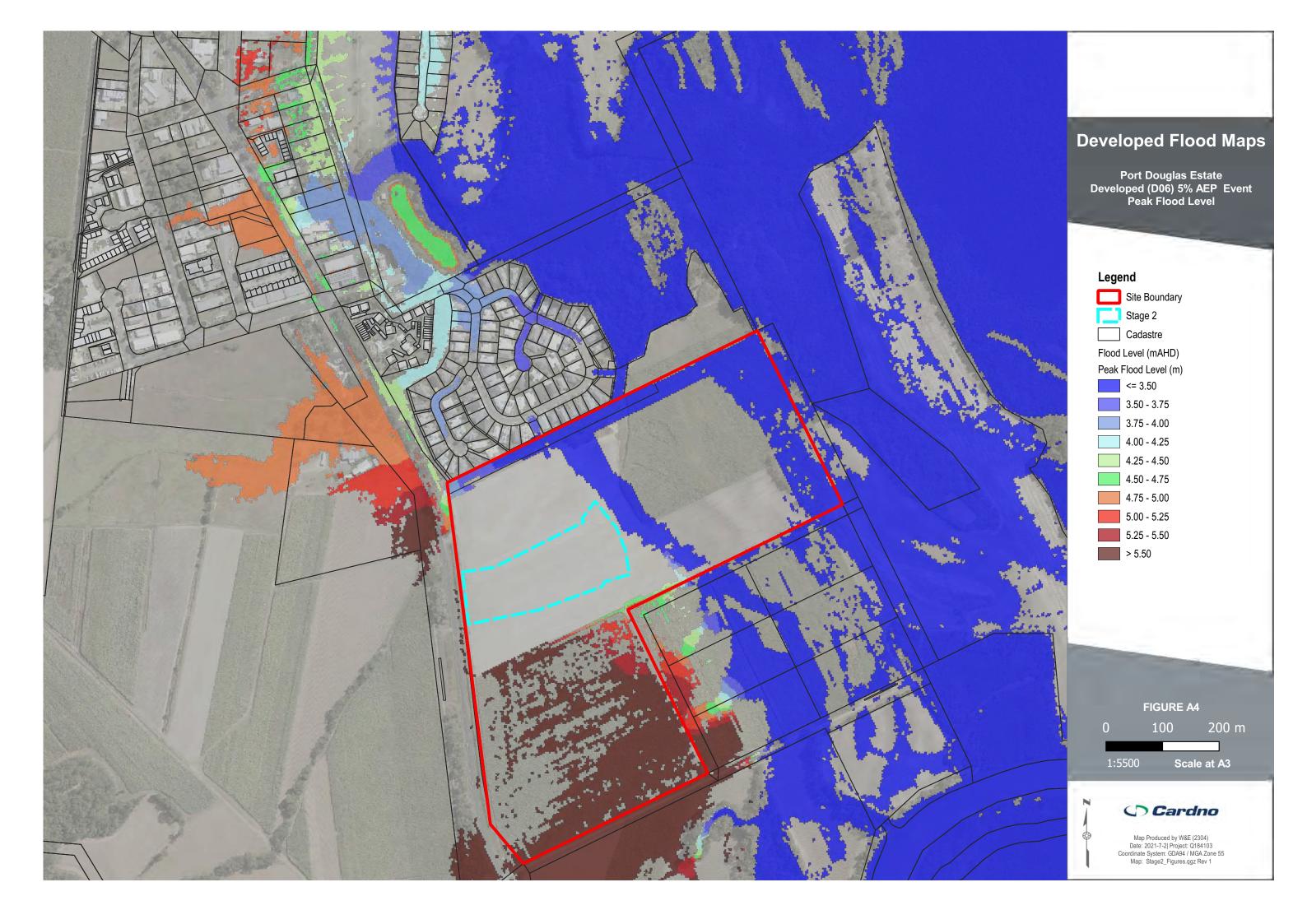
The proposed Stage 2 layout and components of the masterplan were investigated to satisfy items 9 and 10 of the INREQ (Ref: ID1003437). Modelling has indicated that no actionable nuisance or adverse impacts are anticipated to occur as a result of the addition of Stage 2 to the previously modelled Stage 1 phases.

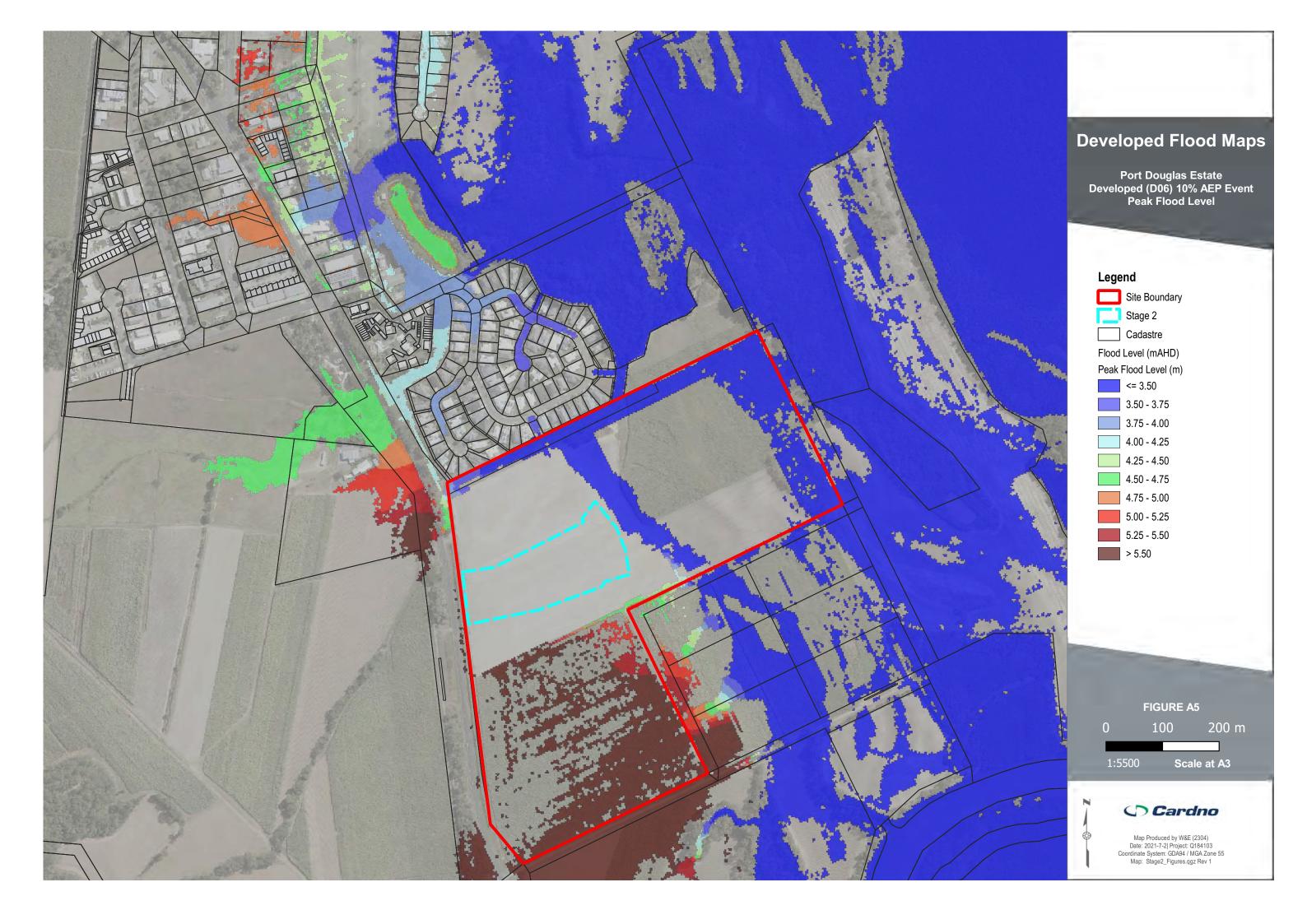
Although some consideration has been made to the flow regime of futures stages, the assessment was at a conceptual level only and did not incorporate all future design stages or all internal stormwater networks. As such, it is recommended that a master plan flood study is carried out to investigate the flooding behavior of the entire site. As discussed with council, this is to be progressed after the submission of the Stage 2 DA and will consider aspects such as developed hydrology and post development stormwater management to assess the ultimate flow regime of the site.

