

Enquiries: Rebekah Foster
Direct Phone: 07 5433 2413
Our Ref: DA/38032/2019/V3RL
Your Ref: M2584
Date: 20 November 2019

Dennis Family Corporation Pty Ltd
C/- JFP Urban Consultants Pty Ltd
PO Box 6
MAROOCHYDORE QLD 4558

Dear Sir/Madam

Re: DEVELOPMENT APPROVAL

Planning Act 2016

Development Application No.: DA/38032/2019/V3RL

Property Location: 22-80 Cash Street, D'Aguilar

Property Description: Lot 1 RP 230991, Lot 2 RP 80309

Development Type: Reconfiguring a Lot - Development Permit for Subdivision (2 into 148 Lots)

Please be advised that on 18 November 2019 the above development application was approved by Council's Delegate as the Assessment Manager subject to conditions.

The following type of approval has been issued:

- Development Permit for Reconfiguration of a Lot (2 into 148 Lots)

The development allowed by this approval must be carried out in accordance with the attached Decision package.

Attached is an extract from the *Planning Act 2016* which details your appeal rights and the appeal rights of any submitters, if applicable, regarding this decision.

Should you have any further queries in relation to this decision, please contact Rebekah Foster as referenced above.

Yours faithfully



Rebekah Foster

Planner

Development Services

Enclosures: Attachment 1 - Decision Notice
Attachment 2 - Assessment Manager Conditions
Attachment 3 - Approved Plans/ Documents
Attachment 4 - Infrastructure Charges Notice
Attachment 5 - Appeal Rights

Cc: Department of State Development, Manufacturing, Infrastructure and Planning

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or your operational works application approved *faster?***
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ATTACHMENT 1

Decision Notice

Decision Notice

Planning Act 2016, section 63

APPLICATION DETAILS

Application No: DA/38032/2019/V3RL
Applicant: Dennis Family Corporation Pty Ltd
Street Address: 22-80 Cash Street, D'Aguilar
Real Property Description: Lot 1 RP 230991, Lot 2 RP 80309
Planning Scheme: Moreton Bay Regional Council Planning Scheme

APPROVAL DETAILS

Date of Decision: 18 November 2019

The development application was approved by Council's Delegate as the Assessment Manager subject to conditions (refer Attachment 2).

| APPROVAL TYPE | Development Permit | Preliminary Approval |
|---|-------------------------------------|--------------------------|
| Reconfiguring a Lot for (2 into 148 Lots) | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

OTHER NECESSARY PERMITS

Listed below are other permit/s that are necessary to allow the development to be carried out:

- Operational Work - Roadworks
- Operational Work - Stormwater
- Operational Work - Drainage work
- Operational Work - Earthworks
- Operational Work - Landscaping
- Operational Work - Electrical and Street Lighting

CURRENCY PERIOD OF APPROVAL

In accordance with section 85 of the *Planning Act 2016*, the currency period for each aspect of the development approval is as outlined below:

- Reconfiguring a Lot – 4 years from the date this approval starts to have effect.

DEEMED APPROVAL

Not applicable.

VARIATION APPROVAL

Not applicable.

INFRASTRUCTURE

Unless otherwise specified, all assessment manager conditions of this development approval relating to the provision of infrastructure are non-trunk infrastructure conditions under Chapter 4, section 145 of the *Planning Act 2016*.

ASSESSMENT MANAGER CONDITIONS

The conditions relevant to this development approval are listed in Attachment 2 of the Decision package.

APPROVED PLANS / DOCUMENTS

The approved plans and/or documents as listed below for this development approval are included in Attachment 3 of the Decision package.

| Approved Plans and Documents | | | |
|---------------------------------------|--------------------------|-------------------------------|-------------------------------|
| Plan / Document Name | Reference Number | Prepared By | Dated |
| Reconfiguration Plan | M2584P_DA1 R1 H | JFP Consultants | 6 November 2019 |
| Plan of Development | M2584P_DA1 02 D | JFP Consultants | 16 October 2019 |
| Road 4 - Fauna Movement Plan | 718-098800-L00-DR02 01 | Tract | 28 th October 2019 |
| Ecological Assessment Report | S50578ER001_Rev A | S5 Environmental | 30th July 2019 |
| Site Based Stormwater Management Plan | M2584EA1_DA1_SBSMP Rev C | JFP Urban Consultants Pty Ltd | 24/07/2019 |
| Traffic Engineering Report | Rev 7 | TTM Consulting | 21/08/2019 |

| Plans to be Amended | | | |
|-----------------------------|-------------------------|-----------------------|------------------|
| Plan / Document Name | Reference Number | Prepared By | Dated |
| Bushfire Hazard Assessment | M2584L BFA-Issue B | JFP Urban Consultants | 18 February 2019 |
| Landscape Masterplan | 719-0988-00-RP001 | Tract | 2 February 2019 |
| Rehabilitation Intent Plan | M2584-DA1-CR01 (D) | JFP Consultants | 20 February 2019 |

ASSESSMENT BENCHMARKS

The Assessment Benchmarks that applied to the development from the following Categorising Instruments include;

Categorising Instrument (*Planning Regulation 2017*)

State Planning Policy

- *State Planning Policy 2017, Part E*

Regional Plan

- *South East Queensland Regional Plan 2017 (ShapingSEQ)*

Schedule 10 of the Regulation

Local Categorising Instrument (*Moreton Bay Regional Council Planning Scheme*)

- Reconfiguring a Lot Code - Township Zone - Township Residential Precinct

Local Categorising Instrument (Variation Approval)

Not applicable.

Local Categorising Instrument (Temporary Local Planning Instrument)

Not applicable.

OTHER RELEVANT ASSESSMENT MATTERS

Not Applicable.

REASONS FOR DECISION

Subject to development conditions being imposed (refer Attachment 2), the development can comply with the applicable Assessment Benchmarks against which the application was required to be assessed. For further details, refer to the Reasons for the Decision section of the Assessment Report which is available on Council's website (via PD Online) www.moretonbay.qld.gov.au using the application number referenced in this Notice.

REASONS FOR APPROVAL DESPITE NON-COMPLIANCE WITH ASSESSMENT BENCHMARKS

Not Applicable.

REFERRAL AGENCY CONDITIONS

The following Referral Agencies are relevant to the application:

| Referral Trigger | Name & Address of Agency | Status |
|------------------|--------------------------|--------|
|------------------|--------------------------|--------|

The IDAS Referral Agencies applicable to this application are:

| | | |
|---|--|--------------------|
| Schedule 10, Part 9, Division 4, subdivision 2, Table 1 (Reconfiguring a lot within 25m of a state transport corridor) | Department of State Development, Manufacturing, Infrastructure and Planning SARA – SEQ North Region Office MyDAS electronic lodgement: https://prod2.dev- assess.qld.gov.au/suite/ for assistance, contact DSDMIP on telephone (07) 5352 9701 or email SEQNorthSARA@dsdmip.qld.gov.au | Concurrence Agency |
|---|--|--------------------|

SUBMISSIONS

Not applicable.

APPEAL RIGHTS

Attachment 5 of the Decision package is an extract from the *Planning Act 2016* which details your appeal rights and the appeal rights of any submitters, if applicable, regarding this decision.

OTHER DETAILS

If you wish to obtain more information about Council's decision, please refer to the Assessment Report for the application on Council's PD Online webpage at www.moretonbay.qld.gov.au using the application number referenced in this Notice.

ATTACHMENT 2

Assessment Manager Conditions of Approval

| CONDITION | | TIMING |
|---|---|--|
| RECONFIGURING A LOT - ALL STAGES | | |
| DEVELOPMENT PLANNING | | |
| 1 | Approved Plans and/or Documents | |
| | Undertake development generally in accordance with the approved plans and/or documents. These plans and/or documents will form part of the approval, unless otherwise amended by conditions of this approval. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan) and to be maintained at all times. |
| 2 | Amended Landscape Plan Required | |
| A | Submit an amended Landscape Masterplan incorporating the following: 1. Approved Reconfiguration Plan (M2584P_DA1 R1 I) prepared by JFP Consultants on 6 November 2019 | Prior to any Approval of Operational Works. |
| B | Obtain approval from Council for the amended Landscape Masterplan in accordance with (A) above. | Prior to any Approval of Operational Works. |
| C | Implement the requirements and recommendations of the approved plan. The approved amended plan will form part of the approval. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan) and to be maintained at all times. |
| 3 | Amended Rehabilitation Intent Plan Required | |
| A | Submit an amended Rehabilitation Intent Plan incorporating the following: 1. Approved Reconfiguration Plan (M2584P_DA1 R1 I) prepared by JFP Consultants on 6 November 2019 | Prior to any Approval of Operational Works. |
| B | Obtain approval from Council for the amended Rehabilitation Intent Plan in accordance with (A) above. | Prior to any Approval of Operational Works. |
| C | Implement the requirements and recommendations of the approved plan. The approved amended plan will form part of the approval. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan) and to be maintained at all times. |

| CONDITION | | TIMING |
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| 4 | Amended Bushfire Management Plan Required | |
| A | <p>Submit an amended Bushfire Management Plan incorporating the following:</p> <ol style="list-style-type: none"> 1. Approved Reconfiguration Plan (M2584P_DA1 R1 I) prepared by JFP Consultants on 6 November 2019 | Prior to any Approval of Operational Works. |
| B | Obtain approval from Council for the amended Bushfire Management Plan in accordance with (A) above. | Prior to any Approval of Operational Works. |
| C | Implement the requirements and recommendations of the approved plan. The approved amended plan will form part of the approval. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan) and to be maintained at all times. |
| 5 | Develop in Stages | |
| | Develop the site generally in accordance with the stages identified on the approved plans in consecutive order. Development must comply with each condition of the development approval as it relates to each stage, unless otherwise stated in the condition. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan). |
| 6 | Fencing of Park Boundaries | |
| | <p>Provide semi-transparent fencing to park boundaries as follows:</p> <ol style="list-style-type: none"> 1. Eastern and southern boundary of Lot 8; 2. Eastern boundary of Lots 9-13; 3. Northern and western boundary of Lot 14; 4. Western boundary of Lots 15-18; 5. Southern and western boundary of Lot 19; 6. Southern boundary Lots 70-74; 7. Eastern boundary of Lot 139; 8. Western boundary of Lot 140 and 9. Northern boundary of Lot 148. <p>Fencing is to have a maximum height of 1.8 metres and a minimum 50% transparency. The details of proposed fencing must be included within the landscape master plan.</p> | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan) for each respective stage. |
| 7 | Entry Statement | |
| | <p>Establishment of any "Entry Statement" as a marketing strategy for the development must accord with the following, unless otherwise approved by Council:</p> <ol style="list-style-type: none"> 1. Located within a privately owned allotment or on the boundary of a privately owned allotment; | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan). |

| CONDITION | | TIMING |
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| | <ol style="list-style-type: none"> 2. Limited to one (1) entry statement per development; 3. Constructed of durable, weather resistant materials; 4. Positively contributes to the character of the surrounding area; and 5. Does not contain the logo of any developer or other entity. | |
| 8 | Landscaping for Reconfiguring a Lot | |
| A | Carry out landscaping and associated earthworks, site preparation and other necessary works in accordance with approved plans, details and technical specifications of any proposed planting or landscape work (both soft and hard works) where such works will be on land under the control of Council, whether as a park, reserve or road reserve. Landscaping is to accord with Planning scheme policy - Integrated design Appendix D - Landscaping. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan) for each respective stage. |
| B | Before commencing the works obtain approval for the plans, details and technical specifications of any planting or landscape work from Council. | Prior to work commencing on site. |
| 9 | Street Trees | |
| | Provide street trees within the development in accordance with Planning scheme policy - Integrated design Appendix D - Landscaping. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan) for each respective stage. |
| 10 | Water and/or Sewerage | |
| | <p>Submit to Council a Certificate of Completion or Provisional Certificate of Completion (for each stage where there are stages) for the development from the Northern SEQ Distributor–Retailer Authority (Unitywater) confirming:</p> <ol style="list-style-type: none"> 1. a reticulated water supply network connection is available to the land; and 2. a sewerage network connection is available to the land; and 3. all the requirements of Unitywater have been satisfied. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan) for each respective stage. |
| 11 | New Telecommunications Infrastructure | |
| A | Provide Fibre-Ready telecommunications infrastructure (pit and pipe) throughout the development in accordance with the Communication Alliance specifications contained within Industry Guideline G645:2011 Fibre Ready Pit and Pipe Specifications for Real Estate Development Projects or in accordance with the NBN Co. specifications contained within New Developments: Deployment of the NBN Co Conduit and Pit Network – Guidelines for Developers NBN-TE-CTO-194 and Creating Pit and Pipe Designs for New Developments (Job Aid for Developers) NBN-TE-CTO-586, as amended and current at the date of installation. | Prior to the development being accepted off maintenance. |
| B | Provide certification from a RPEQ electrical engineer that the works specified in (a) above have been installed and evidence that a | Prior to submitting to the Council any |

| CONDITION | | TIMING |
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| | telecommunications carrier licensed under the Telecommunications Act 1997 has agreed to take ownership of the infrastructure. OR Provide written confirmation from NBN Co that the works specified in (a) above have been accepted by it. | request for approval of a plan of subdivision (i.e. survey plan) for each respective stage. |
| 12 | Electricity | |
| A | Provide evidence (e.g. Certificate for Electricity Supply to Subdividers with Agreement Number or Certificate of Supply) demonstrating that an electricity supply network has or will be constructed within all new roads and along the frontage of each proposed lot. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan) for each respective stage. |
| B | Provide underground electricity to each lot. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan) for each respective stage. |
| 13 | Certify Lots are in Accordance with Approved Plan | |
| | Provide certification from a Licensed Surveyor that the lots created accord with the approved plan. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan) for each respective stage. |
| 14 | Street Names | |
| A | Submit requests for the names of new street/s in accordance with Council's Policy 11-2150-038 Allocation of Road Names and Street Address Numbers or as amended; | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan) for each respective stage. |
| B | Obtain approval from Council for the names of new streets in accordance with (A) above; | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan) for each respective stage. |
| C | Erect approved street name boards on all new roads in accordance (A) and (B); and | Prior to submitting to the Council any request for approval of a plan of subdivision |

| CONDITION | | TIMING |
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| | | (i.e. survey plan) for each respective stage. |
| D | Mark all street names on the survey plans. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan) for each respective stage. |
| 15 | Payment of Rates | |
| | Pay all outstanding rates and charges applicable to the subject land. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan) for each respective stage. |
| 16 | Dedicated Road Access | |
| | Provide dedicated constructed road access to the development. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan) for each respective stage and to be maintained at all times. |
| 17 | Earth Retaining Structures | |
| | <p>Unless otherwise approved by Council in writing, ensure that all earth retaining structures, where higher than 1.5m, are stepped, terraced and landscaped as follows:</p> <ol style="list-style-type: none"> 1. maximum 1m vertical, minimum 0.5m horizontal, maximum 2m vertical; and 2. maximum overall structure height of 3m. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan) for each respective stage and to be maintained at all times. |
| 18 | Remove /Demolition of Existing Buildings | |
| | Remove / demolish all existing buildings located on Lot 2 RP80309. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan). |
| ENVIRONMENTAL PLANNING | | |
| 19 | Approved Echidna Species Management Plan | |
| | Provide evidence of a rehabilitation permit for tampering with Echidna Habitat, by way of a High-Risk Species Management Plan | Prior to works commencing on site. |

| CONDITION | | TIMING |
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| | (SMP) approved by the Department of Environment and Science | |
| 20 | Vegetation Management Plan | |
| A | <p>Submit a Vegetation Management Plan to Council for approval outlining vegetation clearing procedures and protection / enhancement of retained vegetation in accordance with Planning Scheme Policy- Environmental areas and corridors. The plan shall be prepared by a suitably qualified person and include scaled plans and supporting documentation that provides for the following:</p> <ol style="list-style-type: none"> 1. Nomination on a plan all vegetation that is required to be removed due to development works; 2. Nomination on a plan Habitat Trees to be removed requiring the replacement of nest boxes; 3. Nomination on a plan the trees that are unsafe or that are required to be removed under the <i>Biosecurity Act 2014</i>; 4. Clearing procedures, weed control measures, ongoing maintenance procedures and monitoring programs; 5. Nomination on a plan the vegetation to be retained throughout the development; 6. Tree protection measures during site works to be retained. | Prior to works commencing on site. |
| B | Obtain approval from Council for the Vegetation Management Plan in accordance with (A) above. | Prior to works commencing on site. |
| C | Carry out works in accordance with the approved Vegetation Management Plan. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan) for each respective stage. |
| 21 | Management of Wildlife | |
| A | Carry out approved vegetation clearing under the supervision of a Koala/Fauna Spotter Catcher holding a valid Rehabilitation Permit for the relocation of fauna such as Koala/Echidna/Micro Bats as per Part 3 of the Nature (Koala) Conservation Plan 2017. | Prior to and during site works. |
| B | Clearing of native vegetation on premises must be carried out in a way that ensures koalas have enough time to move from the area being cleared without human intervention; and | Prior to and during site works. |
| C | Links between koala habitats are maintained to allow koalas to move from the area being cleared; and | Prior to and during site works. |
| D | A tree is not cleared if a koala is present in the tree or the crown of the tree overlaps another tree in which a koala is present; and | Prior to and during site works. |
| E | <p>Provide an activity report, to be completed by the supervising Koala/Fauna Spotter Catcher, including:</p> <ol style="list-style-type: none"> 1. The number and species of any animals observed during | Within fourteen (14) days of completion of clearing. |

| CONDITION | | TIMING |
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| | clearing; 2. The actions taken to deal with observed animals; 3. The number of any animals that were required to be relocated; 4. The release site for any relocated animals; 5. The number (if any) of animals injured during clearing; 6. The treatment provided; 7. The outcome of any treatment; and 8. The location of the treatment. | |
| 22 | No Net Loss of Fauna Habitat | |
| A | Development does not result in the net loss of fauna habitat. Where development does result in the loss of a Habitat Tree, development will provide replacement fauna nesting boxes at the following rate: <ul style="list-style-type: none"> • One (1) nest box for every hollow removed; or • Where hollows have not yet formed in trees greater than 80cm in diameter at 1.3m height, three (3) nest boxes are required for every habitat tree removed. | Prior to and during site works. |
| B | Where A (above) applies provide a nest box management plan with details of the proposed construction, installation methods and GPS location for each nest box for Council's records. Provide details of proposed maintenance and protocols for replacing fallen or broken nest boxes. Include any additional information that may be relevant such as: <ol style="list-style-type: none"> 1. Requirements for the target species 2. Nest box types - design and sizes 3. Installation technique 4. Proposed location of installed nest box 5. Maintenance regime details. Nest boxes must be maintained for a minimum of 12 months post installation. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan) for each respective stage. |
| 23 | Extent of Vegetation Clearing | |
| | Clearing of native vegetation must be limited to that within the approved development footprint. | Prior to and during site works and to be maintained. |
| 24 | Temporary Exclusion Fencing | |
| | Delineate areas where vegetation is proposed to be retained with exclusion fencing to prevent accidental felling. Clearing is to be undertaken in accordance with AS 4970-2009 Protection of Trees on Development Sites. | During site works. |
| 25 | Removal of Noxious Weeds | |
| | As a General Biosecurity Obligation under the Biosecurity Act 2014, the area of development is required to be free from groundsel and | Prior to and during site works and to be |

| CONDITION | | TIMING |
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| | restricted matter, including any infestations of undesirable species as listed in Planning Scheme Policy - Integrated design Appendix D - Landscaping. | maintained. |
| 26 | Disposal of Cleared Vegetation | |
| | Chip, shred or tub grind cleared native vegetation and spread as mulch or dispose of at an authorised waste facility. Any hollows observed in cleared vegetation must be salvaged and installed as nest boxes in trees within the property. | At all times. |
| 27 | Stockpiles of Construction and Landscaping Materials | |
| | Locate any stockpiles of construction and landscaping materials and other site debris clear of drainage lines and clear of any position from which it could be washed onto any footpath, nature strip, roadway or into any drain, wetland or watercourse. | During site works. |
| DEVELOPMENT ENGINEERING | | |
| 28 | Replace Existing Council Infrastructure | |
| | Replace existing Council infrastructure (including but not limited to street trees and footpaths) that is damaged as part of works carried out in association with the development to Council's standards. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan) for each respective stage. |
| 29 | Alterations and Relocation of Existing Services | |
| | Ensure any alteration or relocation in connection with or arising from the development to any service, installation, plant, equipment or other item belonging to or under the control of an entity engaged in the provision of public utility services is to be carried out with the development and at no cost to Council unless agreed to in writing by the Council. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan) for each respective stage. |
| 30 | Stormwater | |
| | Carry out the development to ensure that adjoining properties, reserves and roads are protected from ponding or nuisance from stormwater as a result of any works undertaken. | To be maintained at all times. |
| 31 | Stormwater Management | |
| A | Submit and have approved by Council, a development application for operational works for stormwater infrastructure to service the development. Design drawings are to be prepared and certified by a suitably qualified Registered Professional Engineer Queensland (RPEQ) and in accordance with the approved plans and documents of development and the MBRC Planning Scheme current at the time of | Prior to commencement of works associated with this condition, for each stage. |

| CONDITION | | TIMING |
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| | the operational works application. | |
| B | <p>Construct stormwater infrastructure to service the development at no cost to Council and in accordance with the approved plans and documents of development.</p> <p>This condition has been imposed under section 145 of the Planning Act 2016.</p> | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan), for each stage. |
| C | <p>Provide registered easements in favour of Council over any drainage paths and drainage infrastructure within all new lot/s in accordance with the approved plans and documents of development.</p> <p>The easement documents must acknowledge the maintenance, repair and replacement responsibilities of the owner of this development site.</p> <p>Note: All easements are to be shown on plans submitted as part of operational works applications.</p> | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan), for each stage. |
| 32 | Pathways | |
| A | <p>Construct, at no cost to Council, 1.5metre wide reinforced concrete pathways in the following locations:</p> <ol style="list-style-type: none"> 1. Within the 5.0m wide verge for Road 1, Road 2, Road 3, Road 6 and Road 7; 2. Within the 5.5m wide verge of Road 2 fronting Lots 24 to 27; 3. Within the 4.5m wide verge for Road 4 and Road 3 fronting lots 100 to 105; 4. Within the pathway corridor adjacent to lots 55 and 100. <p>This condition has been imposed under section 145 of the Planning Act 2016.</p> | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan), for each stage. |
| 33 | Earth Retaining Structures | |
| A | <p>Design all earth retaining structures within private land in accordance with Australian Standards, Building Code requirements and MBRC Planning scheme current the time of the operational works application and the following:</p> <ol style="list-style-type: none"> 1. The minimum design life (the period assumed in design for which a structure or structural element is required to perform its intended purpose without replacement or major structural repairs) for the earth retaining structure that is specified in Table 3.1 of Australian Standard AS4678; 2. Earth retaining structures within the land and around areas of cut on or near the boundaries of the site must be designed to allow for live and dead loads associated with the land/premise's current occupancy use; 3. Provide temporary safety fencing to all earth retaining structures over 1.0m in height. | Prior to commencement of works associated with this condition. |
| B | Submit and have approved by Council, a development application for operational works for all earth retaining structures. | Prior to commencement of |

| CONDITION | | TIMING |
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| | Design drawings are to be prepared and certified by a suitably qualified Registered Professional Engineer Queensland (RPEQ) and in accordance with the approved plans and documents of development and the MBRC Planning Scheme current at the time of the operational works application and they are to clearly show the location and overall configuration (fully dimensioned), design parameters and loads, materials and finishes of all earth retaining structures for the development. | works associated with this condition. |
| C | Construct all earth retaining structures within private land in accordance with Australian Standards, Building Code requirements and approved plans and documents of development. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan), for each stage. |
| D | Provide written certification from a suitably qualified Registered Professional Engineer Queensland (RPEQ) that the design, construction and materials comply with this condition. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan), for each stage. |
| CONCURRENCE AGENCY | | |
| 34 | Concurrence Agency | |
| A | Comply with the conditions of Department of State Development, Manufacturing, Infrastructure and Planning response dated 2 September 2019 (reference: 1903-10276 SRA) or as amended. | At all times. |
| B | Provide certification to Council prepared by a suitably qualified person or the agency demonstrating the requirements of the Department of State Development, Manufacturing, Infrastructure and Planning have been met. | At all times. |

| CONDITION | | TIMING |
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| RECONFIGURING A LOT - STAGE 1 | | |
| DEVELOPMENT PLANNING | | |
| 35 | Land for Drainage Purposes | |
| A | Provide the following documentation (as amended by the Queensland Titles Registry) to Council duly completed for the transfer of Lot 901 to Council for the purposes of Drainage: <ol style="list-style-type: none"> 1. Queensland Titles Registry Form 1 - Transfer; 2. Queensland Titles Registry Form 24 - Property Information (Transfer); 3. Queensland Titles Registry Form 20 - Trust Details Form; 4. Solicitors Undertaking confirming that all executed forms above will be submitted to the Queensland Titles Registry Office, at no cost to the Council, concurrently with the lodgement of any | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |

| | | |
|--------------------------------|--|--|
| | survey plan proposing to create proposed Lot 901. | |
| B | <p>Transfer land shown as Lot 901 on the approved plans to Council in Fee Simple on Trust, at no cost to the Council, for the purposes of Drainage.</p> <p>This condition has been imposed under section 145 of the <i>Planning Act 2016</i>.</p> | Concurrently with the registration of a survey plan with the Queensland Titles Registry Office. |
| DEVELOPMENT ENGINEERING | | |
| 36 | New Council Roads | |
| A | <p>Submit and have approved by Council, a development application for operational works for the following:</p> <ol style="list-style-type: none"> 1. All new roads and associated works. The following classifications are to be applied: <ul style="list-style-type: none"> • Living Residential - Road 1, Road 2 and Road 3, to be contained within the nominated road reserve widths identified on the approved plans. 2. All frontage roads and associated works. The frontage works are as follows: <ul style="list-style-type: none"> • Cash Street - The road is to be in accordance with the Living Residential typology. This includes kerb and channel on an approved alignment, carriageway pavement widening for the full frontage of the development stage and the formation of the verge to permanent levels. <p>Design drawings are to be prepared and certified by a suitably qualified Registered Professional Engineer Queensland (RPEQ) and in accordance with the approved plans and documents of development and the MBRC Planning Scheme current at the time of the operational works application.</p> | Prior to commencement of works associated with this condition. |
| B | <p>Construct, at no cost to Council and in accordance with the approved plans and documents of development the following:</p> <ol style="list-style-type: none"> 1. All new roads and associated works 2. All frontage roads and associated works <p>This condition has been imposed under section 145 of the Planning Act 2016.</p> | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |
| 37 | New Intersection | |
| A | <p>Ensure the detailed design of any operational works application is in accordance with the Integrated Transport Assessment (ITA) approved in this development approval for determining impacts on the road system including necessary mitigation measures. Any configuration or layouts provided are accepted as demonstrating the conceptual configuration of the works only and are subject to detailed design.</p> | At all times. |