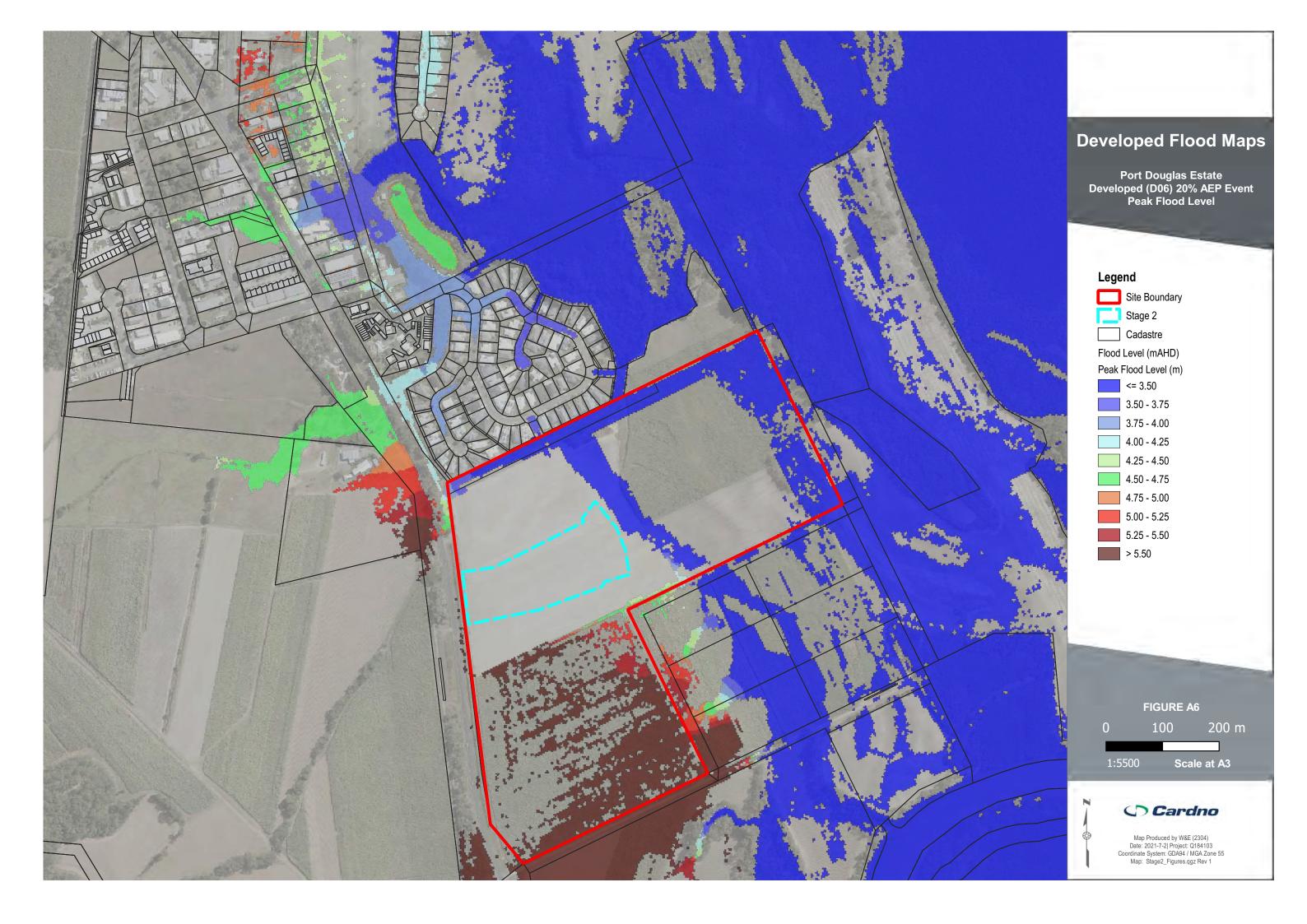


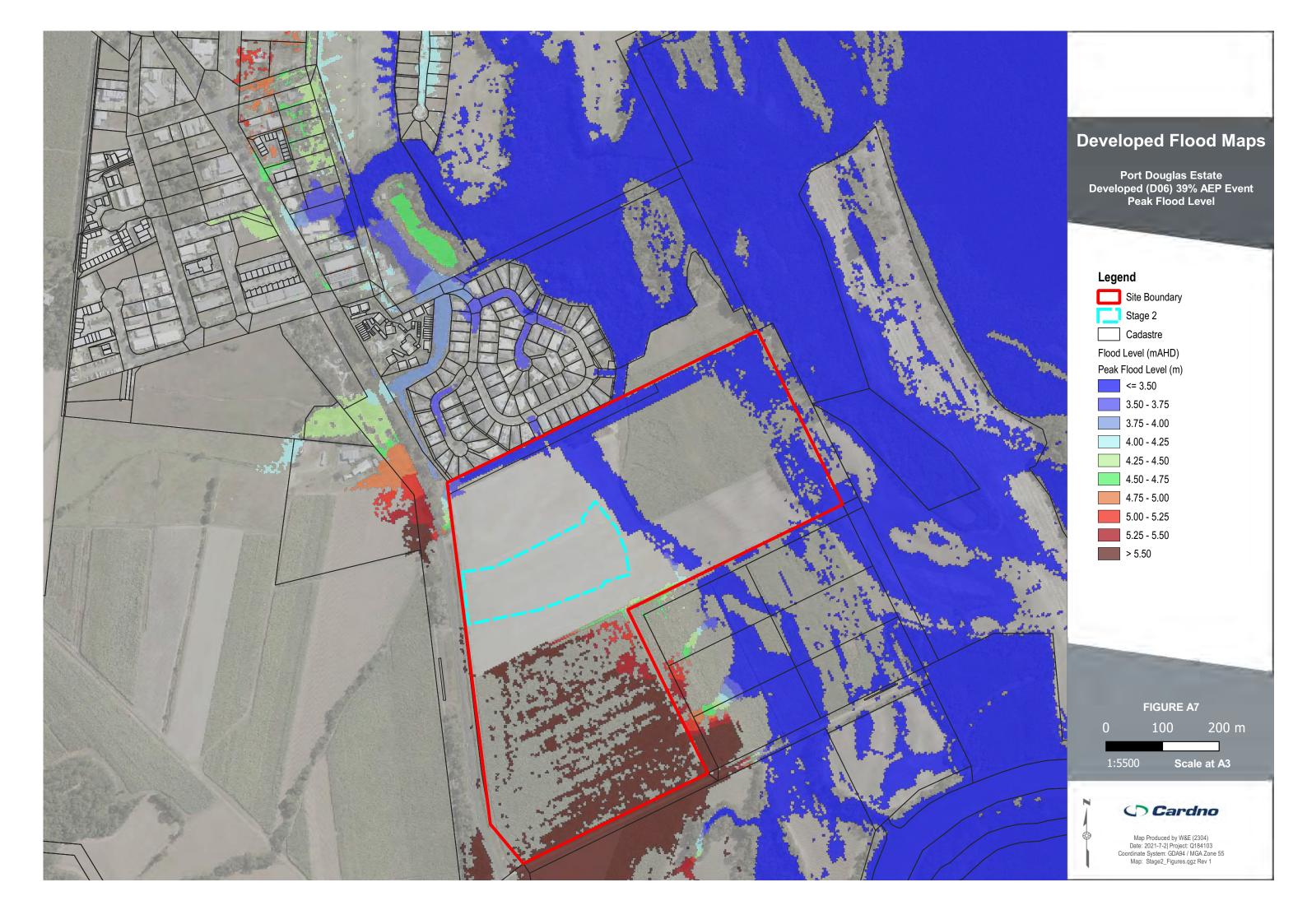




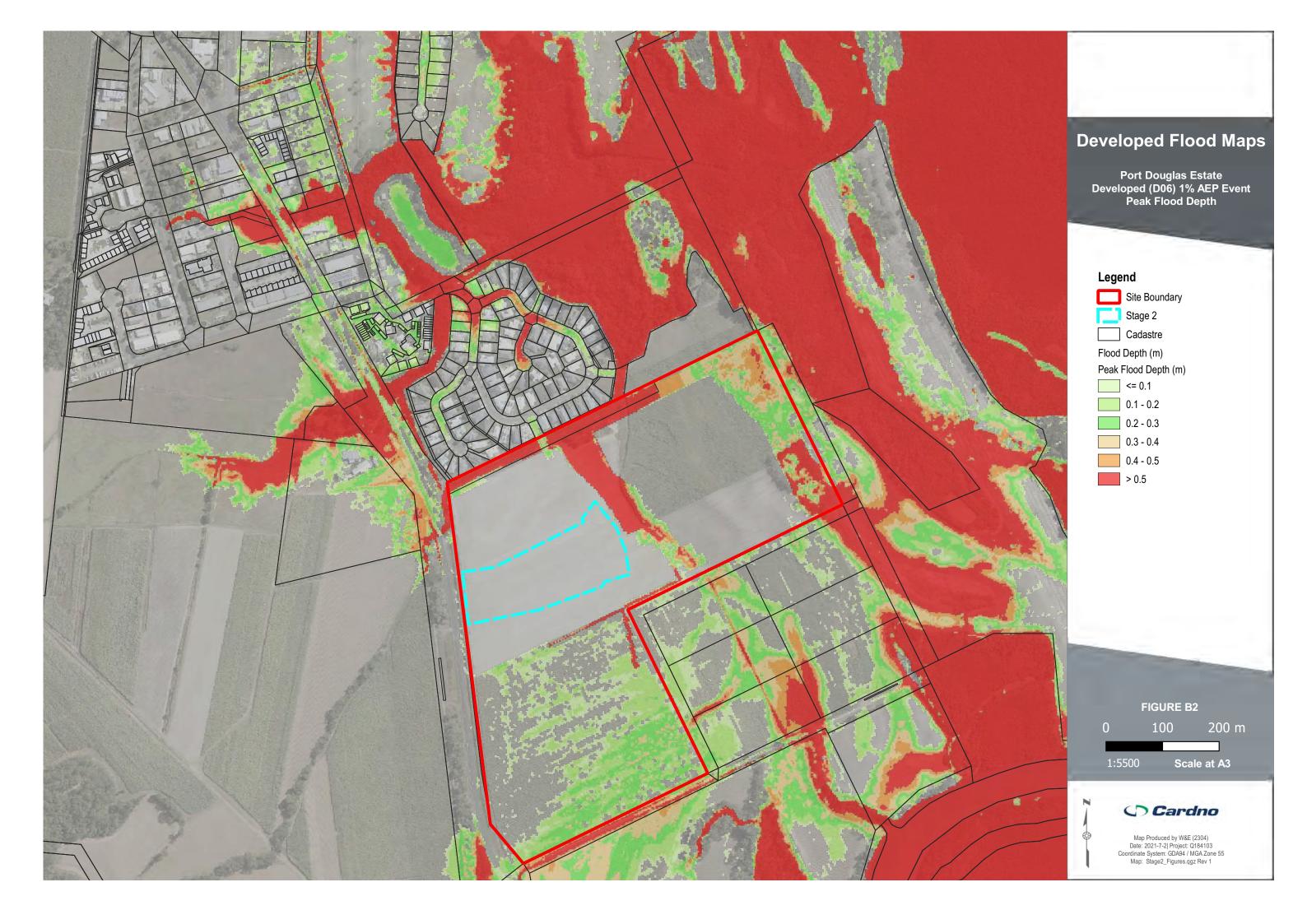


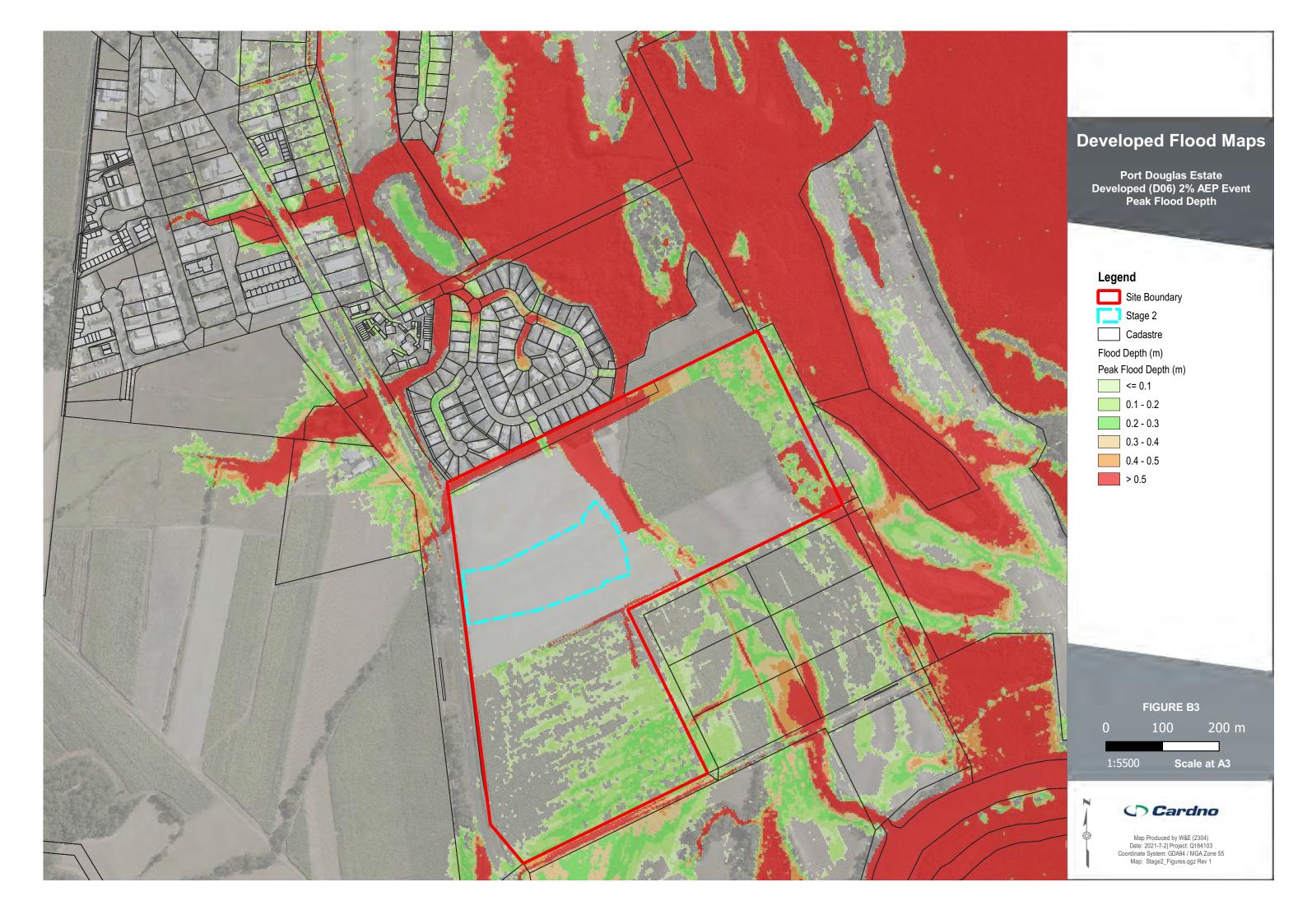


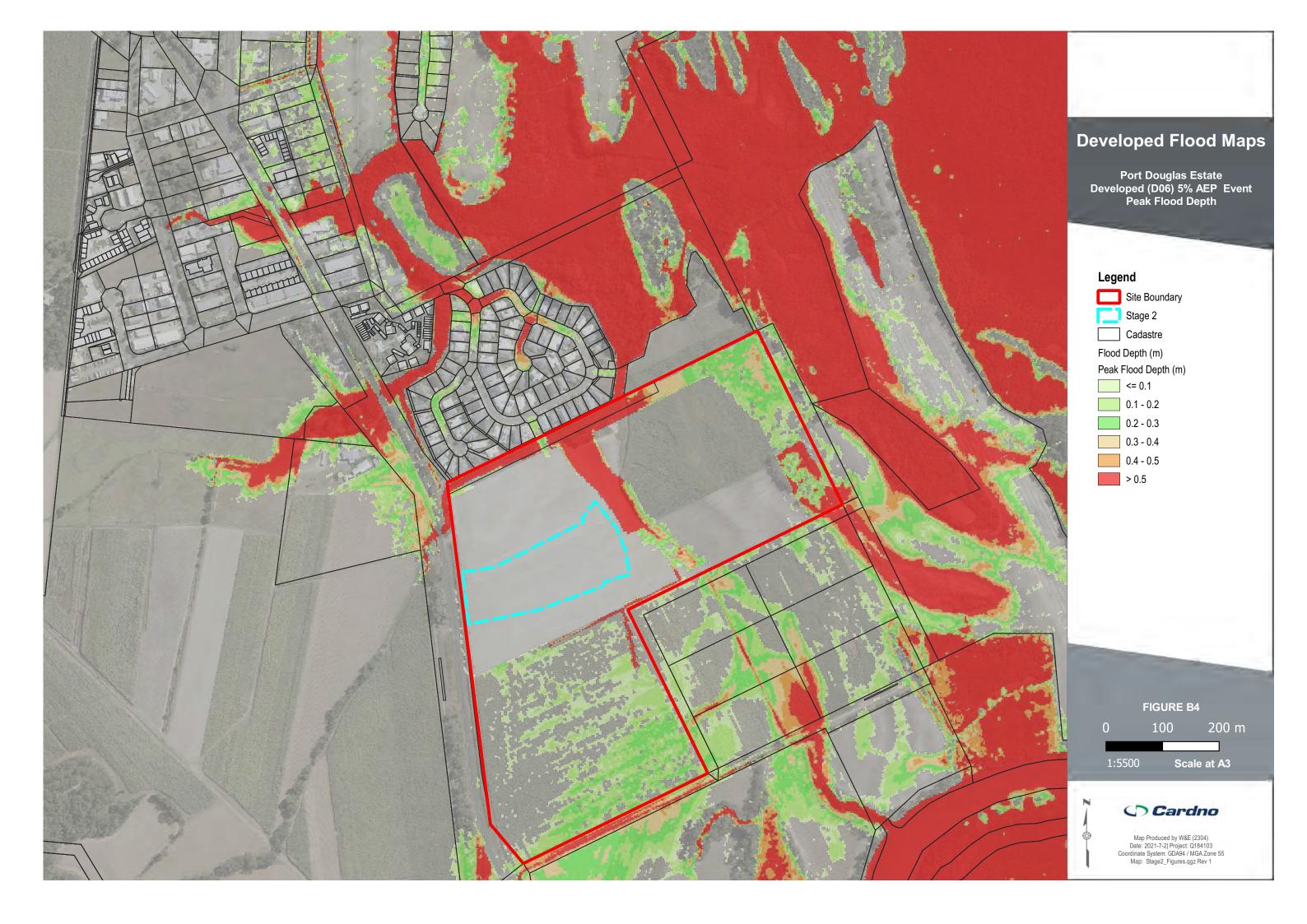


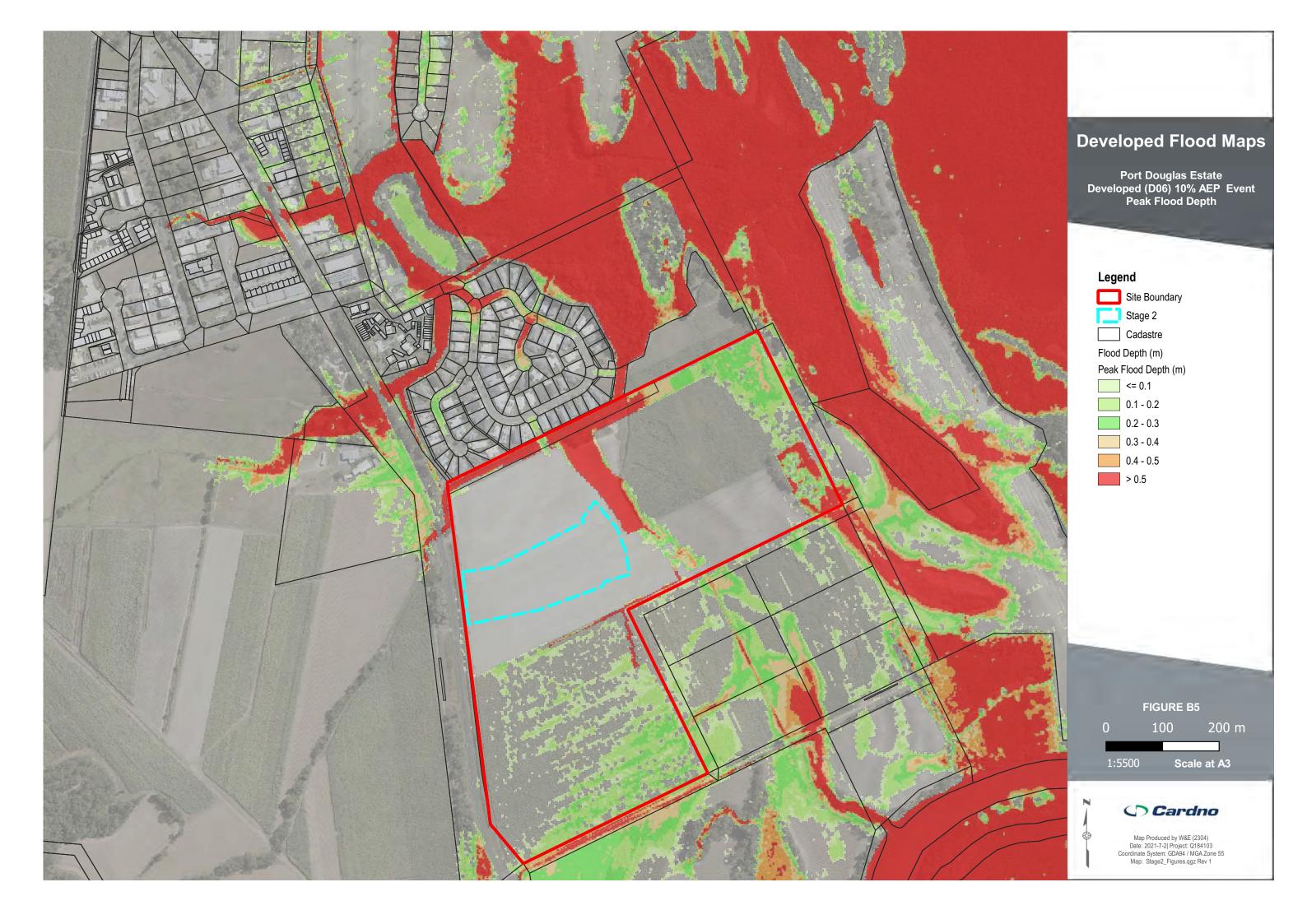


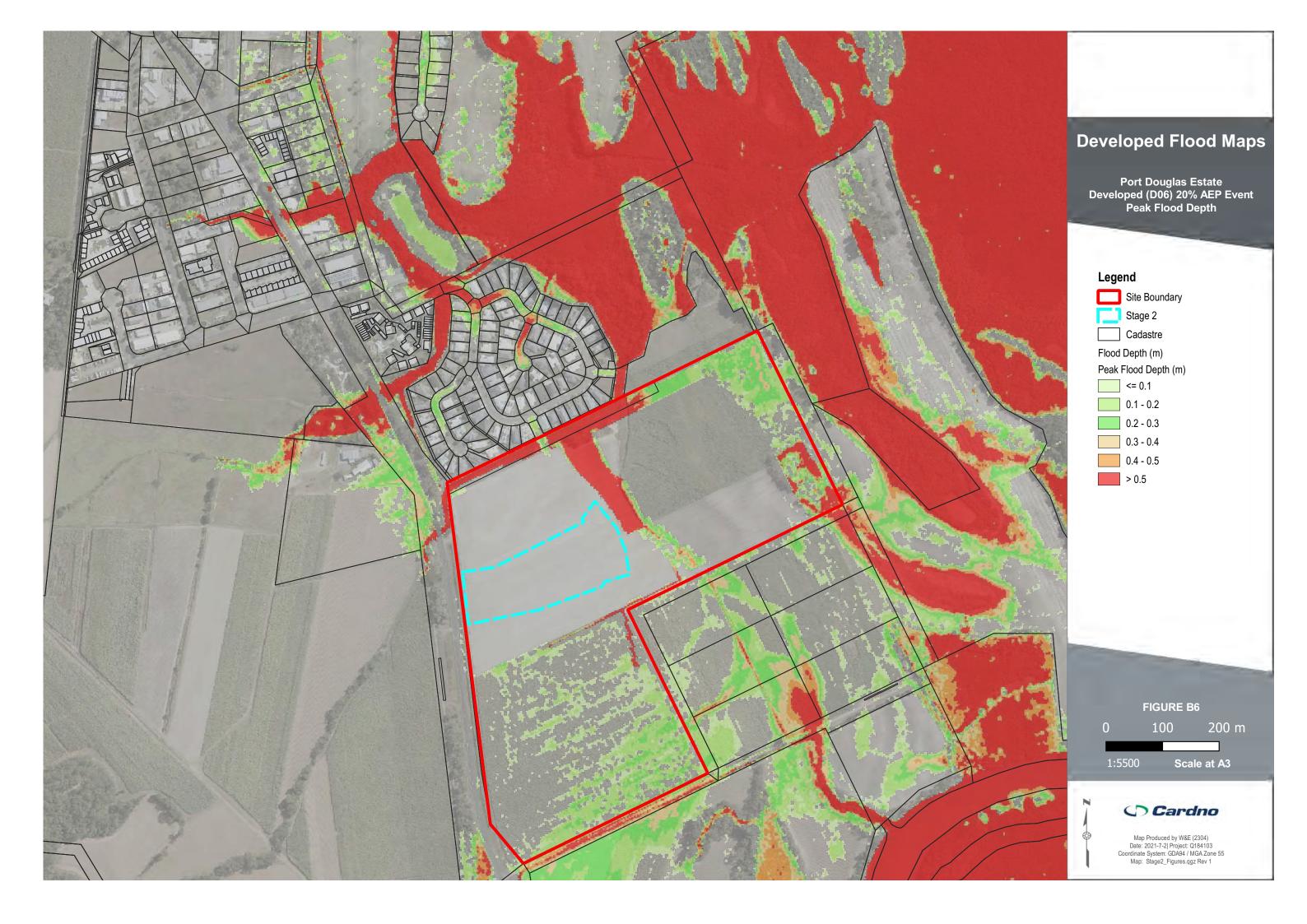


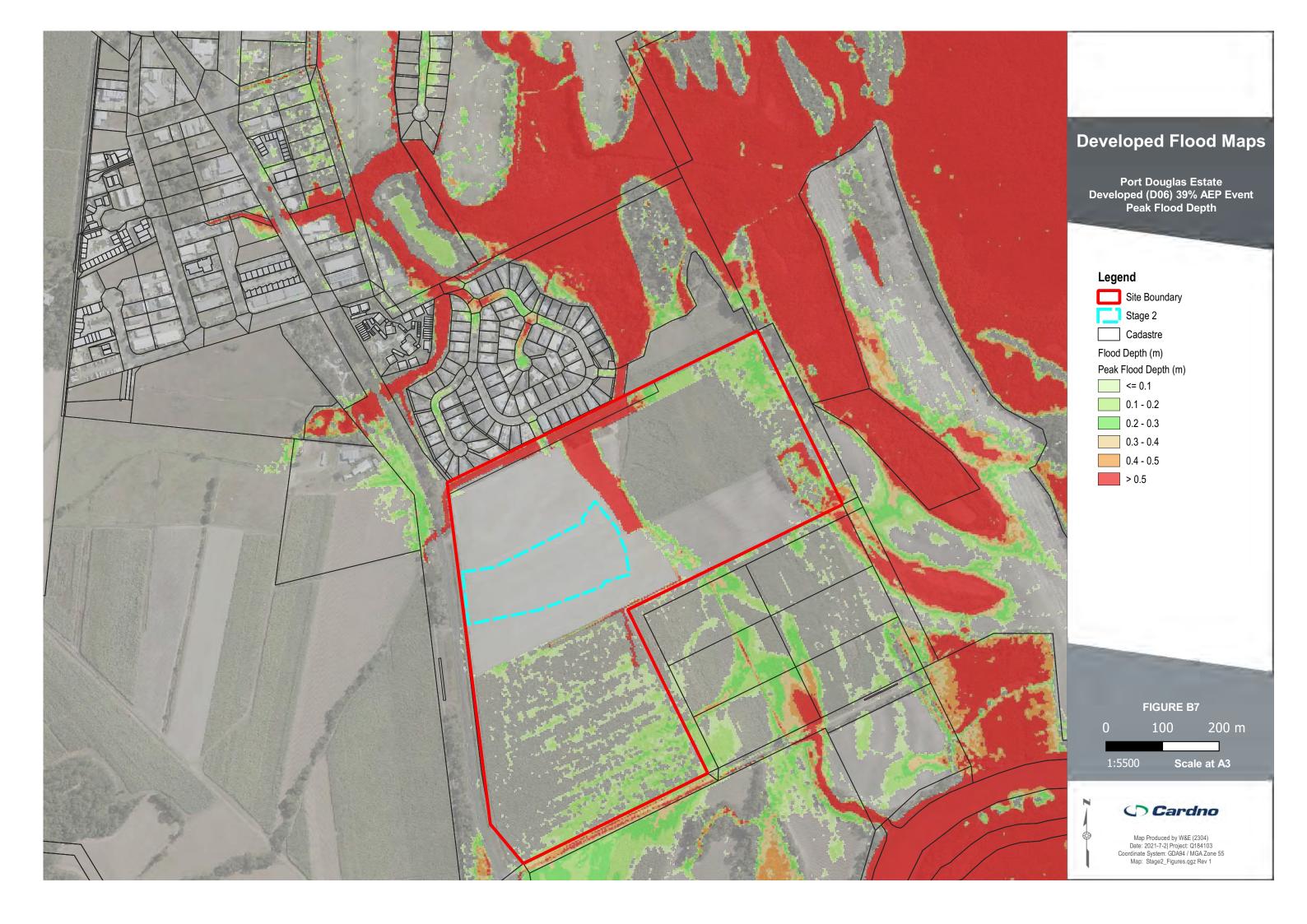


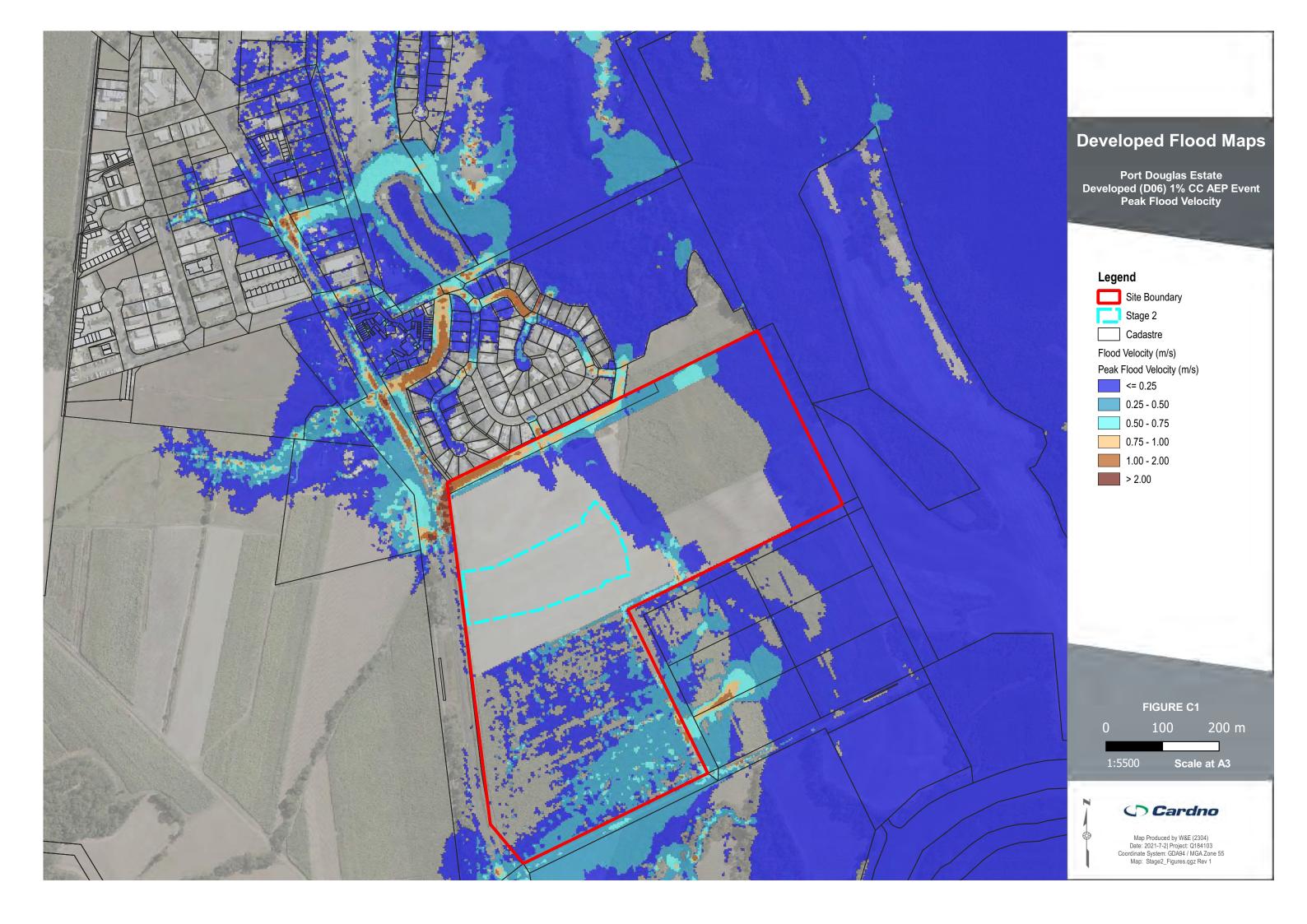


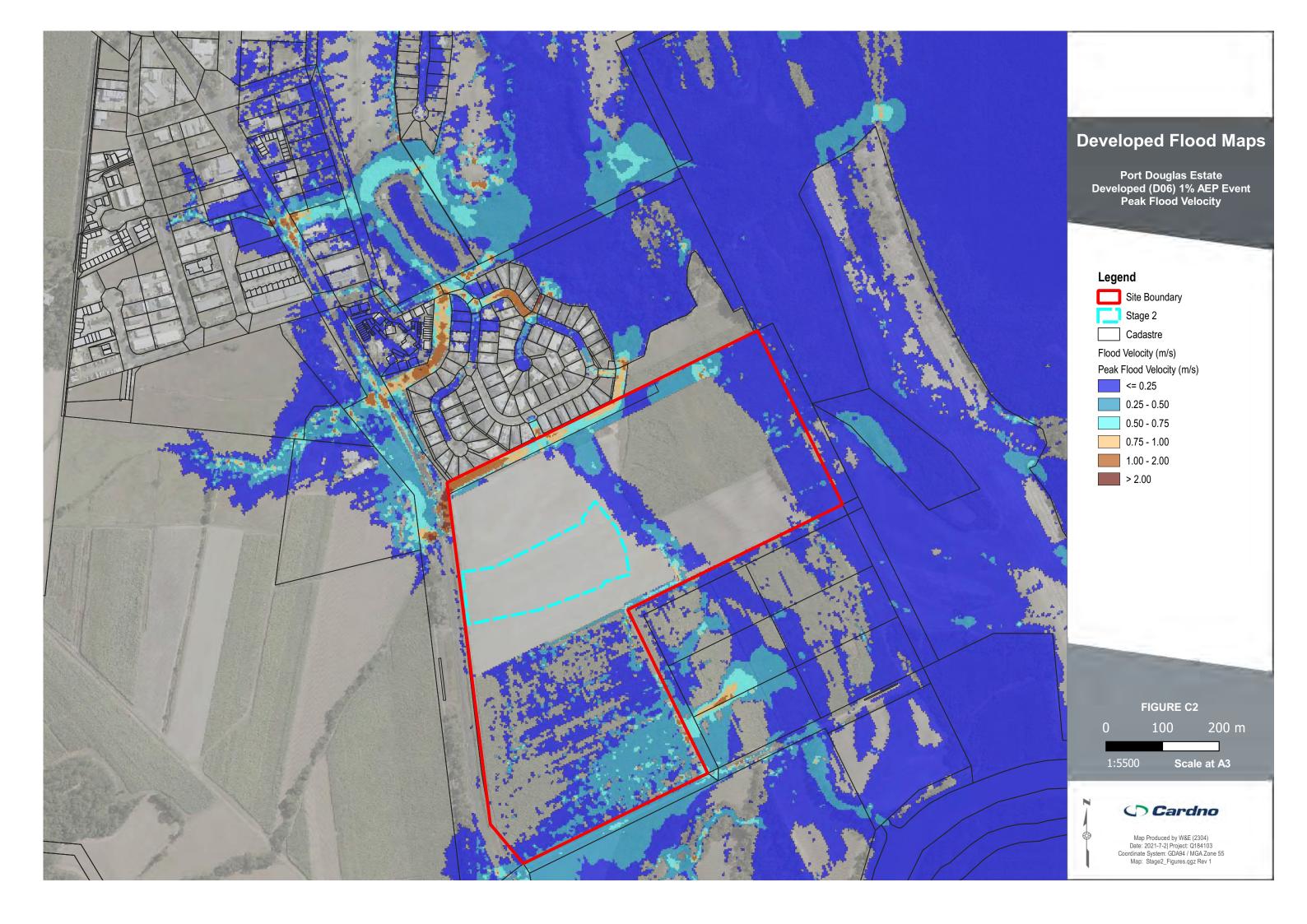


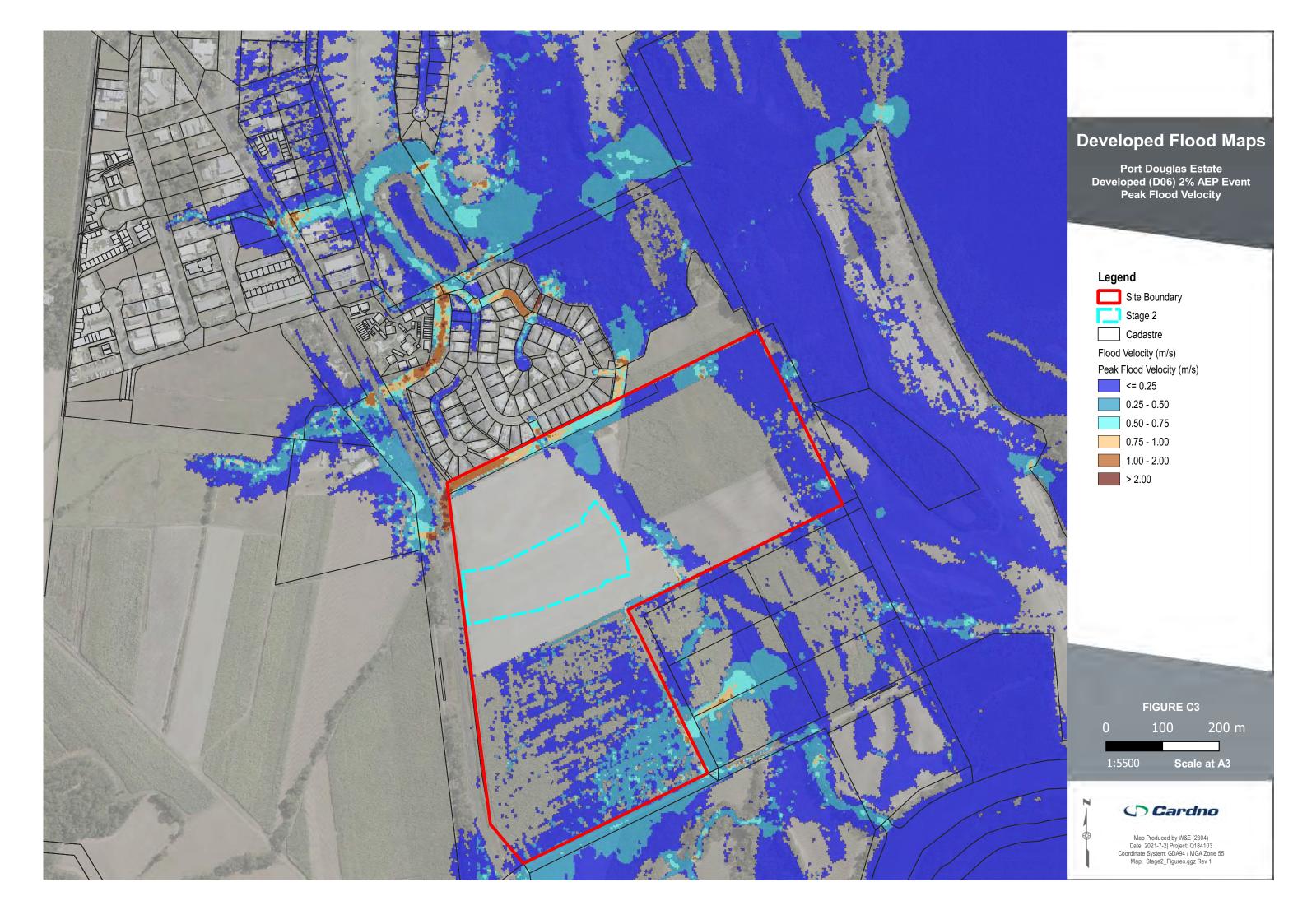


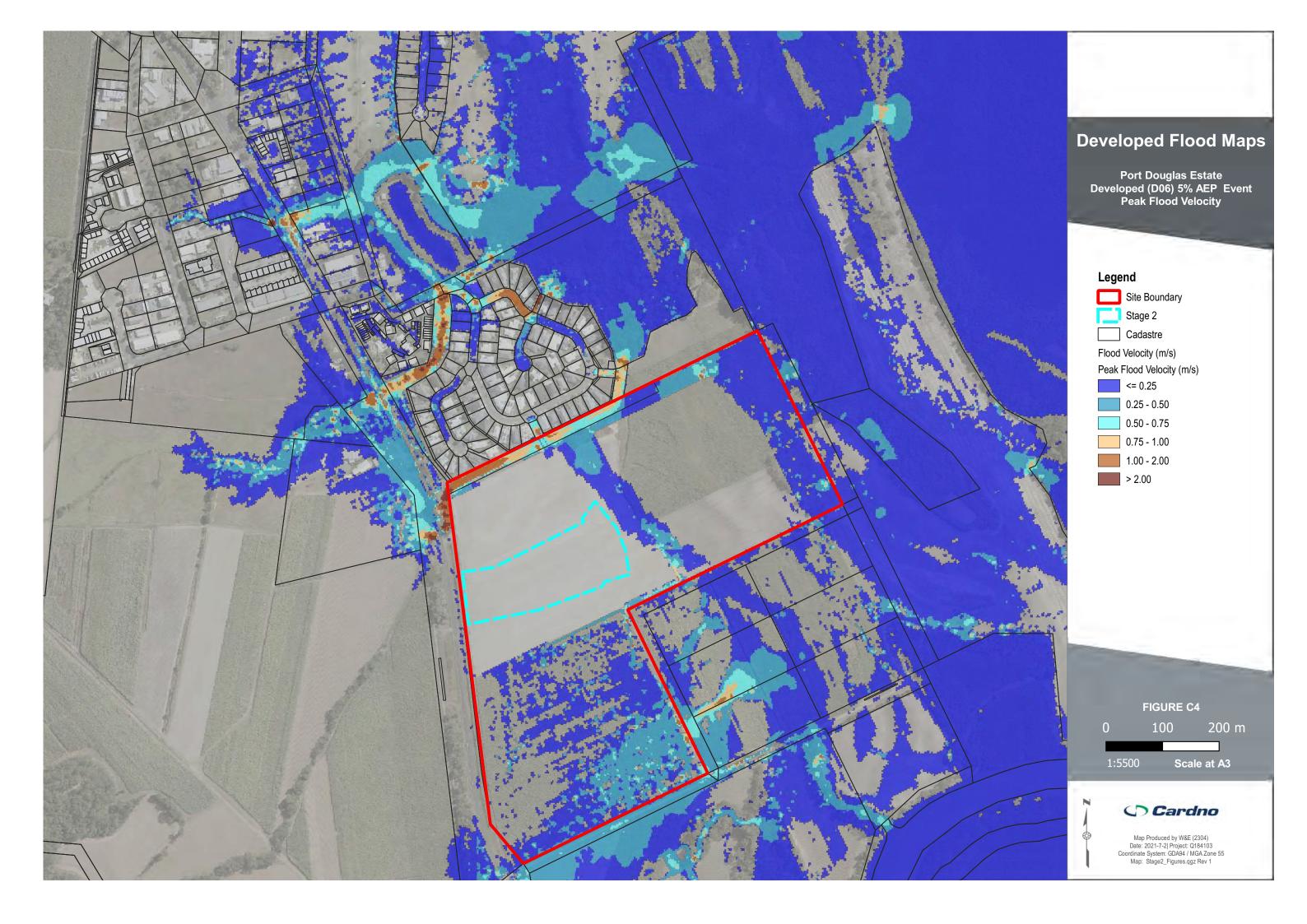


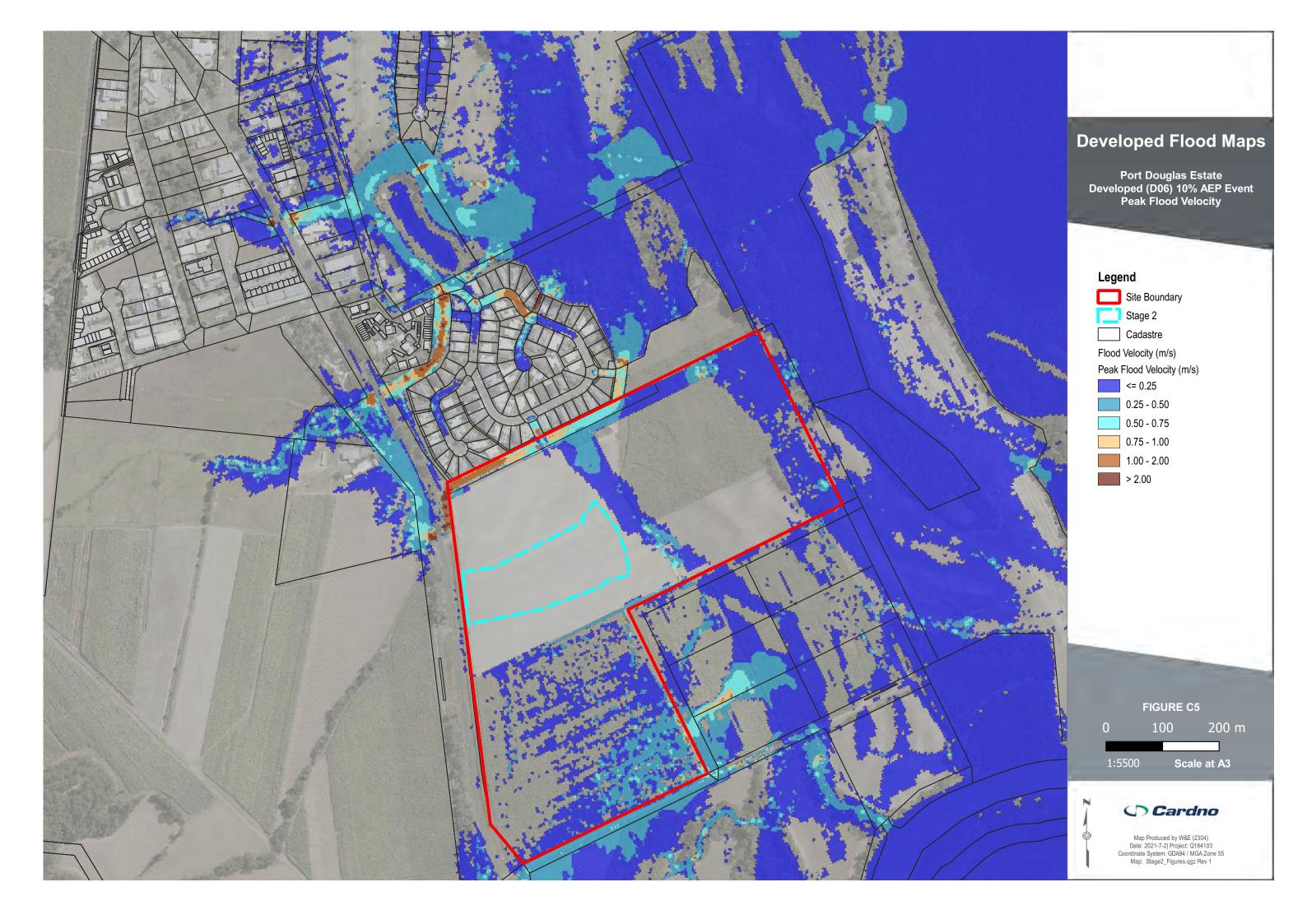


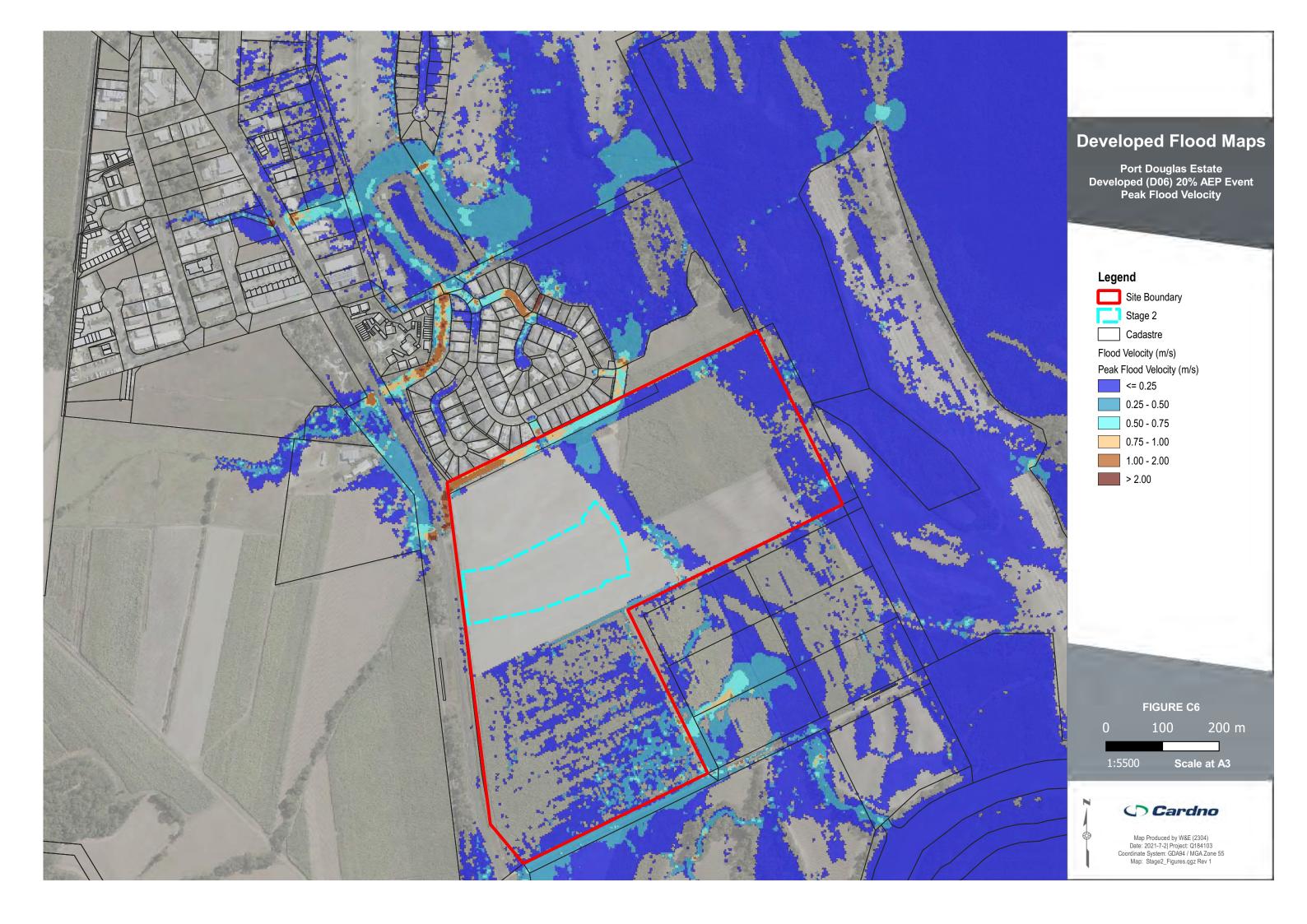


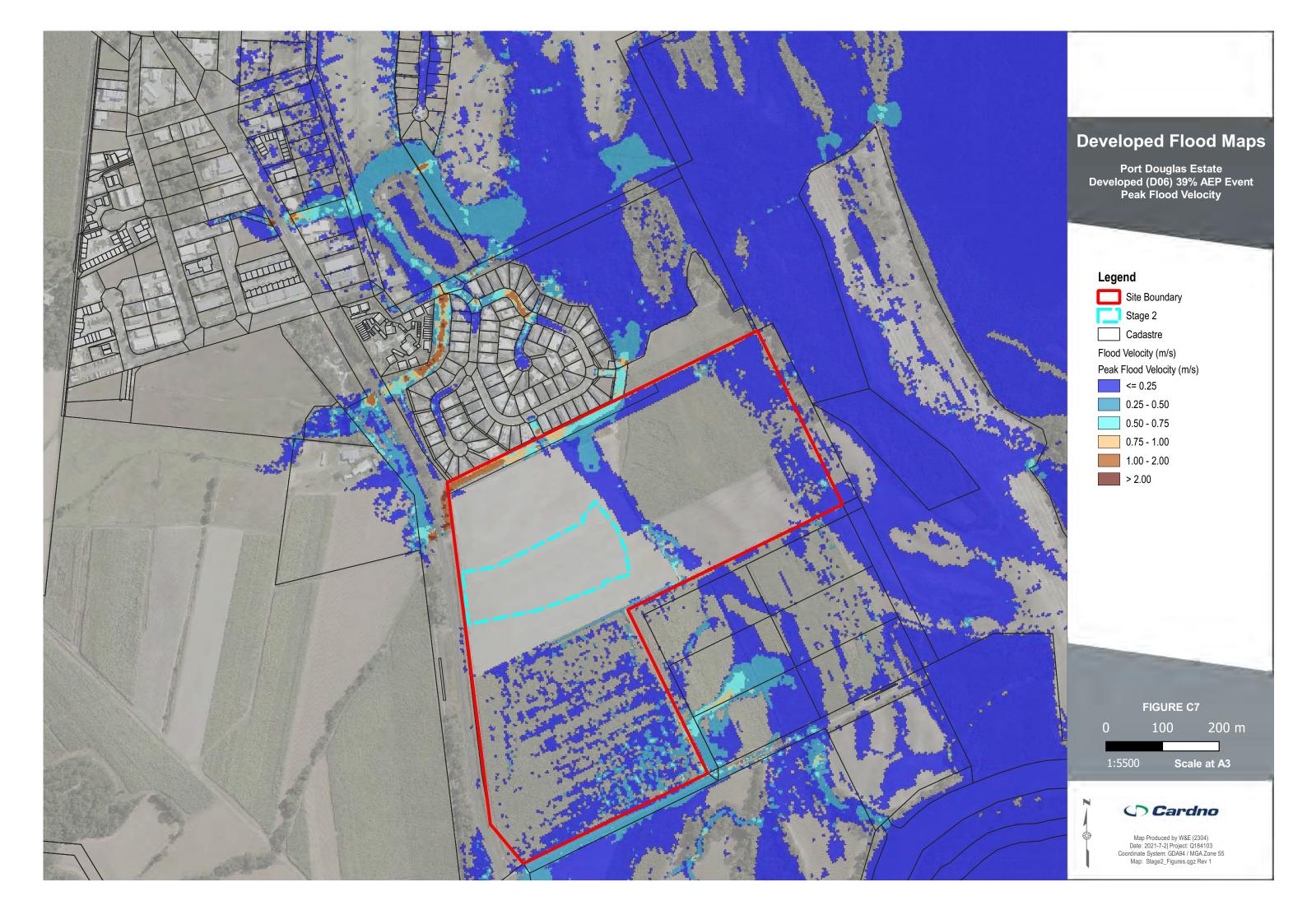


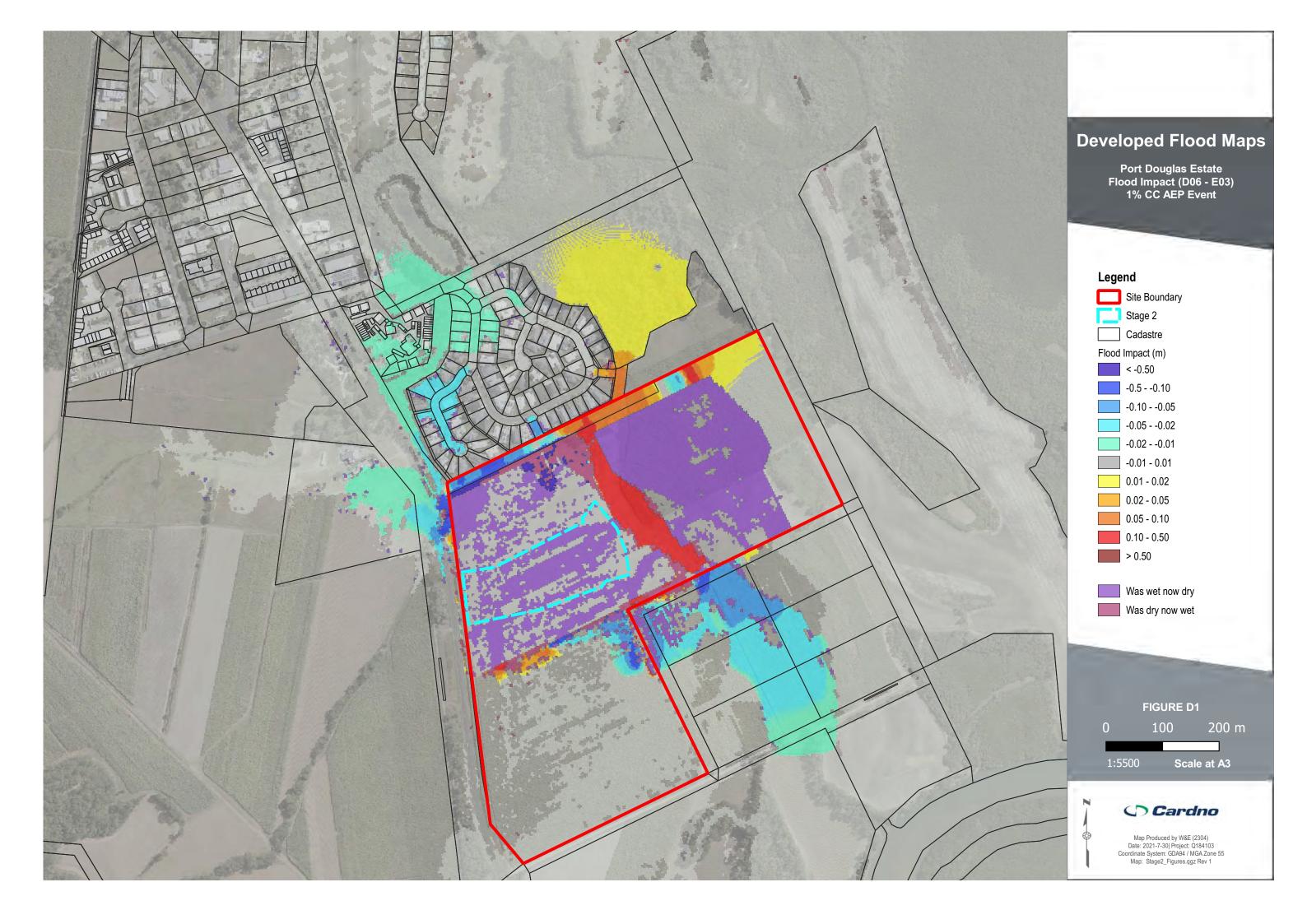


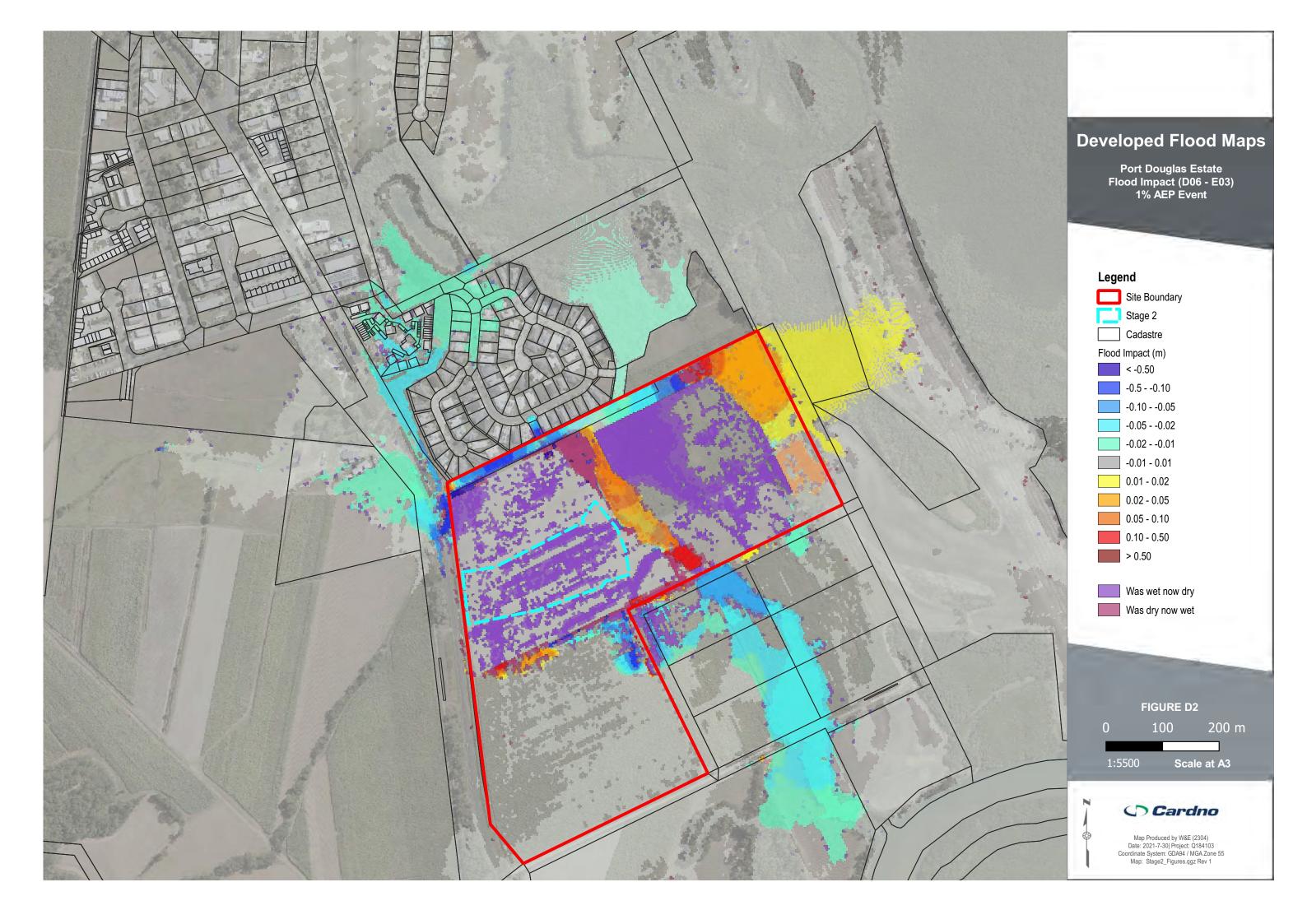


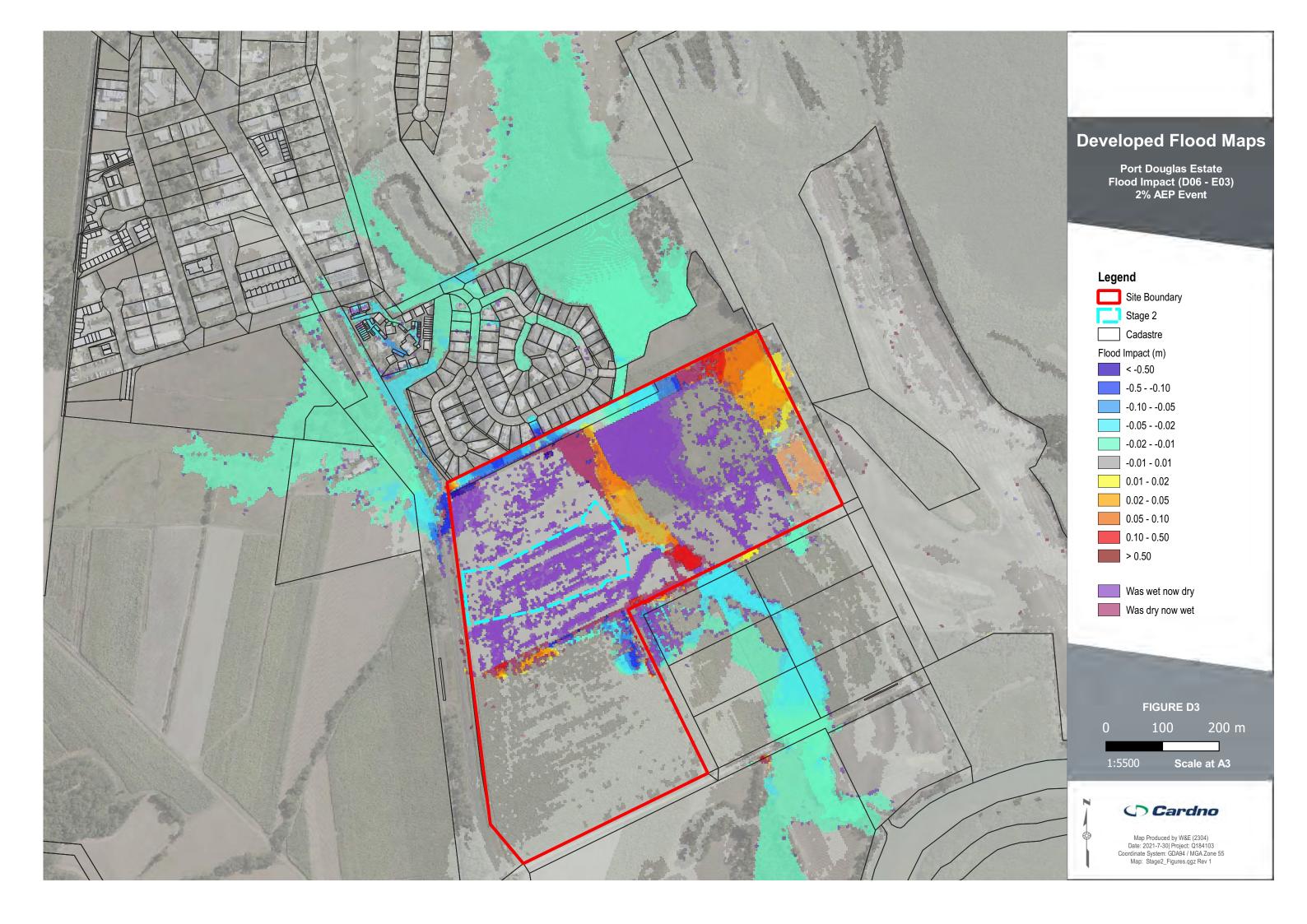


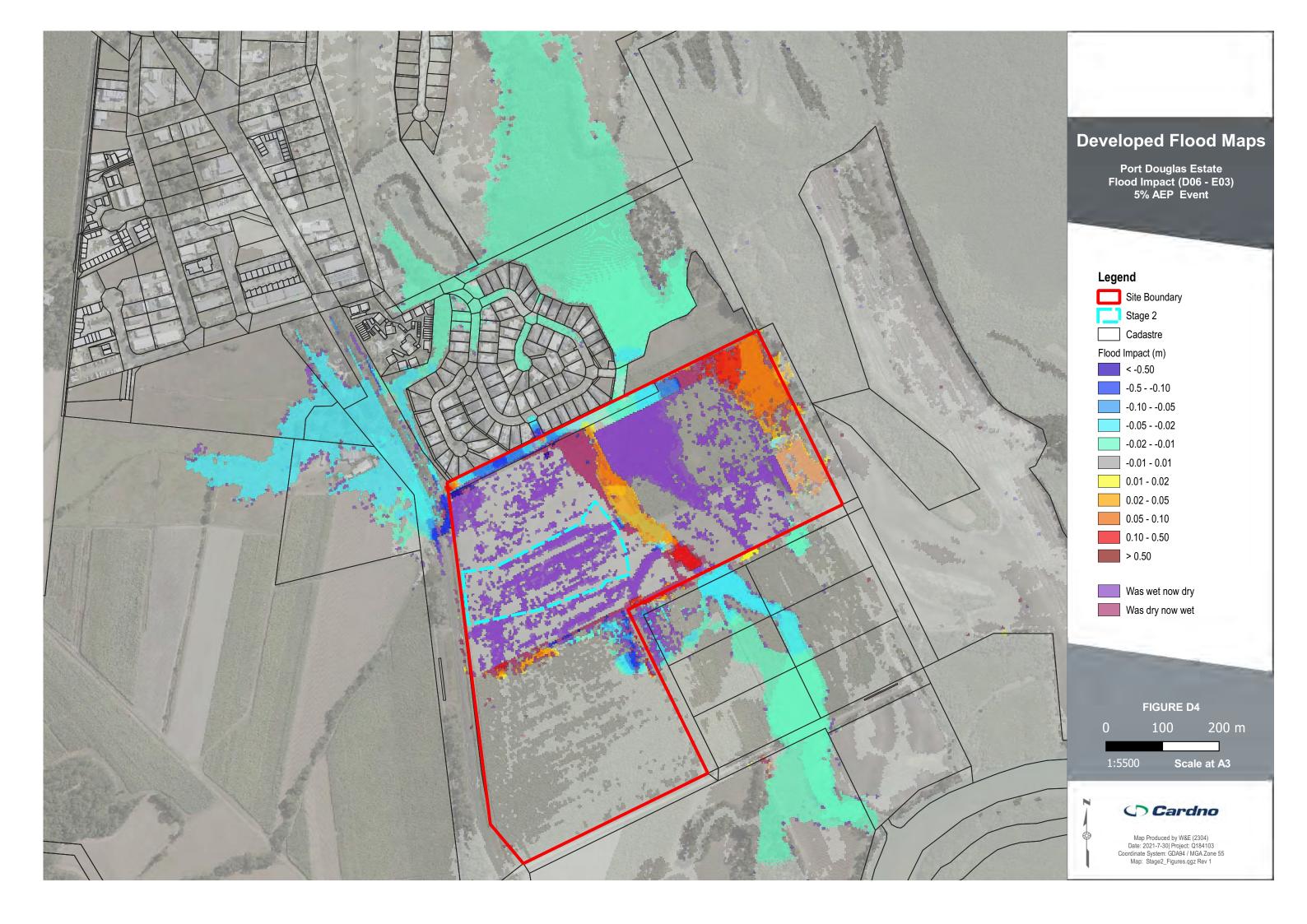


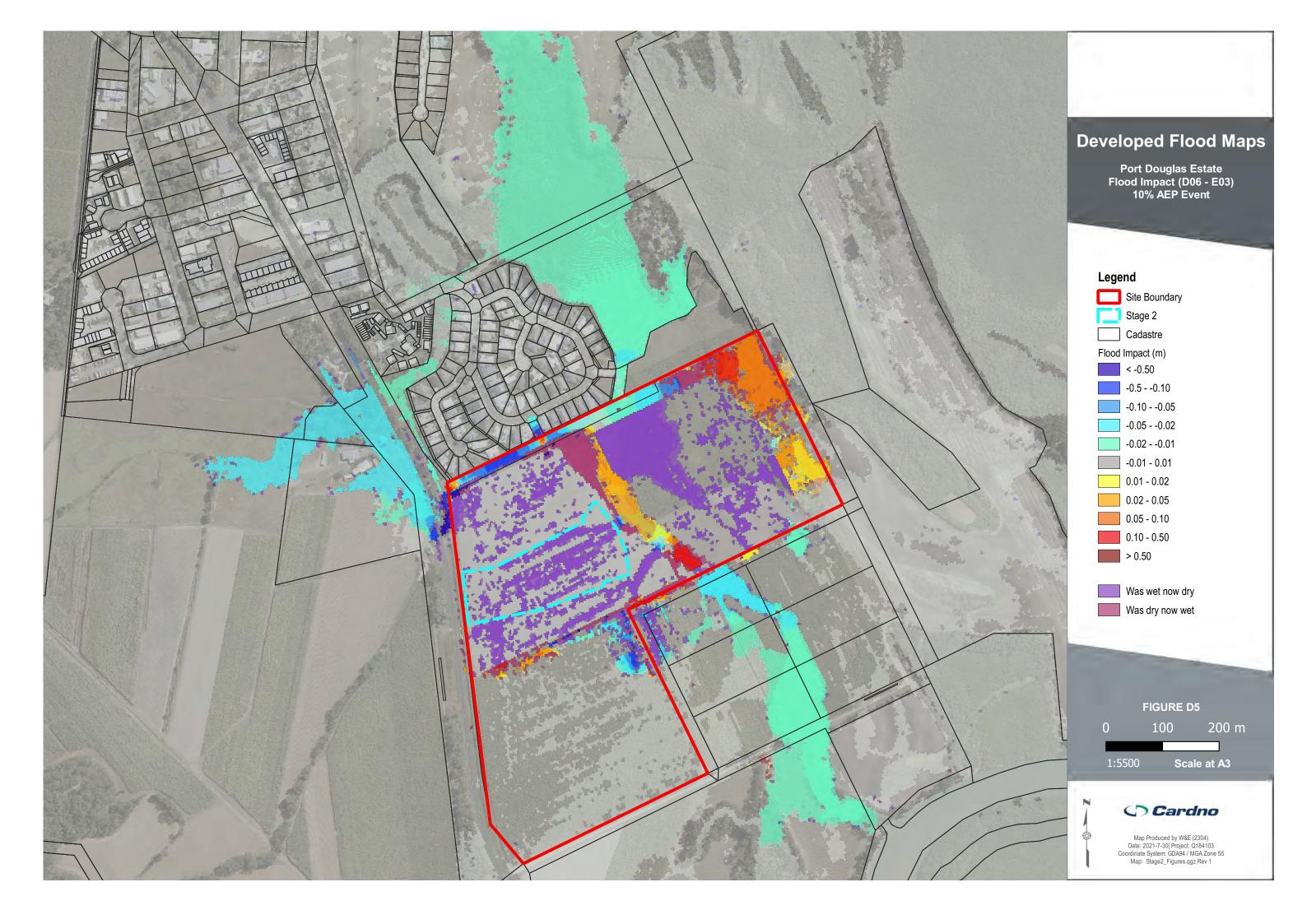


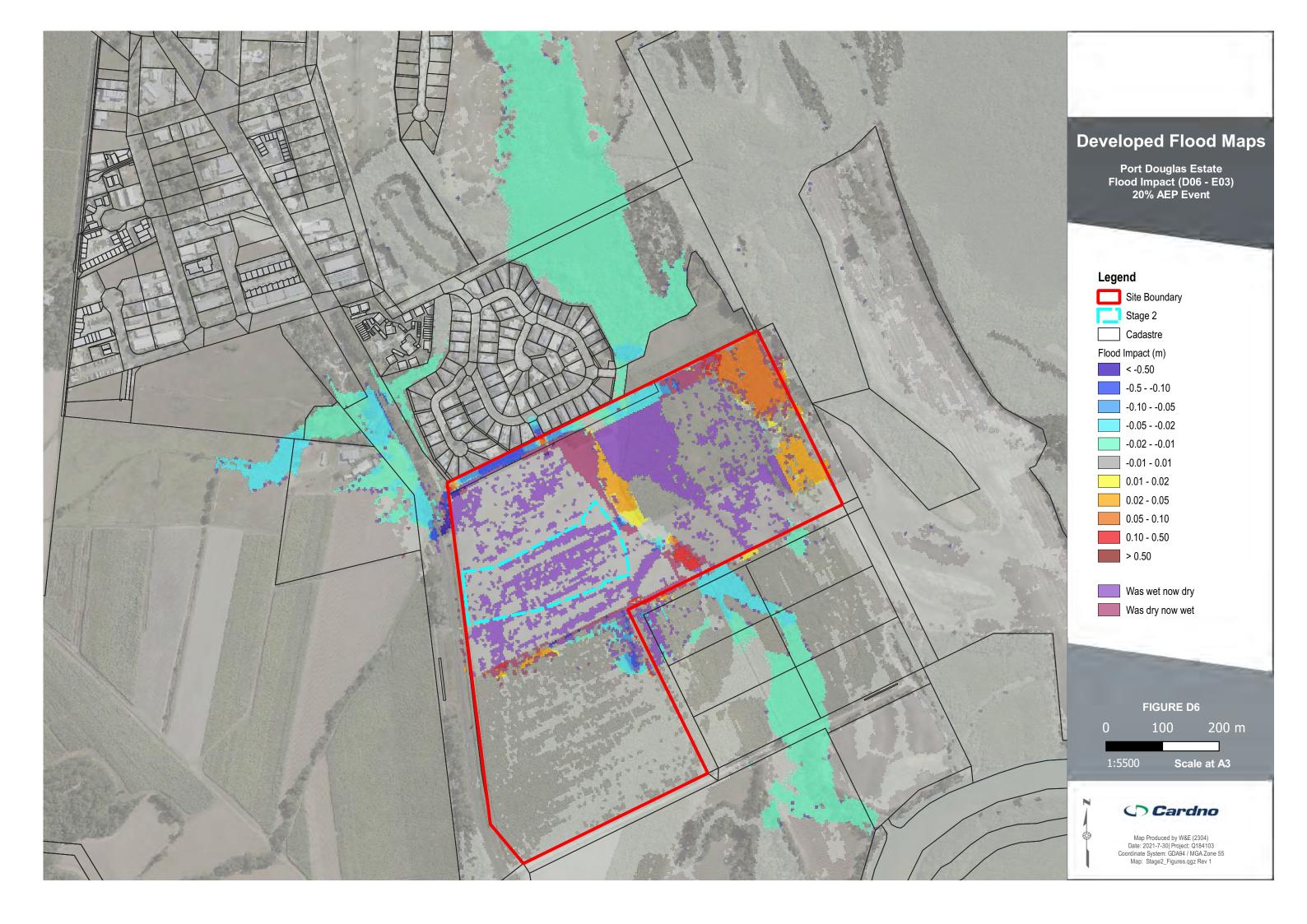


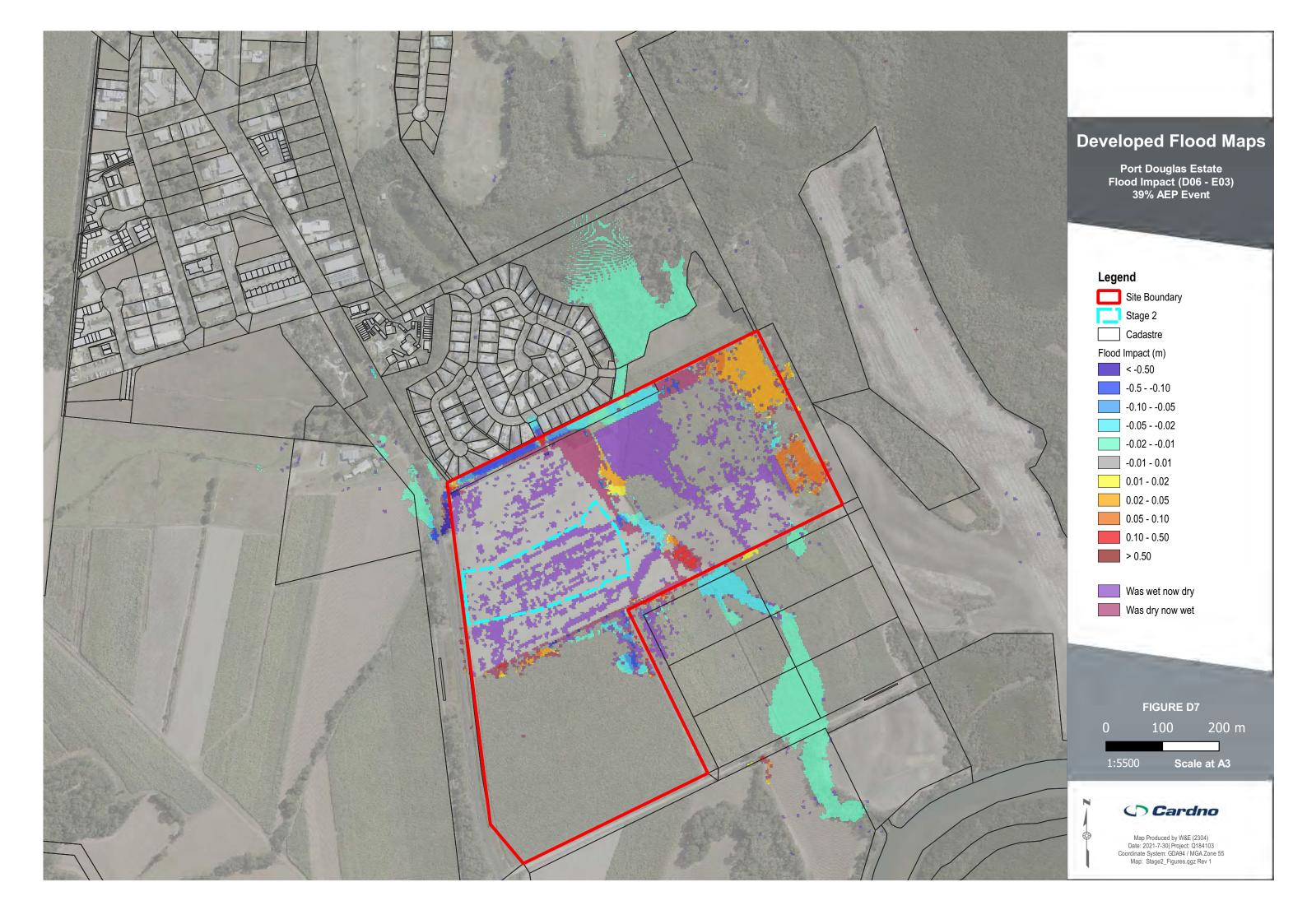














Attachment I

Preliminary Stage 2 Civil Plans



Cardno (QLD) Pty Ltd | ABN 57 051 074 992

15 Scott Street, Parramatta Park

Cairns QLD 4870

Tel: 07 4034 0500

Web: www.cardno.com.au

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PORT DOUGLAS LAND DEVELOPMENTS PTY LTD

PORT DOUGLAS ESTATE - STAGE 2 SUBDIVISION OF LOT 2 ON SR431 CAPTAIN COOK HIGHWAY, CRAIGLIE

Drawing Number