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| B | <p>Submit and have approved by Council, a development application for operational works for the intersections of Cash Street / Road 1 and Cash Street / Road 2.</p> <p>Design drawings are to be prepared and certified by a suitably qualified Registered Professional Engineer Queensland (RPEQ) and in accordance with the conceptual intersection configuration in the Council approved ITA and the MBRC Planning Scheme current at the time of the operational works application.</p> | Prior to commencement of works associated with this condition. |
| C | <p>Construct the intersections of Cash Street / Road 1 and Cash Street / Road 2 at no cost to Council and in accordance with the approved plans and documents of development.</p> <p>This condition has been imposed under section 145 of the Planning Act 2016.</p> | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |
| 38 | Temporary Turnarounds | |
| A | <p>Submit and have approved by Council a development application for operational works for a 9.0m radius sealed temporary turnaround at the end of Road 2 and Road 3.</p> <p>Design drawings are to be prepared and certified by a suitably qualified Registered Professional Engineer Queensland (RPEQ) and in accordance with approved plans and documents of development and the MBRC Planning Scheme current at the time of the operational works application and the following:</p> <ol style="list-style-type: none"> 1. The temporary turnaround is to be of a configuration that enables Council's standard waste collection vehicle to undertake a three-point turn or better. | Prior to commencement of works associated with this condition. |
| | <p>Construct a sealed temporary turnaround at the end of Road 2 and Road 3, at no cost to Council and in accordance with approved plans and documents of development.</p> <p>This condition has been imposed under section 145 of the Planning Act 2016.</p> | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |
| 39 | Rear Allotment Access Driveways | |
| | <p>Design and construct residential rear allotment access driveways from the back of kerb for the full length of the access handle to Lot 5 in accordance with the approved plans and documents of development.</p> <p>The following are the minimum requirements:</p> <ol style="list-style-type: none"> 1. Design loading of 2.5x10³ Equivalent Standard Axles (ESA) for each lot entitled to use the driveway; 2. Minimum sealed width must be 3.0m; 3. The construction must be reinforced concrete slabs or interlocking concrete pavers, unless approved otherwise; 4. Appropriate longitudinal drainage, cross drainage and scour/erosion protection works must be provided; 5. General maximum longitudinal grade must be 16%, | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |

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| | <p>unless approved otherwise;</p> <p>6. Install conduits for underground electricity supply and telecommunications including draw wires within and for the entire length of the access handle;</p> <p>7. Design and construct a driveway crossover from the constructed road to the site in accordance with MBRC Standard Drawing RS-049 and RS-050.</p> | |
| 40 | Existing Dams | |
| A | <p>Drain, desilt, remove embankments of existing dams and fill the dam to reinstate the ground levels generally as they existed prior to the dam being constructed and in accordance with the plans and documents of development.</p> <p>The dam area is to be made free draining and stabilized to prevent erosion. Any filling required to ensure the area is free draining is to be carried out in accordance with a level of supervision as detailed in AS3798.</p> <p>This condition has been imposed under section 145 of the Planning Act 2016.</p> | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |
| B | Provide certification from a suitable geotechnical testing authority that filling has been conducted in accordance with AS3798. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |

| CONDITION | | TIMING |
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| RECONFIGURING A LOT - STAGE 2 | | |
| DEVELOPMENT ENGINEERING | | |
| 41 | New Council Roads | |
| A | <p>Submit and have approved by Council, a development application for operational works for the following:</p> <ol style="list-style-type: none"> All new roads and associated works. The following classifications are to be applied: <ul style="list-style-type: none"> Living Residential - Road 2 and Road 3, to be contained within the nominated road reserve widths identified on the approved plans. All frontage roads and associated works. The frontage works are as follows: <ul style="list-style-type: none"> Cash Street - The road is to be in accordance with the Living Residential typology. This includes kerb and channel on an approved alignment, carriageway pavement widening for the full frontage of the development stage and the formation of the verge to permanent levels. <p>Design drawings are to be prepared and certified by a suitably</p> | Prior to commencement of works associated with this condition. |

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| | qualified Registered Professional Engineer Queensland (RPEQ) and in accordance with the approved plans and documents of development and the MBRC Planning Scheme current at the time of the operational works application. | |
| B | Construct, at no cost to Council and in accordance with the approved plans and documents of development the following: <ol style="list-style-type: none"> 1. All new roads and associated works 2. All frontage roads and associated works <p>This condition has been imposed under section 145 of the <i>Planning Act 2016</i>.</p> | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |
| 42 | New Intersection | |
| A | Ensure the detailed design of any operational works application is in accordance with the Integrated Transport Assessment (ITA) approved in this development approval for determining impacts on the road system including necessary mitigation measures. Any configuration or layouts provided are accepted as demonstrating the conceptual configuration of the works only and are subject to detailed design. | At all times. |
| B | Submit and have approved by Council, a development application for operational works for the intersection of Cash Street and Road 3. Design drawings are to be prepared and certified by a suitably qualified Registered Professional Engineer Queensland (RPEQ) and in accordance with the conceptual intersection configuration in the Council approved ITA and the MBRC Planning Scheme current at the time of the operational works application. | Prior to commencement of works associated with this condition. |
| C | Construct the intersection of Cash Street and Road 3, at no cost to Council and in accordance with the approved plans and documents of development. This condition has been imposed under section 145 of the <i>Planning Act 2016</i> . | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |
| 43 | Temporary Turnarounds | |
| A | Submit and have approved by Council a development application for operational works for a 9.0m radius sealed temporary turnaround at the end of Road 3. Design drawings are to be prepared and certified by a suitably qualified Registered Professional Engineer Queensland (RPEQ) and in accordance with approved plans and documents of development and the MBRC Planning Scheme current at the time of the operational works application and the following: <ol style="list-style-type: none"> 1. The temporary turnaround is to be of a configuration that enables Council's standard waste collection vehicle to undertake a three point turn or better. | Prior to commencement of works associated with this condition. |

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| | Construct a sealed temporary turnaround at the end of Road 3, at no cost to Council and in accordance with approved plans and documents of development. This condition has been imposed under section 145 of the <i>Planning Act 2016</i> . | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |

| CONDITION | | TIMING |
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| RECONFIGURING A LOT - STAGE 3 | | |
| DEVELOPMENT PLANNING | | |
| 44 | Land for Drainage Purposes | |
| A | Provide the following documentation (as amended by the Queensland Titles Registry) to Council duly completed for the transfer of Lot 902 to Council for the purposes of Drainage: <ol style="list-style-type: none"> 1. Queensland Titles Registry Form 1 - Transfer; 2. Queensland Titles Registry Form 24 - Property Information (Transfer); 3. Queensland Titles Registry Form 20 - Trust Details Form; 4. Solicitors Undertaking confirming that all executed forms above will be submitted to the Queensland Titles Registry Office, at no cost to the Council, concurrently with the lodgement of any survey plan proposing to create proposed Lot 902. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |
| B | Transfer land shown as Lot 902 on the approved plans to Council in Fee Simple on Trust, at no cost to the Council, for the purposes of Drainage. This condition has been imposed under section 145 of the <i>Planning Act 2016</i> . | Concurrently with the registration of a survey plan with the Queensland Titles Registry Office. |
| 45 | Landscaping for Verge of New Road 4 | |
| A | Carry out landscaping and planting along the southern verge of New Road 4, in accordance with the approved Road 4 - Fauna Movement Plan. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan). |
| B | Provide certification from a registered professional that the planting and landscaping have been provided in accordance with the approved plan. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan). |
| DEVELOPMENT ENGINEERING | | |
| 46 | New Council Roads | |
| A | Submit and have approved by Council, a development application | Prior to |

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| | <p>for operational works for the following:</p> <ol style="list-style-type: none"> 1. All new roads and associated works. The following classifications are to be applied: <ul style="list-style-type: none"> • Living Residential - Road 3 and Road 4, to be contained within the nominated road reserve widths identified on the approved plans. <p>Design drawings are to be prepared and certified by a suitably qualified Registered Professional Engineer Queensland (RPEQ) and in accordance with the approved plans and documents of development and the MBRC Planning Scheme current at the time of the operational works application.</p> | commencement of works associated with this condition. |
| B | <p>Construct, at no cost to Council and in accordance with the approved plans and documents of development the following:</p> <ol style="list-style-type: none"> 1. All new roads and associated works <p>This condition has been imposed under section 145 of the <i>Planning Act 2016</i>.</p> | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |
| 47 | Temporary Turnarounds | |
| A | <p>Submit and have approved by Council a development application for operational works for a 9.0m radius sealed temporary turnaround at the end of Road 3 and Road 4.</p> <p>Design drawings are to be prepared and certified by a suitably qualified Registered Professional Engineer Queensland (RPEQ) and in accordance with approved plans and documents of development and the MBRC Planning Scheme current at the time of the operational works application and the following:</p> <ol style="list-style-type: none"> 1. The temporary turnaround is to be of a configuration that enables Council's standard waste collection vehicle to undertake a three point turn or better. 2. | Prior to commencement of works associated with this condition. |
| | <p>Construct a sealed temporary turnaround at the end of Road 3 and Road 4, at no cost to Council and in accordance with approved plans and documents of development.</p> <p>This condition has been imposed under section 145 of the <i>Planning Act 2016</i>.</p> | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |
| 48 | Combined Driveway Crossover | |
| A | <p>Construct combined driveway crossovers to proposed Lot/s 107/108, 109/110, 111/112 and 113/114 in accordance with the approved plans and documents of development and MBRC Standard Drawing/s RS-049 and RS-050.</p> | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |

| CONDITION | | TIMING |
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| RECONFIGURING A LOT - STAGE 4 | | |
| DEVELOPMENT ENGINEERING | | |
| 49 | New Council Roads | |
| A | <p>Submit and have approved by Council, a development application for operational works for the following:</p> <ol style="list-style-type: none"> All new roads and associated works. The following classifications are to be applied: <ul style="list-style-type: none"> Living Residential - Road 3, Road 4 and Road 6, to be contained within the nominated road reserve widths identified on the approved plans. <p>Design drawings are to be prepared and certified by a suitably qualified Registered Professional Engineer Queensland (RPEQ) and in accordance with the approved plans and documents of development and the MBRC Planning Scheme current at the time of the operational works application.</p> | Prior to commencement of works associated with this condition. |
| B | <p>Construct, at no cost to Council and in accordance with the approved plans and documents of development the following:</p> <ol style="list-style-type: none"> All new roads and associated works <p>This condition has been imposed under section 145 of the <i>Planning Act 2016</i>.</p> | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |
| 50 | Landscaping for Verge of New Road 4 | |
| A | Carry out landscaping and planting along the southern verge of New Road 4, in accordance with the approved Road 4 - Fauna Movement Plan. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan). |
| B | Provide certification from a registered professional that the planting and landscaping have been provided in accordance with the approved plan. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. survey plan). |
| 51 | Temporary Turnarounds | |
| A | <p>Submit and have approved by Council a development application for operational works for a 9.0m radius sealed temporary turnaround at the end of Road 3.</p> <p>Design drawings are to be prepared and certified by a suitably qualified Registered Professional Engineer Queensland (RPEQ) and in accordance with approved plans and documents of development and the MBRC Planning Scheme current at the time of the operational works application and the following:</p> | Prior to commencement of works associated with this condition. |

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| | 1. The temporary turnaround is to be of a configuration that enables Council's standard waste collection vehicle to undertake a three point turn or better. | |
| | Construct a sealed temporary turnaround at the end of Road 3, at no cost to Council and in accordance with approved plans and documents of development. This condition has been imposed under section 145 of the <i>Planning Act 2016</i> . | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |
| 52 | Driveway Crossover | |
| A | Construct combined driveway crossover to proposed Lots 75/76 in accordance with the approved plans and documents of development and MBRC Standard Drawing/s RS-049 and RS-050. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |
| 53 | Rear Allotment Access Driveways | |
| | Design and construct residential rear allotment access driveways from the back of kerb for the full length of the access handle to Lot 66 in accordance with the approved plans and documents of development. The following are the minimum requirements: <ol style="list-style-type: none"> 1. Design loading of 2.5x10³ Equivalent Standard Axles (ESA) for each lot entitled to use the driveway; 2. Minimum sealed width must be 3.0m; 3. The construction must be reinforced concrete slabs or interlocking concrete pavers, unless approved otherwise; 4. Appropriate longitudinal drainage, cross drainage and scour/erosion protection works must be provided; 5. General maximum longitudinal grade must be 16%, unless approved otherwise; 6. Install conduits for underground electricity supply and telecommunications including draw wires within and for the entire length of the access handle; 7. Design and construct a driveway crossover from the constructed road to the site in accordance with MBRC Standard Drawing RS-049 and RS-050. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |

| CONDITION | | TIMING |
|--------------------------------------|---|--|
| RECONFIGURING A LOT - STAGE 5 | | |
| DEVELOPMENT PLANNING | | |
| 54 | Land for Drainage Purposes | |
| A | Provide the following documentation (as amended by the Queensland Titles Registry) to Council duly completed for the transfer of Lot 900 to Council for the purposes of Drainage: | Prior to submitting to the Council any request for approval of |

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| | <ol style="list-style-type: none"> 1. Queensland Titles Registry Form 1 - Transfer; 2. Queensland Titles Registry Form 24 - Property Information (Transfer); 3. Queensland Titles Registry Form 20 - Trust Details Form; 4. Solicitors Undertaking confirming that all executed forms above will be submitted to the Queensland Titles Registry Office, at no cost to the Council, concurrently with the lodgement of any survey plan proposing to create proposed Lot 900. | a plan of subdivision (i.e. a survey plan). |
| B | <p>Transfer land shown as Lot 900 on the approved plans to Council in Fee Simple on Trust, at no cost to the Council, for the purposes of Drainage.</p> <p>This condition has been imposed under section 145 of the <i>Planning Act 2016</i>.</p> | Concurrently with the registration of a survey plan with the Queensland Titles Registry Office. |
| 55 | Access Easement | |
| | Provide a 6m (minimum) wide access easement over Lot 900 in favour of Lot 3 on SP124806 in accordance with the approved plans and documents of development | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |
| DEVELOPMENT ENGINEERING | | |
| 56 | New Council Roads | |
| A | <p>Submit and have approved by Council, a development application for operational works for the following:</p> <ol style="list-style-type: none"> 1. All new roads and associated works. The following classifications are to be applied: <ul style="list-style-type: none"> • Living Residential - Road 3 and Road 7, to be contained within the nominated road reserve widths identified on the approved plans. <p>Design drawings are to be prepared and certified by a suitably qualified Registered Professional Engineer Queensland (RPEQ) and in accordance with the approved plans and documents of development and the MBRC Planning Scheme current at the time of the operational works application.</p> | Prior to commencement of works associated with this condition. |
| B | <p>Construct, at no cost to Council and in accordance with the approved plans and documents of development the following:</p> <ol style="list-style-type: none"> 1. All new roads and associated works <p>This condition has been imposed under section 145 of the <i>Planning Act 2016</i>.</p> | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |
| 57 | Vehicular Access | |
| A | Design and construct vehicular access to the drainage reserve | Prior to submitting to |

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| | located adjacent to lots 139 and 140. | the Council any request for approval of a plan of subdivision (i.e. a survey plan). |
| 58 | Rear Allotment Access Driveways | |
| | <p>Design and construct residential rear allotment access driveways from the back of kerb for the full length of the access handle to Lots 147 and 148 in accordance with the approved plans and documents of development.</p> <p>The following are the minimum requirements:</p> <ol style="list-style-type: none"> 1. Design loading of 2.5x10³ Equivalent Standard Axles (ESA) for each lot entitled to use the driveway; 2. Minimum sealed width must be 3.0m; 3. The construction must be reinforced concrete slabs or interlocking concrete pavers, unless approved otherwise; 4. Appropriate longitudinal drainage, cross drainage and scour/erosion protection works must be provided; 5. General maximum longitudinal grade must be 16%, unless approved otherwise; 6. Install conduits for underground electricity supply and telecommunications including draw wires within and for the entire length of the access handle; 7. Design and construct a driveway crossover from the constructed road to the site in accordance with MBRC Standard Drawing RS-049 and RS-050. | Prior to submitting to the Council any request for approval of a plan of subdivision (i.e. a survey plan). |

| ADVICES | |
|----------------|---|
| 1 | Aboriginal Cultural Heritage Act 2003 |
| | <p>The <i>Aboriginal Cultural Heritage Act 2003</i> commenced in Queensland on April 16, 2004. The Act provides blanket protection of Aboriginal cultural heritage sites and places, including significant areas and objects, as well as archaeological remains. The Act also recognises that Aboriginal cultural heritage parties are key stakeholders in the assessment and management of Aboriginal cultural heritage.</p> <p>Under the Act, if a proposed activity involves disturbance of the ground surface, cultural heritage Duty of Care must be considered. This involves consideration of whether an activity is <i>likely</i> to harm Aboriginal cultural heritage. This may require involvement from the relevant Aboriginal cultural heritage party.</p> <p>Cultural heritage Duty of Care compliance ultimately lies with the person or entity conducting the activity, and penalty provisions apply for failing to fulfil this Duty of Care.</p> <p>Council strongly advises that before undertaking the land use activity, you refer to the cultural heritage duty of care - Department of Aboriginal and Torres Strait Islander Partnerships (Queensland Government) for further information regarding the responsibilities of the developer.</p> |
| 2 | Adopted Charges |
| | Payment of an Adopted Infrastructure Charge in accordance with Council's Infrastructure Charges Resolution (No. 8) dated 14 August 2018 or as amended apply to this development |

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| | <p>approval.</p> <p>From 1 July 2014, Moreton Bay Regional Council no longer issues an Infrastructure Charges Notice on behalf of Unitywater for water supply and sewerage networks and therefore a separate Infrastructure Charges Notice may be issued directly to the applicant by Unitywater in respect to this development approval.</p> <p>Payment of Infrastructure Charges is to be in accordance with the Infrastructure Charges Notice issued with this development approval and any Infrastructure Charges Notice issued by Unitywater. From 1 July 2014, all Infrastructure Charges for infrastructure networks controlled by Unitywater (eg. water and/or sewerage) regardless of when the Infrastructure Charges Notice was issued are to be paid directly to Unitywater while Infrastructure Charges for networks controlled by Moreton Bay Regional Council will continue to be paid directly to Moreton Bay Regional Council.</p> |
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PROPERTY NOTES

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| 1 | DS07 Additional Development Requirements |
| | <p>The following property note will be attached to Council's database for Lots 70-74, 128-148:</p> <p><i>"Additional development requirements apply to this lot. Any development on this lot must be in accordance with the approved plan and associated conditions.</i></p> <p><i>Further details can be found in the development permit creating the lot or the development approval for the use, and the associated Council report (Delegated or Council Meeting) or approval letter. This information is available through the PD Online facility on Council's website www.moretonbay.qld.gov.au."</i></p> |
| 2 | DS02 Bushfire Management |
| | <p>The following property note will be attached to Council's database for Lots 70-74, 128-148:</p> <p><i>"An approved Bushfire Management Plan applies to this lot. Any development on this lot must be in accordance with the approved Bushfire Management Plan and any conditions related to the approved plan.</i></p> <p><i>Further details can be found in the development permit creating the lot or the development approval for the use, and the associated Council report (Delegated or Council Meeting) or approval letter. This information is available through the PD Online facility on Council's website www.moretonbay.qld.gov.au."</i></p> |

ATTACHMENT 3

Approved Plans / Documents

Development Assessment Rules—Representations about a referral agency response

The following provisions are those set out in sections 28 and 30 of the Development Assessment Rules¹ regarding **representations about a referral agency response**

Part 6: Changes to the application and referral agency responses

28 Concurrence agency changes its response or gives a late response

- 28.1. Despite part 2, a concurrence agency may, after its referral agency assessment period and any further period agreed ends, change its referral agency response or give a late referral agency response before the application is decided, subject to section 28.2 and 28.3.
- 28.2. A concurrence agency may change its referral agency response at any time before the application is decided if—
- (a) the change is in response to a change which the assessment manager is satisfied is a change under section 26.1; or
 - (b) the Minister has given the concurrence agency a direction under section 99 of the Act; or
 - (c) the applicant has given written agreement to the change to the referral agency response.²
- 28.3. A concurrence agency may give a late referral agency response before the application is decided, if the applicant has given written agreement to the late referral agency response.
- 28.4. If a concurrence agency proposes to change its referral agency response under section 28.2(a), the concurrence agency must—
- (a) give notice of its intention to change its referral agency response to the assessment manager and a copy to the applicant within 5 days of receiving notice of the change under section 25.1; and
 - (b) the concurrence agency has 10 days from the day of giving notice under paragraph (a), or a further period agreed between the applicant and the concurrence agency, to give an amended referral agency response to the assessment manager and a copy to the applicant.

¹ Pursuant to Section 68 of the *Planning Act 2016*

² In the instance an applicant has made representations to the concurrence agency under section 30, and the concurrence agency agrees to make the change included in the representations, section 28.2(c) is taken to have been satisfied.

Part 7: Miscellaneous

30 Representations about a referral agency response

30.1. 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.³

³ An applicant may elect, under section 32, to stop the assessment manager's decision period in which to take this action. If a concurrence agency wishes to amend their response in relation to representations made under this section, they must do so in accordance with section 28.

SARA reference: 1903-10276 SRA
Council reference: DA/38032/2019/V3RL
Applicant reference: M2584P

2 September 2019

Chief Executive Officer
Moreton Bay Regional Council
PO Box 159
Caboolture Qld 4510
mbrc@moretonbay.qld.gov.au

Attention: Luke Ritchie

Dear Mr Ritchie

SARA response—22-80 Cash Street and 1901 D'Aguilar Highway, D'Aguilar

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

The development application described below was confirmed as properly referred by the Department of State Development, Manufacturing, Infrastructure and Planning on 3 April 2019.

Response

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| Outcome: | Referral agency response – with conditions. |
| Date of response: | 2 September 2019 |
| 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

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| Description: | Development permit | Reconfiguration of a lot (2 lots into 152 lots) |
| SARA role: | Referral Agency | |
| SARA trigger: | Schedule 10, Part 9, Division 4, Subdivision 2, Table 1 (Planning Regulation 2017) | |
| | Development application for reconfiguring of a lot within 25 metres of | |

South East Queensland (North) regional
office
Mike Ahern Building, Level 3, 12 First
Avenue, Maroochydore
PO Box 1129, Maroochydore QLD 4558

a state transport corridor

SARA reference: 1903-10276 SRA

Assessment Manager: Moreton Bay Regional Council

Street address: 22-80 Cash Street and 1901 D'Aguilar Highway, D'Aguilar

Real property description: Lot 1 on RP230991 and Lot 2 on RP80309

Applicant name: Dennis Family Corporation Pty Ltd

Applicant contact details: C/- JFP Urban Consultants Pty Ltd
PO Box 6
Maroochydore QLD 4558
tbalcombe@jfp.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 Ruth Creffield, Planning Officer, on 5352 9775 or via email SEQNorthSARA@dsdmip.qld.gov.au who will be pleased to assist.

Yours sincerely



Garth Nolan
Manager (Planning)

cc Dennis Family Corporation Pty Ltd, tbalcombe@jfp.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 5 - Approved plans and specifications

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) (Copies of the plans and specifications referenced below are found at Attachment 5)

| No. | Conditions | Condition timing |
|---|---|---|
| Reconfiguring of a Lot | | |
| Schedule 10, Part 9, Division 4, Subdivision 2, Table 1 – State transport corridors - 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. | The development must be carried out generally in accordance with Reconfiguration Plan prepared by JFP Consultants dated 25 July 2019, reference M2584P_DA1 R1 and revision F, as amended in red by SARA. In particular, no pedestrian access is permitted between the south-east corner of the development to the existing bus stop pair on D'Aguilar Highway / Raaen Road. | At all times. |
| 2. | <p>a) Road works comprising a change in configuration of the left turn treatment on the D'Aguilar Highway Western Approach includes a high angle left turn treatment, must be provided generally in accordance with Preliminary Functional Layout, prepared by TTM Consulting Pty Ltd, as amended in red by SARA, dated 20 August 2019, reference 18BRT0545-01 and revision B.</p> <p>b) The road works must be designed and constructed in accordance with the Road Planning and Design Manual.</p> | Prior to submitting the Plan of Survey to the local government for approval for Stage 3 of the development. |
| 3. | <p>a) Stormwater management of the development must ensure no worsening or actionable nuisance to the state-controlled road.</p> <p>b) Any works on the land must not:</p> <ul style="list-style-type: none"> i. create any new discharge points for stormwater runoff onto the state-controlled road; ii. interfere with and/or cause damage to the existing stormwater drainage on the state-controlled road; iii. surcharge any existing culvert or drain on the state-controlled road; iv. reduce the quality of stormwater discharge onto the state-controlled road. <p>c) RPEQ certification with supporting documentation must be provided to the North Coast District Development Assessment Team, via North.Coast.IDAS@tmr.qld.gov.au within the Department of Transport and Main Roads,</p> | <p>a) and b) at all times.</p> <p>c) Prior to submitting the plan of survey to the local government for approval.</p> |

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|----|---|--|
| | confirming that the development has been designed and constructed in | |
| 4. | <p>Noise attenuation measures to achieve the following external noise criteria must be provided for outdoor spaces for passive recreation:</p> <p>a) ≤ 57 dB(A) L10 (18 hour) free field (measured L90 (18 hour) free field between 6am and 12 midnight ≤ 45 dB(A))</p> <p>b) ≤ 60 dB(A) L10 (18 hour) free field (measured L90 (18 hour) free field between 6am and 12 midnight > 45 dB(A)).</p> | Prior to submitting the Plan of Survey to the local government for approval and to be maintained at all times. |

Attachment 2—Advice to the applicant

| General advice | |
|----------------|---|
| 1. | Terms and phrases used in this document are defined in the <i>Planning Act 2016</i> its regulation or the State Development Assessment Provisions (SDAP) v2.4. If a word remains undefined it has its ordinary meaning. |
| 2. | <p><u>Public utility works and connection approval:</u></p> <p>The applicant is advised that if any works and/or connections are required to public utility services within a State-controlled road reserve, approval must be given by the Department of Transport and Main Roads (TMR) under the relevant public utility legislation (electricity, water/sewer, telecommunication), and in accordance with TMR technical standards (TN163). Approvals must be obtained prior to commencing any utility works within the state-controlled road reserve. Please contact the public utility team via northcoast@tmr.qld.gov.au for further information on the application and approval process.</p> |
| 3. | <p><u>Road works approval</u></p> <p>Under section 33 of the <i>Transport Infrastructure Act 1994</i>, written approval is required from TMR to carry out road works on a state-controlled road. Please contact the Department of Transport and Main Roads' on North.Coast.IDAS@tmr.qld.gov.au 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.</p> |
| 4. | <p><u>Noise Compliance</u></p> <p>The submitted Noise Report (dated 10 July 19, revision 2), has been reviewed by TMR. To demonstrate Compliance with Condition 4, an amended report is advised to be submitted to TMR for review and endorsement, that considers a noise barrier or earth mound.</p> <p>The nearest lots to the state-controlled road (SCR) have significant noise levels. The report recommends QDC building mitigation only. Section 6.1 states that the <i>State Development and Assessment Provisions</i> (SDAP) facade criterion is 60dBA LA10(18h) facade corrected because of the low background L90(8h) noise level at night. Figure 4 shows that the outdoor open space criterion can be met if building on half of each of the nearest lots to the SCR. However, for the ground floor the facade criterion level of 60dBA LA10(18h) facade-corrected lies in the middle of the tan contour in Figure 5. This means that many of the nearest lots to the D'Aguilar Highway would not comply without a barrier or earth mound.</p> <p>To demonstrate compliance with Condition 4, the applicant is advised to submit an amended noise report that addresses the above for TMR review and endorsement via North.Coast.IDAS@tmr.qld.gov.au. The review of the report and a barrier design, will ensure the proposed development can comply with the condition and the requirements of TMR's, Road Traffic Noise Management Code of Practice, Chapter 5 and Technical Standards MRS15 and MRTS15.</p> |

Attachment 3—Reasons for referral agency response

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

The reasons for the department's decision are:

- The proposed development is for a reconfiguration of a lot (2 lots into 152 lots).
- The proposed development site is located within 25 metres of a state-controlled road – D'Aguilar Highway.
- Access to the proposed development will be from Cash Street – a local road.
- A condition is included for noise attenuation measures to minimise noise intrusions on the development from the D'Aguilar Highway.
- SARA assessed the development application against State code 1: Development in a state-controlled road environment of the *State Development Assessment Provisions*, version 2.4, and determined that with conditions the development achieves compliance with the acceptable outcomes and performance outcomes of the state code.

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 2.4), as published by the department
- The Development Assessment Rules
- SARA DA Mapping system

Attachment 4—Change representation provisions

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Attachment 5—Approved plans and specifications

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30 July 2019

File Ref: S50578ER001_Rev A

Contact: Lucy Healing

Team Leader - Planning
Development Services
Moreton Bay Regional Council

INFORMATION REQUEST RESPONSE ITEMS 6, 7 AND 8 – 22-80 CASH ST D'AGUILAR

1. INTRODUCTION

This letter has been provided in response to Moreton Bay Regional Council's (MBRC) Information Request dated the 27th March, 2019. S5 Environmental was commissioned by JFP Urban Consultants on behalf of their client, Dennis Family Corporation Pty Ltd, to address Information Request Items 6, 7 and 8.

In providing a response to Information Request *Environment Planning Items 6 and 7* (Council Ref. No. DA/38032/2019/V3RL) a vegetation and fauna assessment has been undertaken of the property located at 22-80 Cash St D'Aguilar. The methodology of the vegetation and fauna assessment is outlined in **Section 3**, and results of the assessment are summarised in **Section 4** of this document.

Item 6 requires a response on how the development adopts a 'least risk, least impact approach' and both ecological and bushfire hazard issues need to be addressed. **Section 5** outlines how the development adopts a 'least risk, least impact' approach for both issues. The additional vegetation and fauna assessment is required by Item 7 to provide the response to Item 6. Detail on how Item 7 has been addressed and justification on the survey methodology and survey effort is outlined in **Section 6**.

Information Request *Environmental Planning Item 8* requires the proposed development to consider a perimeter road along the southern boundary of the development site. A response to Item 8 is provided in **Section 7**.

1.2 Proposed Development

S5 Environmental understand that the proponent is proposing the development of a residential subdivision consisting of 148 residential allotments off Cash St, associated new internal public roads throughout, and, two large drainage reserves (refer JFP layout *Reconfiguration Plan M2584P_DA1 R1 Issue F Appendix A*).

2. SITE DESCRIPTION

The subject properties are described as Lot 1 on RP230991 and Lot 2 on RP80309, located at 22-80 Cash St, D'Aguilar. The properties have a total area of approximately 17.756 hectares (ha) and are herein referred to as 'the site'.

The northern lot is uninhabited, largely clear of vegetation and used currently for grazing of cattle. A decommissioned railway cutting runs along the southern boundary of the northern lot and supports the greatest area of canopy vegetation. The southern lot currently contains a residential dwelling, horse yards and associated out buildings. A review of aerial imagery (refer **Figure 1**) reveals significant vegetation clearing was undertaken in the southern lot as recently as 2009, accounting for the native regrowth and weed vegetation forming the balance of the lot. The area around the house and yards, and, the western portion of the southern lot has also been cleared since at least the late 1990's. The site is bordered by rural land to the east, residential development to the north and west, and the D'Aguilar Hwy to the south.

As identified in JFP Urban Consultants *Ecological Assessment Report* the site is mapped within Moreton Bay Regional Council *Environmental Areas Overlay* 'High Value Area - MSES - Matters of State Environmental Significance', and, 'Value Offset Area – Matters of Local Significance (MLES) - Waterway Buffer' (refer JFP *Reconfiguration Plan M2584P_DA1 R1 Issue F Appendix A* and **Figure 2**).



Figure 1. Historical clearing. Imagery captured 31/10/2008-13/06/2009.

Source: Queensland Globe, State of Queensland 2019.

3. VEGETATION AND FAUNA ASSESSMENT METHODOLOGY

The ecological desktop assessment and site investigations undertaken by JFP in the *Ecological Assessment Report* have been reviewed and are generally incorporated into this Information Request Response as background supporting information. The intent of this assessment is to determine the following:

- Quantify the level of habitat use by *Phascolarctos cinereus* (Koala);
- Quantify the density of non-juvenile koala habitat trees (NJKHT) across the site, as defined under *Planning Regulation 2017 - Schedule 24*;
- Location of hollow-bearing trees and other habitat features. While no hollow-bearing trees were observed during previous site investigations (by JFP), an additional search is to be undertaken;
- Vegetation structure and condition, including weed presence and species richness; and
- Site usage by diurnal and nocturnal fauna.

Three S5 Environmental Ecologists attended the site to conduct these detailed surveys over 2 days and 2 nights, being Wednesday the 8th of May and Thursday the 9th of May, 2019.

Weather was fine and clear throughout the days and evenings of the survey. The second night had a gentle breeze towards the end of the survey period. In the 2 weeks prior to the survey, the site received approximately 1mm of rainfall on the 4th of May (BOM 2019).

3.1 *Phascolarctos cinereus* activity

The current *P. cinereus* activity within the site was assessed using the Spot Assessment Technique (SAT) as detailed by Phillips and Callaghan (2011) on behalf of the Australian Koala Foundation. Nine SAT surveys were undertaken in total. SAT survey locations (refer **Figure 2**) were selected to both geographically capture the available habitat across the vegetated portions of the southern lot, and, the range in canopy cover across the site. More survey effort was given to the areas of greater canopy cover.

While no formal SATs were undertaken north of the decommissioned railway cutting, a search for *P. cinereus* scats underneath the majority of scattered NJKHT within the open grazing land had previously been undertaken by JFP Urban Consultants (personal communication). No scats were recorded during this search.

3.2 *Non-Juvenile Koala Habitat Tree Density*

The density of NJKHT across the site was determined through the completion of seven quadrats in which each tree meeting the definition of a NJKHT was counted. The location of the quadrats was selected after a review of aerial imagery (refer **Figure 1** and **Figure 2**) which determined canopy cover and site disturbance could be placed into 3 representative categories – areas of continuous canopy cover (decommissioned railway cutting), both within mapped MSES and outside the mapped MSES; areas that have been completely cleared in the last 10 years; and, areas that had been partly cleared with a

discontinuous canopy cover. The intent was to survey six 50m x 20m quadrats however the past clearing resulted in the need for this to be adjusted in the field to restrict each quadrat to a visually consistent density of NJKHT over the entire length and width of quadrat. Two of the 50m x 20m quadrats were separated into two smaller quadrats where there was a clear change in NJKHT density and were counted separately.

3.3 Habitat Features

A search was undertaken for hollows and other habitat features at each SAT site, quadrat, and, incidental detection during a general meander moving through the site. The intention was for all hollow-bearing trees and stags to be tagged to be revisited as part of the nocturnal component of the survey. However, no hollow-bearing trees were detected during the day time search and only two possible stag trees. A discussion on this is provided below (refer **Section 3.7**).

3.4 Vegetation Structure and Condition

At each Quadrat, assessment was undertaken on the condition and structure of the vegetation including canopy cover, shrub and groundlayer cover, species richness, woody debris, and weed cover. The BioCondition Field Assessment Datasheet was used as a template to provide a consistent format to the assessment and comparison of the vegetation structure and condition within different areas of the site.

3.5 Active Diurnal Fauna Search and Bird Survey

An active diurnal search was undertaken over two days through turning over logs and rocks, raking through leaf litter, and looking under bark and other areas of microhabitat in accordance with the *Queensland Herbarium's Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (2018). Searches were also undertaken for signs of fauna presence (scats, diggings, arboreal scratch marks, nests, and feeding signs) within each quadrat and during a general meander through the site. In particular, the site was investigated for *Calyptorhynchus lathami* (Glossy Black-Cockatoo) feeding signs beneath *Allocasuarina littoralis* (Black She-oak) or other she-oak species. It is noted that previous site investigations by JFP Urban Consultants also searched for *C. lathami* feeding signs without success.

A bird survey of 5 to 10 minutes moving through each quadrat looking and listening for birds was undertaken for an insight on species occurrence in the area. All incidental observations of birds heard or seen while moving through the site, between SAT sites and Quadrats were also recorded. Birds seen flying overhead have been recorded as 'off-site'. Surveys were throughout the day from mid-morning to late afternoon.

3.6 Amphibian survey

Prior to the two nocturnal surveys, areas of standing water on site (at the time of survey) were investigated for amphibian presence through aural point surveys. The surveys were undertaken within the mapped waterway corridor and two ponds within the *Melaleuca quinquenervia* (Broad-leaved Paperbark) community in the proposed eastern Drainage Reserve (refer **Figure 2**).

3.7 Stag watch and spotlighting

Stag Watching and Spotighting undertaken as part of the nocturnal component of the survey, were also completed in accordance with the *Queensland Herbarium's Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (2018).

A Stag Watch was completed on the second night of the survey to determine if native fauna were occupying the two stags found within the proposed eastern Drainage Reserve (refer **Figure 3**). No stags or hollow-bearing trees were found during the first day of site survey. The Stag Watch began 30 minutes prior to sunset and continued until 30 minutes after sunset to maximise detection of nocturnal arboreal mammals potentially occupying each of the hollows being observed.

Following the Stag Watch, the Ecologists undertook spotlighting for an additional 1 – 1.5 hours as a non-intrusive search to provide a snap shot of nocturnal fauna presence on the site. A timed 'random meander' technique was employed with each of the ecologists traversing the site on foot as vegetation allowed. Two binoculars, a 600 lumens Spotlight, 450 lumens torch, and three head torches were utilised during the 1.5 hours of each Survey Night. The Ecologists targeted mature trees, acacia (wattles) understorey, the *M. quinquenervia* community, and, open grassy areas. The head torches and spotlights are used to detect eyeshine then the species identified using binoculars.

S5 Environmental gave full consideration to ethical survey, spotlighting, and, handling techniques by minimising habitat disturbance when completing thorough suitable habitat searches including avoiding prolonged exposure of animals to the spotlight beam.

3.8 Limitations and Constraints

It is important to note constraints and limitations that may likely influence the outcomes of the survey. These include disturbances from a number of variables including road traffic noise from the D'Aguilar Highway and domestic activities occurring on residential blocks adjoining the subject site. Additionally, the tenants on the southern lot had a barking dog at the time of the survey and were riding trail bikes through the site at dusk on the first night.

More generic limitations such as seasonality, weather and moon phase can affect the detectability of different species in different ways. There were also very few flowering trees at the time of the survey providing limited resource for nocturnal species that forage on blossoms of eucalyptus, corymbia and angophora species.



Legend

- Cadastre
- Drainage Reserves
- ★ Frog survey
- MSES
- Quadrats
- SAT
- Waterway Buffer

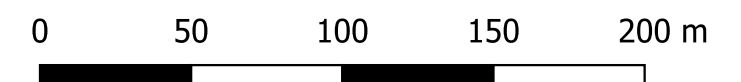
Figure 2 - Field Survey

22-80 Cash St, D'Aguilar

Job Number: S50578;
 Author: Lucy Healing; Date: 29-07-2019;
 Data: Digital Cadastral Database (c) - State of Qld 2018; Aerial Photography - Nearmaps Imagery Dated 22/06/2019

K:\01 S5 Consulting\S5 Projects\S5 Projects\S50578 Cash St D'Aguilar\03 Drawings\QGIS\Cash Street.qgz

This plan may only be relied upon in relation to the project and purpose for which it was commissioned. It should be noted, that this plan is not inclusive of all Environmental Features/ layers.



Scale: approx 1:2500 @A3



4. SURVEY RESULTS

The results of the site investigations are outlined below and within **Figure 3**. During the two days and two nights approximately 25 fauna species were detected, a summary of fauna observations is provided in **Table 3**.

4.1 *Phascolarctos cinereus* Site Usage

No scats were located during the nine SAT surveys. No trees with arboreal scratch marks typical of *P. cinereus* scratch marks were observed at the SAT sites or during any of the site investigations. It is also noted that no signs of *P. cinereus* presence were detected during the previous ecological site investigations undertaken by JFP Urban Consultants. As such, site usage by *P. cinereus* is considered to be 'Low' as per the Spot Assessment Technique (Phillips and Callaghan, 2011). Accordingly it is considered unlikely the site is currently utilised by the species due to lack of signs of presence, previous clearing activities, and, lack of site connectivity with other habitat areas.

4.2 *Non-Juvenile Koala Habitat Tree Survey*

A summary of NJKHT counts recorded within the quadrats is provided in **Table 1** below. These quantities have been extrapolated to provide approximate densities of NJKHT across the site using the extent of disturbance in recent and historical aerial imagery as a reference. The locations of the Quadrats are illustrated in **Figure 2**, and densities are illustrated as stems/hectare (ha) in **Figure 3**. It should be noted that Quadrat 4 (refer **Plate 1** and **2**) was altered to be become 25m x 20m, as a 50m length with an even representation of vegetation structure and condition was not achievable in this location. As such, Quadrat 4 was terminated where there was a clear change in NJKHT densities. Quadrat 6 was divided into two quadrats largely due to the change in vegetation structure and condition of the understorey, the counts of NJKHT were similar.

TABLE 1. SUMMARY OF NON-JUVENILE KOALA HABITAT TREE SURVEY.

| Quadrat | Size (m) | Count | NJKHT Stems/ha |
|---------|----------|-------|----------------|
| 1 | 50 x 20 | 40 | 400 |
| 2 | 50 x 20 | 33 | 330 |
| 3 | 50 x 20 | 47 | 470 |
| 4 | 25 x 20 | 61 | 1220 |
| 5 | 50 x 20 | 17 | 170 |
| 6a | 20 x 20 | 12 | 300 |
| 6b | 25 x 20 | 14 | 280 |
| 7 | 50 x 20 | 30 | 300 |

Quadrat 4 had the highest density of NJKHT of the seven Quadrats due to the regrowth of *M. quinquenervia*. There was one mature *Eucalyptus tereticornis* (Forest Red Gum) and one *E. tereticornis*

sapling in addition to the *M. quinquenervia* regrowth. Quadrat 1 (refer **Plate 3**) and Quadrat 2 (refer **Plate 4**) were located within the area mapped as MBRC MSES (corresponding to the *Koala State Planning Policy* mapping), had comparable NJKHT densities - 40 and 33 respectively. Quadrat 3 (refer **Plate 5**), located to the east within the same decommissioned railway cutting area (and not mapped MSES) was slightly higher at 47 NJKHT, with fewer large *E. pilularis* (Blackbutt), and a greater variety of koala habitat tree species (KHT) including *E. racemosa* (Scribbly Gum) and *E. microcorys* (Tallowwood).

No Quadrats were undertaken in areas that were largely clear of NJKHT and these areas have been labelled in **Figure 3** as 'Scattered NJKHT'.



Plate 1. Quadrat 4. High number of NJKHT largely due to *M. quinquenervia* regrowth



Plate 2. Quadrat 4. One mature *E. tereticornis*.



Plate 3. Quadrat 1. Located within mapped MBRC MSES. View looking east from start of transect. Mid-storey of scattered *A. littoralis*.



Plate 4. Quadrat 2. Located within mapped MBRC MSES. View looking east from middle of transect.



Plate 5. Quadrat 3. Located outside the mapped MSES within vegetation along decommissioned railway cutting. View east from start of transect. Vegetation to be retained with proposed eastern Drainage Reserve.



Plate 6. Quadrat 3. View east from middle of transect. Vegetation to be retained within proposed eastern Drainage Reserve. Adjacent rural zoned land in background of image.

4.3 Habitat Features

Habitat features observed during the survey and discussed below are illustrated in **Figure 3**.

Live and dead trees within the Quadrats, SAT sites, and trees encountered through the traversing of the site were inspected for habitat features including termitaria, hollows, cracks, and, nests. Only one tree that had a potential hollow (detected during the second evening spotlighting) and two stag trees with multiple fissures and likely habitat for microbats were observed (refer **Plate 8**). No hollow-bearing trees, apart from the one tree with a possible small hollow observed during spot lighting on the second night, could be located. A large termitarium (appeared old and unused) was recorded within the decommissioned railway cutting vegetation.

Particular attention was paid to a large (>1000mm dbh) *E. tindaliae* (Tindale's Stringybark) to assess habitat value including the presence of hollows, and, tree health and structure. While no hollows could be observed in the tree from the ground, the size of the tree, both tree height and the mass of large alive and dead limbs, provides high value arboreal habitat. The limbs and messy habit of the tree provide foraging and sheltering opportunities for arboreal fauna. This tree was inspected for nocturnal fauna during spotlighting without success.

A number of holes and crevices in the railway embankment were inspected however the only fauna detected were several cane toads.

Large piles of timber from the historical clearing provide shelter for terrestrial fauna including *Tachyglossus aculeatus* (Short-beaked Echidna) (refer **Plate 9**). Diggings typical of *T. aculeatus* (refer **Plate 10**) are prevalent near large piles of timber in the southern lot. Large timber debris from clearing is scattered throughout the southern portion of the site, including some hollow logs (refer **Plate 7**).

Large rocks, rock piles and caves are not present within the site.



Plate 7. Hollow log in Quadrat 3. Denser vegetation to the south of decommissioned railway cutting in the background of image.



Plate 8. Stag tree. Clear view of majority of stag obscured by mid-storey vegetation.



Plate 9. Large woody debris near Quadrat 6.



Plate 10. Diggings typical of Echidna prevalent near large woody debris

4.4 Vegetation Structure and Condition Assessment Summary

A summary of the significant information recorded during the vegetation structure and condition assessments at the seven Quadrats is presented below in **Table 2**. Data sheets are included in **Appendix B**.

TABLE 2. BIOCONDITION ASSESSMENT SUMMARY

| Attribute | Q1 | Q2 | Q3 | Q4 | Q5 | Q6a | Q6b | Q7 |
|--------------------|------|------|------|-------|------|-----|------|------|
| % Canopy cover | 89.2 | 90.4 | 94.2 | 61.6 | 56.6 | 26 | 10.6 | 64.2 |
| % Shrub cover | 0 | 0 | 0 | 10.4 | 9.4 | 3.4 | 2 | 25.8 |
| % Groundcover | 6.4 | 7.8 | 2 | 44.66 | 25 | 30 | 53.6 | 11 |
| % Weed groundcover | 0 | 0.4 | 0.4 | 0.3 | 0.2 | 0 | 15 | 27 |
| Species richness | 18 | 19 | 25 | 29 | 28 | 28 | 25 | 41 |

The area of greatest canopy cover was recorded within the decommissioned railway cutting area encompassing Quadrat 1, 2 and 3 (refer **Plate 11**). Shrub cover was greatest in Quadrat 7 which included a number of *Glochidion sumatranum* (Umbrella Cheese Tree), *Alphitonia excelsa* (Red Ash) and *Clerodendrum floribundum* (Lolly Bush) saplings (refer **Plate 12**), however, weed groundcover was also greatest in this area (refer **Plate 13**). Native groundcover percentage was greatest in Quadrat 4 which supported the native grasses and forbs found in the other Quadrats but also a number macrophyte species and species which prefer a more shaded and moister environment than found elsewhere on site (refer **Plate 14**). Quadrat 7 had a significantly higher species richness than other Quadrats in part due to being excluded from grazing but also as it was located on the ecotone between the lower slope of an open forest community and an overland flowpath with associated riparian species.



Plate 11. Canopy cover Quadrat 2



Plate 12. Shrub layer in Quadrat 7.



Plate 13. Weed grasses in Quadrat 7, native groundcover species persist throughout.



Plate 14. Image captured to west of Quadrat 4. Native ferns found within the shaded moist environment of overland flowpath.

4.5 Active Diurnal Search and Bird Survey

Fauna detected during the active diurnal search which involved the turning over of logs and rocks (no large rocks and no rock piles observed) and inspecting microhabitats, including holes in the old railway cutting embankment, was limited to skinks (not identified) and cane toads.

Numerous diggings typical of *T. aculeatus* were observed through the southern lot and appeared particularly active near piles of large woody debris. A number of scats were recorded within the area of the proposed eastern Drainage Reserve and identified using Triggs (1996) as *Macropus rufogriseus* (Red-Necked Wallaby) and *Macropus giganteus* (Eastern Grey Kangaroo).

Several species of birds were recorded during the dedicated bird survey and incidental sightings. A full list of birds and other fauna recorded is provided in **Table 3** below. No birds listed as Endangered, Vulnerable or Near Threatened (EVNT) were detected. Further to this, no feeding signs of *C. lathamii* were found under the occasional patches of *A. littoralis*.

A couple of European hares (*Lepus europaeus*) were flushed from cover during the survey.

4.6 Amphibian Survey

One species of native amphibian was recorded within the site, with aural observations of *Limnodynastes peronei* (Striped Marsh Frog) within the mapped waterway corridor (refer **Figure 3**). This species is known to be widespread and highly adaptable in terms of its habitat and well-hidden in vegetation, debris and often burrowing effectively to avoid predation and detection. *Limnodynastes peronei* call throughout the year.

Litoria fallax (Eastern Sedgefrog) was heard calling off-site from the vicinity of the dam located in the rural property to the east (refer **Figure 3**). The two native frog species are listed as Least Concern under the *Nature Conservation Act 1992* (NCA). *Litoria fallax* commonly call year-round and are generally found in vegetation bordering permanent water-sources in large quantities like the dam on the adjacent property.

The introduced cane toad was also recorded during the survey.

4.7 Stag Watch and Spotlighting

The Stag Watch component of the survey yielded no results, whilst the observations of fauna during spotlighting was limited to microbats. A clear view of the entirety of the stags during the stag watch was not possible because of the mid-storey vegetation (refer **Plate 8**) and *Lantana camara* in the vicinity. However, the surrounding trees and mid-storey vegetation was searched during this time for fauna possibly exiting these stags. It is possible these stags are used by microbats for roosting though none were detected in this vicinity. The stags may provide roosting and breeding habitat for other arboreal species, habitat that was generally lacking across the site.

The mid-storey vegetation around the base of the large *E. tindaliae* (discussed above) including numerous acacia species, was thoroughly searched at dusk, in lieu of not being able to inspect the canopy for hollows, for foraging *Petaurus norfolcensis* (Squirrel Gliders). None were detected. *Trichosurus vulpecula* (Brushtail Possum) and *Pseudocheirus peregrinus* (Common Ringtail Possum) are nocturnal, arboreal marsupials and are found to occupy dry eucalyptus forests among other habitats and are common in suburban parklands and gardens. It is highly likely that these species inhabit the area, though none were detected. Additionally, flying fox species likely use the site from time to time, although none were detected. It is noted that there was a general lack of flowering canopy trees at the time of the survey, a foraging resource for these species.

TABLE 3: SUMMARY OF SURVEY RESULTS

| Species | Common Name | Observation Methods | Time | Location | Other Notes |
|---------------------------------|------------------------------|---------------------|--|--|--|
| Amphibians | | | | | |
| <i>Litoria fallax</i> | Eastern sedgefrog | Aural | Second night 5.00pm | Offsite. Heard calling from the dam in the rural property to the east of the eastern drainage reserve. | |
| <i>Limnodynastes peronei</i> | Striped marsh frog | Aural | First and second night 5pm and 5.30pm | From pond to south of culverts under Cash St, and in small depressions nearby. Refer to Figure 3 for location | |
| <i>Rhinella marina</i> | Cane toad | Visual | Midday | Holes in embankment of decommission railway easement cutting | Several observed in several holes inspected for native fauna |
| Avifauna | | | | | |
| <i>Ardea ibis</i> | Cattle egret | Visual | 8/05/2019 early afternoon | Near water reservoir at northern edge of the site and throughout the southern portion of the site. | |
| <i>Calyptorhynchus funereus</i> | Yellow-tailed black-cockatoo | Aural and visual | 8/05/2019 and 9/05/2019 in the afternoon | Offsite Observed 2 to 3 birds both days flying over the site | |
| <i>Cracticus torquatus</i> | Grey butcher bird | Aural and visual | Various times on both days | Near water reservoir at northern edge of the site and throughout the southern portion of the site. | |
| <i>Dacelo novaeguineae</i> | Kookaburra | Aural and visual | 8/05/2019 and 9/05/2019 in the afternoon | | |
| <i>Rhipidura albiscapa</i> | Grey fantail | Aural and visual | Various times on both days | Within understorey of eastern end of decommissioned railway easement vegetation. Also within <i>Melaleuca quinquenervia</i> vegetation in proposed eastern drainage reserve. | Flock feeding |

| Species | Common Name | Observation Methods | Time | Location | Other Notes |
|----------------------------------|------------------------------------|---------------------|--|---|--|
| <i>Rhipidura leucophrys</i> | Willy wagtail | Aural | Various times on both days | Numerous locations across entirety of site. | |
| <i>Taeniopygia sp.</i> | Zebra finch or Double-barred finch | Nest | n/a | Within shrub at the northern edge of proposed eastern drainage reserve, observed in Quadrat 7 | |
| <i>Coracina novaehollandiae</i> | Black-faced cuckoo-shrike | Visual | 9/05/2019 late afternoon | Observed near Quadrat 5 | |
| <i>Cracticus tibicen</i> | Australian magpie | Aural and visual | Various times both days | Various locations across site | |
| <i>Eopsaltria australis</i> | Yellow-breasted robin | Visual | 8/05/2019 | Quadrat 3 | One individual |
| <i>Geopelia striata</i> | Peaceful dove | Visual | 8/05/2019 Mid-morning | Quadrat 3 | On ground |
| <i>Manorina melanocephala</i> | Noisy miner | Aural and visual | Various times both days | Various locations across site | |
| <i>Myzomela sanguinolenta</i> | Scarlett honeyeater | Aural and visual | 8/05/2019 and 9/05/2019 various times throughout the day | Within canopy of eastern end of decommissioned railway easement vegetation. Also adjacent the rural zoned land within proposed eastern drainage reserve in <i>Melaleuca quinquenervia</i> canopy (refer Figure 3) | Flock appeared to be feeding in flowering <i>Melaleuca quinquenervia</i> trees |
| <i>Philemon corniculatus</i> | Noisy friarbird | Aural | 9/05/2019 early afternoon | Near Quadrat 6 | In regrowth canopy vegetation |
| <i>Taeniopygia sp.</i> | Zebra finch or Double-barred finch | Nest | n/a | Within shrub at the northern edge of proposed eastern drainage reserve (refer Figure 3) | |
| <i>Trichoglossus molucacanus</i> | Rainbow lorikeet | Aural and visual | 8/05/2019 mid-morning and 9/05/2019 late afternoon | Observed near Quadrat 1 and Quadrat 5 | |
| <i>Vanellus miles</i> | Masked lapwing | Visual | Mid-morning | Quadrat 1 | |
| Mammals | | | | | |
| <i>Lepus europaeus</i> | European hare | Visual | 8/05/2019 Midday | Quadrat 2 and 3 | One individual at each Quadrat |

| Species | Common Name | Observation Methods | Time | Location | Other Notes |
|---------------------------------|-----------------------|---------------------|----------------------------|--|---------------------------------|
| <i>Macropus giganteus</i> | Eastern grey kangaroo | Scat | n/a | Quadrat 4 | |
| <i>Macropus rufogriseus</i> | Red-necked wallaby | Scat | n/a | Quadrat 4 | |
| <i>Microchiroptera suborder</i> | Microbats | Visual | 8/05/2019 5.45pm | West of Quadrat 1. Beginning of spotlight transect | Several individuals observed |
| <i>Tachyglossus aculeatus</i> | Short-beaked echidna | Diggings | n/a | Quadrats 4, 5 and 6 | Very active in Quadrats 4 and 5 |
| Reptiles | | | | | |
| | Native skinks | Visual | Various times on both days | Numerous locations in leaf litter | Observed during SAT surveys |
| <i>Varanus varius</i> | Lace monitor | Visual | 8/05/2019 | In tree Quadrat 2 | One individual observed |



4.8 Landscape Context

The highest value connection with habitat areas outside the site is with the rural property to the east, with no barriers to fauna movement into the site from this direction. The mapped waterway also has some connectivity with a Council Reserve to the north of Cash Street, although native vegetation in this park is minimal and there is a lack of connectivity beyond this area to the north. For further detailed discussions on the connectivity of the site in a local and regional landscape context, refer to the *Ecological Assessment Report* prepared by JFP Urban Consultants (M2584L EA01), dated 21st of September).