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party arising out of any use or reliance by third party on the

content of this document.

Verified

RPEQ No. ???

AHD

Q184103-02-CI-1001

DRAWING SCHEDULE AND LOCALITY PLAN

AS SHOWN | A1

Cardno (QLD) Pty Ltd | ABN 57 051 074 992

15 Scott Street, Parramatta Park

Cairns QLD 4870

Tel: 07 4034 0500 Web: www.cardno.com.au

27/08/2021

Date

PRELIMINARY ISSUE

Description

Des. | Verif. | Appd.

- G1 THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT.
- G2 THE INFORMATION CONTAINED ON THESE DRAWINGS IS FOR ENGINEERING PURPOSES ONLY. ALL DISCREPANCIES THAT COULD RESULT IN CHANGES TO THE DETAILS SHALL BE REFERRED TO THE ENGINEER PRIOR TO PROCEEDING WITH CONSTRUCTION.

IF IN DOUBT - ASK.

- G3 CONSTRUCTION FROM THESE DRAWINGS AND ASSOCIATED CONSULTANTS' DRAWINGS SHALL NOT COMMENCE UNTIL APPROVED BY THE LOCAL AUTHORITIES.
- G4 ALL COORDINATES ARE TO MGA ZONE 55.

BY THE CONTRACTOR.

- G4 ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT AUSTRALIAN STANDARDS AND WITH THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES EXCEPT WHERE VARIED BY THE PROJECT SPECIFICATION.
- G5 ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE. ENGINEERS' DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS.
- G6 THE BUILDER SHALL GIVE 72 HOURS NOTICE FOR ALL ENGINEERING INSPECTIONS. G7 UNLESS NOTED OTHERWISE ALL LEVELS ARE IN METRES AND ALL DIMENSIONS