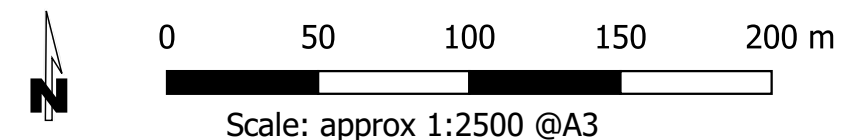
Figure 3 - Field Results

22-80 Cash St, D'Aguilar

Job Number: S50578;
 Author: Lucy Healing; Date: 29-07-2019;
 Data: Digital Cadastral Database (c) - State of Qld 2018; Aerial Photography - Nearmaps Imagery Dated 22/06/2019

K:\01 S5 Consulting\S5 Projects\S5 Projects\S50578 Cash St D'Aguilar\03 Drawings\QGIS\Cash Street.qgz

This plan may only be relied upon in relation to the project and purpose for which it was commissioned. It should be noted, that this plan is not inclusive of all Environmental Features/ layers.



5. INFORMATION REQUEST ITEM 6 RESPONSE

Information Request Item 6 requires an assessment of the proposed development to be made against the Overall Outcomes of the *Reconfiguration of a Lot Code - Township Zone – Township Precinct*. And, specifically Overall Outcome (b). Overall Outcome (b) requires reconfiguring a lot avoids areas subject to constraint, limitation, or environmental values. And ‘Where reconfiguring a lot cannot avoid these identified areas, it responds by:

- i. adopting a ‘least risk, least impact’ approach when designing, siting and locating development to minimise the potential risk to people, property and the environment;*
- ii. ensuring no further instability, erosion or degradation of the land, water or soil resource;*
- iii. maintaining environmental values, including natural, ecological, biological, aquatic, hydrological and amenity values, and enhancing these values through the provision of environmental offsets, landscaping and facilitating safe wildlife movement through the environment;*
- iv. protecting native species and protecting and enhancing native species habitat;*
- v. protecting and preserving the natural, aesthetic, architectural historic and cultural values of significant trees, places, objects and buildings of heritage and cultural significance;*
- vi. establishing effective separation distances, buffers and mitigation measures associated with major infrastructure to minimise adverse effects on sensitive land uses from noise, dust and other nuisance generating activities;*
- vii. ensuring it promotes and does not undermine the ongoing viability, integrity, operation, maintenance and safety of major infrastructure;*
- viii. ensuring effective and efficient disaster management response and recovery capabilities.’*

Overall Outcome b (i) Bushfire Hazard Response

With regards to bushfire hazard, the majority of the development is located within a ‘Low Bushfire Hazard’ Area. As stated in the JFP Urban Consultants *Bushfire Hazard Assessment* report, the site is ‘bordered by urban development to the north, cleared Rural residential (with an approved subdivision) to the northeast, and, mixed use and Highway to the west, and bushfire attack is unlikely to come from these directions’. Hazardous vegetation, after clearing and rehabilitation associated with the proposed development, is located along the southern and south-eastern boundary of the site, and, within the proposed eastern Drainage Reserve. It should be noted, as highlighted in the *Bushfire Hazard Assessment Report*, the vegetation adjacent the southern boundary of the southern lot, within the D’Aguilar Highway and Raaen Road road reserve could be removed from assessment according to Leonard and Opie (2017) as the vegetation is less

than 50m wide and has only been included in the vegetation assessment as a precaution due to the potential height of the canopy vegetation. A building footprint setback of 16m has been provided to this vegetation, adopting a 'least risk' approach.

Only two lots are adjacent the 'High Bushfire Hazard' area at the south eastern boundary. The building envelopes in these lots are setback 20m from the hazard. It should be noted, the vegetation in the adjacent rural lot, within the mapped remnant vegetation is not currently a High Hazard, as the understorey has been heavily grazed by stock, and there are no fire ladders into the canopy. A High Hazard rating has been calculated based on potential future rehabilitation of this vegetation.

An esplanade road has been provided around the majority of the proposed eastern Drainage Reserve to provide a separation between hazardous vegetation and future lots. To provide further separation, the JFP Urban Consultants *Concept Rehabilitation Plan* includes a 3m wide landscaped area along the inner southern boundary of the Reserve. This will provide a total separation 19.5m between the area of future rehabilitation and lots 140 – 146.

A bio-basin (Bio 4) with a boulder wall along the northern edge and emergency access easement along the southern edge, now provides 26m separation between lot 148 and the future hazardous vegetation within the rehabilitation area. It is anticipated the small area available for planting on Bio 4 batters will be with less flammable species consistent with 'RVC' species mix outlined in the JFP *Concept Rehabilitation Plan*. Proposed lots 70-72 and lot 74 share rear boundaries and side boundary respectively with the northern boundary of the proposed eastern Drainage Reserve. The vegetation in this area is already largely devoid of mid-storey vegetation and sparse understorey. A 4 metre wide maintenance track is to be installed along this northern boundary (refer JFP layout *Reconfiguration Plan M2584P_DA1 R1 Issue F Appendix A*), providing a separation of the lots from the rehabilitation area and access for weed management and revegetation activities. A 10 meter deep Asset Protection Zone (APZ) has been applied to the rear of lots 70-72, and to southwest corner of lot 74. As such, risk to people and property has been minimised through providing setbacks to hazardous vegetation so all future dwellings achieve a minimum of BAL-29, with the majority of lots achieving BAL-12.5 or BAL -LOW (refer S5 Environmental *Bushfire Attack Level Plan Issue A*).

Risk has been further reduced by ensuring all lots are connected to a reticulated water supply and have direct access to sealed public roads. Emergency egress for future residents and access for emergency vehicles for lots adjacent to sources of bushfire threat are as follows:

- Lots 128 -139 – for bushfire threat from vegetation within the D'Aguilar Highway road corridor there will be direct egress to the north into a Low Bushfire Hazard area, and emergency access to manage the hazard via the APZs at the rear of the properties (refer *Section C3 JFP Urban Consultants Bushfire Hazard Assessment*), and via D'Aguilar Highway and Raaen Road. As noted above, the vegetation to the rear of these Lots, between D'Aguilar Highway and the development site could be filtered out of

- the bushfire hazard assessment due to being less than 50m wide. It has only been included as a precaution due to the size of the trees present and areas of unmanaged understorey. As such, the vegetation is 'unlikely to support the full potential of a running fire front' (Leonard, J. & Opie. K, 2017);
- Lots 140-148 - for bushfire threat from vegetation within the D'Aguilar Highway road corridor there will be direct egress to the north via proposed sealed public road into a Low Bushfire Hazard area (maximum distance to egress to north is 150m for lot 148), and emergency access to manage the hazard via the APZs at the rear of the properties (refer *Section C3 JFP Urban Consultants Bushfire Hazard Assessment*), and via D'Aguilar Highway and Raaen Road. As noted above, the vegetation to the rear of these Lots, between Raaen Road and the development site could be filtered out of the bushfire hazard assessment due to being less than 50m wide. It has only been included as a precaution due to the size of the trees present and areas of unmanaged understorey. As such, the vegetation is 'unlikely to support the full potential of a running fire front' (Leonard, J. & Opie. K, 2017). In addition, the vegetation is separated from future lots by an existing gravel track (refer **Plate 15**). Accordingly, the threat from this vegetation is considered low;
 - Lots 140 -148 – for bushfire threat from the area of rehabilitation with full restoration within the proposed eastern Drainage Reserve there will be direct egress to the west via proposed new public road and to the south to Raaen Road via an emergency easement over proposed lots 147 and 148. Emergency access to manage the threat will be via the esplanade roads and proposed emergency easement accessible from Raaen Road (refer **Plate 16**); and
 - Lots 70-72 and lot 74 – for bushfire threat from the area of area of rehabilitation with full restoration within the proposed eastern Drainage Reserve there will be direct egress to the west via proposed new public road into a Low Bushfire Hazard area. Emergency access to manage the threat will be via the proposed esplanade roads and APZs.

Overall Outcome b (i) Ecological Values Response

With regards to locating the development for least risk and least impact to ecological values, reference is made to the findings of both the JFP Urban Consultant *Ecological Assessment Report* and the findings of the additional site investigations undertaken by S5 Environmental. In particular, the following findings are significant:

- The area of greatest canopy cover is located within the area of the decommissioned railway. However, vegetation structure and condition (BioCondition) assessments indicated no significant difference between the MBRC mapped MSES and canopy cover within the vegetation further to the east, which was slightly greater (refer **Quadrat 3 Table 2** and **Figure 2**);
- The highest density of NJKHT was associated with the *M.quinquenervia* community within the proposed eastern Drainage Reserve. Surveys also indicate there is no significant difference between

NJKHT densities within the MBRC mapped MSES and the vegetation further to the east. Refer to **Figure 3** for NJKHT density across the site;

- Vegetation structure and condition assessments indicate the areas of greatest flora species richness and percentage cover of the mid-storey was associated with the overland flow path within the proposed eastern Drainage Reserve (refer Quadrat 7 **Table 2** and **Figure 2**);
- The area of greatest fauna activity recorded was within or adjacent the overland flow path within the proposed eastern Drainage Reserve (refer **Table 3** and **Figure 3**);
- No large hollow bearing trees could be located and only 1 tree with a possible small hollow was recorded (refer **Figure 3**), and will be retained within the eastern Drainage Reserve;
- Two stag trees were located within and adjacent the overland flow path within the proposed eastern Drainage Reserve (refer **Figure 3**). One of the stag trees will be lost to construct Bio 3;
- No evidence of *P. cinereus* activity within the site was detected;
- No evidence of *C. lathamii* was detected, nor significant stands of she-oaks, a foraging resource for the species;
- No nesting habitat for the *Petauroides volans* (Greater Glider) was detected. Two nights spotlighting did not locate the species;
- Microbats were recorded within proposed western Drainage Reserve (refer **Figure 3**);
- A large *E. tindaliae* likely provides roosting and foraging habitat for arboreal species (refer **Figure 3**);
- The highest value connectivity of habitat areas within the site with other habitat areas is with the Rural Zoned property to the east of the proposed eastern Drainage Reserve; and
- The mapped waterway corridor currently provides habitat for common native frog species. The corridor has limited connectivity with a Council Reserve to the north and canopy vegetation within the mapped MSES. This area, while highly degraded, has great potential habitat value through proposed rehabilitation activities.

Considering these findings, the proposed layout (refer JFP *Reconfiguration Plan M2584P_DA1 R1 Issue F*) protects the area of the site with highest ecological value within the proposed eastern Drainage Reserve. The area has been assessed as having high canopy cover (Quadrat 3); the greatest flora species richness (Quadrat 7) and highest percentage native shrub cover (Quadrat 4 and 7), high native groundlayer cover (Quadrat 4); the highest density of NJKHT (Quadrat 4); the area of greatest observed fauna activity; the only tree observed with a possible hollow; two stag trees (only one can be retained) which provides potential roosting habitat for microbats; and, the best connectivity with habitat outside the site.

A bund for stormwater management is proposed to be constructed within the eastern Drainage Reserve (refer JFP *Reconfiguration Plan M2584P_DA1 R1 Issue F Appendix 1*). A tree survey has now been undertaken in this area to locate on plan all trees (excluding *M. quinquenervia*) greater than 150mm diameter at breast height (dbh), all *M. quinquenervia* greater than 300mm dbh, and the edges of the larger clumps of *M.*

quinquenervia regrowth. The location of this bund has been determined in reference to the tree survey results to avoid removal of surveyed trees and minimise impact. The proposed bund location was also observed to have an understorey dominated by weed grasses.

The proposed layout also includes a Drainage Reserve within the western portion of the site and protects the mapped waterway corridor and the western end of the canopy vegetation within the decommissioned railway cutting. As such, amphibian habitat, an area with high numbers of NJKHT and canopy trees, and, an area with some connectivity with habitat outside the site will be protected. A wide road verge has also been proposed along the road that connects the western and eastern Drainage Reserves, allowing planting of canopy trees to facilitate some arboreal fauna movement through the site.

As such, the majority of the proposed development is located within areas of lower ecological value, and, areas assessed as supporting the greatest ecological value are to be protected and rehabilitated. As such, the proposed layout adopts a least risk and least impact approach to ecological values.



Plate 15. Looking west along existing gravel track under powerlines adjacent proposed lots 140 – 147 providing separation to hazardous vegetation



Plate 16. Existing clearing within Raaen Rd road corridor vegetation and access to proposed emergency easement over rear of lots 147 and 148.

Overall Outcome b (ii) Response

While the issues addressed in this Information Request response are restricted to ecological and bushfire hazard matters, it is noted that no areas of erosion or instability were observed during site investigations. Further to this, the mapped waterway and overland flow path protected within the Drainage Reserves are to be revegetated, improving stability and water quality.

Overall Outcome b (iii) Response

As detailed in the response above to b) i) Natural, ecological, biological and aquatic values will be protected within the proposed Drainage Reserves, and these values will be maintained and enhanced through the proposed rehabilitation illustrated in the JFP Urban Consultant's *Concept Rehabilitation Plan*. No environmental offsets, as per the *Environmental Offsets Act*, are applicable to the development, however, the proposed areas of mass planting and infill planting provide an offset to the proposed clearing of vegetation. It should be noted, the need to provide a response to the Overall Outcome of the Code is a direct result of proposed new boundaries within mapped MSES. However, the area proposed to be rehabilitated, including large areas of revegetation (more than 15,000m² within the eastern Drainage Reserve alone) far exceeds the vegetated portion of mapped MSES with new boundaries and proposed to be cleared (6,275m²).

While not directly applicable to the scope of this Information Request response, it is noted that amenity values will be maintained through the retention of canopy vegetation at the highest points of the site and a large open space area maintained with revegetated waterway and scattered trees connecting to the Council reserve to the north of Cash Street. It is also understood hydrological values will be maintained through the proposed stormwater management plan by JFP Urban Consultants. Additionally, the proposed *Landscape Masterplan* by Tract maximises the incorporation of local native species into landscaping.

With regards to wildlife movement, the area of the site with the highest value connectivity with other habitat areas (Rural Zoned property to the east) is the proposed eastern Drainage Reserve, which will be maintained and enhanced. The mapped waterway corridor has limited connectivity with a Council Reserve to the north and canopy vegetation within the mapped MSES, which will be maintained and enhanced through proposed rehabilitation activities within the western Drainage Reserve. A wide road verge has also been proposed along the road that connects the two Drainage Reserves, allowing planting of canopy trees to facilitate some arboreal fauna movement through the site.

Overall Outcome b (iv) Response

Native species and native species habitat will be protected within the proposed Drainage Reserves. Site investigations have indicated the area of greatest habitat heterogeneity, including arboreal, terrestrial and aquatic habitats represented by high canopy cover, vegetation with the greatest structural diversity in the mid-storey and understorey, highest flora species richness, ephemeral ponds, macrophyte vegetation, and woody debris, will be protected within the eastern Drainage Reserve. This assessment is consistent with the area having the greatest concentration of fauna observations (visual, aural, signs of presence). While an area of native vegetation is proposed to be removed, it is not considered to be a loss of irreplaceable values. The vegetation to be removed has a very large edge to area ratio, and if retained within a residential development would be subject to ongoing edge effects, lowering the habitat value particularly to terrestrial fauna. The arboreal habitat this vegetation currently provides can be replaced in time with revegetation and rehabilitation of the proposed Drainage Reserves.

Overall Outcome b (v) Response

With regards to protecting the natural value of significant trees it is noted MBRC places significance on 'habitat trees', defined under the MBRC Planning Scheme as trees with a dbh greater than 800mm. Two trees meeting this criterion have been surveyed and identified on plan by JFP Urban Consultants (refer JFP *Reconfiguration Plan M2584P_DA1 R1 Issue F Appendix A*) and located within the vicinity of proposed lot 122 and lot 135. These trees are not proposed to be retained, as retention of isolated large trees within residential lots, is considered hazardous to person and property. The large *E. tindaliae* located within proposed lot 122, while considered to have high habitat value due to the sheer size of the tree and complicated messy structure of the live and many dead and hanging branches, is not suitable to be retained within a residential lot or road reserve.

Overall Outcome b (vi) Response

Not relevant to ecological and bushfire hazard matters.

Overall Outcome b (vii) Response

Not relevant to ecological and bushfire hazard matters.

Overall Outcome b (viii) Response

As addressed in the response to (b) i), with regards to bushfire hazard, effective and efficient disaster response and recovery will be facilitated through access to a reticulated water supply for fire-fighting, emergency egress for future residents and access for emergency vehicles through a Low Bushfire Hazard area via proposed sealed public roads, access to manage potential sources of bushfire threat via D'Aguilar Highway, Raaen Road, proposed new esplanade road, an emergency easement over proposed lots 147 and 148, and the proposed Asset Protection Zones.

6. INFORMATION REQUEST ITEM 7 RESPONSE

Information Request Item 7 requires *'the applicant [to] provide a detailed vegetation survey / tree and fauna assessment of the entire development site. This report is required to be structured in accordance with Planning Scheme Policy SC 6.8 - Environmental Areas and Corridors. The amended Ecological Assessment Report is required to address Overall Outcome (b) as identified in item 5 above'*.

As outlined in **Section 3** and **Section 4** of this Information Request Response, substantial additional field investigations have been undertaken. The findings of these investigations and the previous investigations undertaken by JFP Urban Consultants have been used in the response provided above to Overall Outcome (b).

Prior to summarising the additional investigations, clarification and response to statement 7a), 7b) and 7e) of the Information Request are provided below:

7a) states that the previous report *'has categorised the site into identifiable vegetation communities with no detailed vegetation survey / tree plot having been undertaken or provided as part of this assessment'*. Attention is drawn to the previous clearing of the site illustrated by the 2009 aerial image (refer **Figure 1**). With reference to this aerial, and from a full day spent traversing the site, differentiation of pasture from open forest, and open forest from regrowth, and areas dominated by *M. quinquenervia* is entirely feasible. A tree plot for the entire site, while informative for smaller development sites, is considered unreasonable for a 17.756 ha site where it can be clearly seen via aerial photography where the trees are located. A tree plot at the interface of development and areas to be retained and protected is however useful to minimise impacts, which has now been undertaken. In particular this has been used to inform the proposed location of the bund in the eastern Drainage Reserve.

Additionally, an assessment of the density of NJKHT across the site and SAT surveys provide an understanding on the impacts to *P. cinereus* and the species habitat posed by the development. This additional survey work has also now been undertaken. Locating every NJKHT on plan by a registered surveyor is only relevant when offsets are required under the *Environmental Offsets Act*, and even then there is a provision for applying the maximum density of NJKHT of 250 per hectare, rather than surveying large areas of trees.

7b) states *'no dedicated fauna assessment has been undertaken with the report acknowledging that only a desktop assessment has been undertaken, apart from observations made on the random site visits'*. This is not entirely accurate. While previous fauna investigations did not include dedicated fauna assessment techniques like the Spot Assessment Technique, spotlighting, or trapping, a thorough desktop investigation informed site investigations and assessment of habitat value for significant species that were considered as having potential to be present within the development site. Additionally, most of the smooth-barked trees were inspected for arboreal scratch marks, the base of numerous NJKHT trees were searched for scats, and the majority of larger trees were inspected for the presence of hollows (refer 2009 aerial image indicating the majority of the site was cleared of canopy vegetation at this time). The previous site assessment involved a full day in the field, mostly spent within the vegetated area of the site.

7e) states *'a field study observed a significant number of Eucalyptus racemosa within the proximity of the mapped MSES area'*. This is not correct, the Ecological Assessment states that a significant number of *E. racemosa* were observed within an area mapped as preclear RE12.12.2/12.12.15. While this partly overlaps with the mapped MSES and decommissioned railway corridor, the *E. racemosa* are more prevalent and *E. pilularis* less so within the eastern portion of the decommissioned railway corridor, and not within the mapped MSES.

In summary, the following additional site investigations have been undertaken over two consecutive days and nights (by three persons), and are outlined in **Section 3** and **Section 4** of this review:

- Nine Spot Assessment Technique surveys looking for *P.cinereus* presence and level of activity;
- Six quadrats of 50m x 20m and one 20m x 20m for stem counts of NJKHT to quantify NJKHT density across the site;
- Seven vegetation structure and condition (BioCondition) assessments;
- Active diurnal fauna search and bird survey (at each Quadrat and random meanders);
- Aural frog surveys;
- Search for hollow-bearing trees (at each Quadrat, during random meanders and scattered trees across northern portion of the site);
- One stag watch; and
- Two nocturnal surveys (spotlighting).

All specific habitat features and indications of fauna presence observed were recorded and the site was assessed for habitat value and likely presence of significant species.

Including the previous site investigations by JFP Urban Consultants, the diurnal survey effort undertaken for the proposed development totals seven-person days (one person/one day plus three persons/two days). This exceeds the four days prescribed in the MBRC Environmental Areas and Corridors Planning Scheme Policy. The nocturnal survey was undertaken over two consecutive nights by three persons. While the nocturnal survey effort represents six survey nights, it was undertaken over two nights. Evaluating if this is appropriate the following needs to be considered:

- Approximately two thirds of the site is clear of canopy, mid-storey, and shrub layer vegetation and grazed by cattle, and, the presence of nocturnal fauna in this area could easily be detected;
- Dirt bikes are currently regularly being used through the vegetation in the southern lot creating continual disturbance;
- There was a lack of flowering canopy species at the time of survey;
- The survey nights were fine with little to no breeze;
- Lack of understorey in areas with greatest canopy cover allowing good observation into the canopy for detecting nocturnal arboreal fauna;
- The lack of arboreal habitat generally and lack of habitat for hollow-dependant fauna across the site from past clearing (refer **Figure 1**); and
- The presence of nocturnal fauna can be detected through other means like scats, diggings and scratch marks; or, likelihood of presence extrapolated from availability of required habitat and connectivity.

Taking into consideration all the above factors, the nocturnal survey effort is considered adequate to detect nocturnal fauna present at the time of survey. While additional survey effort may be optimal if undertaken at different times of the year and flowering seasons, it is considered unlikely to provide greater insight of fauna use of the site than what can be surmised by an assessment of the habitat available, habitat connectivity, and, detected by other means. To this end, nocturnal fauna not detected (not listed in **Table 3**) but considered likely to be present includes *Perameles nasuta* (Long-Nosed Bandicoot) (while numerous diggings were detected they were considered to be more consistent those made by the *T. aculeatus*), possums and flying foxes seasonally with flowering of canopy species. *P. norfolcensis* and *P. breviceps* (Sugar Glider) have the potential to be present as the southern portion of the site provides a foraging resource for the species however are unlikely to be present in large numbers due to a lack of hollow-bearing trees. Common nocturnal birds including *Podargus strigoides* (Tawny Frogmouth) are also likely to be present.

Item 7 specifically highlights the area of MSES as Low Value Bushland Habitat and an area the MBRC Planning Scheme specifically seeks to protect. Therefore, in addition to the response provided to Information Request Item 6, potential impacts to *P. cinereus* are further addressed. The total area of MSES mapped within the site is 15,400m². Approximately half (7,600m²) of this area is proposed to be removed (subject to new boundaries and clearing). Of the MSES proposed to be removed only approximately 5,200m² supports koala habitat. It has been established through site surveys canopy vegetation proposed to be retained within the eastern Drainage Reserve, and outside the MSES mapped area, has equal or greater canopy cover and NJKHT density where located within the same decommissioned railway corridor. The area within the decommissioned railway corridor proposed to be retained, with high density NJKHT totals approximately 3,700m². In addition, more than 3,200m² of *M. quinquenervia* clumps are to be retained in the eastern Drainage Reserve. The eastern Drainage Reserve has a further 3000+m² (excluding the proposed Bio 3 and Bio 4 areas) largely lacking KHT and canopy vegetation, and, available for consolidated revegetation with KHT species. These areas, proposed to protected and rehabilitated in the eastern Drainage Reserve, and the additional 5,682m² (as detailed in the JFP *Concept Rehabilitation Plan*) proposed for revegetation in the western Drainage Reserve, will adequately offset the koala habitat values lost.

In assessing the impact to *P. cinereus*, the current usage of the site needs to be taken into consideration in conjunction with potential future use by the species and movement through the site. It has been established through nine SAT surveys that *P. cinereus* use of the site is currently in very low numbers or not currently present. The site is also not considered to be significant to the species for through movement to other habitat areas, with few habitat opportunities to the north and west. The proposed development is therefore considered to present low or no impacts to the species the short-term and provide more habitat than currently mapped as MSES within the site in the long term, and, with connectivity to the Rural Zoned land to the east.

7. INFORMATION REQUEST ITEM 8 RESPONSE

Information Request Item 8 requests the consideration of a perimeter road along the southern boundary to facilitate the outcome sought under Performance Outcome PO44 as follows:

Example E44 nominates that reconfiguring a lot provides a road layout which includes a perimeter road that separates new lots from hazardous vegetation on adjacent lots. Further, Performance Outcome PO44 requires the road layout and design to support safe and efficient emergency services access to all lots, manoeuvring within the subdivision and the availability and maintenance of access routes for the purpose of safe evacuation. In acknowledging that the current proposal recommends the provision of a 16m asset protection zone in order to achieve the minimum separation distance, it is suggested that the applicant give further consideration to the provision of a perimeter road along the southern boundary of the development site (Lots 133 - 152). The provision of a perimeter road would facilitate the outcome sought under Performance Outcome PO44.

As identified in the JFP Urban Consultants *Bushfire Hazard Assessment* the 16m asset protection zone has been placed over lots 128 – 147 as a precaution. Discussed above in **Section 5** (refer overall Outcome b (i) Response), the vegetation to the rear of these lots, could be filtered out of the bushfire hazard assessment due to being less than 50m wide. As such, the vegetation is 'unlikely to support the full potential of a running fire front' (Leonard, J. & Opie, K, 2017). It has only been included as a 'least risk, least impact' approach due to the potential size of the *Eucalyptus pilularis* present (and potential limb fall) and areas of unmanaged understorey. As such, the threat from this vegetation is considered low.

Regardless of the low threat, while lots 140 – 147 are located on a cul-de-sac the following is noted:

- the maximum distance for evacuation to the north is under 150m,
- an existing gravel track adjacent rear boundaries (refer **Plate 15**) already provides separation from the vegetation and emergency access, and
- direct evacuation and emergency access via Raaen Road will be facilitated by a proposed easement over lot 147 and lot 148 (refer JFP *Reconfiguration Plan M2584P_DA1 R1 Issue F*) and the gravel track (refer **Plate 16**).