- ARE IN MILLIMETRES. G8 THE CONTRACTOR SHALL VERIFY THE LOCATIONS OF ALL EXISTING SERVICES WITH THE RELEVANT AUTHORITIES BEFORE COMMENCING CONSTRUCTION. ANY COST ASSOCIATED WITH REPAIRING DAMAGE TO EXISTING SERVICES SHALL BE PAID FOR
- G9 THE CONTRACTOR SHALL ENSURE ALL RELEVANT PERMITS ARE IN PLACE PRIOR TO
- G10 THE CONTRACTOR'S FNQROC APPROVED EROSION AND SEDIMENT CONTROL PLAN (E.S.C.P.) SHALL BE IN PLACE PRIOR TO COMMENCEMENT OF WORKS IN ACCORDANCE WITH FNQROC SPECIFICATION C211 UNO.
- G11 ALL MATERIALS SHALL BE TRANSPORTED VI A DESIGNATED CONSTRUCTION ACCESS ROUTE UNLESS DIRECTED OTHERWISE BY THE SUPERINTENDENT.
- G12 ALL LEVELS IN THIS CONTRACT ARE AUSTRALIAN HEIGHT DATUM (AHD). G13 LEVELS FOR CONNECTION TO EXISTING WORKS MAY BE VARIED WHERE NECESSARY ON SITE TO ACHIEVE A SATISFACTORY SMOOTH FINISH TO EXISTING WORKS UPON APPROVAL BY THE SUPERINTENDENT.
- G14 ALL LEVELS ARE DTM DERIVED FOR LAYOUTS. THE CONTRACTOR SHALL CONFIRM LEVELS ON SITE BEFORE CONSTRUCTION.
- G15 DO NOT OBTAIN DIMENSIONS FROM SCALING OFF PLANS
- G16 EXISTING CONTOURS, LEVELS AND FEATURES SHOWN ON THE DRAWINGS ARE INDICATIVE ONLY AND ARE BASED ON SURVEY DRAWINGS AND DATA PROVIDED BY
- G17 IN THE EVENT OF ANY INCONSISTENCY OR CONTRADICTION BETWEEN TECHNICAL CONSTRUCTION SPECIFICATIONS THE FOLLOWING ORDER OF PRIORITY SHALL
- FNQROC DEVELOPMENT GUIDELINES, ENGINEERING SPECIFICATIONS.
- PROJECT DRAWINGS
- FNQROC STANDARD DRAWINGS.