While the gravel track becomes less formed adjacent proposed lots 128 -139 the following is noted:

- the maximum distance for evacuation to the north away from this vegetation for these lots is 110m (with a choice of two routes) on a sealed public road,
- the JFP Urban Consultants *Bushfire Hazard Assessment* recommends the rear boundaries of the APZs over lots 128 – 147 APZs include a gate, and
- emergency services access to the APZs is supported via standard side boundary setbacks.

Accordingly, a perimeter road is considered unwarranted due to the low threat presented by the vegetation and emergency egress and access already facilitated through the proposed layout and existing tracks and public roads.

Should you have any further queries relating to the above please do not hesitate to contact the under signed.



Regards,

A handwritten signature in blue ink that reads 'Lucy Healing'.

Lucy Healing

Senior Ecologist

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Enclosed:

- Appendix A – JFP Reconfiguration Plan Reconfiguration Plan M2584P_DA1 R1 Issue F
- Appendix B – BioCondition Data Sheets

References:

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APPENDIX A

Development Layout

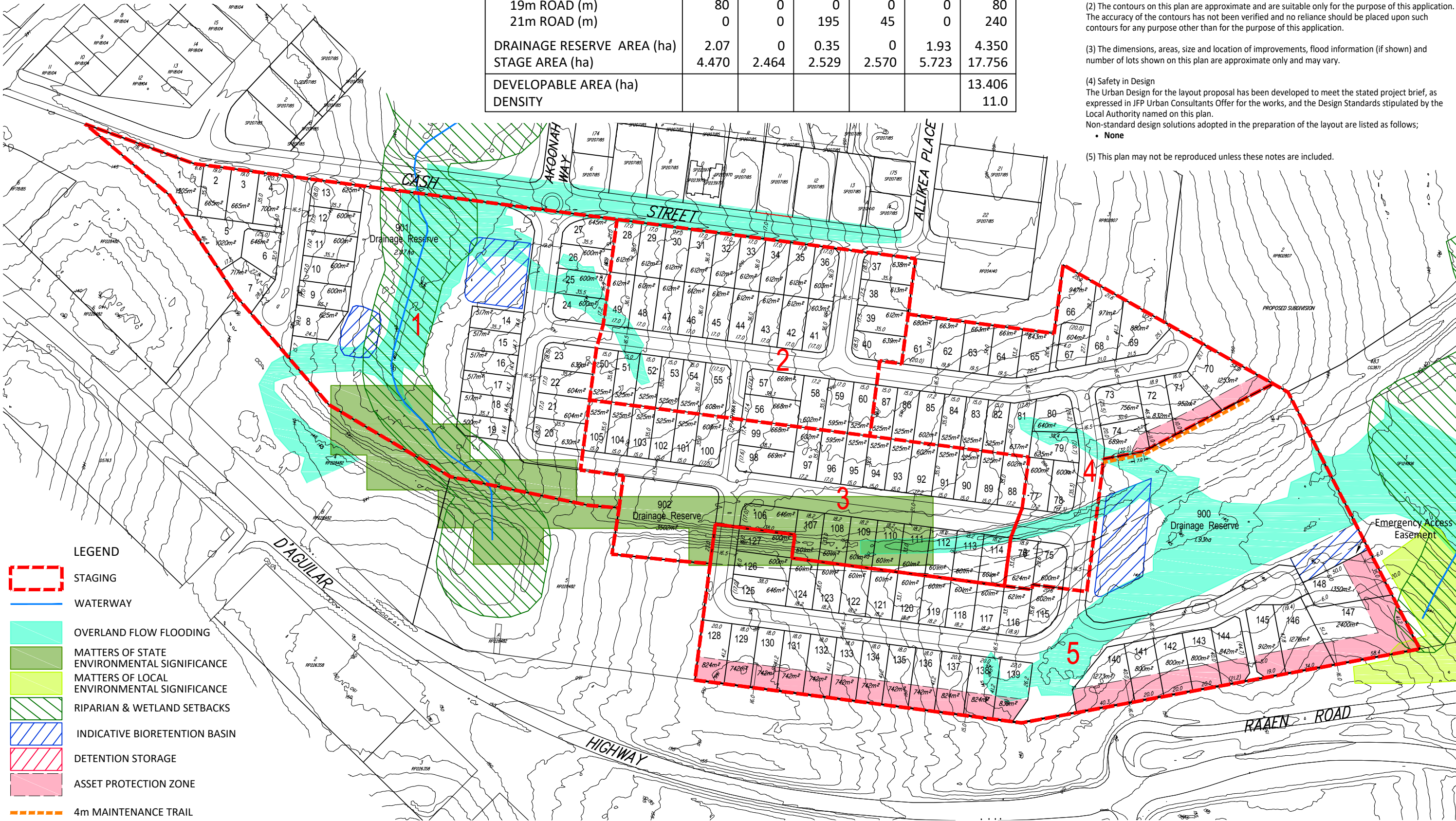
PROPERTY DESCRIPTION

LOT 1 ON RP230991 &
LOT 2 ON RP80309
PARISH OF DURUNDUR
COUNTY OF CANNING
TOTAL AREA 17.756ha

| STATISTICS | STAGE 1 | STAGE 2 | STAGE 3 | STAGE 4 | STAGE 5 | TOTAL |
|---------------------------------|---------|---------|---------|---------|---------|--------|
| NO. OF LOTS | 27 | 33 | 27 | 27 | 34 | 148 |
| LENGTH OF NEW 13.5m ROAD (m) | 30 | 0 | 105 | 0 | 0 | 135 |
| 16.5m ROAD (m) | 230 | 265 | 30 | 345 | 475 | 1345 |
| 19m ROAD (m) | 80 | 0 | 0 | 0 | 0 | 80 |
| 21m ROAD (m) | 0 | 0 | 195 | 45 | 0 | 240 |
| DRAINAGE RESERVE AREA (ha) | 2.07 | 0 | 0.35 | 0 | 1.93 | 4.350 |
| STAGE AREA (ha) | 4.470 | 2.464 | 2.529 | 2.570 | 5.723 | 17.756 |
| DEVELOPABLE AREA (ha) | | | | | | 13.406 |
| DENSITY | | | | | | 11.0 |

NOTES

- (1) This plan was prepared for the purpose and exclusive use of DFC (PROJECT MANAGEMENT) PTY LTD to accompany an application to MORETON BAY REGIONAL COUNCIL to Reconfigure the land described in the plan and is not to be used for any other purpose or by any other person or corporation. JFP URBAN CONSULTANTS PTY LTD accepts no responsibility for any loss or damage suffered howsoever arising to any person or corporation who may use or rely on this plan in contravention to the terms of this clause or clauses 2, 3, 4, 5 or 6 hereof.
- (2) The contours on this plan are approximate and are suitable only for the purpose of this application. The accuracy of the contours has not been verified and no reliance should be placed upon such contours for any purpose other than for the purpose of this application.
- (3) The dimensions, areas, size and location of improvements, flood information (if shown) and number of lots shown on this plan are approximate only and may vary.
- (4) Safety in Design
The Urban Design for the layout proposal has been developed to meet the stated project brief, as expressed in JFP Urban Consultants Offer for the works, and the Design Standards stipulated by the Local Authority named on this plan.
Non-standard design solutions adopted in the preparation of the layout are listed as follows;
• None
- (5) This plan may not be reproduced unless these notes are included.



LEGEND

- STAGING
- WATERWAY
- OVERLAND FLOW FLOODING
- MATTERS OF STATE ENVIRONMENTAL SIGNIFICANCE
- MATTERS OF LOCAL ENVIRONMENTAL SIGNIFICANCE
- RIPARIAN & WETLAND SETBACKS
- INDICATIVE BIORETENTION BASIN
- DETENTION STORAGE
- ASSET PROTECTION ZONE
- 4m MAINTENANCE TRAIL

NORTH:

SCALE:

SCALE: @ A3 1:2500

0 25 50 75 100 125 150 175

THIS SCALE SHOWN IS ORIGINAL DRAWING SCALE - (A3 SIZE)

DO NOT SCALE FROM THIS DRAWING - USE ONLY DIMENSIONS PROVIDED - IF IN DOUBT PLEASE ENQUIRE

| | | | | |
|----------|-----|----------|----|-----------------------------------|
| DESIGNED | TJM | CHECKED | GB | L.A. MORETON BAY REGIONAL COUNCIL |
| DRAWN | TJM | APPROVED | GB | COUNCIL REF |

ISSUES:

| | | | |
|--------|--|----------|-------|
| F | NEW APZ, EMT & MAINT TRAIL ADDED | 25-07-19 | SCP |
| E | LOTS 14 - 19 AMENDED | 08-07-19 | DWW |
| D | LOTS 14-19, 27 & ROUNDABOUT AMENDED | 28-06-19 | SCP |
| C | LAYOUT AMENDED | 30-05-19 | DWW |
| B | APZ, BIO BASINS & LOTS 148-149 AMENDED | 25-02-19 | SCP |
| A | ORIGINAL | 10-01-19 | TJM |
| ISSUE: | DETAILS: | DATE: | INIT: |

TITLE:

RECONFIGURATION PLAN
DFC (PROJECT MANAGEMENT) PTY LTD
CASH STREET, D'AGUILAR

DETAILS:

JOB NUMBER: M2584P_DA1 R1 F
PLAN: ISSUE:
SHEET: 1 OF 1
DATE: 25th July 2019

BRISBANE - SUNSHINE COAST - CENTRAL QLD
BRISBANE - JFP House
76 Ernest Street,
South Brisbane Qld 4101
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JFP URBAN CONSULTANTS PTY LTD A.C.N. 050 434 045

PLANNERS
URBAN DESIGNERS
SURVEYORS
ENGINEERS
LANDSCAPE ARCHITECTS

JFP
URBAN CONSULTANTS

APPENDIX B

Datasheets

QUADRAT 1

[illegible]

QUADRAT 2

[illegible]

QUADRAT 3

[illegible]

QUADRAT 4

[illegible]

| Weightings | | | | |
|------------|-----------|-----------|-----------|--|
| Woodland | Grassland | Shrubland | Mangroves | |
| 15 | 0 | 0 | 15 | |
| 5 | 0 | 0 | 5 | |
| 5 | 0 | 5 | 5 | |
| 5 | 0 | 0 | 5 | |
| | | | | |
| 5 | 0 | 5 | 5 | |
| | | | | |
| 5 | 0 | 0 | 5 | |
| | | | | |
| 5 | 0 | 0 | 5 | |
| 5 | 0 | 5 | 5 | |
| 5 | 5 | 5 | 0 | |
| 5 | 5 | 5 | 5 | |
| 10 | 10 | 10 | 10 | |
| 5 | 5 | 5 | 0 | |
| | | | | |
| 5 | 5 | 5 | 0 | |

| | | | | | | | | |
|------------------|--|--|--|----|----|----|----|--|
| | | | | | | | | |
| Total Site Score | | | | 80 | 30 | 45 | 65 | |
| Size of Patch | | | | 10 | 10 | 10 | 10 | |
| Context | | | | 5 | 5 | 5 | 5 | |
| Connection | | | | 5 | 5 | 5 | 5 | |

QUADRAT 5

Quadrat Length 50
Quadrat Width 20
Large Trees
Tree Canopy Height
Recruitment of Canopy Sp
Tree Canopy Cover

Shrub Cover %

Coarse Woody Debris

Native Plant Richness

Non-native Plant Cover
Ground Cover

| | | | | | | | | | | | | |
|---------------|-----------|---------|-----------|-----------|--------|-------------|----------|-------|------------|-----------|-----------|-----------|
| 50 | | | | | | Value NA | SubScore | Score | Weightings | | | |
| 20 | | | | | | | | | Woodland | Grassland | Shrubland | Mangroves |
| | | | | | | | | | 15 | 0 | 0 | 15 |
| | | | | | | | | | 5 | 0 | 0 | 5 |
| | | | | | | | | | 5 | 0 | 5 | 5 |
| | | | | | | 56.6 | 5 | 0 | 0 | 5 | | |
| | | | | | | 66.6 | | | | | | |
| Canopy | | Length | Subcanopy | | Length | | | | | | | |
| 50 | 44.7 | 5.3 | 49.3 | 35.8 | 13.5 | | | | | | | |
| 38 | 27.5 | 10.5 | 25.6 | 11 | 14.6 | | | | | | | |
| 26 | 13.5 | 12.5 | 7.3 | 4.3 | 3 | | | | | | | |
| | | 0 | 2.2 | 0 | 2.2 | | | | | | | |
| | | | | | 0 | | | | | | | |
| | | | | | 0 | | | | | | | |
| | Sub-total | 28.3 | | Sub-total | 33.3 | | | | | | | |
| | Total | 56.6 | | Total | 66.6 | | | | | | | |
| | | | | | | 9.4 | | | 5 | 0 | 5 | 5 |
| Shrub | | Length | | | | | | | | | | |
| 28.6 | 25.4 | 3.2 | | | | | | | | | | |
| 8.2 | 8 | 0.2 | | | | | | | | | | |
| 4.3 | 3 | 1.3 | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | Sub-total | 4.7 | | | | | | | | | | |
| | Total | 9.4 | | | | | | | | | | |
| | | | | | | | | | | | | |
| Length | | 2 | 0.5 | 0.5 | | | | | | | | |
| | | | | | | | | | | | | |
| Total Length | | 3 | | | | | | | | | | |
| Area | | 500 sqm | | | | | | | | | | |
| Multiplier | | 20 | | | | 60 | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | 4 | 5 | 0 | 0 | 5 | | |
| | | | | | | 7 | 5 | 0 | 5 | 5 | | |
| | | | | | | 5 | 5 | 5 | 5 | 0 | | |
| | | | | | | 12 | 5 | 5 | 5 | 5 | | |
| | | | | | | 45 | 10 | 10 | 10 | 10 | | |
| | | | | | | Average | | | | | | |
| native grass | 3 | 40 | 8 | 5 | 10 | 13.2 | | | 5 | 5 | 5 | 0 |
| native forbs | 25 | 5 | 20 | 8 | 0 | 11.6 | | | | | | |
| native shrubs | 0 | 0 | 0 | 0 | 1 | 0.2 | | | | | | |
| non-native g | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | |
| non-native fo | 0 | 0 | 0 | 0 | 1 | 0.2 | | | | | | |
| Litter | 67 | 55 | 70 | 87 | 88 | 73.4 | | | 5 | 5 | 5 | 0 |
| Rock | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | |

| | | | | | | | | | | | | | | |
|------------------|-----|-----|-----|-----|-----|-----|--|--|----|----|----|----|----|--|
| Bare ground | 5 | 0 | 2 | 0 | 0 | 1.4 | | | | | | | | |
| Cryptograms | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| Total | 100 | 100 | 100 | 100 | 100 | 100 | | | | | | | | |
| Total Site Score | | | | | | | | | | 80 | 30 | 45 | 65 | |
| Size of Patch | | | | | | | | | 10 | 10 | 10 | 10 | | |
| Context | | | | | | | | | 5 | 5 | 5 | 5 | | |
| Connection | | | | | | | | | 5 | 5 | 5 | 5 | | |

Quadrat Length
Quadrat Width
Large Trees
Tree Canopy Height
Recruitment of Canopy Sp
Tree Canopy Cover

 **Boronia Bay**
Regional Council

| | | | | | | | | |
|-------------------------|--|--|--|-----------|-----------|-----------|-----------|--|
| Total Site Score | | | | 80 | 30 | 45 | 65 | |
| Size of Patch | | | | 10 | 10 | 10 | 10 | |
| Context | | | | 5 | 5 | 5 | 5 | |
| Connection | | | | 5 | 5 | 5 | 5 | |

Quadrat Length
Quadrat Width
Large Trees
Tree Canopy Height
Recruitment of Canopy Sp
Tree Canopy Cover



Size of Patch
Context
Connection

| | | | | | | |
|--|--|--|----|----|----|----|
| | | | 10 | 10 | 10 | 10 |
| | | | 5 | 5 | 5 | 5 |
| | | | 5 | 5 | 5 | 5 |

QUADRAT 7

| | |
|----------------|----|
| Quadrat Length | 50 |
| Quadrat Width | 20 |

Large Trees
Tree Canopy Height
Recruitment of Canopy Sp
Tree Canopy Cover

Canopy
Sub-Canopy

| Canopy | | Length | Subcanopy | | Length |
|--------|------------------|--------|-----------|------------------|--------|
| 50 | 42 | 8 | 50 | 32.2 | 17.8 |
| 30.9 | 15.8 | 15.1 | 30.9 | 23.9 | 7 |
| 13 | 4 | 9 | 21.2 | 19.9 | 1.3 |
| | | 0 | 15 | 9.5 | 5.5 |
| | | | 6.1 | 3.6 | 2.5 |
| | | | | | 0 |
| | Sub-total | 32.1 | | Sub-total | 34.1 |
| | Total | 64.2 | | Total | 68.2 |

Shrub Cover %

| Shrub | | Length |
|-------|------------------|--------|
| 39.5 | 37.5 | 2 |
| 29.8 | 28.2 | 1.6 |
| 27.5 | 26.2 | 1.3 |
| 22.5 | 21.5 | 1 |
| 18.4 | 17.6 | 0.8 |
| 12.6 | 10 | 2.6 |
| 7.7 | 6 | 1.7 |
| 4 | 3.2 | 0.8 |
| 2.4 | 1.3 | 1.1 |
| | Sub-total | 12.9 |
| | Total | 25.8 |

Coarse Woody Debris

| | | | | | |
|---------------------|---------|-----|-----|---|-----|
| Length | 1 | 0.5 | 0.5 | 1 | 1.5 |
| | 5 | | | | |
| Total Length | 9.5 | | | | |
| Area | 500 sqm | | | | |
| Multiplier | 20 | | | | |

Native Plant Richness

Non-native Plant Cover

Ground Cover

| | 1 | 2 | 3 | 4 | 5 | Average |
|---------------|----|----|----|----|----|---------|
| native grass | 2 | 10 | 15 | 0 | 3 | 6 |
| native forbs | 0 | 3 | 0 | 0 | 5 | 1.6 |
| native shrubs | 0 | 0 | 15 | 0 | 2 | 3.4 |
| non-native g | 5 | 5 | 0 | 95 | 5 | 22 |
| non-native f | 10 | 0 | 0 | 0 | 15 | 5 |
| Litter | 73 | 80 | 68 | 5 | 70 | 59.2 |
| Rock | 0 | 0 | 0 | 0 | 0 | 0 |

| Value | SubScore | Score |
|-------|----------|-------|
|-------|----------|-------|

| | |
|----|------|
| NA | |
| | 100 |
| | 64.2 |
| | 68.2 |

25.8

NA

190

| | |
|---------------|----|
| Tree | 7 |
| Shrub | 7 |
| Grass | 8 |
| Forbs & Other | 19 |

5 Average

| Weightings | | | |
|------------|-----------|-----------|-----------|
| Woodland | Grassland | Shrubland | Mangroves |
| 15 | 0 | 0 | 1 |
| 5 | 0 | 0 | |
| 5 | 0 | 5 | |
| 5 | 0 | 0 | |
| | | | |
| | | | |
| 5 | 0 | 5 | |
| | | | |
| | | | |
| 5 | 0 | 0 | |
| | | | |
| 5 | 0 | 0 | |
| 5 | 5 | 5 | |
| 5 | 5 | 5 | |
| 10 | 10 | 10 | 1 |
| 5 | 5 | 5 | |
| | | | |
| 5 | 5 | 5 | |

| | | | | | | | | | | | | | | |
|------------------|-----|-----|-----|-----|-----|-------|--|--|----|----|----|----|----|--|
| Bare ground | 10 | 2 | 2 | 0 | | 3.5 | | | | | | | | |
| Cryptograms | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | |
| Total | 100 | 100 | 100 | 100 | 100 | 100.7 | | | | | | | | |
| Total Site Score | | | | | | | | | | 80 | 30 | 45 | 65 | |
| Size of Patch | | | | | | | | | 10 | 10 | 10 | 10 | | |
| Context | | | | | | | | | 5 | 5 | 5 | 5 | | |
| Connection | | | | | | | | | 5 | 5 | 5 | 5 | | |

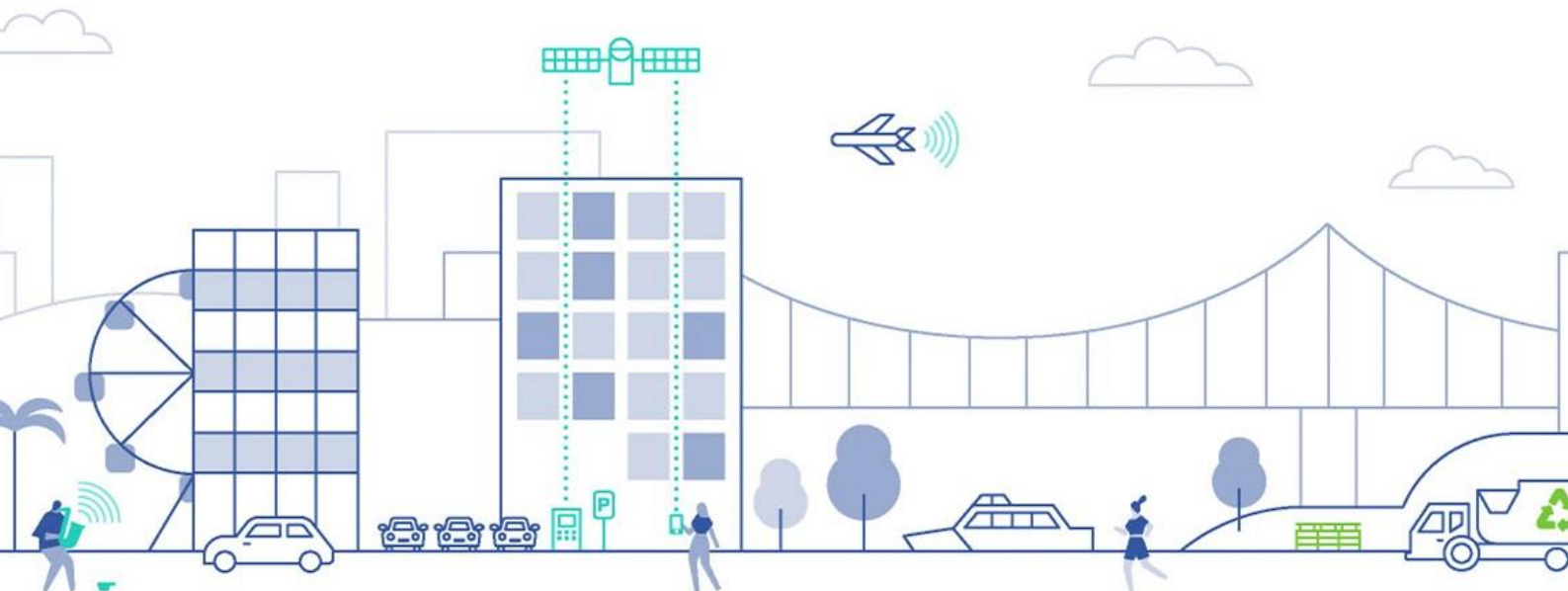


Traffic Engineering Report

Proposed Residential Subdivision

At 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar

On behalf of DFC (Project Management) Pty Ltd



About TTM

For 30 years, we've been at the centre of the Australian development and infrastructure industry. Our unique combination of acoustics, data, traffic and waste services is fundamental to the success of any architectural or development project.

We have over 50 staff, with an unrivalled depth of experience. Our industry knowledge, technical expertise and commercial insight allow us to deliver an exceptional and reliable service.

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Revision Record

| No. | Author | Reviewed/Approved | Description | Date |
|-----|--------------|--------------------------|---------------------------|----------|
| 1. | A. Stamatiou | | Draft DA Report | 30/01/19 |
| 2. | A. Stamatiou | D. Grummitt | Draft DA Report | 05/02/19 |
| 3. | A. Stamatiou | D. Grummitt (RPEQ 19356) | DA Report | 25/02/19 |
| 4. | A. Stamatiou | D. Grummitt (RPEQ 19356) | DA Report | 28/02/19 |
| 5. | A. Stamatiou | D. Grummitt (RPEQ 19356) | SARA RFI Response | 24/06/19 |
| 6. | N. Garvey | D. Grummitt (RPEQ 19356) | SARA RFI Response | 23/07/19 |
| 7. | A. Stamatiou | D. Grummitt (RPEQ 19356) | Updated SARA RFI Response | 21/08/19 |

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1 Introduction

1.1 Background

TTM Consulting has been engaged by DFC (Project Management) Pty Ltd to prepare a traffic engineering report investigating a proposed residential subdivision. It is understood that a Development Application has been lodged with Moreton Bay Regional Council with referral to State Assessment and Referral Agency (SARA).

This report incorporates a response to the information request letter (dated 9th August 2019) received from the Department of State Development, Manufacturing, Infrastructure and Planning, outlined in Section 1.3. The application reference is 1903-10276 SRA.

1.2 Scope

This report investigates the transport aspects associated with the proposed development. The scope of the transport aspects investigated includes:

- Internal road hierarchy to cater for lot access, vehicle design speeds and road user amenity requirements
- Internal road layout to provide efficient and safe internal manoeuvring for service vehicles
- Parking supply required to cater for development demand
- Identification of likely traffic volumes and traffic distribution from the future development
- Identification of likely traffic impact of development on the public road network
- Access to suitable level of public transport

To assess the proposed transport arrangements, the development plans have been assessed against the following guidelines and planning documents:

- MBRC Planning Scheme, specifically:
 - Integrated Transport Assessment PSP
 - Integrated Design PSP (Appendix A – Streets, Roads & Utilities)
- Department of Transport and Main Roads Guide ‘*Guide to Traffic Impact Assessment*’
- Queensland Complete Streets
- Queensland Streets

1.3 Further Advice Response

The traffic and transport issues raised in the state further advice letter dated 9th August 2019 are summarised below, with the response location provided.

| Advice Notice | Response Location |
|--|--|
| <p><u>Issue:</u></p> <p>The submitted Traffic Engineering Report (prepared by TTM, dated 23.07.19), has not sufficiently addressed SARA's information request. Further information is required to demonstrate that the proposed development can comply with the State Development Assessment Provisions (SDAP) State code 1: Development in a State-controlled Road Environment (specifically Table 1.2.1 and PO20-PO22), and not result in a worsening of operating conditions on the state-controlled road network.</p> <p>The following issues have been identified with the response to SARA's information request:</p> <ul style="list-style-type: none"> The Traffic Engineering Report has not been conducted in accordance with the Guide to Traffic Impact Assessment (GTIA). The applicant has not shown where the level of service goes from D to E, which is when the upgrade works needs to occur. The 42 seconds, where upgrades need to occur for safety reasons (page 50 of GTIA), is not the trigger for upgrade works to the intersection. Upgrade works are triggered when the level of service drops from level of service D to E. <p><u>Action:</u></p> <p>It is requested that a revised Traffic Engineering Report be submitted that addresses the above issues, provides an annotated concept plan detailing any necessary works and demonstrates that the works can be constructed by the applicant within the existing road reserve.</p> <p>The Traffic Impact Assessment is required to be certified by an RPEQ and be submitted in accordance with the Department of Transport and Main Roads' Guide to Traffic Impact Assessment (GTIA).</p> | <p>Section 5.6</p> <p>Section 5.6.3</p> <p>Section 5.6.3, Appendix D and Appendix E.</p> <p>Appendix C</p> |

1.4 Site Location

The site is located at 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar, as shown in Figure 1.1 and Figure 1.2. The property description is Lot 1 on RP230991 and Lot 2 on RP80309. Lot 1 has road frontage to Cash Street and is currently unoccupied. Lot 2 has road frontage to Raaen Road and D'Aguilar Highway and is occupied by an existing residential dwelling.

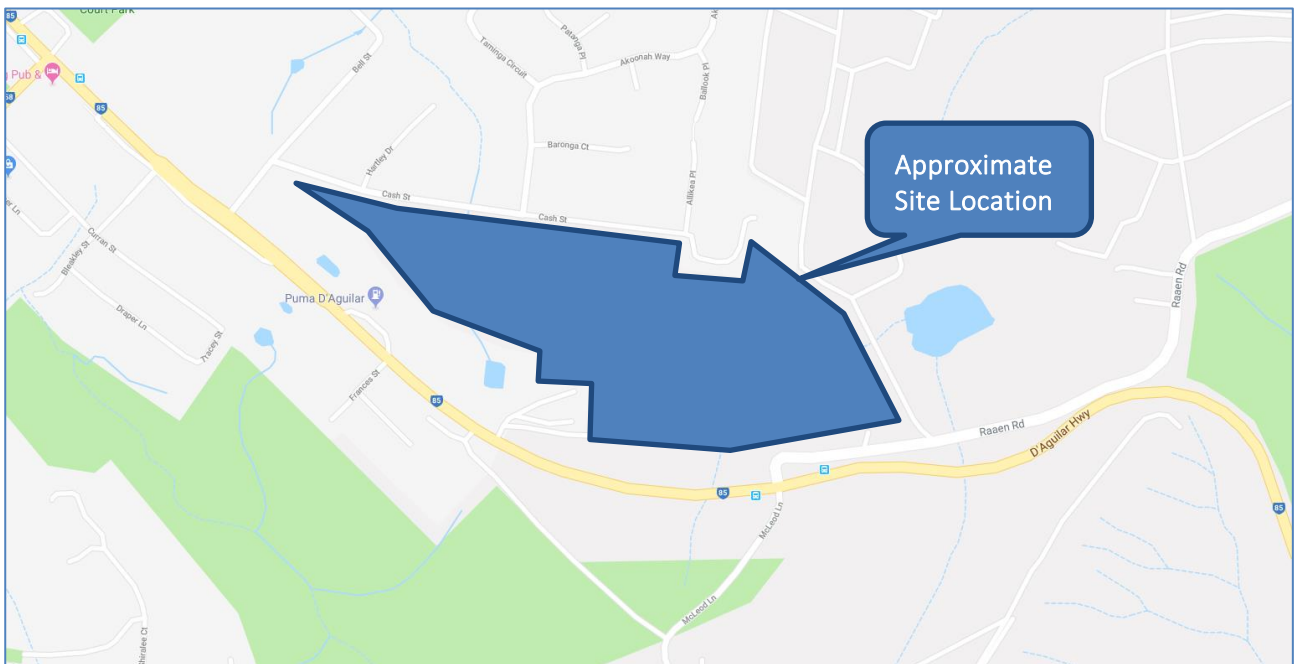


Figure 1.1: Site location (Source: Google Maps)



Figure 1.2: Site Area (Source: Nearmap)

1.5 Development Profile

The scheme consists of a multi-staged residential subdivision development. A summary of the proposed development is summarised in Table 1.1.

Table 1.1: Proposed Development Profile

| Stage | Lots |
|-------------------|------------|
| Stage 1 | 27 |
| Stage 2 | 33 |
| Stage 3 | 27 |
| Stage 4 | 27 |
| Stage 5 | 34 |
| Total Lots | 148 |

A copy of the subdivision plan, prepared by JFP Consultants, is included in **Appendix A**.

1.6 Development Access

All vehicular access between the existing public road network and the development is proposed via three access intersections to Cash Street, as depicted in Figure 1.3. These include:

- A western access forming a priority-controlled 'T' intersection with Cash Street;
- A central access that will form the fourth approach to the existing Cash Street/ Akoonah Way intersection. It is proposed that this intersection will be upgraded to a roundabout as part of the development; and
- An eastern access located to the west of the Cash Street/ Allikea Place intersection.

Further details regarding the proposed site access arrangements is included in Section 4.

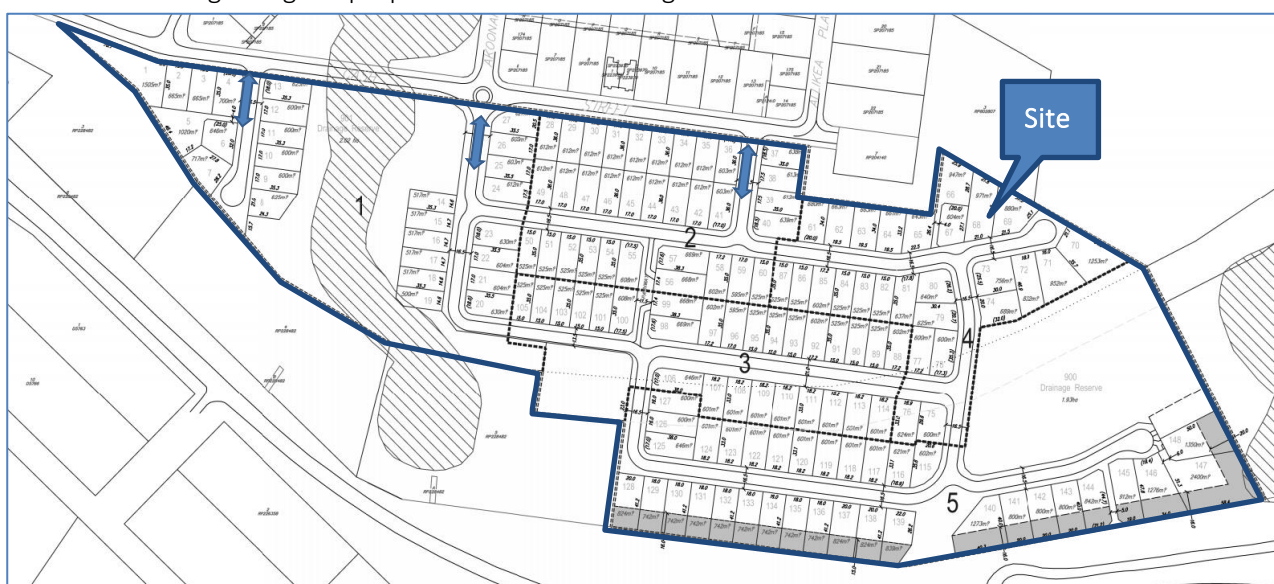


Figure 1.3: Site Access Locations

2 Existing Transport Infrastructure

2.1 The Road Network

The majority of roads in the immediate vicinity of the site are administered by Moreton Bay Regional Council, the exception being D'Aguilar Highway / Wood Street which is administered by the Department of Transport and Main Roads (DTMR). The hierarchy and characteristics of roads in the immediate vicinity of the site are shown below in Table 2.1.

Table 2.1: Local Road Hierarchy

| Road | Speed Limit | Lanes | Classification | Road Authority |
|--------------------------------|-------------|-----------------------------|----------------------|----------------|
| Cash Street | 50kph | 2 (undivided) | Local Collector Road | MBRC |
| Bell Street | 50kph | 2 (undivided) | Local Collector Road | MBRC |
| D'Aguilar Highway/ Wood Street | 60kph | 2 (undivided, plus parking) | State Arterial | DTMR |

Cash Street currently has a 17m wide road reserve width and is constructed with a sealed carriageway width of approximately 6m at the site frontage, with kerb and channel on the northern side. Cash Street is classed as a 'Living Residential' street, however, the section east of the Akoonah Way intersection is practically a local access street.

Cash Street currently terminates as a stub road along the extend of the eastern boundary. It is unlikely to be extended at this location due to the existing water reservoir, infrastructure and existing rural residential development approvals further to the east.

All of the intersections framing the wider development site are priority-controlled 'T' intersections.

2.2 Road Planning

As per Council pre-lodgement meeting minutes, the balance of Cash Street will be required to be constructed to suit a 17.0m wide Living Residential typology with an 8.0m carriageway. Whilst Council has requested that additional road reserve widening be provided, survey plans provided by JFP demonstrate that this is not required.

Review of the MBRC Local Government Infrastructure Plan (LGIP) mapping indicates that Council has no transport infrastructure upgrades planned in the local area that would impact the subject site or be impacted by the proposed development.

2.3 Public Transport, Pedestrian and Cyclist Facilities

Public Transport

Christensen's Bus and Coach currently operate bus route 895 along D'Aguilar Highway providing 5 services on weekdays and two services on Saturdays. On school holidays the weekday services are reduced to two per day. There are four existing bus stops that could potentially be used for the development including two stops adjacent the Raaen Road / McLeod Lane intersection near the south-east corner of the site and two

stops adjacent the Mt Mee Road intersection west of the site. Figure 2.1 below shows the location of these stops.

All four stops are rural in nature with no formal facilities such as seating, shelter or pedestrian paths.



Figure 2.1: Existing Public Transport Bus Stops (Source: Google Maps 2018)

Pedestrians and Cyclists

There are currently no formal cyclist facilities on Cash Street or any other roads in the vicinity of the site.

Formal pedestrian footpaths are located on one side of Bell Street (on the eastern side from D'Aguilar Highway to Cash Street) and Cash Street (along the northern side). Formal kerb ramps are provided at all road intersections.

Council's active transport network within the vicinity of the subject site, as shown in the MBRC Planning Scheme, is illustrated in Figure 2.2.

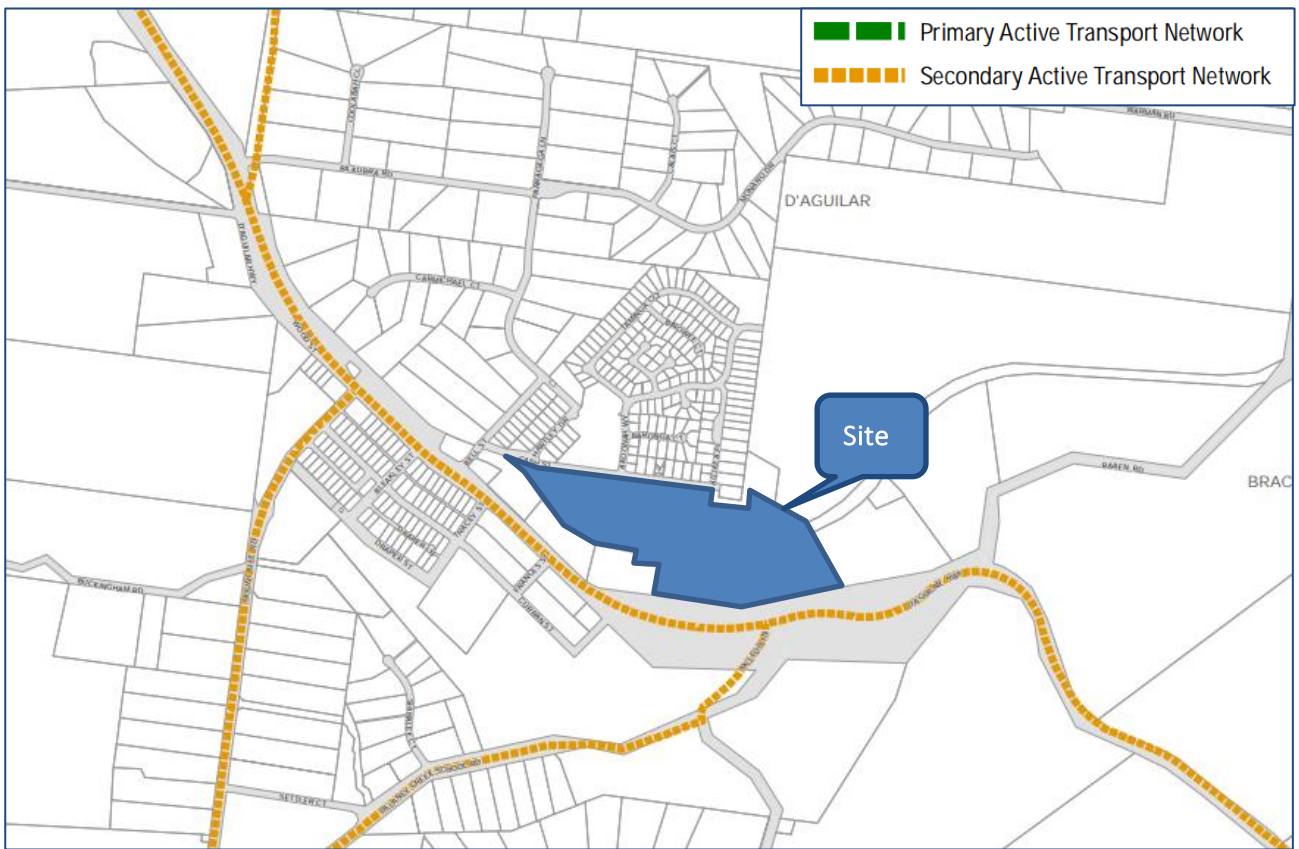


Figure 2.2: MBRC Planning Scheme Overlay Map – Active Transport (Source: MBRC Planning Scheme)

3 Internal Road Network

3.1 Internal Road Hierarchy

The site layout proposes three access points to Cash Street which service the development. Due to the development size, the initial section of the central access point features a 19.0m wide road reserve, which reduces to 16.5m. The proposed roads will function as 'Access Residential' roads, mostly with 16.5m wide road reserves, 8m carriageways and 4.25m verge widths.

3.2 Internal Road Design

It is noted that Council's PSP- Integrated Design- Appendix A stipulates internal roads to be 'Living Residential' typology as indicated in the pre-lodgement meeting minutes. While the roads are proposed as 'Access Residential', they are consistent with the required cross-section attributes described in the PSP, as well as existing streets in the surrounding area. The internal road designs are considered appropriate as they will be able to accommodate all required underground infrastructure without compromising road functions due to the only difference being in verge widths.

Therefore, the proposed internal road hierarchy is generally in accordance with Council's road typologies and is appropriate for the development.



Figure 3.1: Proposed Internal Road Hierarchy

The proposed development proposes a modified grid pattern for the majority of the site. Two cul-de-sac's are provided in the eastern side of the site, and one on the western side. As per pre-lodgement meeting minute notes, the cul-de-sac's have been utilised where no other appropriate access is available due to site constraints. This is also consistent with the development in the surrounding area and is considered suitable.

3.2.1 Priority Controlled Intersections

The proposed internal intersections are designed as priority controlled 'T' intersections. Traffic priority is to be provided with give-way conditions applied to approaches as shown in Figure 3.2.



Figure 3.2: Proposed Internal Road Priorities

3.2.2 Future Connection to Adjoining Development

Vehicular access for the future connection is intended to be provided for Lot 5 on RP228482 via the proposed road network in Stage 5 associated with land to the immediate west of the site.

Figure 3.3 outlines the future adjoining connection located immediately to the west of Stage 5. Additionally, it is noted that the cul-de-sac in Stage 1 can facilitate a possible future connection to the adjoining land via Lot 4 on RP228482.

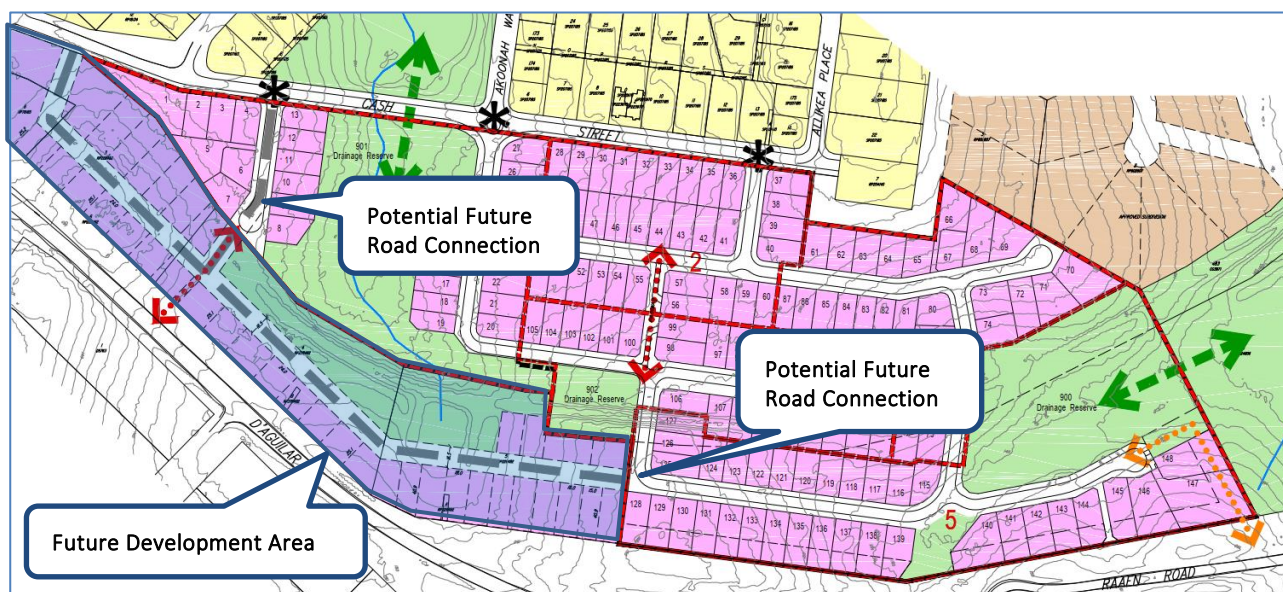


Figure 3.3: Future Connection to Adjoining Development

3.2.3 Structure Planning

A copy of the structure plan is provided in **Appendix B**.

The structure plan provides for the future road connections from the proposed internal road network to adjoining lots to the south west of the proposed development, namely Lot 6 on RP781185, Lot 3 on 228482 and Lot 5 on RP228482.

The proposed development provides a drainage reserve lot with open space corridor connectivity to existing mapped vegetation and drainage lines with the future adjoining lots.

3.3 Car Parking Arrangements

Council requires 1 parking space per dwelling and 1 on-street parking space per lot for lots with frontages greater than 12.5m. This equates to a minimum requirement of 148 parking spaces for the residential dwellings and 148 on-street parking spaces. It is expected that this minimum will be catered for within each dwelling via enclosed garages and driveways (minimum of 1 single garage per lot), as well as providing on-street parking within the road carriageway.

The on-street parking arrangements will be adequately catered for via the 8m carriageway, which can accommodate a 2-way traffic flow and parking on one side.

4 Site Access Arrangements

The development plan proposes three access intersections to Cash Street. These include:

- A western access forming a priority-controlled 'T' intersection;
- A central access forming a 4-way roundabout intersection; and
- An eastern access forming a priority-controlled offset cross intersection.

The adequacy of each access intersection is addressed in the following sections.

4.1 Intersection Sight Distance

The site access intersections have suitable sight distance, with the minimum requirements outlined in Austroads 'Guide to Road Design – Part 4A: Unsignalised & Signalised Intersections' for an intersection being achieved. Table 4.1 outlines the sight distance requirements and provisions confirmed by on-site inspection.

As such, the proposed intersection locations are anticipated to achieve sufficient motorist sight distances.

Table 4.1: Sight Distance Requirements & Measurements

| Access | Type | Requirement (at 60kph design speed) | Provision (m) | |
|----------------|---|-------------------------------------|---------------|--|
| | | | West | East |
| Western Access | Approach Sight Distance (ASD) | 73m | 74 | 440 |
| | Minimum Gap Sight Distance (MGSD) | 83m | 98 | 260 |
| | Safe Intersection Sight Distance (SISD) | 123m | 154 | 440 |
| Central Access | Approach Sight Distance (ASD) | 73m | 251 | 265 |
| | Minimum Gap Sight Distance (MGSD) | 83m | 260 | 265 |
| | Safe Intersection Sight Distance (SISD) | 123m | 282 | 265 |
| Eastern Access | Approach Sight Distance (ASD) | 73m | 464 | Clear to stub road (approx. 35m). Land appears to be generally flat and should achieve required sight distances. |
| | Minimum Gap Sight Distance (MGSD) | 83m | 464 | |
| | Safe Intersection Sight Distance (SISD) | 123m | 464 | |

4.2 Intersection Separation

The proposed western access intersection is located approximately 75m east of the existing Hartley Drive intersection and 170m west of the Akoonah Way intersection. This proposed intersection separation is appropriate and acceptable.

The proposed central access intersection aligns with the existing Akoonah Way intersection which does not change intersection separation.

The proposed eastern access intersection is located approximately 90m west of the existing Allikea Place intersection and approximately 200m east of the Akoonah Way intersection. This proposed intersection separation is appropriate and acceptable.

4.3 Intersection Configuration

Both the western access intersection and eastern access intersections should be provided as priority-controlled 'T' intersections with 'Give Way' control on the access road approaches.

The central access intersection, as indicated on the plan of development, should be provided as a single-lane roundabout intersection.

5 Traffic Impact Assessment

5.1 Scope

Three key intersections have been assessed for morning and afternoon peak hour periods, including:

- D'Aguilar Highway / Bell Street intersection
- Bell Street / Cash Street intersection
- Cash Street / Akoonah Way / Proposed Site Access Intersection

These intersections have been assessed based on the surveyed existing (2018) traffic demands, and estimated traffic demands at the assumed opening year of development (2021) and 10-year design horizon (2031). The D'Aguilar Highway intersection has been assessed for only the opening year scenario as required by DTMR's *Guide to Traffic Impact Assessment*.

5.2 Existing Traffic Volumes

5.2.1 Peak Hour

TTM conducted an intersection movement survey at the D'Aguilar Highway/ Bell Street intersection, from 07:00 to 09:00am and 14:00 to 18:00pm on Tuesday 4th December 2018. The peak hours were found to be 07:45 to 08:45am and 15:15 to 16:15pm. The results of the survey are shown below in Figure 5.1.

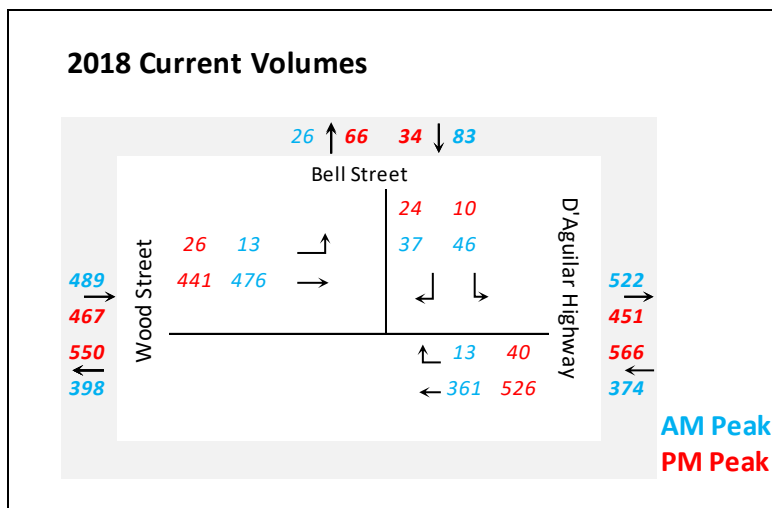


Figure 5.1: D'Aguilar Highway/ Cash Street Intersection Survey Results

The survey results indicate that the AM / PM peak hour traffic volumes on D'Aguilar Highway adjacent to the subject site are in the order of 890vph / 1,020vph. Heavy vehicles (i.e. non-car) on D'Aguilar Highway was approximately 10%.

5.2.2 Daily Traffic

Traffic surveys undertaken by TTM indicate two-way daily traffic volumes as indicated in Table 5.1.

Table 5.1: Existing Daily Traffic Volumes

| Road | Segment | Daily Volume (2-Way) |
|-------------------|-------------------------------|----------------------|
| D'Aguilar Highway | East and West of Intersection | 9,600vpd |
| Bell Street | North of Intersection | 1,050vpd |

5.3 Base Traffic Demands

To estimate future traffic demands in the absence of the proposed development a annual average compound traffic growth rate of 3% has been applied to the 2018 surveyed traffic volumes to obtain both opening year (2021) and 10-year design horizon (2031) demands.

This growth rate is based on Council's current population estimates of the expected growth within the Caboolture catchment, as well as historical traffic growth on D'Aguilar Highway over the last 10-years (as indicated from DTMR's AADT data for traffic count site 20853 and 20528).

The resulting Base traffic volume diagrams are shown in **Appendix D**.

5.4 Development Traffic

5.4.1 Estimated Development Traffic Generation

The RTA's *Guide to Traffic Generating Developments* details a recommended traffic generation rate of 0.85 trips per dwelling (peak hour) & 9 vehicles per day (daily traffic) for low/medium density residential developments. Based on application of these peak hour and daily traffic generation rates, the overall traffic generation of the development will be as shown in Table 5.2.

Table 5.2: Development Traffic Generation – Summary

| Land Use | Extent | Generation Rate | AM Peak Hour | PM Peak Hour | Daily |
|-------------|----------|-----------------------------|-------------------|-------------------|----------|
| Residential | 148 lots | 0.85vph / 9vpd per dwelling | 126vph (in + out) | 126vph (in + out) | 1,332vpd |

5.4.2 Estimated Development Traffic Distribution

Directional distribution of development traffic is assumed to be consistent with existing traffic distribution as exhibited in the traffic survey data. The following additional assumptions apply to identification of traffic distribution at the Bell Street / Cash Street intersection and at each of the proposed site access intersections to Cash Street:

- The directional split of vehicles at the respective intersections are as follows:
 - 15% of the surveyed traffic travels north and south on Bell Street, and the remaining 85% of traffic to / from Cash Street. This has been estimated based on the size of the existing catchment area of the residential dwellings that are expected to utilise Cash Street and Bell Street.

- 90% of the surveyed traffic on Cash Street travels to / from Akoonah Way, and the remaining 10% of traffic to / from Allikea Place. This has been estimated based on the size of the existing catchment area of the residential dwellings. It is noted that for the purposes of the assessment, vehicles travelling to / from Hartley Drive have been included travelling to / from Akoonah Way.
- 70% of development traffic travels to / from the central site access, with the remaining 30% to the eastern access.
- For the central site access analysis, the following has been applied:
 - The western access lots in Stage 1 has not been included. Similarly, the lots in Stage 2 with frontage to Cash Street have not been included in either the central or eastern site access analysis. The impact of traffic generated by these lots have been accounted for the assessment of the Cash Street / Bell Street intersection.
 - Development traffic for this access has been broken down into the following:
 - Stage 1 (less western access) = 14 lots
 - Stage 2 (45% expected to utilise central access) = 15 lots
 - Stage 3 (100% expected to utilise central access) = 27 lots
 - Stage 5 (75% expected to utilise central access) = 25 lots
- For the eastern site access, the following development traffic has been applied and broken down into:
 - Stage 2 (33% expected to utilise eastern access) = 9 lots
 - Stage 4 (100% expected to utilise eastern access) = 27 lots
 - Stage 5 (25% expected to utilise eastern access) = 9 lots

5.5 Project Traffic Demands

Traffic volume diagrams detailing the proposed developments traffic demands and the future year traffic demands are shown in **Appendix D**.

5.6 D'Aguilar Highway / Bell Street Intersection Assessment

5.6.1 Crash Data Analysis

Road crash data has been obtained from Queensland Government's *Queensland Globe* database. Data relating to crashes that have occurred within 100m of the D'Aguilar Highway / Bell Street intersection has been reviewed. Over the last 10 years four crashes have occurred all of which were associated with right turning vehicles at the intersection. Two of the crashes involved vehicles turning right into Bell Street from D'Aguilar Highway and two crashes involved vehicles turning right out of Bell Street. A summary of the crash data is below in Table 5.3.