SAFETY IN DESIGN AND CONSTRUCTION

D1 CONSTRUCTION WORK UNDERTAKEN BY THE BUILDER/CONTRACTOR IS TO COMPLY WITH THE REQUIREMENTS OF THE WORK PLACE HEALTH AND SAFETY ACT.

D2 CONSTRUCTION ACTIVITY CAN BE HAZARDOUS. POTENTIAL SAFETY HAZARDS

- CONSIDERED BY THE DESIGNERS TO HAVE A HIGHER RISK THAN NORMAL CONSTRUCTION ACTIVITY ARE IDENTIFIED WITH APPROPRIATE NOTES ON THESE DRAWINGS. IT SHOULD BE NOTED THAT DESIGNERS HAVE A LOWER LEVEL OF UNDERSTANDING OF THE RISKS INVOLVED IN CONSTRUCTION COMPARED TO THAT OF A COMPETENT CONTRACTOR. IT IS THEREFORE ESSENTIAL THAT AN ADEQUATE SAFETY PLAN IS PREPARED BY THE CONTRACTOR FOR THE WORKS. SAFETY PLANS ARE TO BE PREPARED IN COMPLIANCE WITH THE STATUTORY REQUIREMENTS. THE DESIGNERS MAY NOT BE AWARE OF ALL SAFETY RISKS AND HAZARDS INVOLVED IN THIS PROJECT AND THE ABSENCE OF COMMENT DOES NOT IMPLY THAT THERE ARE ONLY LOW LEVEL RISKS OR HAZARDS INVOLVED IN THIS PROJECT. APPROPRIATE WORK METHOD STATEMENTS ARE TO BE PREPARED FOR ANY HIGH RISK ACTIVITY BY THE CONTRACTOR. THE DESIGNERS ARE AVAILABLE TO BE CONSULTED WHEN REQUIRED CONCERNING THEIR AREA OF CONTROL WITH REGARD TO SAFETY PLANS.
- D3 PRIOR TO ANY WORKS THE CONTRACTOR SHALL HAVE COMPLETED A RISK ASSESSMENT OF ALL CONSTRUCTION PROCEDURES AND ENSURED THAT WHERE POSSIBLE, ALL RISKS HAVE BEEN ELIMINATED AND WHERE NOT POSSIBLE THEIR SAFETY PLAN HAS ADDRESSED THOSE ISSUES AND IT HAS BEEN FORMULATED AND DOCUMENTED FOR STRICT ADHERENCE DURING THE CONSTRUCTION WORKS.
- D4 PRIOR TO THE USE OF THE PROJECT AS DESIGNED, THE OWNER SHALL HAVE COMPLETED A RISK ASSESSMENT OF ALL WORK PRACTICES AND ENSURED THAT WHERE POSSIBLE ALL RISKS HAVE BEEN ELIMINATED AND WHERE NOT POSSIBLE THEIR SAFETY PLAN HAS ADDRESSED THOSE ISSUES AND IT HAS BEEN FORMULATED AND DOCUMENTED FOR STRICT ADHERENCE AFTER COMMISSIONING.

SITE CLEARANCE

- THE SITE SHALL BE CLEARED ONLY TO THE EXTENT NECESSARY TO PERMIT
- CONSTRUCTION OF THE PERMANENT WORKS U.N.O. C2 AREAS TO BE USED FOR STOCKPILING EXCESS EXCAVATED MATERIALS SHALL BE
- CLEARED AND STRIPPED OF TOPSOIL AND OTHER UNSUITABLE MATERIAL. C3 ALL ITEMS NOMINATED ON THE DRAWINGS TO BE REMOVED ARE TO BE DISPOSED OF OFF SITE. REMOVED VEGETATION IS TO HAVE ALL ROOTS GRUBBED OUT AND DISPOSED OF OFF SITE. ALL OFFSITE DISPOSAL IS AT CONTRACTORS
- C4 CLEARING AND DEMOLITION OPERATIONS SHALL BE CARRIED OUT ONLY WITHIN
- THOSE AREAS AFFECTED BY THE PROPOSED WORKS UNLESS NOTED OTHERWISE. C5 PRIOR TO EXCAVATION COMMENCING THE CONTRACTOR WILL PRESENT 48 HOURS PRIOR TO WORKS COMMENCING 'DIAL BEFORE YOU DIG'.

Description

EARTHWORKS

- E1 ALL EARTHWORK AND PAVEMENT WORKS TO BE IN ACCORDANCE WITH AND COMPLY WITH FNQROC DEVELOPMENT GUIDELINES.
- E2 DRY DENSITY RATIO AS REFERRED TO IN THESE NOTES IS THE RATIO DETERMINED IN ACCORDANCE WITH AS1289.5.4.1 OF COMPACTED DRY DENSITY IN ACCORDANCE WITH AS1289.5.3.1 OR AS1289.5.8.1 TO THE STANDARD MAXIMUM DRY DENSITY DETERMINED IN ACCORDANCE WITH AS1259.5.1.11 (STANDARD COMPACTION).
- E3 STRIP ALL VEGETAL MATTER, TOPSOIL AND OTHER UNSUITABLE MATERIAL FROM AREAS TO BE EXCAVATED OR FILLED. STOCKPILE SUITABLE TOPSOIL MATERIAL IN APPROVED LOCATIONS FOR SUBSEQUENT RE-USE.
- E4 EXCAVATE AS REQUIRED AND DEPOSIT EXCAVATED MATERIAL AS NECESSARY. COMPACT SURFACES EXPOSED BY STRIPPING OR EXCAVATION TO 98% DRY DENSITY RATIO TO A DEPTH OF AT LEAST 250mm, SHOULD ANY SOFT OR
- UNSUITABLE MATERIAL BE IDENTIFIED SEEK THE ADVICE OF THE SUPERINTENDENT. E5 SUBGRADE CBR'S SHALL BE UNDERTAKEN ON THE EXISTING MATERIAL IN ACCORDANCE WITH TEST METHOD AS1289.6.1.1.
- MINIMUM 1 TEST PER 2500m² OR 1 PER MATERIAL TYPE. E6 THE EXPOSED SUBGRADE SHOULD BE COMPACTED TO 98% SDRR. COMPACTION TESTING SHOULD BE UNDERTAKEN IN ACCORDANCE WITH FNQROC DEVELOPMENT GUIDELINES, WITH 1 TEST PER 500m² AND A MINIMUM OF 3 TESTS PER LOT.
- E7 FOLLOWING COMPLETION OF SUBGRADE COMPACTION, TRIMMING AND SATISFACTORY CBR AND DENSITY TESTING, THE WHOLE OF THE SUBGRADE AREA SHALL BE INSPECTED BY PROOF ROLLING WITH A FULLY LADEN WATER TRUCK IN THE PRESENCE OF THE SUPERINTENDENT. IF THE SUBGRADE IS FOUND TO NOT BE ADEQUATE, THE CONTRACTOR AT THEIR OWN EXPENSE MUST RECOMPACT THE SUBGRADE AND UNDERTAKE THE REQUIRED COMPACTION TESTING.
- E8 ONCE SUBGRADE HAS BEEN APPROVED BY THE SUPERINTENDENT, THE CONTRACTOR IS TO UNDERTAKE A SURVEY TO CONFIRM DEPTH OF PAVEMENT. THE SURVEY IS TO BE PROVIDED TO THE SUPERINTENDENT FOR APPROVAL
- E9 PAVEMENT AREAS SHOULD BE KEPT FREE OF STANDING WATER AT ALL TIMES. PAVEMENT FAILURE AS A RESULT OF WATER INGRESS DURING CONSTRUCTION S HALL BE THE CONTRACTOR'S RESPONSIBILITY. SUCH PAVEMENT SHALL BE REPAIRED TO THE SATISFACTION OF THE SUPERINTENDENT AT THE CONTRACTOR'S
- E10 THE CONTRACTOR IS TO PROVIDE 72 HOURS NOTICE PRIOR TO ANY INSPECTIONS
- E11 COMPACT FILL TO 98% DRY DENSITY RATIO IN LAYERS OF THICKNESS APPROPRIATE TO THE COMPACTION PLANT EMPLOYED BUT NOT EXCEEDING 200mm.
- E12 ALL MATERIALS WITHIN 300mm BELOW CONCRETE PAVEMENT/SUBGRADE
- INTERFACE SHALL BE COMPACTED TO 98% DRY DENSITY RATIO. E13 IN PLACING FILL IN AND AROUND ROAD FOOTPATHS AND BATTERS ALLOW FOR TOPSOIL THICKNESS AS DETERMINED ON BASIS OF ACTUAL TOPSOIL MATERIALS
- E14 ALL AREAS EXPOSED BY EARTHWORKS SHALL BE TOPSOILED AND GRASSED. HYDROMULCH TO BE USED ON BATTERS GREATER THAN 1 VERTICAL TO 6 HORIZONTAL AND UP TO 1 VERTICAL TO 4 HORIZONTAL. STEEPER BATTERS SHALL HAVE JUTE MATTING INSTALLED TO MANUFACTURERS SPECIFICATION. ALL AREAS GRASSED WILL HAVE ROOT MAT AT THE END OF DEFECTS LIABILITY PERIOD AND SHALL BE FREE OF ROCK AND LOOSE STONE WHEN WORKS ARE TAKEN AS "ON
- E15 ALL EXISTING STRUCTURES AND SERVICES IN THE VICINITY OF EARTHWORKS SHOULD BE PROTECTED AT ALL TIMES.
- E16 ALL CONTROLLED FILL TO BE MIN CBR15 MATERIAL.
- E17 ALL EARTHWORKS TESTING TO BE SUPERVISED TO LEVEL 2. FREQUENCY OF FIELD DENSITY TESTING TO BE TYPE 1 IN ACCORDANCE WITH TABLE 8.1 OF AS3798 AND FNQROC DEVELOPMENT GUIDELINES.
- E18 PAVEMENT TESTING AND CONSTRUCTION LIMITS AND TOLERANCES SHALL BE IN ACCORDANCE WITH FNQROC DEVELOPMENT GUIDELINES.
- E19 PAVEMENT MATERIAL SHALL MEET THE MATERIALS QUALITY TESTING REQUIREMENTS OUTLINED IN MRTS 05 "UNBOUND PAVEMENTS". PRIOR TO INCORPORATION IN THE WORKS, THE CONTRACTOR SHALL PROVIDE THE MATERIALS QUALITY TESTING CERTIFICATES FOR THE PROPOSED MATERIALS TO THE CONSULTANT FOR REVIEW. THESE CERTIFICATES SHALL INCLUDE, AT MINIMUM, THE TESTING OUTLINED IN THE ANNEXURE TO FNQROC'S CONSTRUCTION SPECIFICATION DOCUMENT C242 "FLEXIBLE PAVEMENTS".

DRAINAGE

- DR1 STORMWATER DRAINAGE PIPE SHALL BE RCP FJ CLASS 2 PIPE UNO. JOINTS TO HAVE MANUFACTURER APPROVED BANDS AT ALL JOINTS TO PREVENT MOVEMENT OF FINE MATERIAL THROUGH JOINT e.g. ROCLA SAND BANDS
- DR2 BEDDING SHALL BE TYPE HS2 AS SPECIFIED IN AS3725.
- DR3 PIPE LAYING SHALL COMMENCE AT THE DOWNSTREAM END OF THE WORKS AT ALL
- DR4 STORMWATER HEADWALLS TO BE CONSTRUCTED AS DETAILED ON FNQROC STANDARD DRAWING S1080. SEEK SUPERINTENDENTS APPROVAL OF VARIATION PRIOR TO CONSTRUCTION. LIDS SHALL BE CAST AFTER COMPLETION OF ALL
- DR5 STORMWATER KERB INLET PITS TO BE CONSTRUCTED AS DETAILED ON FNQROC STANDARD DRAWINGS S1050, S1055 AND S1060 U.N.O.
- DR6 ALL "FINISHED SURFACE LEVELS" ON STORMWATER LONG SECTIONS ARE BASED ON A PROJECTION OF THE KERB INVERT AT THE SETOUT CO-ORDINATE.
- DR7 SUBSOIL DRAIN MIN GRADE 0.5%. REFER FNQROC STD DWG S1095 FOR DETAILS. DR8 ALL STORMWATER DRAINAGE LINES SHALL HAVE CCTV SURVEY COMPLETED IN ACCORDANCE WITH THE FNQROC DEVELOPMENT MANUAL.
- DR9 ALL TOP OF PIT, INLETS AND GPT UNITS TO BE CONFIRMED BY CONTRACTOR ON SITE PRIOR TO ORDERING. ANY VARIATION IN LEVELS FROM THE DESIGN PLANS TO BE REPORTED TO THE SUPERINTENDENT

DUST CONTROL

Des. Verif.

- DC1 SITE TO BE KEEP MOIST AT ALL TIMES TO ENSURE DUST CONTROL
- DC2 UNCOMPLETED WORKS ARE TO BE WATERED AND ROLLED AT THE END OF EACH WORKING DAY TO ENSURE A FIRM SEALED SURFACE TO CONTROL DUST.

ROADWORKS

- RW1 PAVEMENT DESIGN TO BE CONFIRMED FOLLOWING RECEIPT OF CONFIRMATORY CBR TESTS OF THE SUBGRADE AT TIME OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE 7No. CONFIRMATORY SUBGRADE SOAKED CBR TESTING TO THE SUPERINTENDENT AS SOON AS POSSIBLE LOCATIONS TO BE AGREED WITH THE
- RW2 EXCAVATE OR FILL AS NECESSARY TO PAVEMENT/SUBGRADE INTERFACE AS DESCRIBED IN THE SPECIFICATION AND EARTHWORKS NOTES.
- RW3 PRIOR TO PLACING ROAD PAVEMENT MATERIAL THE SUBGRADE SHALL BE TESTED AND PROOF ROLLED IN THE PRESENCE OF THE SUPERINTENDENT AND DOUGLAS SHIRE COUNCIL'S INSPECTING OFFICER.
- RW4 PAVEMENT DESIGN SHALL BE AS SHOWN ON DRAWINGS

SEDIMENT CONTROL

- SC1 CONTROL WILL BE VIA THE INSTALLATION OF SILT FENCING, CATCH DRAINS, HAYBALE BARRIERS AND SEDIMENT PONDS.
- SC2 TOPSOIL STOCK-PILES ARE TO BE LOCATED IN AREAS CLEAR OF SERVICING, WATERCOURSES, ROAD AND DRAINAGE WORKS AND PROVIDED WITH SILT FENCING ON THEIR DOWNSTREAM SIDE.
- SC3 DURING THE PROJECTS CONSTRUCTION, ALL PITS ARE TO BE BLOCKED OFF AT THE SURFACE AND RUNOFF FLOWS ARE TO BE DIRECTED TO THE SEDIMENT PONDS WHERE CONTAMINATED WATERS CAN BE TREATED UNTIL THE SURROUNDING LANDSCAPE HAS BEEN STABILISED TO THE SATISFACTION OF THE SITE SUPERINTENDENT. ONLY ON THE COMPLETION OF WORKS ARE THE SEDIMENT PONDS ARE TO BE REMOVED.
- SC4 REFER TO IPWEAQ STD DWG No. D-0040 AND D-0041 FOR FURTHER DETAILS. SC5 ALL BATTERS TO BE STABILISED WITHIN 10 DAYS OF COMPLETION OF BULK EARTHWORKS (eg. HYDROMULCHING, TURFING etc.).
- SC6 SURROUNDING CARRIAGEWAYS TO BE KEPT CLEAN OF ANY MATERIAL CARRIED ONTO ROADWAY BY CONSTRUCTION VEHICLES FROM SITE.
- SC7 THE CONTRACTOR SHALL PROVIDE A STORMWATER MANAGEMENT PLAN FOR APPROVAL PRIOR TO STARTING WORKS.

REINFORCEMENT

R1 ALL REINFORCING BARS SHALL BE GRADE D500N TO AS 4671 UNLESS NOTED OTHERWISE. IT SHALL BE CUT AND BENT IN ACCORDANCE WITH AS3600. ACCEPTABLE MANUFACTURERS AND PROCESSORS OF STEEL REINFORCEMENT MUST HOLD A VALID CERTIFICATE OF APPROVAL, ISSUED BY THE AUSTRALIAN CERTIFICATION AUTHORITY FOR REINFORCING STEELS (ACRS), OR TO SUCH AN EQUIVALENT CERTIFICATION SYSTEM AS MAY BE APPROVED IN WRITING BY THE SPECIFIER. EVIDENCE OF COMPLIANCE WITH THIS CLAUSE MUST BE OBTAINED WHEN CONTRACT BIDS ARE RECEIVED. ALL MESH SHALL BE GRADE 500L TO AS4671 AND SHALL BE SUPPLIED IN FLAT

REINFORCEMENT NOTATION SHALL BE AS FOLLOWS IN THE FOLLOWING

NUMBER OF BARS IN GROUP — BAR GRADE AND TYPE SPACING IN mm NOMINAL BAR SIZE IN mm

THE FIGURES FOLLOWING THE FABRIC SYMBOLS RL, SL, L, TM IS THE REFERENCE NUMBER FOR FABRIC TO AS 4671.

R2 REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND NOT NECESSARILY IN TRUE PROJECTION.

R3 SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN POSITIONS SHOWN OR OTHERWISE APPROVED IN WRITING BY THE ENGINEER. LAPS SHALL BE IN ACCORDANCE WITH AS 3600 AND NOT LESS THAN THE DEVELOPMENT LENGTH FOR EACH BAR, AS SHOWN IN THE TABLE BELOW.

LAP SCHEDULE	
BAR DIA.	LENGTH
R6	300
R10	400
N12	500
N16	600

- R4 WELDING OF REINFORCEMENT SHALL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS OR APPROVED BY THE ENGINEER. WHERE APPROVED, WELDING MUST COMPLY WITH AS1554.3 STANDARD STEEL WELDING, PART 3: WELDING OF REINFORCING STEEL. NO WELDING IS ALLOWED WITHIN 120mm OF BENDS.
- R5 FABRIC SHALL BE LAPPED TWO TRANSVERSE WIRES PLUS 25mm. BUNDLED BARS SHALL BE TIED TOGETHER AT 30 BAR DIAMETER CENTRES WITH 3 WRAPS OF THE WIRE.
- R6 ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON MILD STEEL PLASTIC TIPPED CHAIRS, PLASTIC CHAIRS OR CONCRETE CHAIRS AT NOT GREATER THAN 1 METRE CENTRES BOTH WAYS, AND 800 EACH WAY FOR FABRIC. WHEN POURED ON GROUND AS FORMWORK PROVIDE PLATES UNDER ALL BAR CHAIRS. PLASTIC TIPPED STEEL CHAIRS SHALL NOT BE USED ON EXPOSED FACES IN EXPOSURE CLASSIFICATION B1, B2 AND C ONLY PLASTIC OR CONCRETE CHAIRS.
- R7 SITE BENDING OF REINFORCEMENT SHALL BE AVOIDED IF POSSIBLE. WHERE SITE BENDING IS UNAVOIDABLE IT SHALL BE CARRIED OUT COLD, WITHOUT THE APPLICATION OF HEAT, AND IN ACCORDANCE WITH THE PRACTICE NOTE RPN1 OF THE STEEL REINFORCEMENT INSTITUTE OF AUSTRALIA. REINFORCEMENT SHALL NOT BE REBENT WITHOUT APPROVAL OF THE SUPERINTENDENT.
- R8 THE STRUCTURAL ENGINEER SHALL BE GIVEN 48 HOURS NOTICE FOR REINFORCEMENT INSPECTION AND CONCRETE SHALL NOT BE DELIVERED UNTIL FINAL APPROVAL HAS BEEN OBTAINED FROM THE STRUCTURAL ENGINEER.

CONCRETE

- C1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600, AS 1379 & AS 3610 CURRENT EDITIONS WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.
- PROJECT ASSESSMENT SHALL BE CARRIED OUT IN ACCORDANCE WITH AS 1379, EXCEPT THAT SAMPLING FREQUENCY SHALL BE AS FOLLOWS. ONE SAMPLE SHALL CONSIST OF 3 CYLINDERS

NUMBER OF TRUCKS	NUMBER OF SAMPLES
1	1
2 - 10	2
11 - 20	3
FOR EACH ADDITIONAL 10 TRUCKS	1 EACH

SLUMP TEST REQUIRED FOR EACH BATCH PRIOR TO PLACING CONCRETE. SLUMP MEASURED SHOULD NOT BE GREATER THAN TARGET SLUMP WITHIN TOLERANCES GIVEN IN AS1379.

- C2 CONSTRUCTION TOLERANCES TO BE TO AS3610.
- C3 REMOVE FREE WATER, DUST AND DEBRIS, STAINS etc. FROM FORMS, EXCAVATIONS etc. BEFORE PLACING CONCRETE.
- C4 CLEAR CONCRETE COVER TO ALL REINFORCEMENT SHALL BE AS SHOWN ON
- C5 CONCRETE SIZES SHOWN DO NOT INCLUDE THICKNESS OF APPLIED FINISHES NO FINISH WHICH DECREASES COVER IS ALLOWED WITHOUT THE WRITTEN APPROVAL OF THE ENGINEER.
- C6 CONSTRUCTION JOINTS WHERE NOT SHOWN SHALL BE LOCATED TO THE APPROVAL OF THE ENGINEER.
- C7 THE FINISHED CONCRETE SHALL BE MECHANICALLY VIBRATED TO ACHIEVE A DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORMWORK THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE POCKETS. ALL CONCRETE INCLUDING SLABS ON GROUND AND FOOTINGS SHALL BE COMPACTED WITH MECHANICAL VIBRATORS.
- C8 WET CONCRETE TO BE UNIFORM, HOMOGENEOUS, COHESIVE AND ABLE TO BE WORKED READILY INTO CORNERS AND AROUND REINFORCEMENT COMPLETELY FILLING FORMWORK WITHOUT SEGREGATION, EXCESS FREE WATER ON SURFACE, LOSS OF MATERIAL OR CONTAMINATION. CONCRETE TO HAVE GOOD DIMENSIONAL STABILITY AND ABLE TO RESIST PLASTIC SETTLEMENT CRACKING, THERMAL CRACKING AND SHRINKAGE
- C9 SLUMP TO BE AS REQUIRED FOR PLACEMENT(eg PUMPING etc.) COMPACTION AND FINISHING. USE SUPERPLASTERCISERS AND HIGH RANGE WATER REDUCERS TO ACHIEVE ADEQUATE WORKABILITY.
- C10 MIX CONCRETE TO ENSURE UNIFORM DISTRIBUTION OF CONSTITUENTS.
- C11 USE EVAPORATIVE RETARDANT DURING CONCRETE PLACING AND
- IMMEDIATELY AFTER BULL FLOATING. C12 CURING OF ALL CONCRETE IS TO BE ACHIEVED BY KEEPING SURFACES CONTINUOUSLY WET FOR A PERIOD OF THREE DAYS, AND THE PREVENTION OF LOSS OF MOISTURE FOR A TOTAL OF 7 DAYS FOLLOWED BY A GRADUAL DRYING OUT. APPROVED SPRAYED ON CURING COMPOUNDS THAT COMPLY WITH AS 3799 MAY BE USED. PROPOSED PRODUCTS TO BE PROVIDED TO THE
- SUPERINTENDANT FOR REVIEW AND APPROVAL. C13 PREVENT RAPID DRYING OUT OF CURING PERIOD.
- C14 DO NOT STRIP FORMWORK UNTIL CONCRETE IS HARDENED SUFFICIENTLY TO
- WITHSTAND MOVEMENT AND FORM REMOVAL WITHOUT DAMAGE. C15 REPAIRS TO CONCRETE SHALL NOT BE ATTEMPTED WITHOUT THE PERMISSION OF THE ENGINEER.
- C16 CAST-IN FIXINGS, BOLTS ETC. SHALL NOT BE ALTERED WITHOUT THE
- PERMISSION OF THE ENGINEER.
- C17 CONCRETE PAVEMENT IS TO HAVE STEEL TROWEL FINISH. C18 NO WATER IS TO BE ADDED TO THE CONCRETE ON SITE UNLESS APPROVAL IS PROVIDED BY THE SUPERINTENDENT.
- C19 SUBMIT NAMES AND CONTACT DETAILS OF PROPOSED CONCRETE SUBCONTRACTORS.
- C20 AT LEAST ONE WEEK PRIOR TO CONCRETE PLACEMENT SUBMIT DETAILS OF PROPOSED READY MIX CONCRETE SUPPLIER, NAME OF CONCRETE DELIVERY SUPERVISOR, LOCATION OF BATCHING PLANT, CONCRETE MIX DESIGNS, METHOD OF CONCRETE MIXTURE TEMPERATURE CONTROL, MIXING, HANDLING, TRANSPORT, PUMPING, PLACEMENT, COMPACTION, FINISHING PROTECTION AND CURING, SEQUENCE AND TIMES FOR CONCRETE POURS, CONSTRUCTION JOINT LOCATIONS TO SUPERINTENDENT FOR APPROVAL. NOMINATE FOR EACH MIX DESIGN THE SOURCE, TYPE AND PROPORTIONS OF CONSTITUENTS, AGGREGATE GRADINGS AND SATURATED-DRY DENSITIES, ADDITIVES AND ADMIXTURES, MAXIMUM WATER CONTENT AND MAXIMUM
- (fc), AND TARGET DRYING SHRINKAGE. C21 PROVIDE CONCRETE TEST RESULTS TO SUPERINTENDENT PROMPLTY, WITHIN TWO WEEKS OF TESTING.