Table 5.3: Summary of Crash Data (D'Aguilar Highway / Bell Street Intersection)

| Date | Crash Hour | Severity | Casualties | Type | DCA Code & Description |
|---------|------------|-------------------|-----------------------------------|---------------|--|
| 05/2015 | 8am | Medical treatment | 1 Medically treated | Multi-Vehicle | 104- Veh'S Adjacent Approach: Thru-Right |
| 12/2014 | 9am | Hospitalisation | 1 Hospitalised | Multi-Vehicle | 104- Veh'S Adjacent Approach: Thru-Right |
| 08/2012 | 11am | Fatal | 1 Fatality 2 Medically treated | Multi-Vehicle | 202- Veh'S Opposite Approach: Thru-Right |
| 05/2011 | 3pm | Hospitalisation | 1 Hospitalised | Multi-Vehicle | 202- Veh'S Opposite Approach: Thru-Right |

Review of historical imagery and data indicates that road safety improvements were undertaken along this section of D'Aguilar Highway at around early 2016. Improvements appear to have include a reduction in posted speed limit, from 80kph to 60kph, and other lane treatments at intersections.

The crash data indicates that there have been no recorded road crashes at the intersection since the above-mentioned road safety improvements were undertaken.

5.6.2 Turn Lane Warrant Analysis

A turn lane warrant analysis has been undertaken in accordance with DTMR's *Supplement to Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersection* (Aug 2014) to determine if turn treatment upgrades are required as a result of the proposed development.

Table 5.4 details the parameters and turn lane treatment types required without, and with, the proposed development for the 2021 scenario. The existing turn treatments at the intersection are a channelised right turn (CHR) and an auxiliary left turn lane (AUL(s)).

Table 5.4: Turn Lane Warrant Assessment – D'Aguilar Highway / Bell Street Intersection

| Bell Street Turn | Scenario | AM Peak Hour | | | PM Peak Hour | | |
|------------------|--------------|------------------|----------------|-----------|------------------|----------------|-----------|
| | | Q _{R/L} | Q _M | Treatment | Q _{R/L} | Q _M | Treatment |
| Right Turn | 2021 Base | 13 | 928 | CHR(s) | 40 | 1083 | CHR |
| | 2021 Project | 29 | 1083 | CHR | 92 | 1116 | CHR |
| Left Turn | 2021 Base | 13 | 520 | BAL | 26 | 482 | AUL(s) |
| | 2021 Project | 29 | 520 | AUL(s) | 60 | 482 | AUL(s) |

The assessment indicates that in the opening year (2021) scenario, the proposed development does not trigger a change to right and left turn lane treatment types.

5.6.3 SIDRA Analysis

The existing intersection configuration has been analysed for the 2021 traffic volume scenarios. Figure 5.2 shows the modelled intersection configuration.

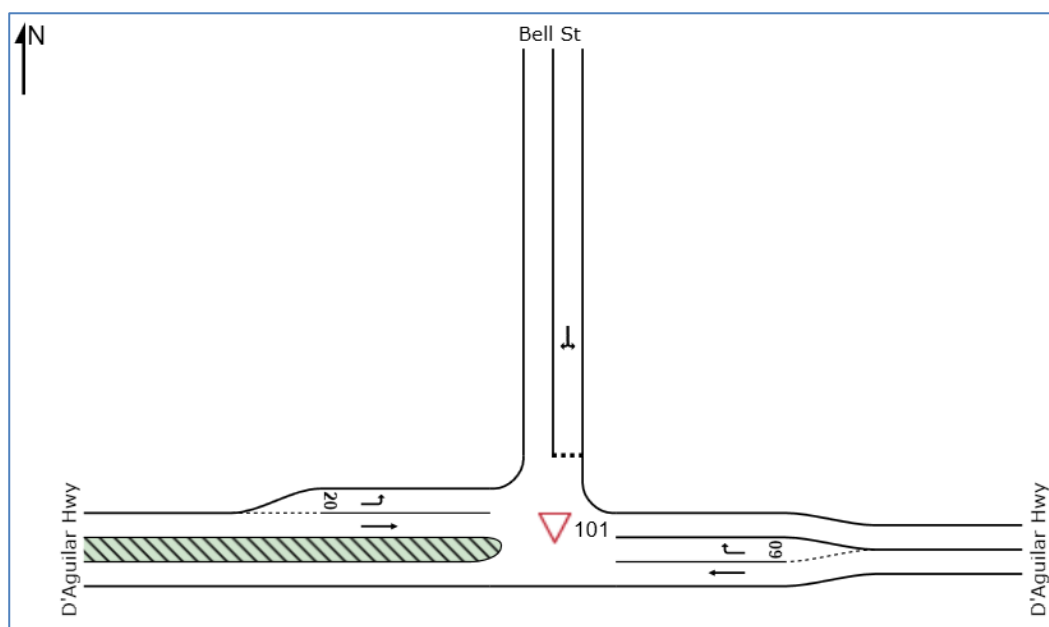


Figure 5.2: D'Aguilar Highway / Bell Street Intersection Layout

Table 5.5 summarises the analysis outputs. Detailed analysis output summaries are included in **Appendix E**.

Table 5.5: Summary of Sidra Outputs (D'Aguilar Highway / Bell Street Intersection)

| Case | Degree of Saturation | Worst Average Delay | Worst Level of Service | 95th Percentile Critical Queue (m) | | |
|--|----------------------|---------------------|------------------------|------------------------------------|-------|------|
| | | | | East | North | West |
| AM Survey Case 2018 | 27.4% | 19.9 sec | C | 0.5 | 5.5 | 0 |
| AM Base Case 2021 | 29.9% | 23.4 sec | C | 0.5 | 6.4 | 0 |
| AM Project Case 2021 – 60 dwellings | 37.2% | 26.4 sec | D | 0.7 | 11.2 | 0 |
| AM Project Case 2021 – 61 dwellings | 37.9% | 26.5 sec | D | 0.7 | 11.5 | 0 |
| AM Project Case 2021 – 148 dwellings (completed development) | 55.4% | 30.7 sec | D | 1.1 | 20.2 | 0 |
| PM Survey Case 2018 | 29.7% | 25.2 sec | D | 1.4 | 3.6 | 0 |
| PM Base Case 2021 | 32.5% | 30.6 sec | D | 1.5 | 4.3 | 0 |
| PM Project Case 2021 – 60 dwellings | 32.4% | 34.9 sec | D | 2.3 | 7.3 | 0 |
| PM Project Case 2021 – 61 dwellings | 32.4% | 35.0 sec | E | 2.3 | 7.3 | 0 |
| PM Project Case 2021 – 148 dwellings (completed development) | 47.1% | 43.2 sec | E | 3.5 | 13.3 | 0 |

As outlined in DTMR's *Guide to Traffic Impact Assessment*, the average delay metric is the key performance measure for priority-controlled intersections. It states that "where average peak hour delays for any turn

movement exceeds 42 seconds then the intersection should be upgraded for safety reasons where it is practical to do so.”

Further, TTM have been advised by DTMR that the trigger for upgrade requirements is the change from LOS D to LOS E, which corresponds to an average delay threshold of 35 seconds and 42 seconds respectively.

The analysis indicates that the existing intersection currently operates at a maximum average delay of 26 seconds (LOS D) during the PM peak hour period which occurs on the right turn from Bell Street into D’Aguilar Highway. The maximum for the opening year ‘without development’ scenario is calculated to be 31 seconds (LOS D). Both values are below the nominated 42 seconds and LOS D (35 seconds) thresholds.

The analysis demonstrates that the critical period in terms of average delay is the PM case. As indicated in Table 5.5 above, the additional traffic demands associated with 60 dwellings of the proposed development would result in a maximum average delay of 34.9 seconds (which equates to LOS D), on the right turn out of Bell Street, which is within the nominated 42 seconds and LOS D (35 seconds) thresholds. This indicates that no mitigating intersection upgrades are required to accommodate up to 60 dwellings of the development.

However, the additional traffic demands associated with the proposed development after the completion of 61 dwellings would result in a minimum average delay of 35 seconds (LOS E), which exceeds the nominated LOS D threshold. As such, the analysis indicates that an intersection upgrade is warranted prior to 61 residential dwellings of the development becoming operational.

Further analysis of a potential intersection upgrade has indicated that the introduction of a channelised left turn treatment on the D’Aguilar Highway western approach to the intersection would effectively mitigate the impact of the proposed development.

Figure 5.3 below presents the conceptual intersection configuration with the above-mentioned left turn treatment. Table 5.6 below summarises the SIDRA analysis results for the 2021 ‘with development’ traffic volume scenarios for the completed development. The analysis indicates that the average delay on the right turn movement from Bell Street into D’Aguilar Highway would be 31 seconds (with LOS D) which is well below the 42 second threshold and below LOS E, therefore the impact of the development would be mitigated.

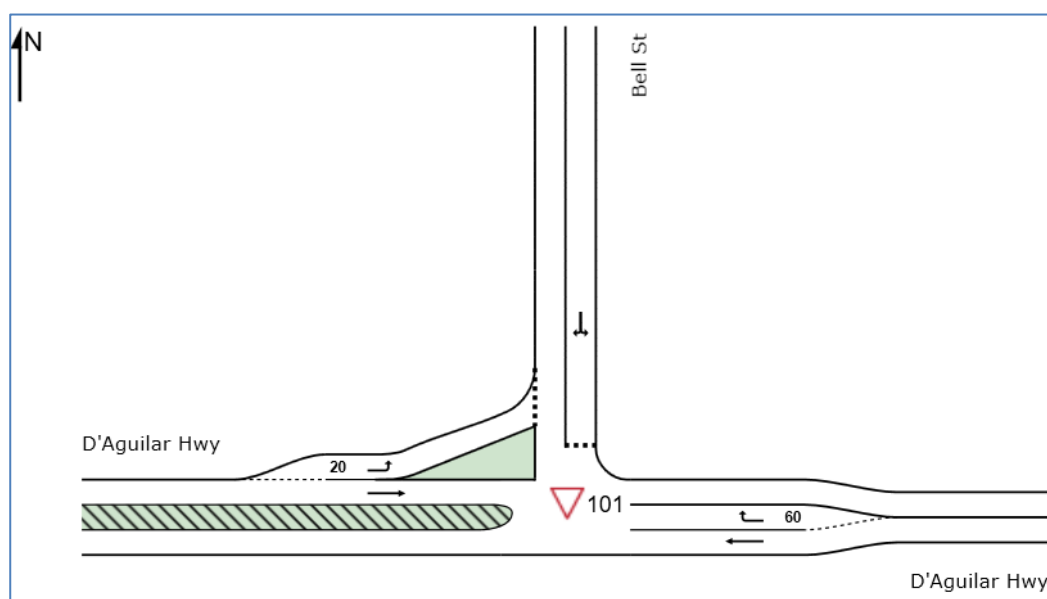


Figure 5.3: Recommended D'Aguilar Highway / Bell Street Intersection Layout

TTM has prepared a concept functional layout plan, drawing 18BRT0545-01B attached in **Appendix C**, of the associated works demonstrating the necessary construction works within the road reserve regarding the recommended intersection layout of D'Aguilar Highway and Bell Street.

Table 5.6: Summary of Sidra Outputs (D'Aguilar Highway / Bell Street Intersection - Upgrade)

| Case | Degree of Saturation | Worst Average Delay | Worst Level of Service | 95th Percentile Critical Queue (m) | | |
|---|----------------------|---------------------|------------------------|------------------------------------|-------|------|
| | | | | East | North | West |
| AM Project Case 2021– 148 dwellings (completed development) | 43.1% | 22.9 sec | C | 0.9 | 14.6 | 0.5 |
| PM Project Case 2021– 148 dwellings (completed development) | 35.4% | 30.9 sec | D | 2.8 | 9.6 | 1.2 |

5.6.4 Conclusion

Based on the above analysis, it is concluded that the existing D'Aguilar Highway / Bell Street intersection is adequate to accommodate 60 residential dwellings of the development and that the intersection should be upgraded prior to the completion of 61 residential dwellings with the upgrade including a change to the left turn treatment on the D'Aguilar Highway western approach to provide a high angle left turn treatment.

5.7 Bell Street / Cash Street Intersection Assessment

5.7.1 Turn Lane Warrant Analysis

A turn lane warrant analysis has been undertaken in accordance with DTMR's *Supplement to Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersection* (Aug 2014) to determine if the proposed development changes the intersection configuration that is required as part of the proposed development.

Table 5.7 details the parameters and turn lane treatment types required without, and with, the proposed development for the 2021 scenarios. The existing turn treatments at the intersection are a BAR and BAL.

Table 5.7: Turn Lane Warrant Assessment – Bell Street / Cash Street Intersection

| Cash Street Turn | Scenario | AM Peak Hour | | | PM Peak Hour | | |
|------------------|--------------|------------------|----------------|-----------|------------------|----------------|-----------|
| | | Q _{R/L} | Q _M | Treatment | Q _{R/L} | Q _M | Treatment |
| Right Turn | 2021 Base | 22 | 16 | BAR | 56 | 16 | BAR |
| | 2021 Project | 54 | 15 | BAR | 145 | 15 | BAR |
| Left Turn | 2021 Base | 0 | 12 | BAL | 0 | 5 | BAL |
| | 2021 Project | 0 | 12 | BAL | 0 | 5 | BAL |

The assessment indicates that for the opening year (2021) scenario, the proposed development does not trigger a change to right and left turn lane treatment types.

5.7.1 SIDRA Analysis

The existing intersection configuration has been analysed for the 2021 traffic volume scenario. Figure 5.4 shows the modelled intersection configuration.

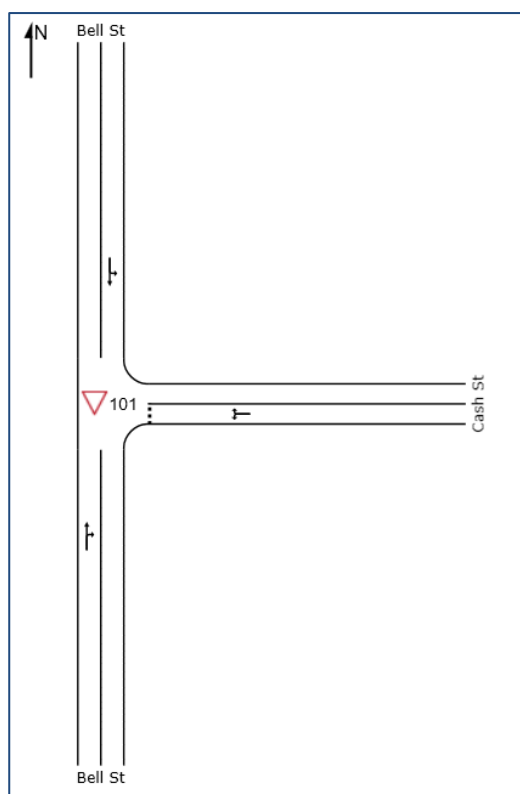


Figure 5.4: Bell Street / Cash Street Intersection Layout

Table 5.8 summarises the analysis outputs. Detailed analysis output summaries are included in **Appendix E**.

Table 5.8: Summary of Sidra Outputs (Bell Street / Cash Street Intersection)

| Case | Degree of Saturation | Worst Average Delay | Worst Level of Service | 95th Percentile Critical Queue (m) | | |
|----------------------|----------------------|---------------------|------------------------|------------------------------------|------|-------|
| | | | | South | East | North |
| AM Survey Case 2018 | 4.8% | 5.6 sec | A | 0.5 | 1.4 | 0 |
| AM Base Case 2021 | 4.8% | 5.6 sec | A | 0.5 | 1.4 | 0 |
| AM Project Case 2021 | 11.0% | 5.8 sec | A | 1.1 | 3.4 | 0 |
| AM Base Case 2031 | 4.8% | 5.6 sec | A | 0.5 | 1.4 | 0 |
| AM Project Case 2031 | 11.2% | 5.8 sec | A | 1.1 | 3.5 | 0 |
| PM Survey Case 2018 | 3.9% | 5.8 sec | A | 1.3 | 0.6 | 0 |
| PM Base Case 2021 | 3.9% | 5.8 sec | A | 1.3 | 0.6 | 0 |
| PM Project Case 2021 | 8.9% | 6.1 sec | A | 3.1 | 1.4 | 0 |
| PM Base Case 2031 | 3.9% | 5.8 sec | A | 1.3 | 0.6 | 0 |
| PM Project Case 2031 | 9.0% | 6.1 sec | A | 3.1 | 1.4 | 0 |

The analysis confirms that the intersection would have ample spare capacity at the 10-year design horizon of the proposed development with the highest degree of saturation being 11.2% (80% is typical maximum threshold) during the morning peak hour period and maximum average delay of only 6 seconds during the afternoon peak hour period. The impact of the proposed development is minor and insignificant.

5.7.2 Conclusion

Based on the above analysis, it is concluded that the existing Bell Street / Cash Street intersection configuration is adequate to accommodate the traffic demands associated with the proposed development up to the 10-year design horizon (2031).

5.8 Cash Street / Site Access / Akoonah Way Intersection Assessment

5.8.1 SIDRA Analysis

The existing intersection configuration has been analysed for the 2021 traffic volume scenario. Figure 5.5 shows the existing intersection configuration and Figure 5.6 shows the modelled intersection configuration for the 2021 and 2031 projects years.

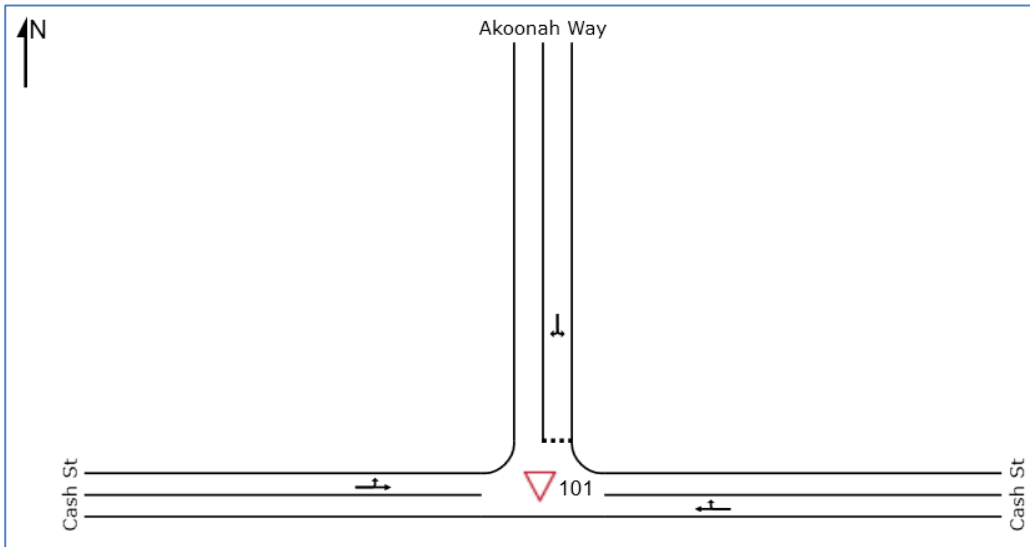


Figure 5.5: Existing Cash Street / Akoonah Way Intersection Layout

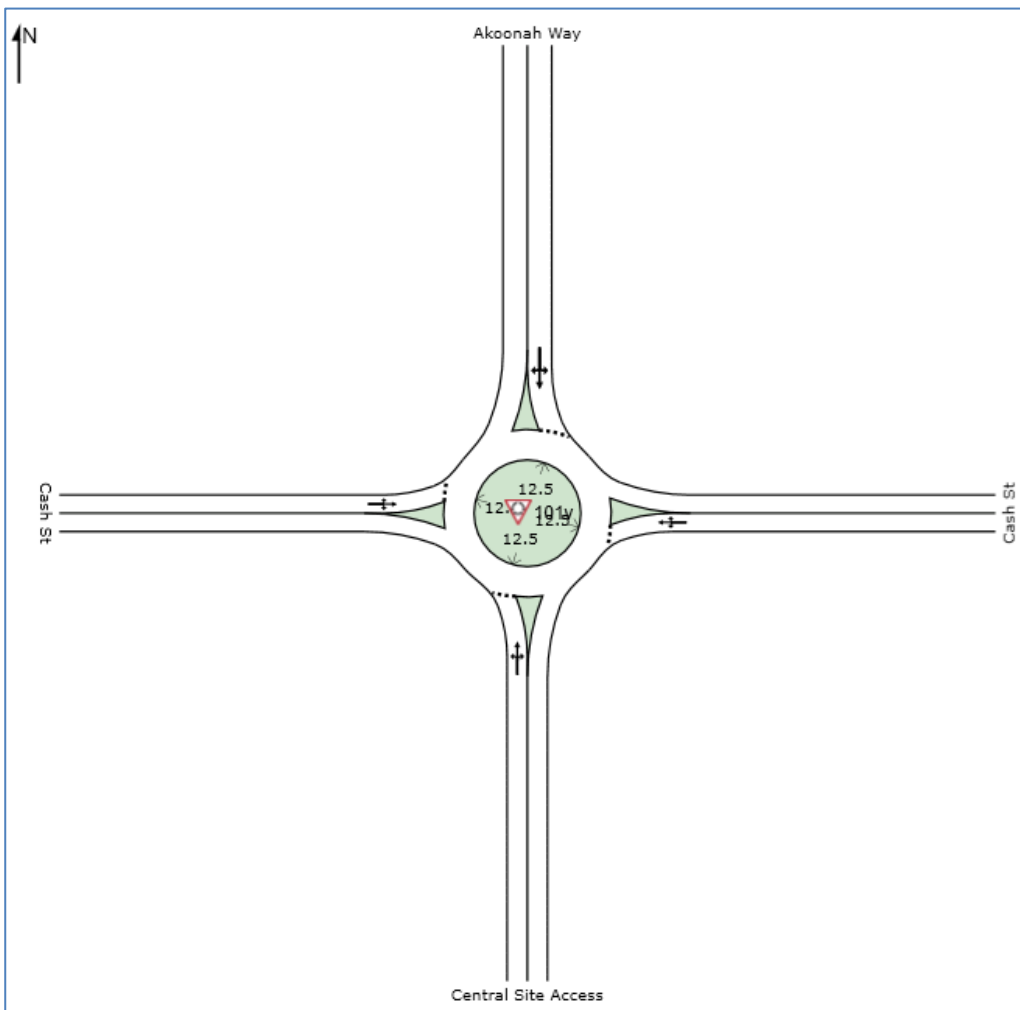


Figure 5.6: Proposed Cash Street / Site Access / Akoonah Way Intersection Layout

Table 5.9 summarises the analysis outputs. Detailed analysis output summaries are included in **Appendix E**.

Table 5.9: Summary of Sidra Outputs (Cash Street / Site Access / Akoonah Way Intersection)

| Case | Degree of Saturation | Average/ Worst Delay | Worst Level of Service | 95th Percentile Critical Queue (m) | | | |
|-----------------------------------|----------------------|-------------------------|------------------------|------------------------------------|------|-------|------|
| | | | | South | East | North | West |
| AM Survey Case 2018 | 5.3% | 5.0/5.5 sec | A | - | 0 | 1.2 | 0 |
| AM Base Case 2021 | 5.3% | 5.0/5.5 sec | A | - | 0 | 1.2 | 0 |
| AM Project Case 2021 (Roundabout) | 5.3% | 6.2/8.7 sec | A | 1.9 | 1.6 | 1.7 | 1.4 |
| AM Base Case 2031 | 5.3% | 5.0/5.5 sec | A | - | 0 | 1.2 | 0 |
| AM Project Case 2031 (Roundabout) | 5.3% | 6.2/8.7 sec | A | 1.9 | 1.6 | 1.7 | 1.4 |
| PM Survey Case 2018 | 3.2% | 5.0/5.5 sec | A | - | 0 | 0.5 | 0 |
| PM Base Case 2021 | 3.2% | 5.0/5.6 sec | A | - | 0 | 0.5 | 0 |
| PM Project Case 2021 (Roundabout) | 8.7% | 5.8/8.6 sec | A | 0.8 | 0.7 | 0.8 | 3.7 |
| PM Base Case 2031 | 3.2% | 5.0/5.6 sec | A | - | 0 | 0.5 | 0 |
| PM Project Case 2031 (Roundabout) | 8.7% | 5.8/8.6 sec | A | 0.8 | 0.7 | 0.8 | 3.7 |

The analysis confirms that the intersection would have ample spare capacity at the 10-year design horizon of the proposed development with the highest degree of saturation being 9% (80% is typical maximum threshold) during the afternoon peak hour period, and the impact of the proposed development is minor and insignificant.

5.8.2 Conclusion

Based on the above analysis, it is concluded that the proposed Cash Street / Site Access / Akoonah Way intersection configuration is adequate to accommodate the traffic demands associated with the proposed development up to the 10-year design horizon (2031).

6 Active Transport

6.1 Public Transport

The proposed development is likely to accommodate in the order of 400 persons which has the potential to generate considerable demand for public bus transport e.g. commuter and school-based travel.

As described in Section 2.3, the nearest existing bus stops to the development are located near the south-east corner of the site, adjacent the D'Aguilar Highway / Raaen Road intersection.

TTM has serious concern with the use of the southern bus stop by the proposed development. Review of the existing conditions at, and around, the bus stop indicates there is inadequate pedestrian facilities such as footpaths and road crossing facilities.

In particular, as depicted in Figure 6.1 below, there is an absence of a suitable crossing facility of D'Aguilar Highway to access the existing bus stop on the southern side of the road. Due to the horizontal and vertical alignment of D'Aguilar Highway, sight distance associated with pedestrians crossing the road is restricted.



Figure 6.1: Existing Conditions at D'Aguilar Hwy / Raaen Rd Intersection Bus Stops

Preliminary review indicates that, to facilitate safe pedestrian crossing of D'Aguilar Highway, a central median refuge may be necessary. The existing carriageway width is insufficient to accommodate such a refuge (minimum 2m width required) and provision of such would necessitate major construction works generally involving carriageway widening in both directions along D'Aguilar Highway. Such works are considered to be well beyond the scope of the proposed development and it would be unreasonable to condition such works on the developer.

In order to provide safe and efficient access to public bus transport it is recommended that:

- Pedestrian access between the south-east corner of the development and D'Aguilar Highway / Raaen Road is not provided; and
- A bus stop is provided on Cash Street located immediately west of the proposed roundabout access intersection on the southern side of the road (i.e. indented bus bay). Provision of such a facility would not only benefit the proposed development but would also provide more convenient access for the existing residential catchment to the north of Cash Street.

6.2 Pedestrian and Cyclist Provisions

All internal roads will provide pedestrian paths on at least one side of the roadway. No formal cycling facilities have been proposed as part of this development application, however, the internal roadways are provided with adequate width to accommodate shared on road cyclist needs for a low speed, low volume environment which is consistent with Council's road hierarchy and design guidelines.

All pedestrian site access is proposed via Cash Street.

7 Conclusions & Recommendations

7.1 Development Summary

The proposed development involves 148 residential dwelling allotments and three drainage reserve allotments. Each dwelling will provide a minimum of a single enclosed garage and one on-street parking space to ensure compliance with Council requirements.

7.2 Development Access

All vehicular access is proposed to occur on Cash Street via 2 priority-controlled 'T' intersections and 1 roundabout controlled intersection. The location and configuration of the proposed accesses is considered suitable and acceptable.

7.3 Development Design

The proposed layout of the internal road network is generally in accordance with Council's design standards and is suitable for the development.