WATER: CEMENT RATIO, TARGET SLUMP, TARGET CHARACTERISTICS, STRENGTH

BEFORE YOU DIG

SERVICE LOCATIONS

IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONTACT THE RELEVANT SERVICE AUTHORITIES TO ASCERTAIN THE EXACT LOCATION OF SERVICES PRIOR TO CONSTRUCTION.

GEOTECHNICAL

- G1 ETS GEOTECHNICAL HAVE PREPARED A GEOTECHNICAL INVESTIGATION REPORT DATED AUGUST 2019. THE CONTRACTOR IS TO COMPLY WITH THE REPORT OR NOTIFY THE ENGINEER OF ANY DISCREPANCIES.
- G2 ALL EARTHWORKS SHALL BE SUPERVISED IN ACCORDANCE WITH L1 OF AS3798. THE CONTRACTOR SHALL EMPLOY AN RPEQ GEOTECHNICAL CONSULTANT WHO SHALL PROVIDE A CERTIFICATE THAT THE WORKS HAVE BEENCOMPLETED SATISFACTORY IN
 - ACCORDANCE WITH THE SPECIFICATION AND TO LEVEL 1 OF AS 3798. ALL BATTERS STEEPER THAN 1 IN 2 AND HIGHER THAN 1.5m ARE TO BE CHECKED BY A GEOTECHNICAL ENGINEER AND CERTIFIED AS TO THEIR STABILITY TO SATISFY DOUGLAS
- G4 ALL STRUCTURE DESIGN CRITERIA SHALL BE CONFIRMED ONCE A GEOTECHNICAL INVESTIGATION HAS BEEN COMPLETED. THIS INCLUDES PAVEMENT DESIGN.
- G5 ALL BATTERS TO BE CONFIRMED BY GEOTECHNICAL INVESTIGATION RECOMMENDATIONS

WATER

W1 CONTRACTOR SHALL ADVISE DOUGLAS SHIRE COUNCIL PRIOR TO UNDERTAKING ANY SEWERAGE AND WATER RELATED WORK.

W2 COMPLY WITH FNQROC - STANDARD DRAWINGS.

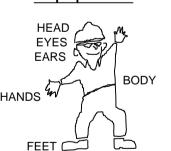
- POTABLE WATER MAINS TO BE INSTALLED 2.80m FROM PROPERTY BOUNDARY U.N.O. GENERALLY IN ACCORDANCE WITH FNQROC STD. DWG S1010. CONNECTION TO EXISTING MAINS TO BE CARRIED OUT BY DOUGLAS SHIRE COUNCIL AT THE
- CONTRACTOR'S EXPENSE ALL PVC WATER MAINS SHALL BE CLASS 16 PVC-M RUBBER RING JOINTED U.N.O.
- ALL DICL WATER MAINS SHALL BE PN35 DICL RUBBER RING JOINTED U.N.O. ALL 63Ø POLY PIPES SHALL BE MDPE CLASS 16.
- WATER MAINS 225Ø OR GREATER SHALL HAVE 900mm MINIMUM COVER
- BEDDING AND SURROUND TO PIPES AND FITTINGS SHALL BE IN IN ACCORDANCE WITH FNQROO STANDARD DRAWING S2016
- HYDRANTS AND VALVES ARE TO BE NYLON POWDER COATED OR EQUIVALENT AND HYDRANTS ARE TO BE THE MAXI-FLOW TYPE.
- HYDRANTS TO BE IDENTIFIED BY KERB MARKER PLATE AND BLUE RETRO-REFLECTIVE MARKER IN ACCORDANCE WITH FNQROC STANDARD DRAWING S2010 & S2005 VALVES TO BE IDENTIFIED BY KERB MARKER PLATE AND YELLOW RETRO-REFLECTIVE MARKER
- IN ACCORDANCE WITH FNQROC STANDARD DRAWING S2010 WATER MAINS CROSSING ROADS SHALL BE PN35 DICL FOR THE FULL ROAD CROSSING WIDTH, FINISHING 100mm BEHIND THE BACK OF KERB AND CHANNEL AT A MINIMUM AND AS SHOWN ON
- W12 MINIMUM TEST PRESSURE OF WATER MAINS SHALL BE 1200kPa. IN ACCORDANCE WITH DOUGLAS SHIRE COUNCIL AND FNQROC SPECIFICATIONS.
- W13 EXISTING HYDRANTS OR VALVES SHALL BE PROVIDED WITH NEW COVER BOXES AND
- SURROUNDS AS PER FNQROC STD. DWGS. S2000 AND S2005. W14 WHERE VALVE SURROUNDS ARE TO BE SET IN CONCRETE, A COMPRESSIBLE LAYER IS TO BE PROVIDED TO ALLOW FOR MAINTENANCE
- W15 LOWER WATER MAIN UNDER ROADS AS NECESSARY TO AVOID SUBGRADE IMPROVEMENT LAYER IF APPLICABLE

W16 WATER INFRASTRUCTURE TESTING AND HOLD POINTS SHALL BE AS PER THE FNQROC "CONSTRUCTION PROCEDURES" MANUAL.

SEWER

- S1 PROPERTY CONNECTION BRANCHES SHALL BE 100 DIA. AND TERMINATE AT THE INLET END OF THE INSPECTION PIPE. THE END SHALL BE SEALED WITH PLUG AND CLIP AND THE INVERT LEVEL
- OF THE BEND SHALL BE AS DIRECTED BY THE SUPERINTENDENT S2 ALL SEWER MAINS SHALL BE 150 DIA. UPVC CLASS DWV SN10 R.R.J. UNLESS NOTED OTHERWISE MANHOLE LIDS TO BE CONSTRUCTED 50mm ABOVE GROUND LEVEL. OR FLUSH WITH PATHWAYS
- ROADWAYS AND PAVED SURFACES
- S4 ENSURE MANHOLES ARE 1.5m CLEAR ON 3 SIDES FROM BATTERS. STEEPEN BATTERS LOCALLY I REQUIRED. MEASUREMENT TAKEN AS A RADIUS AROUND THE CENTRE OF LID.
- ENSURE MANHOLES ARE MIN 0.1m CLEAR FROM PROPERTY BOUNDARIES ENSURE HCBs ARE MIN 0.5m CLEAR FROM PROPERTY BOUNDARIES
- WHERE SEWER IS IN VERGE, E2 HCB's SHALL EXTEND PAST TOP OF BATTER MIN 1.0m SEWER INFRASTRUCTURE TESTING AND HOLD POINTS SHALL BE AS PER THE FNQROC "CONSTRUCTION PROCEDURES" MANUAL.

Personal Protective Equipment



ENERGY SERVICE PROVIDERS





PRIOR TO START OF CONSTRUCTION. PHONE DBYD



TELECOMMUNICATIONS SERVICE PROVIDERS

SERVICE LOCATIONS ON 1100 FOR DETAILS.





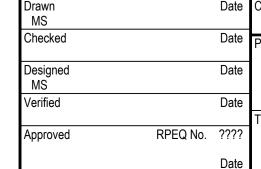
NOTE: SERVICE LOCATIONS ARE APPROXIMATE ONLY FROM PROVIDERS PLANS. LOCATIONS ARE TO BE CONFIRMED PRIOR TO START OF CONSTRUCTION. PHONE DBYD

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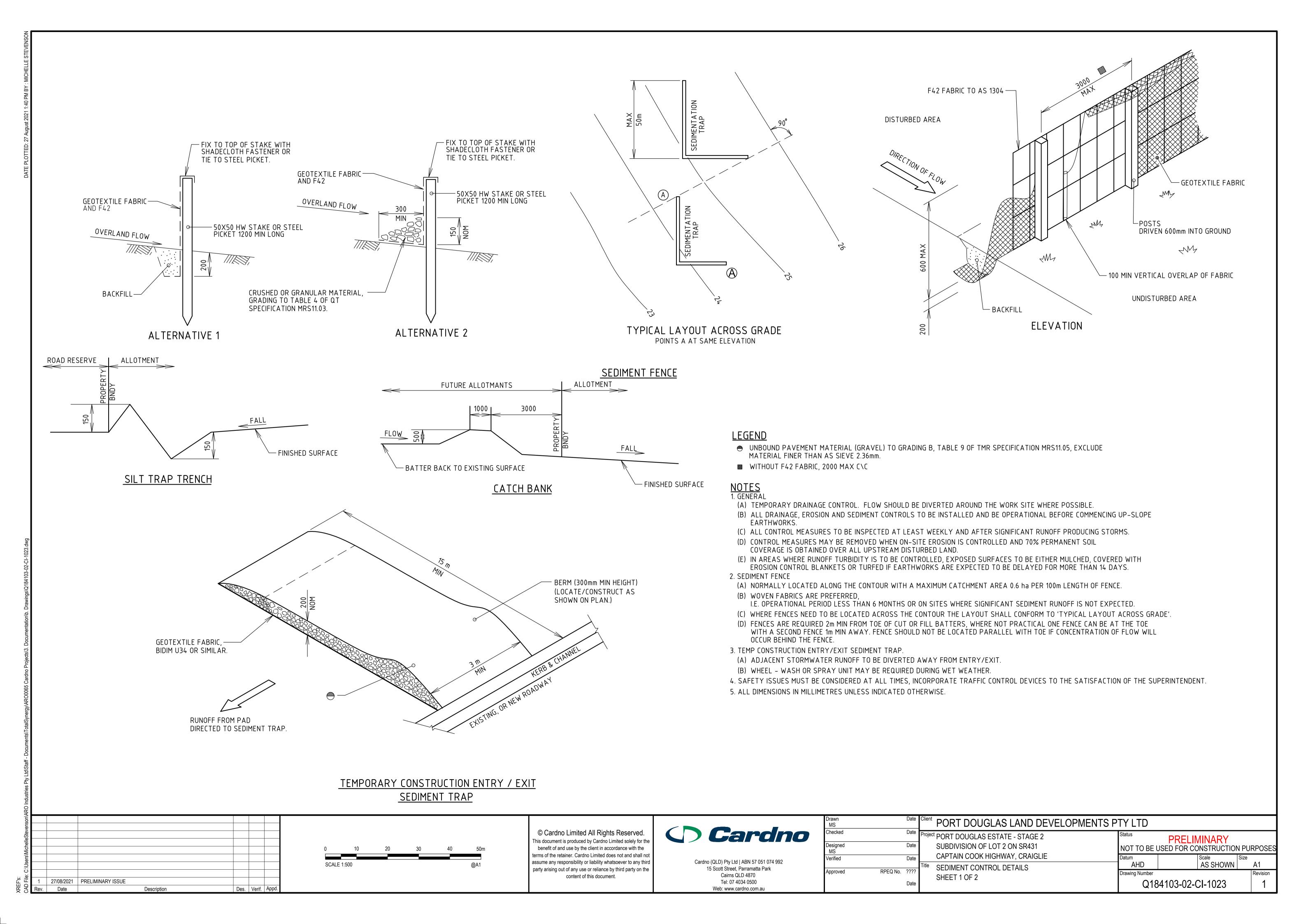
PORT DOUGLAS LAND DEVELOPMENTS PTY LTD ^{oject} PORT DOUGLAS ESTATE - STAGE 2 SUBDIVISION OF LOT 2 ON SR431

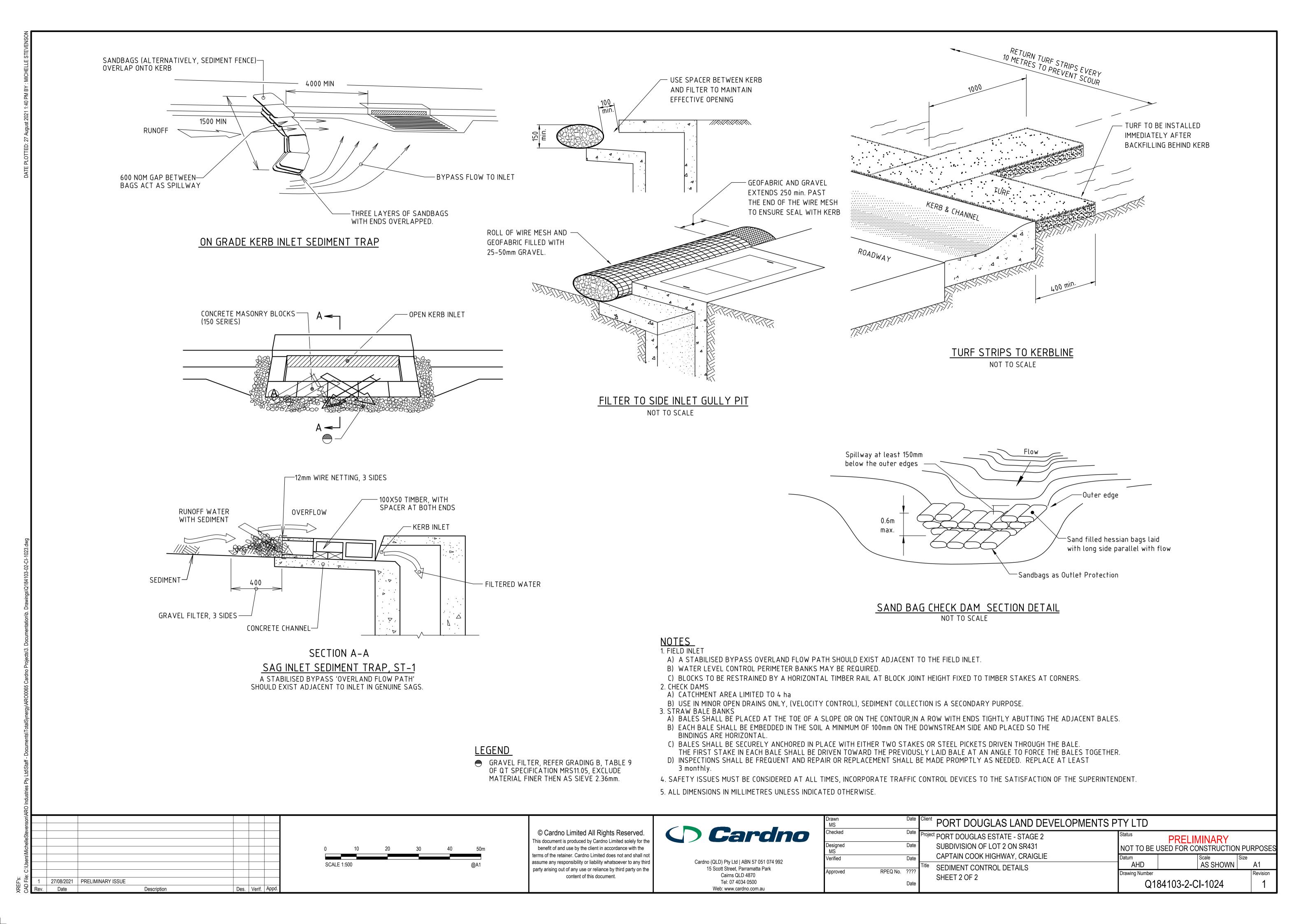
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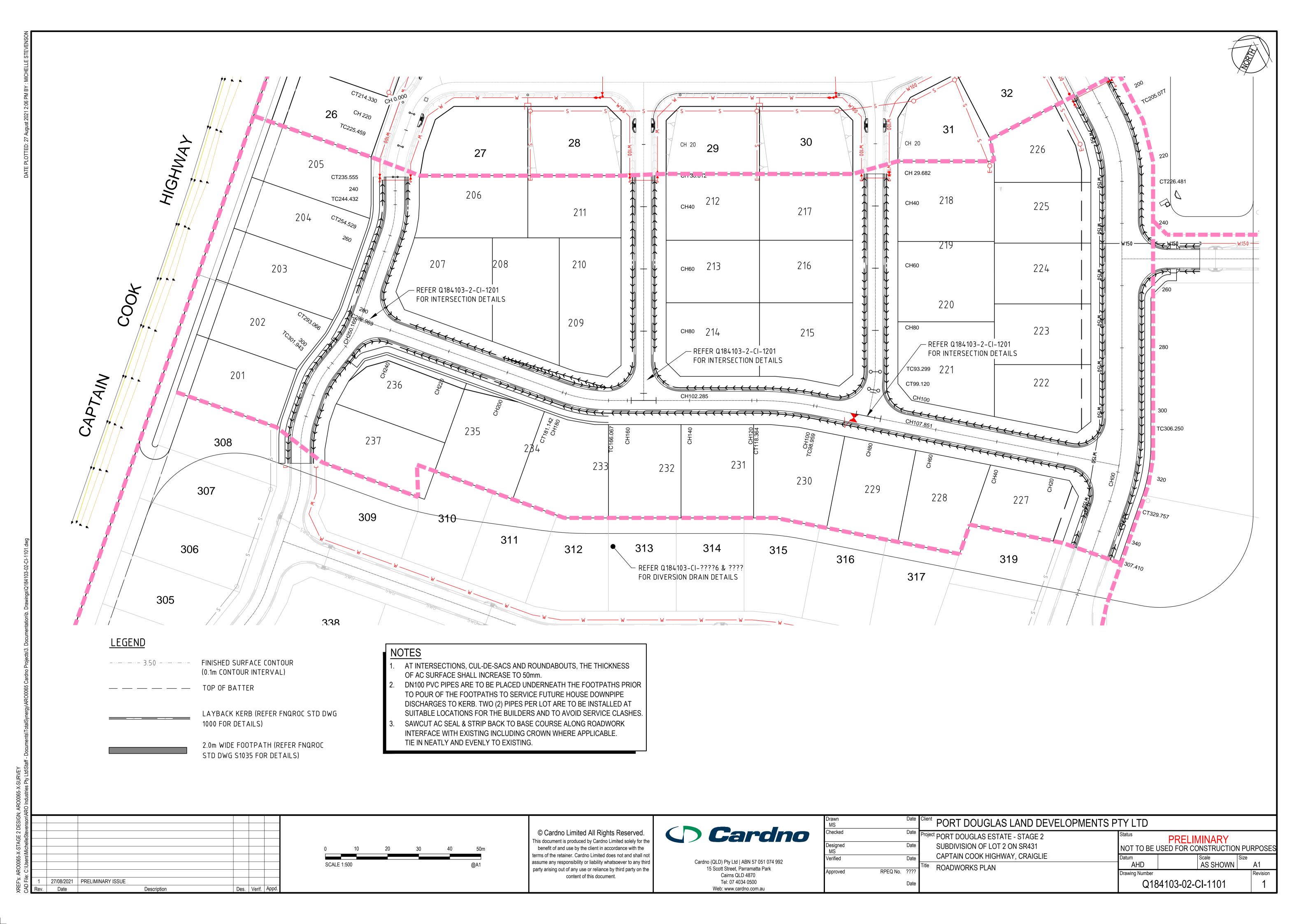
PRELIMINARY NOT TO BE USED FOR CONSTRUCTION PURPOSE CAPTAIN COOK HIGHWAY, CRAIGLIE AHD AS SHOWN A1 Q184103-02-CI-1003

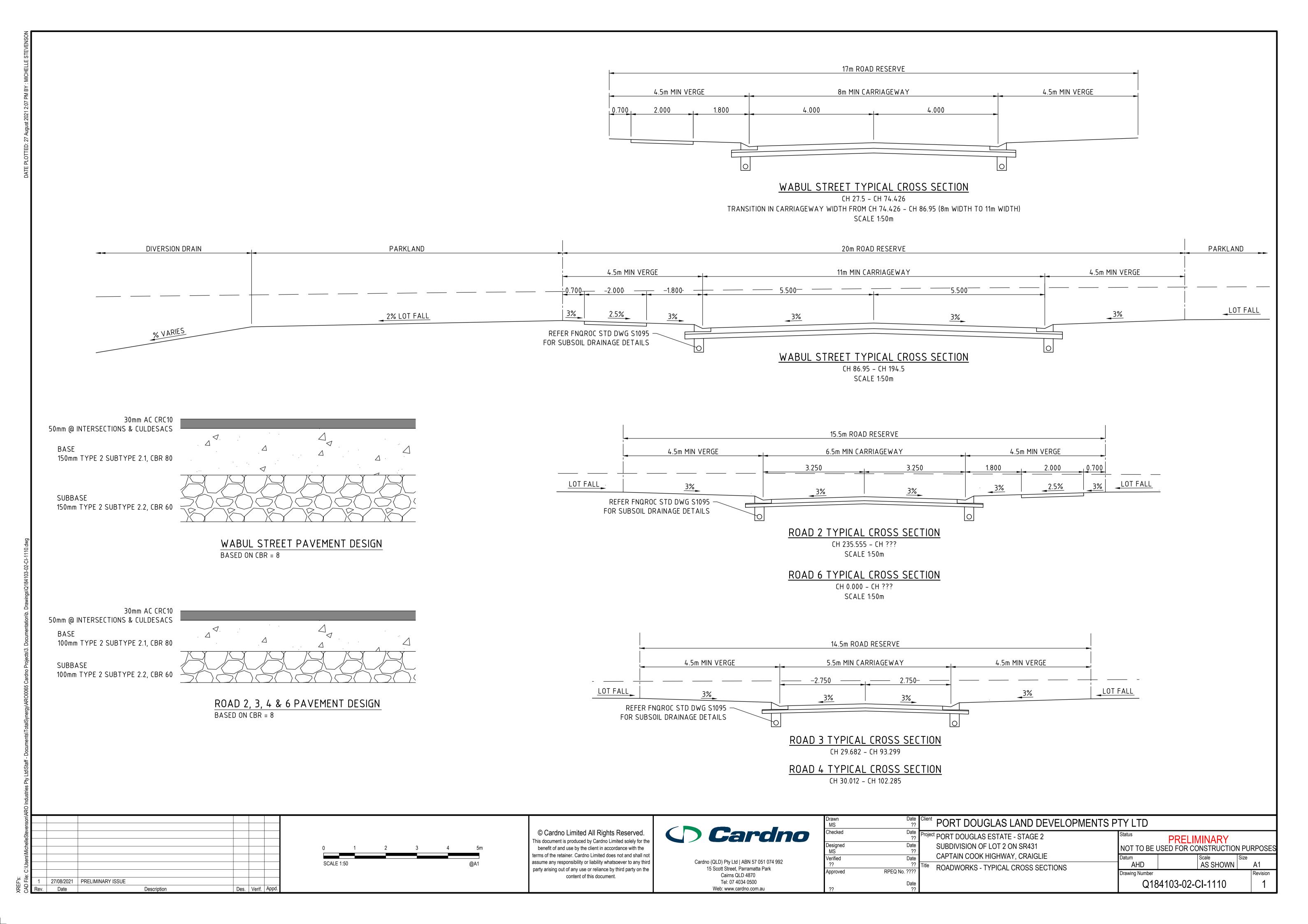


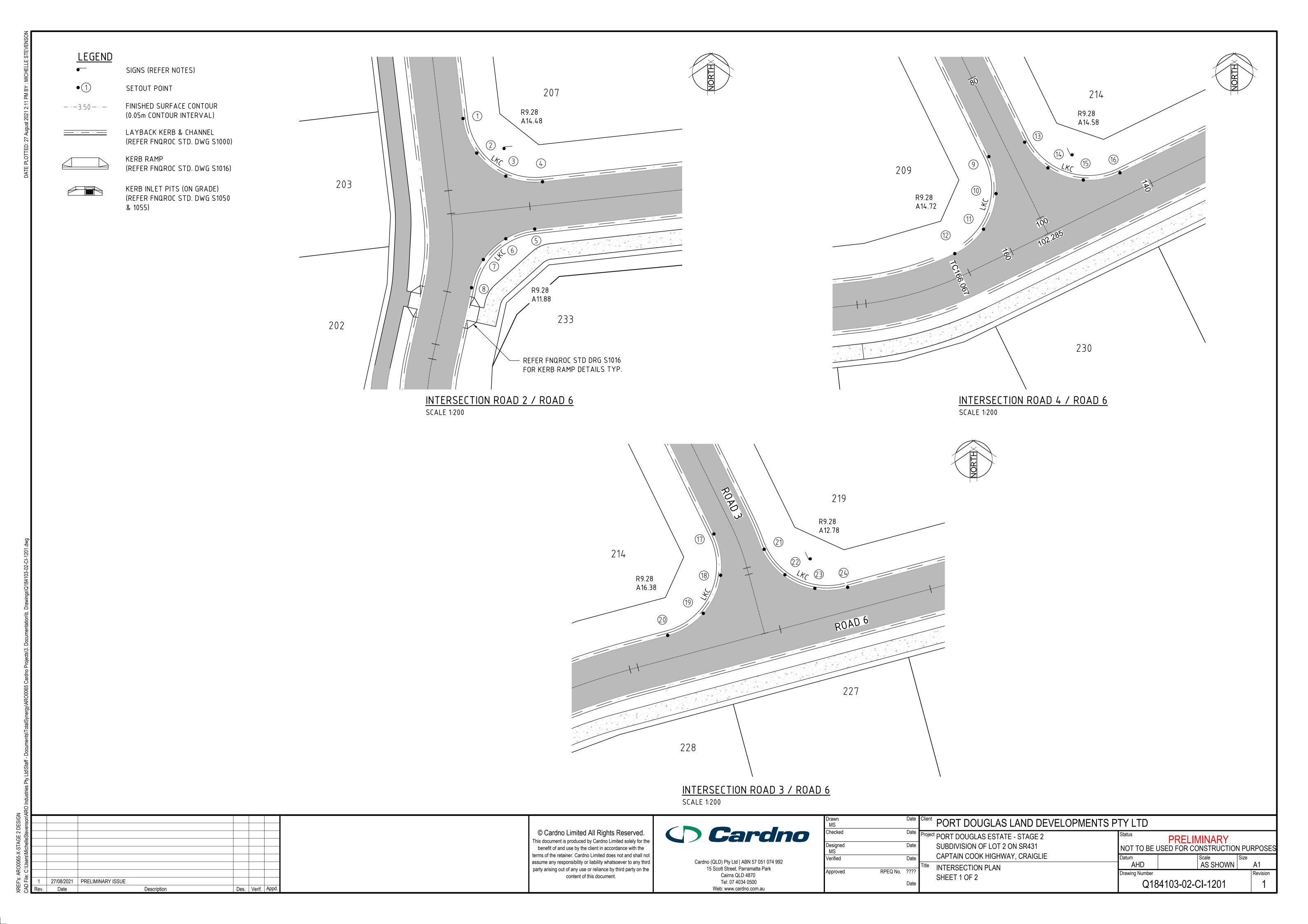
27/08/2021 PRELIMINARY ISSUE Date

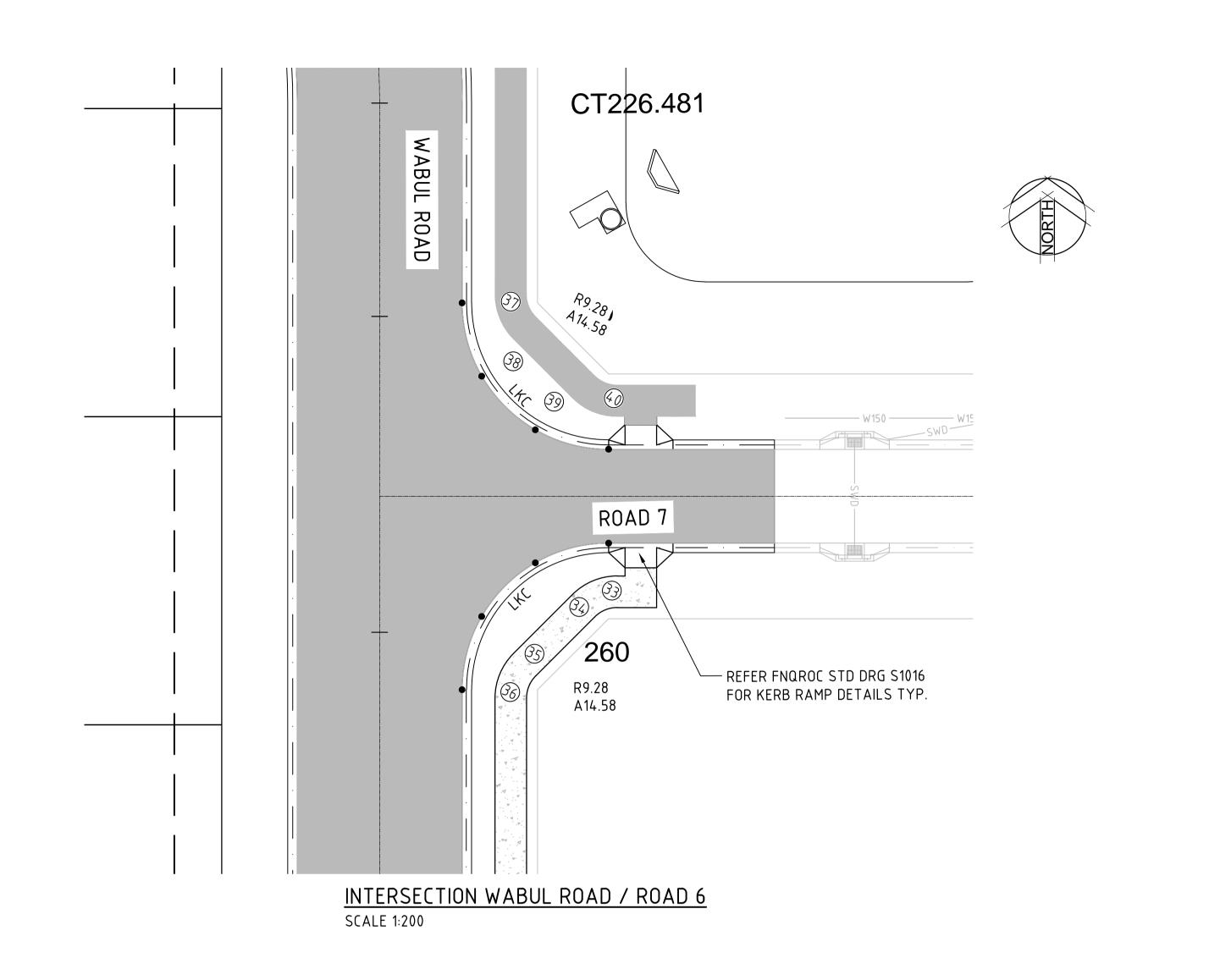


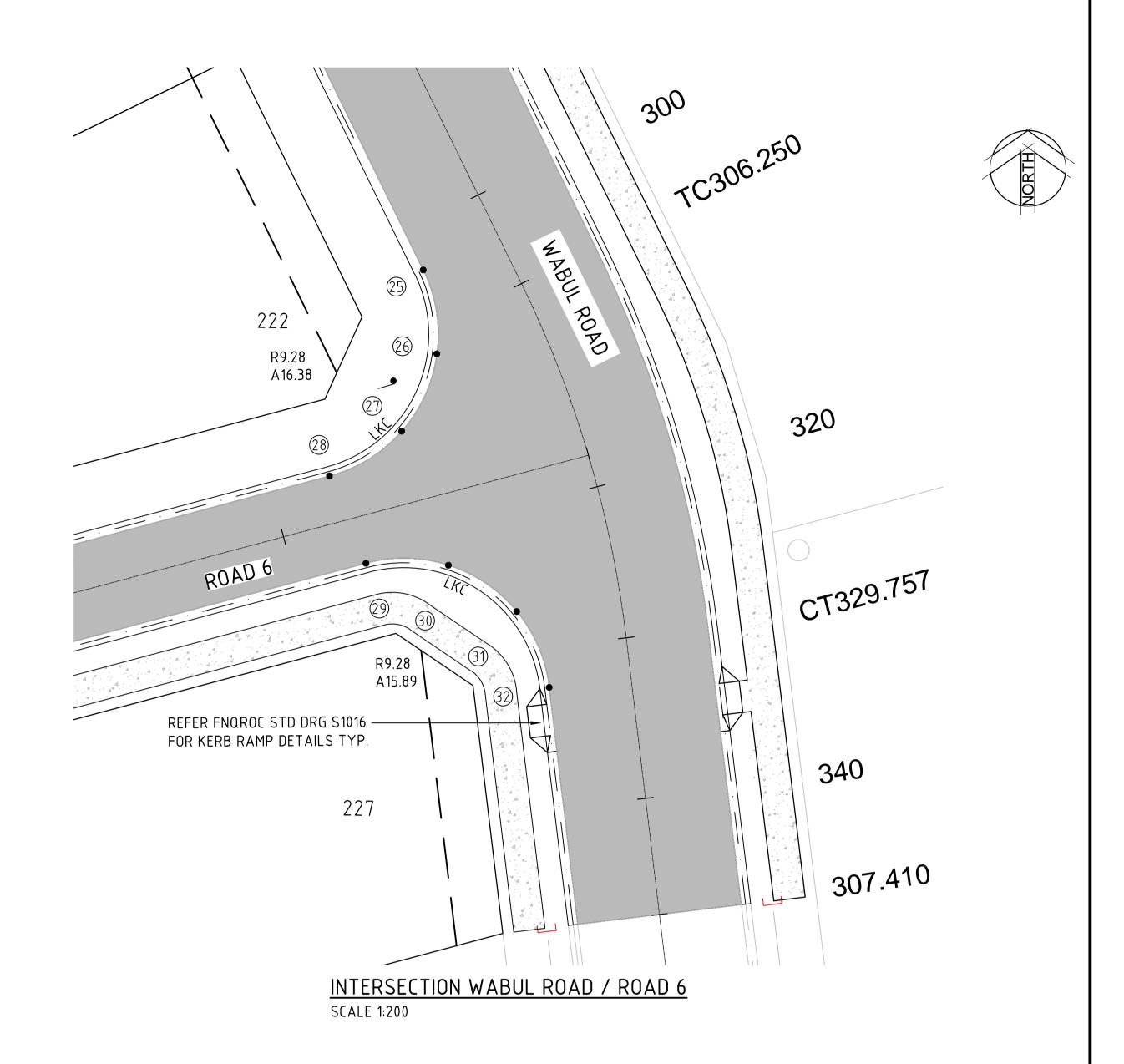


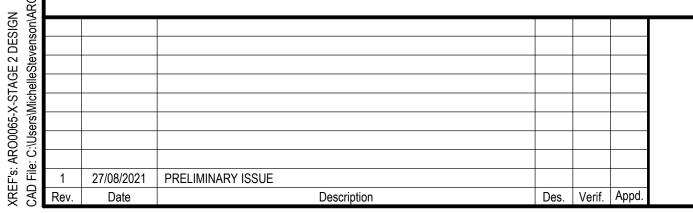












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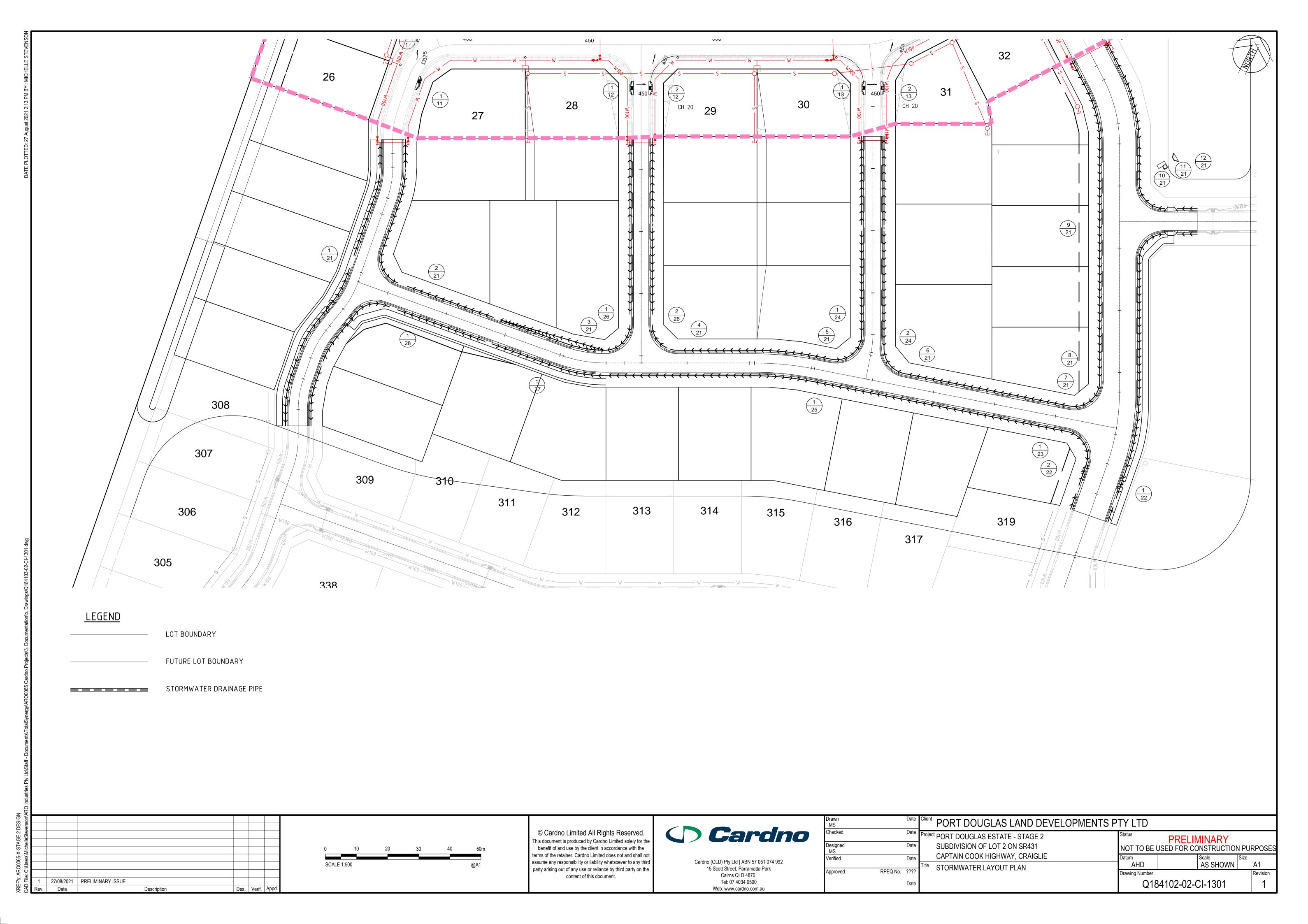
051 074 992 a Park Web: www.cardno.com.au

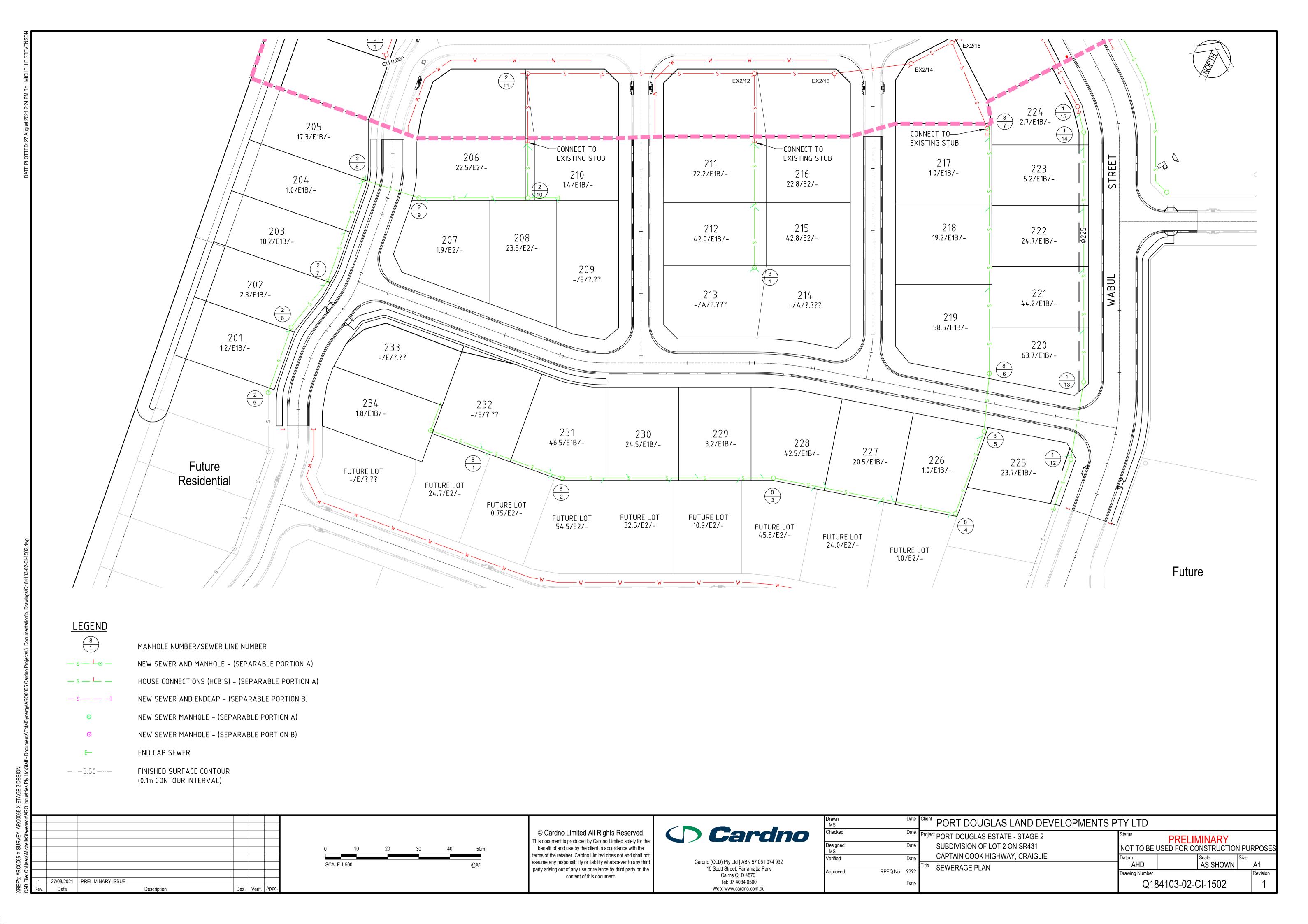
MS		Date	º'''' PORT DOUGLAS
Checked		Date	Project PORT DOUGLAS ESTAT
Designed MS		Date	SUBDIVISION OF LOT 2
Verified		Date	CAPTAIN COOK HIGHW
			Title INTERSECTION PLAN
Approved	RPEQ No.	????	SHEET 2 OF 2
		Date	

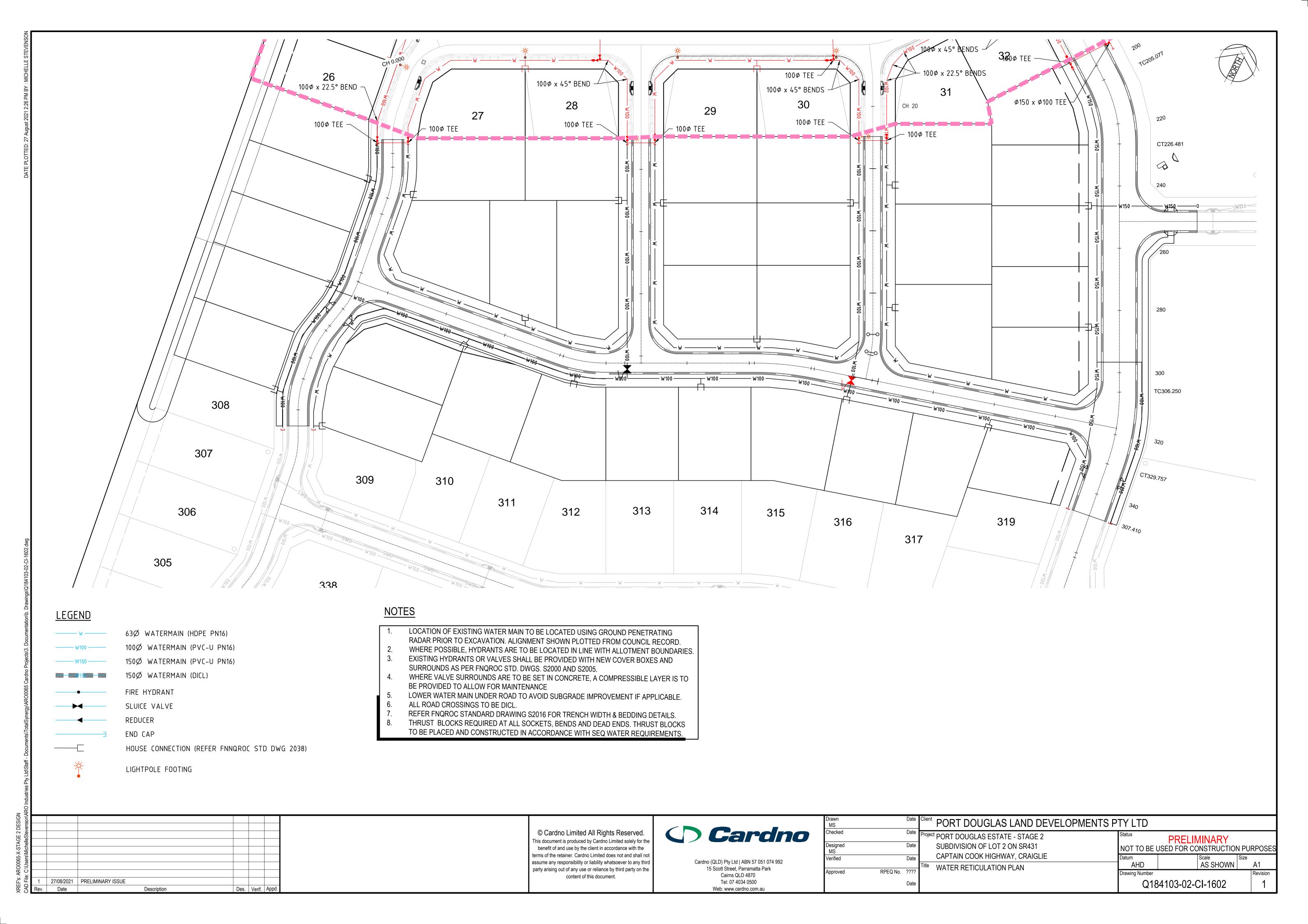
Client	PORT DOUGLAS LAND DEVELOPMENTS P	TY LTD
Project	PORT DOUGLAS ESTATE - STAGE 2	Status
	SUBDIVISION OF LOT 2 ON SR431	NOT TO BE
	CAPTAIN COOK HIGHWAY, CRAIGLIE	Datum

PRELIMINARY
BE USED FOR CONSTRUCTION PURPOSES Scale Size A1 AHD Q184102-02-CI-1202

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content of this document.	Cairns QLD 4870 Tel: 07 4034 0500









Attachment J

Douglas Shire Council Information Request, dated 31 March 2021



PO Box 723 Mossman Qld 4873 www.douglas.qld.gov.au enquiries@douglas.qld.gov.au ABN 71 241 237 800

> Administration Office 64 - 66 Front St Mossman P 07 4099 9444 F 07 4098 2902

Email: billy.glover@cardno.com.au

31 March 2021

Enquiries:

Jenny Elphinstone

Our Ref: ROL 2021_4012/1 (Doc ID 1003437)

Your Ref: Q184103

Port Douglas Land Developments Pty Ltd C/- Cardno PO Box 1619 CAIRNS QLD 4870

Attention Mr Billy Glover

Dear Sir

INFORMATION REQUEST (Given under Section 12 of the Development Assessment Rules)

Council refers to the development application for which a confirmation notice was issued on 22 March 2021.

Applicant Details

Name: Port Douglas Land Developments Pty Ltd

Postal Address: C/- Cardno

PO Box 1619 Cairns Qld 4870

Email: or etp@etp.co.nz

Property Details

Street Address: Captain Cook Highway Craiglie

Real Property Description: Lot 2 on SR431

Local Government Area: Douglas Shire Council

Application Details

Application Number: ROL 2021 4012/1

Approval Sought: Development Permit for Reconfiguring a Lot

Nature of Development

Proposed:

ROL - Reconfiguring a Lot

Description of the Reconfiguring a Lot for one lot into 34 residential lots, new road

Development Proposed: and balance land.

Information Requested

The following additional information is requested in order to complete an assessment of the application:

Existing Approval and Master Planning

The application has been made for 34 residential lots, road and balance land over the whole of Lot 2 on SR431. The application has not been made for staged development and is made exclusive of the development approved for Stage 1. As the applications are mutually exclusive, all pertinent information needs to be lodged with each application.

The report accompanying the application makes mention of an overall Master Plan. Since the issue of a Development Approval for part of the land (Stage 1) the applicant has acquired further land and it is understood this additional land is also intended to be developed for residential development. It is understood all proposed residential development is to utilise trunk infrastructure and Council's urban services.

It is noted that the trunk road infrastructure is to provide connectivity between estate developments. Where any alternative connectivity to the Captain Cook Highway is proposed, other than what is shown in Council's LGIP, then full explanation is required and agreement be achieved with Council. Note, such access may not fulfill the requirements of consideration that the extension to Warbal Street is trunk infrastructure. The provision of trunk road infrastructure must also include the connection to Andreasen Road for potential subdivision to the south.

General Master Planning

- Please provide a masterplan for the whole of the land and any other land intended to form part of the residential development of this area held by the applicant. The masterplan is to include an indicative lot layout, stages, road network, park and drainage lots.
 - The masterplan is to indicate proposed infrastructure. Please provide comments in response to A08 and PO8 of the Reconfiguring of a Lot Code and the respective overlay codes.
- Please provide detail of the number of lots intended to be developed prior to the
 construction and opening of the linking connector road to Andreassen Road and the
 intended timing of the upgrade to the Captain Cook Highway / Andreassen Road
 intersection.
- 3. Please provide details as to when the buffer to the State-controlled road will be developed for the proposed and balance areas.

Road Network

4. Please provide a road connectivity masterplan to demonstrate how the prosed road network provides a safe and efficient road alignment and geometry providing connectivity to Andreassen Road.

- 5. Please provide details on the timing of the connectivity of the development to the Captain Cook Highway via Andreassen Road.
- 6. Please provide a Road Safety Assessment by an accredited Road Safety Auditor for the Milman Drive and Wabul Drive road link extending from the new southern drain crossing through to, and including, the intersection with the Captain Cook Highway.

The intersection analysis for the Captain Cook Highway/Milman Drive intersection is to be undertaken in an approved modelling package (SIDRA or equivalent). All upgrades identified in the Road Safety Audit or the intersection analysis will need to be identified in engineering design plans and associated reports.

Consideration of level of service should also have regard to disaster management requirements to evacuate residents in an emergency.

Where the intersection analysis demonstrates that the additional Stage 2 lots create an unacceptable level of service for the intersection operation, the applicant must identify and provide the upgrades necessary to ensure the intersection operates with an acceptable level of service.

These considerations must include both stage 1 of the existing approval and the proposed stage 2.

- 7. Where the intersection analysis demonstrates there is a component of existing use that contributes to an unacceptable standard of service, please provide an agreement in writing from the Department of Main Roads and Council regarding the timing, costs and responsibility for the necessary works.
- 8. Please include the location of proposed pedestrian pathways on the layout plan.

Flood and storm tide inundation

- 9. Please provide a site plan detailing contours and expected finish levels having regard to impacts of sea level rise. Please provide a copy of the flood study and flood modelling for the site and the whole of the masterplan area. The flood study must include updated modelling to confirm, hydraulic implications and confirm that no further widening of the exiting drain is required to mitigate hydraulic impact of the development. The updated Stormwater modelling needs to confirm the development footprint (where this has changed) plus confirmation of the detention required to mitigate the peak flows from the development footprint. Information on the location, size, configuration and timing for the detention on site is to be provided for Council's consideration.
- 10. Please provide details of post development stormwater and the ability of the intended development to cater for the whole of the masterplan area.

Water Supply

11. Page 43 of the report states the development will connect to the existing water supply infrastructure in Wabul Street. The decision notice for Stage 1 required water supply to include a new main along the Captain Cook Highway and not rely on water supply from the adjacent development to the north, (Wabul Drive). Please update the report comment and provide details of proposed water supply connection having regard to Stage 2 and the intended masterplan. The access to the existing 150mm water main running 407m from Beor Street is not supported and Council anticipates connection to services will require a 300mm main extension from Beor Street down to Andreassen Road to give full reticulation and firefighting flows. Please confirm the proposed connection to Council's services.

In the event that the Master Plan identifies upgrades to the existing Council infrastructure to service the ultimate development, the Master Plan must detail any interim servicing arrangements for the development and identify thresholds (lot yield and timing) associated with those interim and ultimate servicing arrangements.

The Master Plans must also identify any external catchments that will be connected to and/or serviced by the internal water supply and sewer networks.

Sewer Connectivity

12. Please provide an updated sewerage master Plan to confirm the sewer reticulation capacity to utilise the trunk sewer pump station relocated to Stage 1 (from Andreasson Road) by the applicant. The Master Plan must demonstrate that the sewerage reticulation provided within the estate achieves the same functionality and, level control and services the same development footprint as was achieved by the LGIP identified pump station on Adreasson Road. This must include sewer reticulation concept plans with levels and capacities nominated through the estate to connect Andeasson Road properties.

Other Infrastructure Servicing

 Please provide advice on the applicant's intentions for the considerations of other infrastructure such as the location of padmount electricity substations, telecommunications and NBN infrastructure.

Buffer to Agricultural Use

14. Please provide advice on the applicant's intentions for the provision of a suitable buffer to the proposed ongoing agricultural use on the balance land. Supporting information must demonstrate that the buffer provided will alleviate impacts on the new residential use.

Due Date

The due date for providing the requested information is 1 July 2021 accordance with section 14.2 of the Development Assessment Rules, if you do not provide a response before the above due date (or a further agreed period), it will be taken as if you have decided not to respond to the information request and Council will continue with the assessment of the application.

Other

Please quote Council's application number: ROL 2021_4012/1 in all subsequent correspondence relating to this development application.

Should you require any clarification regarding this, please contact Jenny Elphinstone on telephone 07 4099 9444.

Yours faithfully

For

Paul Hoye

Manager Environment & Planning



Attachment K

SARA Advice Notice, dated 12 April 2021



SARA reference: 2103-21727 SRA Applicant reference: Q184103 Council reference: ROL2021 4012

12 April 2021

Port Douglas Land Developments Pty Ltd C/- Cardno Locked Bag 4006 FORTITUDE VALLEY QLD 4006 billy.glover@cardno.com.au

Attention: Billy Glover

Dear Sir/Madam

SARA advice notice – Stage 2 of New Port Estate, Captain Cook Highway, Craiglie

(Advice notice given under section 35 of the Development Assessment Rules)

The State Assessment and Referral Agency (SARA) advises that your development application has not adequately demonstrated compliance with the State Development Assessment Provisions (SDAP).

SARA has reviewed your application material and the following issue with the proposed development has been identified:

State code 1: Development in a state-controlled road environment

1. Issue:

In accordance with SDAP, State code 1: Development in state-controlled road environment, Performance outcome 20, it has not been adequately demonstrated that the existing Captain Cook Highway / Boer Street intersection can accommodate the accumulative traffic generation from Stage 1 and proposed Stage 2, without resulting in a worsening of operating conditions on the state-controlled road network.

The Traffic Impact Assessment (TIA) report prepared by Cardno, dated 16 October 2019, confirmed that the Stage 1 development (32 residential lots) would generate 27 vehicles per hour (vph) in the peak period. The 27vph is proportional to a 3.7% increase in traffic generation via the Captain Cook Highway / Boer Street intersection.

The proposed Stage 2 development proposes 34 residential lots. The accumulative traffic generation at the state-controlled intersection from both Stage 1 and proposed Stage 2 is expected to be above 5%.

In accordance with the <u>Guide to Traffic Impact Assessment</u> (GTIA), a development must not exceed 5% of the base traffic for any movement in the design peak periods in the year of opening of each stage.

Action:

Provide the following:

- A TIA report in accordance with the GTIA with reference to section 6.4 of the GTIA.
- The TIA report must be prepared by a qualified professional and certified by a Registered Professional Engineer of Queensland (RPEQ).
- The TIA report is required to demonstrate compliance with PO20 PO22 Network Impacts of SDAP, State Code 1: Development in a state-controlled road environment.

The Department of Transport and Main Roads has advised to ensure the operating conditions of the state-controlled road network are maintained, the existing Captain Cook Highway / Boer Street intersection may be required to be upgraded to accommodate the accumulative traffic generation from the proposed development. The minimum upgrades required are likely to be a channelised right-turn (CHR) on Captain Cook Highway.

Please note that unlike an information request, <u>assessment timeframes do not stop</u> when advice is provided by SARA.

How to respond

It is recommended that you address these issues promptly and provide a response to SARA by **16 April 2021.** If you decide not to respond, your application will be assessed and decided based on the information provided to date.

Under the <u>Development Assessment Rules</u> (DA Rules), the issuing of advice does not stop the assessment timeframes. If you intend to provide additional information, it should be provided in a timely manner to allow sufficient time for the information to be considered. As such, you are strongly encouraged to consider using the 'stop the clock' provisions under s32 of the DA rules, to allow sufficient time for you to consider and respond to SARA's advice; and for SARA to consider any new or changed material provided.

If you wish to utilise the 'stop the clock' provisions, you should give notice to the assessing authority (assessment manager or referral agency) whose current period you wish to stop. This can be done through MyDAS2 or via correspondence.

You are requested to upload your response and complete the relevant tasks in MyDAS2.

If you require further information or have any questions about the above, please contact Anthony Westbury, Planning Officer, on 40373215 or via email CairnsSARA@dsdmip.qld.gov.au who will be pleased to assist.

Yours sincerely

Joanne Manson A/Manager (Planning)

cc Douglas Shire Council, enquiries@douglas.qld.gov.au

Development details				
Description:	Development permit	Reconfiguring a Lot (1 Lot into 34 Lots, New Road and Balance Lot).		
SARA role:	Referral agency	Referral agency		
SARA trigger:	Reconfiguring a lot near a Schedule 10, Part 9, Divisio	Schedule 10, Part 9, Division 4, Subdivision 2, Table 1 (Planning Regulation 2017) Reconfiguring a lot near a state-controlled road Schedule 10, Part 9, Division 4, Subdivision 2, Table 3 (Planning Regulation 2017) Reconfiguring a lot near a state-controlled road intersection		
SARA reference:	2103-21727 SRA			
Assessment criteria:	State code 1: Developmer	nt in a state-controlled road environment		



Attachment L

Response to SARA Advice Notice, dated 29 June 2021

From: Billy Glover
To: CairnsSARA

Cc: Anthony Westbury; Jenny Elphinstone; enquiries@douglas.qld.gov.au; Rob Wheeler

Subject: 2103-21727 SRA application correspondence

Date: Tuesday, 29 June 2021 5:18:00 PM

Attachments: image002.png

image003.png image004.png image005.png

<u>0184103 - Letter - 2021 06 22.pdf</u> <u>2103-21727 SRA Advice notice.pdf</u>

image007.png

Att: Anthony Westbury

RE: 2103-21727 SRA / ROL2021_4012

Hi Anthony,

Please find attached Traffic Engineering Technical Memorandum prepared by Cardno and dated 22 June 2021.

The attached memorandum is provided in response to SARA advice notice dated 12 April 2021, addressing SDAP State Code 1.

Furthermore, with regard to the timing of development, please see below development timing estimates and dependencies for Stage 2 development, noting these are estimates only and may be subject to changes. The below estimates coincide with the attached Traffic Engineering Technical Memorandum (Stage 2 assumed to be complete in 2022) demonstrating development will not exceed 5% of the base traffic for any movement in the design peak period in the year of opening each stage.

Development Timing (estimates)

Stage 1

Finalise Construction: July 2021 Registered Titles: August 2021

Stage 2

Commence Construction: Early 2022 Finalise Construction: Late 2022

Registered Titles: Shortly after construction completion

Stage 2 Dependencies

The release of Stage 2 will be dependent on:

- Stage 1 lots completely sold out and settled
- Stage 2 approval and construction timeframes
- · Weather factors/impacts during construction of Stage 2

Should you have any queries, please contact myself on the below.

Cc Jenny.Elphinstone@douglas.qld.gov.au; enquiries@douglas.qld.gov.au

Regards,

Billy Glover

PLANNER - TOWNSVILLE & CAIRNS CARDNO



Phone Direct +61 7 4034 0506

Address 15 Scott Street, Parramatta Park, Cairns, Queensland 4870 Australia

Email billy.glover@cardno.com.au Web www.cardno.com













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From: No Reply <mydas-notifications-prod2@qld.gov.au>

Sent: Monday, 12 April 2021 2:29 PM

To: anthony.westbury@dsdilgp.qld.gov.au; Billy Glover

billy.glover@cardno.com.au>

Subject: 2103-21727 SRA application correspondence

Please find attached a notice regarding application 2103-21727 SRA.

If you require any further information in relation to the application, please contact the State Assessment and Referral Agency on the details provided in the notice.

This is a system-generated message. Do not respond to this email.



Email Id: RFLG-0421-0010-2845



Attachment M

SARA Response with conditions, dated 12 July 2021



SARA reference: 2103-21727 SRA
Council reference: ROL2021_4012
Applicant reference: Q184103

12 July 2021

Chief Executive Officer
Douglas Shire Council
PO Box 723
Mossman Qld 4873
enquiries@douglas.qld.gov.au

Attention: Jenny Elphinstone

Dear Sir/Madam

SARA response—Stage 2 New Port Estate Residential Subdivision at Captain Cook Highway, Craiglie

(Referral agency response given under section 56 of the Planning Act 2016)

The development application described below was confirmed as properly referred by the State Assessment and Referral Agency on 24 March 2021.

Response

Outcome: Referral agency response – with conditions.

Date of response: 12 July 2021

Conditions: The conditions in **Attachment 1** must be attached to any

development approval.

Advice: Advice to the applicant is in **Attachment 2**.

Reasons: The reasons for the referral agency response are in **Attachment 3**.

Development details

Description: Development permit Reconfiguring a Lot (1 Lot into 34 Lots, New

Road and Balance Lot).

SARA role: Referral Agency

SARA trigger: Schedule 10, Part 9, Division 4, Subdivision 2, Table 1, Item 1

(Planning Regulation 2017) - Reconfiguring a lot near a State-

Far North Queensland regional office Ground Floor, Cnr Grafton and Hartley Street, Cairns PO Box 2358, Cairns QLD 4870 controlled road

Schedule 10, Part 9, Division 4, Subdivision 2, Table 3, Item 1 (Planning Regulation 2017) - Reconfiguring a lot near a State-

controlled road intersection

SARA reference: 2103-21727 SRA

Assessment Manager: Douglas Shire Council

Street address: Captain Cook Highway, Craiglie

Real property description: Lot 2 on SR431

Applicant name: Port Douglas Land Developments Pty Ltd

Applicant contact details: C/- Cardno (Qld) Pty Ltd

PO Box 1619 CAIRNS QLD 4870

billy.glover@cardno.com.au

Representations

An applicant may make representations to a concurrence agency, at any time before the application is decided, about changing a matter in the referral agency response (s.30 Development Assessment Rules) Copies of the relevant provisions are in **Attachment 4**.

A copy of this response has been sent to the applicant for their information.

For further information please contact Anthony Westbury, Planning Officer, on 40373215 or via email CairnsSARA@dsdilgp.qld.gov.au who will be pleased to assist.

Yours sincerely

Joanne Manson A/Manager (Planning)

cc Port Douglas Land Developments Pty Ltd C/- Cardno, billy.glover@cardno.com.au

enc Attachment 1 - Referral agency conditions

Attachment 2 - Advice to the applicant

Attachment 3 - Reasons for referral agency response

Attachment 4 - Representations provisions

Attachment 1—Referral agency conditions
(Under section 56(1)(b)(i) of the *Planning Act 2016* the following conditions must be attached to any development approval relating to this application)

No.	Conditions	Condition timing					
Recor	Reconfiguring a lot						
transp a lot n 2016 r enforc	Schedule 10, Part 9, Division 4, Subdivision 2, Table 1, Item 1 – Reconfiguring a lot near a State transport corridor, and Schedule 10, Part 9, Division 4, Subdivision 2, Table 3, Item 1 – Reconfiguring a lot near a State-controlled road intersection—The chief executive administering the <i>Planning Act 2016</i> nominates the Director-General of the Department of Transport and Main Roads to be the enforcement authority for the development to which this development approval relates for the administration and enforcement of any matter relating to the following conditions:						
1.	(a) A 2.4 - 2.6 metre noise barrier must be constructed in accordance with the Noise Impact Assessment Report, prepared by Cardno, dated 25 March 2019, reference I019_Q184013.	Prior to submitting the Plan of Survey to the local government for approval and to be maintained at all times.					
	(b) The noise barrier must be designed in accordance with:						
	(i) the Department of Transport and Main Roads' Road Traffic Noise Management Code of Practice, Volume 1, Chapter 6 and 7.						
	(ii) Specification MRTS15 Noise Fences (March 2019).(iii) Standard Drawing Road Manual, Part 13, Number 1606.						
	(c) RPEQ certification must be provided to the Road Corridor Management Unit, Department of Transport and Main Roads, Far North Queensland Region (Far.North.Queensland.IDAS@tmr.qld.gov.au), confirming that the development has been constructed in accordance with parts (a) and (b) of this condition.						
2.	(a) Stormwater management of the development must ensure no worsening or actionable nuisance to the state-controlled road.	(a) & (b) At all times.					
	 (b) Any works on the land must not: create any new discharge points for stormwater runoff onto the state-controlled road. interfere with and/or cause damage to the existing stormwater drainage on the state-controlled road. surcharge any existing culvert or drain on the state-controlled road. reduce the quality of stormwater discharge onto the state-controlled road. 						
3.	Direct access is not permitted between Captain Cook Highway and the subject site.	At all times					
4.	(a) Road works comprising of a channelized right-turn treatment with a short turn slot (CHR(S)) must be provided to-upgrade-the Captain Cook Highway / Beor Street intersection.	Prior to submitting the Plan of Survey to the local government for approval					

- (b) The road works must be designed and constructed in accordance with Austroads Guide to Road Design, Part 4: Intersections and Crossings General, specifically:
 - Figure A 29: Channelized right-turn treatment with a short turn slot (CHR(S)) two lane rural road for north bound vehicles turning right from Captain Cook Highway into Beor Street.

Attachment 2—Advice to the applicant

General advice

 Terms and phrases used in this document are defined in the *Planning Act 2016* its regulation or the State Development Assessment Provisions (SDAP) v2.6. If a word remains undefined it has its ordinary meaning.

2. Transport Corridor Noise

Mandatory Part (MP) 4.4 of the Queensland Development Code (QDC) commenced on 1 September 2010 and applies to building work for the construction or renovation of a residential building in a designated transport noise corridor. MP4.4 seeks to ensure that the habitable rooms of Class 1, 2, 3 and 4 buildings located in a transport noise corridor are designed and constructed to reduce transport noise. Transport noise corridor means land designated under Chapter 8B of the Building Act 1975 as a transport noise corridor. Information about transport noise corridors is available at state and local government offices.

A free online search tool can be used to find out whether a property is located in a designated transport noise corridor. This tool is available at the State Planning Policy Interactive Mapping System website: https://spp.dsdip.esriaustraliaonline.com.au/geoviewer/map/planmaking and allows searches on a registered lot number and/or property address to determine whether and how the QDC applies to the land. Transport Noise Corridors are located under Information Purposes within Transport Infrastructure of the State Planning Policy (SPP) mapping system.

3. Advertising Device

The proposed development is proposing to erect an advertising device that will be visible from a state-controlled road. The applicant should seek advice from the Department of Transport and Main Roads (DTMR) to ensure that the advertising device visible from a state-controlled road, and beyond the boundaries of the state-controlled road, is unlikely to create a traffic hazard for the state-controlled road.

Note: DTMR has powers under section 139 of the Transport Operations (Road Use Management - Accreditation and Other Provisions) Regulation 2015 to require removal or modification of an advertising sign and / for a device which is deemed that it creates a danger to traffic.

4. Roads Works Approval

Under section 33 of the Transport Infrastructure Act 1994, written approval is required from the Department of Transport and Main Roads to carry out road works.

Please contact the Department of Transport and Main Roads on 4045 7144 to make an application for road works approval.

This approval must be obtained prior to commencing any works on the state-controlled road reserve. The approval process may require the approval of engineering designs of the proposed works, certified by a Registered Professional Engineer of Queensland (RPEQ).

Please contact the Department of Transport and Main Roads as soon as possible to ensure that gaining approval does not delay construction.

Attachment 3—Reasons for referral agency response

(Given under section 56(7) of the *Planning Act 2016*)

The reasons for the SARA decision are:

- The site has road frontage to Captain Cook Highway a state-controlled road, and Wabul Street and Andreassen Road, both local roads. There is no direct vehicle access to Captain Cook Highway with existing access available via Wabul Street and Andreassen Road.
- Proposed access for the Stage 2 development site will be via Wabul Street via the local road network, including the approved Stage 1 development, through to the Captain Cook Highway / Beor Street intersection.
- Road works to the Captain Cook Highway / Beor Street intersection will ensure the intersection can
 accommodate the increased traffic generation from the Stage 2 development and not result in a
 worsening of operating conditions on the state-controlled road network.
- Connections to council services, infrastructure and utilities will be obtained via the approved Stage 1 development and will not impact Captain Cook Highway.
- The development will be set back a sufficient distance (minimal distance approx. 22m) from the state-controlled road, and required excavation and filling will not adversely impact the state-controlled road.
- The noise barrier will minimise traffic noise impacts to future residents of the development.
- Stormwater and drainage flows are appropriately managed and will not impact the state-controlled road.
- The proposed development is unlikely to compromise the safety, efficiency, and operating conditions
 of Captain Cook Highway.
- With conditions, the proposed development complies with the relevant provisions of State code 1: Development in a state-controlled road environment.

Material used in the assessment of the application:

- The development application material and submitted plans
- Planning Act 2016
- Planning Regulation 2017
- The State Development Assessment Provisions (version 2.6)
- The Development Assessment Rules
- SARA DA Mapping system
- State Planning Policy mapping system

Attachment 4—Change representation provisions

(page left intentionally blank – attached separately)