7.4 Traffic Impacts

The potential impacts of the proposed development have been considered for the D'Aguilar Highway / Bell Street intersection, Bell Street / Cash Street intersection and the Cash Street / Akoonah Way / Proposed Central Access intersection.

The assessment indicates that upgrade of the D'Aguilar Highway / Bell Street intersection is warranted to mitigate the impacts of the development. The upgrade required includes a change in configuration of the left turn treatment on the D'Aguilar Highway western approach to include a high angle left turn treatment. This upgrade is only required prior to the completion of 61 residential dwellings (Stage 3) of the development i.e. no upgrade is required to accommodate Stages 1 & 2.

7.5 Active Transport Facilities

The proposed site provisions for pedestrian / bicycle facilities is considered adequate for the development.

Use of the existing bus stops, located adjacent the D'Aguilar Highway / Raaen Road intersection (south-east corner of the subject site), for the proposed development is problematic and potentially unsafe due to existing traffic conditions and the lack of appropriate pedestrian crossing facility of D'Aguilar Highway. It is recommended that a new bus stop be provided on Cash Street, immediately to the west of the proposed roundabout access intersection, to provide safe and convenient bus accessibility for the development.

Appendix A Proposed Site Plan

PROPERTY DESCRIPTION

LOT 1 ON RP230991 &
LOT 2 ON RP80309
PARISH OF DURUNDUR
COUNTY OF CANNING
TOTAL AREA 17.756ha

| STATISTICS | STAGE 1 | STAGE 2 | STAGE 3 | STAGE 4 | STAGE 5 | TOTAL |
|----------------------------|---------|---------|---------|---------|---------|--------|
| NO. OF LOTS | 27 | 33 | 27 | 27 | 34 | 148 |
| LENGTH OF NEW | | | | | | |
| 13.5m ROAD (m) | 30 | 0 | 105 | 0 | 0 | 135 |
| 16.5m ROAD (m) | 230 | 265 | 30 | 345 | 475 | 1345 |
| 19m ROAD (m) | 80 | 0 | 0 | 0 | 0 | 80 |
| 21m ROAD (m) | 0 | 0 | 195 | 45 | 0 | 240 |
| DRAINAGE RESERVE AREA (ha) | 2.07 | 0 | 0.35 | 0 | 1.93 | 4.350 |
| STAGE AREA (ha) | 4.470 | 2.464 | 2.529 | 2.570 | 5.723 | 17.756 |
| DEVELOPABLE AREA (ha) | | | | | | 13.406 |
| DENSITY | | | | | | 11.0 |

NOTES

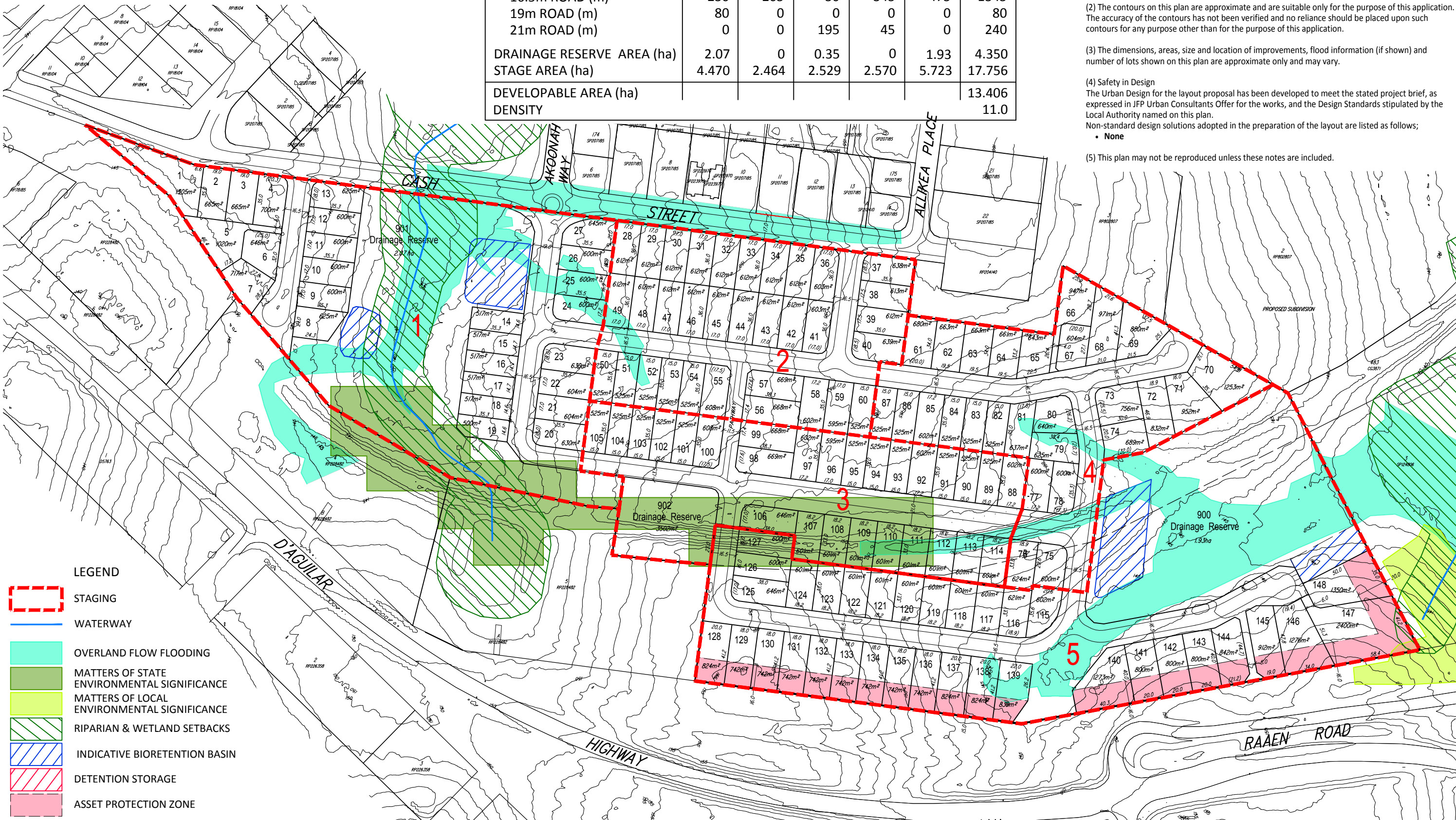
(1) This plan was prepared for the purpose and exclusive use of DFC (PROJECT MANAGEMENT) PTY LTD to accompany an application to MORETON BAY REGIONAL COUNCIL to Reconfigure the land described in the plan and is not to be used for any other purpose or by any other person or corporation. JFP URBAN CONSULTANTS PTY LTD accepts no responsibility for any loss or damage suffered howsoever arising to any person or corporation who may use or rely on this plan in contravention to the terms of this clause or clauses 2, 3, 4, 5 or 6 hereof.

(2) The contours on this plan are approximate and are suitable only for the purpose of this application. The accuracy of the contours has not been verified and no reliance should be placed upon such contours for any purpose other than for the purpose of this application.

(3) The dimensions, areas, size and location of improvements, flood information (if shown) and number of lots shown on this plan are approximate only and may vary.

(4) Safety in Design
The Urban Design for the layout proposal has been developed to meet the stated project brief, as expressed in JFP Urban Consultants Offer for the works, and the Design Standards stipulated by the Local Authority named on this plan.
Non-standard design solutions adopted in the preparation of the layout are listed as follows;
• None

(5) This plan may not be reproduced unless these notes are included.



- LEGEND
- STAGING
 - WATERWAY
 - OVERLAND FLOW FLOODING
 - MATTERS OF STATE ENVIRONMENTAL SIGNIFICANCE
 - MATTERS OF LOCAL ENVIRONMENTAL SIGNIFICANCE
 - RIPARIAN & WETLAND SETBACKS
 - INDICATIVE BIORETENTION BASIN
 - DETENTION STORAGE
 - ASSET PROTECTION ZONE

BRISBANE - SUNSHINE COAST - CENTRAL QLD
BRISBANE - JFP House
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South Brisbane Qld 4101
P 07 3012 0100 W www.jfp.com.au
JFP URBAN CONSULTANTS PTY LTD A.C.N. 050 414 045

PLANNERS
URBAN DESIGNERS
SURVEYORS
ENGINEERS
LANDSCAPE ARCHITECTS

Moreton Bay
Regional Council

NORTH:

SCALE: @ A3 1:2500

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| | | | | |
|----------|-----|----------|----|-----------------------------------|
| DESIGNED | TJM | CHECKED | GB | L.A. MORETON BAY REGIONAL COUNCIL |
| DRAWN | TJM | APPROVED | GB | COUNCIL REF |

| ISSUES: | | |
|---------|--|--------------|
| E | LOTS 14 - 19 AMENDED | 08-07-19 DWW |
| D | LOTS 14-19, 27 & ROUNDABOUT AMENDED | 28-06-19 SCP |
| C | LAYOUT AMENDED | 30-05-19 DWW |
| B | APZ, BIO BASINS & LOTS 148-149 AMENDED | 25-02-19 SCP |
| A | ORIGINAL | 10-01-19 TJM |
| ISSUE: | DETAILS: | DATE: INIT: |

TITLE:

RECONFIGURATION PLAN
DFC (PROJECT MANAGEMENT) PTY LTD
CASH STREET, D'AGUILAR

DETAILS:

JOB NUMBER: M2584P_DA1 R1 E

PLAN: ISSUE:

SHEET: 1 OF 1

DATE: 8th July 2019

Appendix B Structure Plan

PROPERTY DESCRIPTION
LOT 1 ON RP230991 &
LOT 2 ON RP80309
PARISH OF DURUNDUR
COUNTY OF CANNING
TOTAL AREA 17.756ha

NOTES

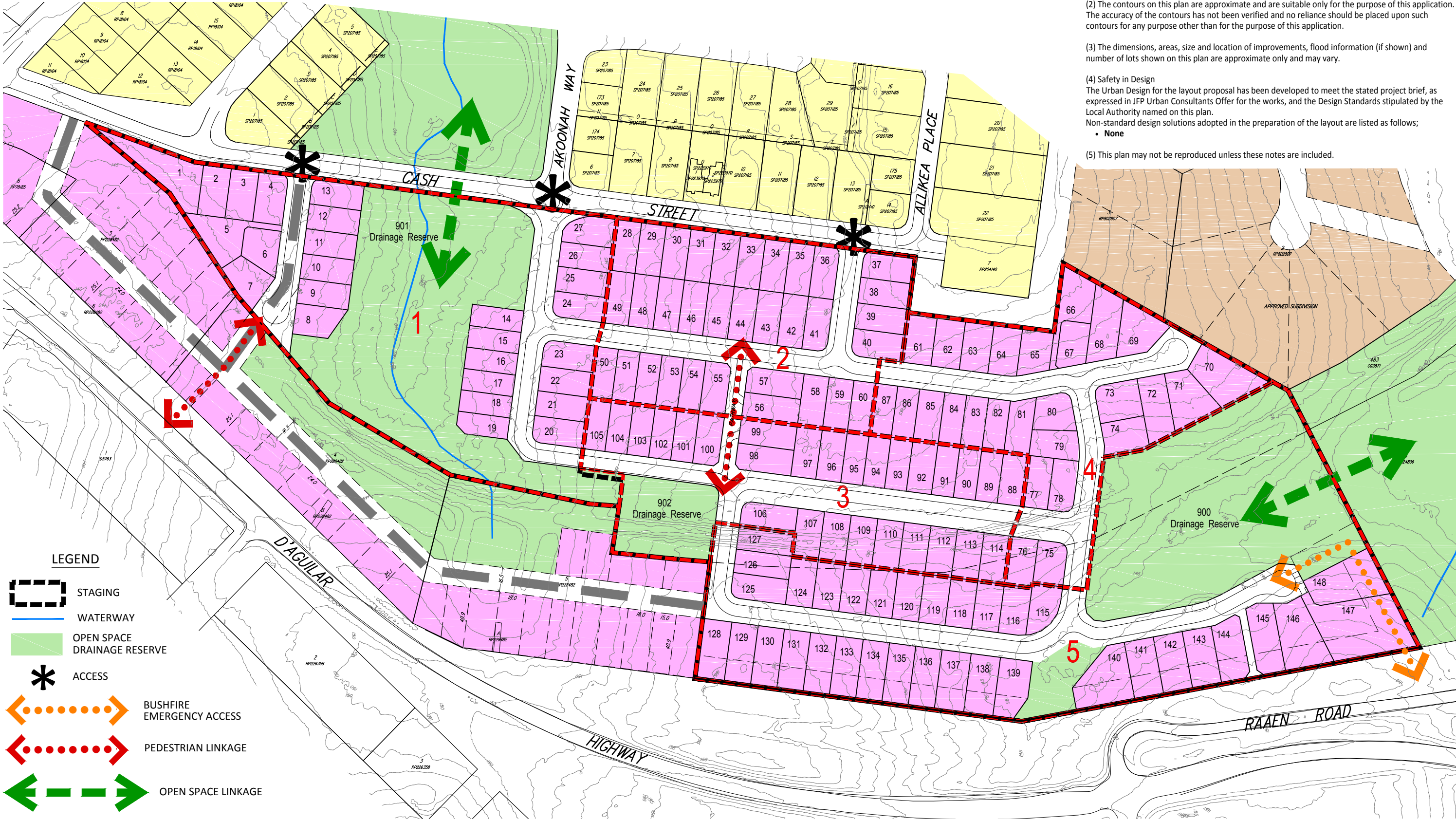
(1) This plan was prepared for the purpose and exclusive use of DFC (PROJECT MANAGEMENT) PTY LTD to accompany an application to MORETON BAY REGIONAL COUNCIL to Reconfigure the land described in the plan and is not to be used for any other purpose or by any other person or corporation. JFP URBAN CONSULTANTS PTY LTD accepts no responsibility for any loss or damage suffered howsoever arising to any person or corporation who may use or rely on this plan in contravention to the terms of this clause or clauses 2, 3, 4, 5 or 6 hereof.

(2) The contours on this plan are approximate and are suitable only for the purpose of this application. The accuracy of the contours has not been verified and no reliance should be placed upon such contours for any purpose other than for the purpose of this application.

(3) The dimensions, areas, size and location of improvements, flood information (if shown) and number of lots shown on this plan are approximate only and may vary.

(4) Safety in Design
The Urban Design for the layout proposal has been developed to meet the stated project brief, as expressed in JFP Urban Consultants Offer for the works, and the Design Standards stipulated by the Local Authority named on this plan.
Non-standard design solutions adopted in the preparation of the layout are listed as follows;
• None

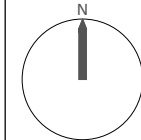
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LEGEND

- STAGING
- WATERWAY
- OPEN SPACE DRAINAGE RESERVE
- ACCESS
- BUSHFIRE EMERGENCY ACCESS
- PEDESTRIAN LINKAGE
- OPEN SPACE LINKAGE

NORTH:



SCALE:

SCALE: @ A3 1:2500
0 25 50 75 100 125 150 175

THIS SCALE SHOWN IS ORIGINAL DRAWING SCALE - (A3 SIZE)
DO NOT SCALE FROM THIS DRAWING - USE ONLY DIMENSIONS PROVIDED - IF IN DOUBT PLEASE ENQUIRE

| | | | | |
|----------|-----|----------|----|-----------------------------------|
| DESIGNED | TJM | CHECKED | GB | L.A. MORETON BAY REGIONAL COUNCIL |
| DRAWN | TJM | APPROVED | GB | COUNCIL REF |

ISSUES:

| | | | |
|--------|--------------------|----------|-------|
| C | LOT LAYOUT UPDATED | 19-07-19 | DWW |
| B | LOT LAYOUT UPDATED | 28-06-19 | SCP |
| A | ORIGINAL | 22-02-19 | SCP |
| ISSUE: | DETAILS: | DATE: | INIT: |

TITLE:

STRUCTURE PLAN
DFC (PROJECT MANAGEMENT) PTY LTD
CASH STREET, D'AGUILAR

DETAILS:

| | | |
|----------------|-------|--------|
| JOB NUMBER: | PLAN: | ISSUE: |
| M2584P | 03 | C |
| SHEET: | | |
| 1 OF 1 | | |
| DATE: | | |
| 19th July 2019 | | |

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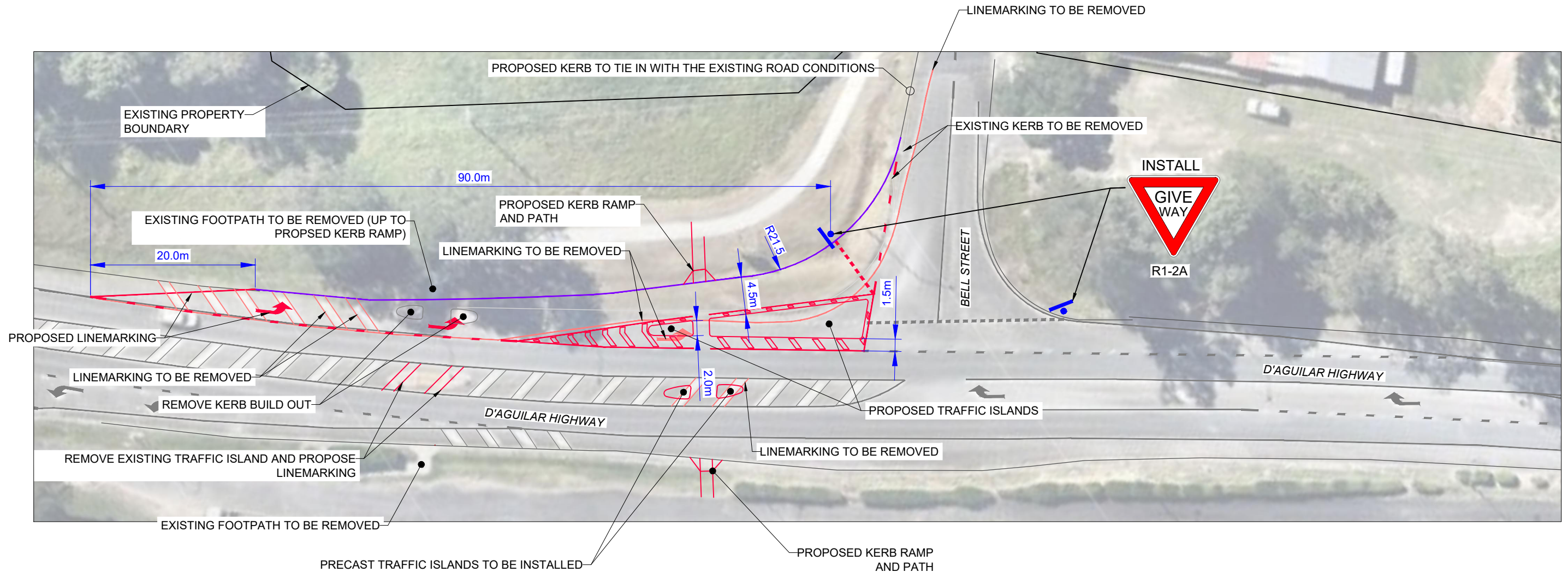
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URBAN DESIGNERS
SURVEYORS
ENGINEERS
LANDSCAPE ARCHITECTS

JFP
URBAN CONSULTANTS

Moreton Bay
Regional Council

Appendix C D'Aguilar Highway and Bell Street Preliminary Functional Layout

\\synergy\projects\18b\18b0545 22-80 cash street & 1901 d'aguiar highway, d'aguiar hwy - plans\19 08 16\18b0545-01b.dwg



NOTES

- 1. THIS IS A CONCEPT DESIGN THAT IS FOR REVIEW PURPOSES.
- 2. ALL EXISTING LINE MARKING IS BASED OF A NEAR MAP IMAGE AND IS SUBJECT TO DETAILED SURVEY INFORMATION.
- 3. ALL DIMENSIONS ARE IN METERS.
- 4. ALL LINE SIGNS AND LINE MARKINGS TO BE INSTALLED IN ACCORDANCE WITH M.U.T.C.D STANDARDS - PART 2.
- 5. PROPOSED KERB RAMP DESIGNED TO MORETON BAY REGIONAL COUNCIL STANDARD DRAWINGS

PRELIMINARY
ADVICE ONLY
20 August 2019

| REV. | DATE | AMENDMENT DESCRIPTION | DRAWN | CHECKED | APPROVED |
|------|----------|-----------------------|-------|---------|----------|
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| A | 07-06-19 | ORIGINAL ISSUE | ST | AS | DG |

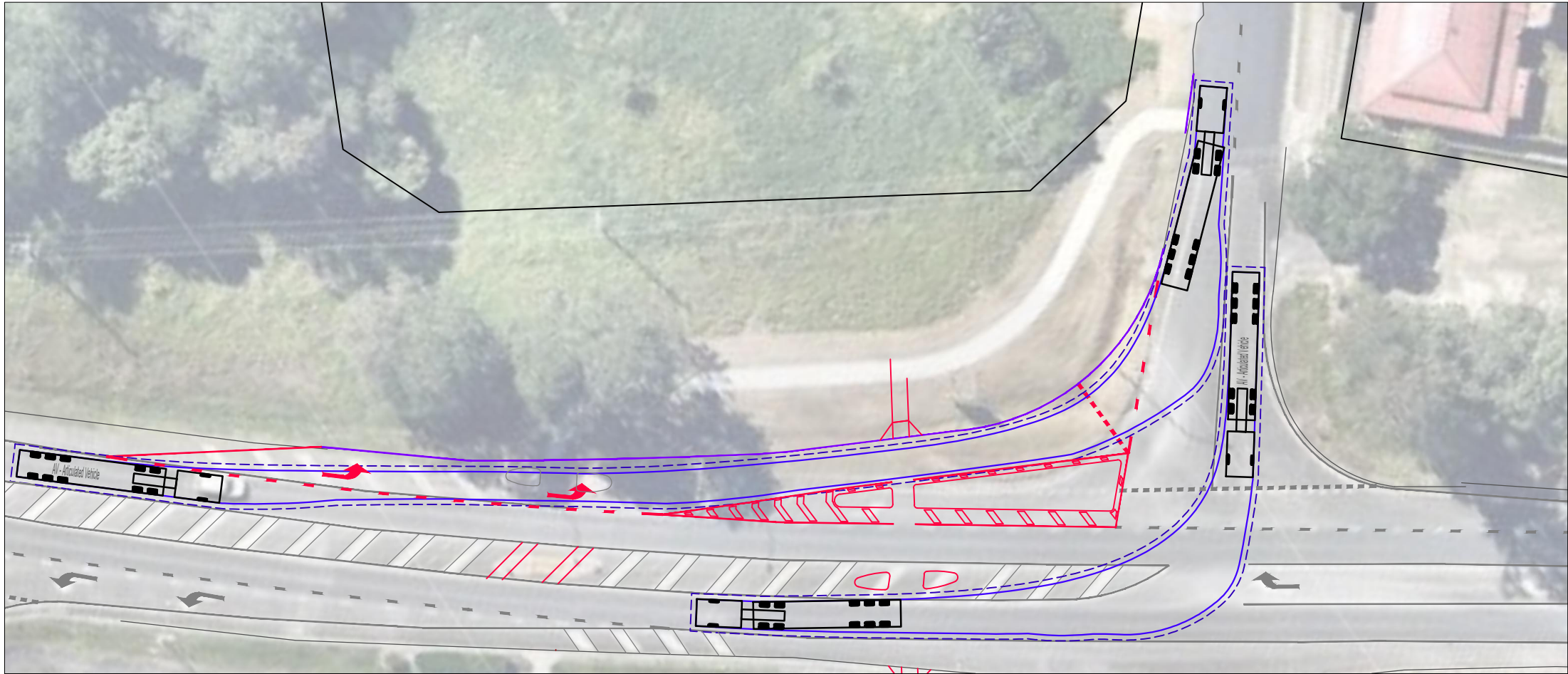
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|---|-------|----------------------------------|



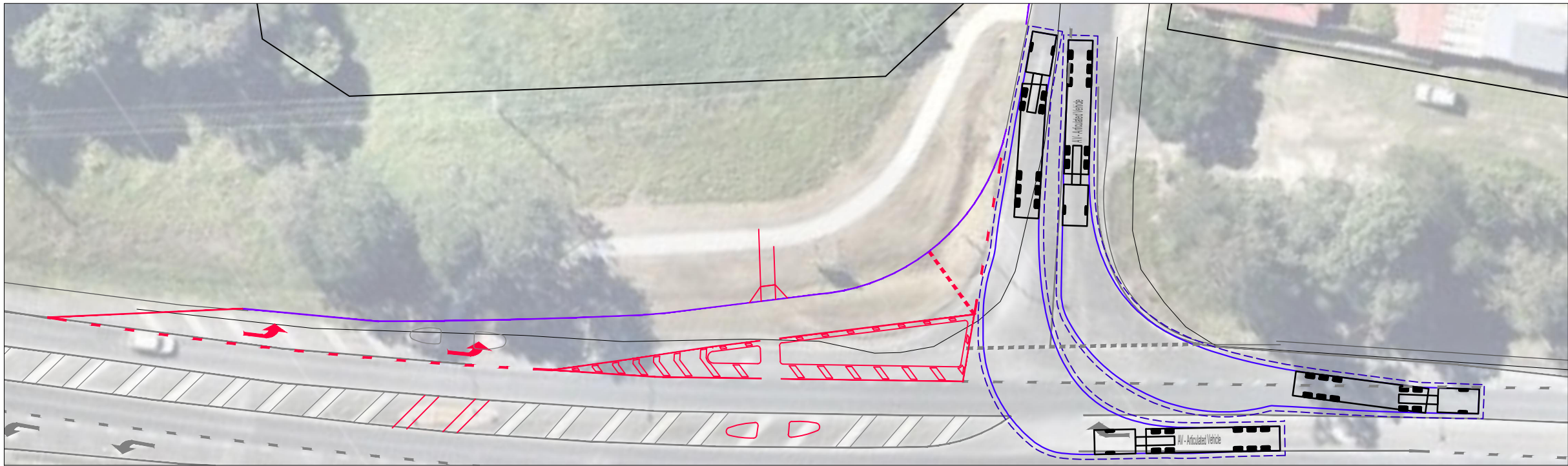
TTM CONSULTING PTY LTD
ABN 65 010 868 621
LEVEL 8, 369 Ann Street, BRISBANE, QLD, 4000
P.O. BOX 12015, BRISBANE, QLD, 4003
T: (07) 3327 9500 F: (07) 3327 9501
E: ttmbri@ttmgroup.com.au W: www.ttmgroup.com.au

| | |
|--|--------------------------------|
| PROJECT 22-80 CASH STREET AND 1901 D'AGUILAR HIGHWAY, D'AGUILAR HIGWAY | PROJECT NUMBER 18BRT0545 |
| DRAWING TITLE D'AGUILAR HIGHWAY AND BELL STREET INTERSECTION UPGRADE PRELIMINARY FUNCTIONAL LAYOUT | DRAWING NUMBER 18BRT0545-01 |
| | DATE 20 Aug 2019 |

| | |
|---------------------|---------------|
| ORIGINAL SIZE A3 | REVISION B |
| SHEET 1 OF 1 | |



AV - LEFT IN / RIGHT OUT MANOEUVRE



AV - RIGHT IN / LEFT OUT MANOEUVRE

**PRELIMINARY
ADVICE ONLY**
20 August 2019

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| A | 07-06-19 | ORIGINAL ISSUE | ST | AS | DG |

| | | | | | | |
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| NORTH | | | | | | |
| CLIENT | DFC (Services) Pty Ltd | | | | | |



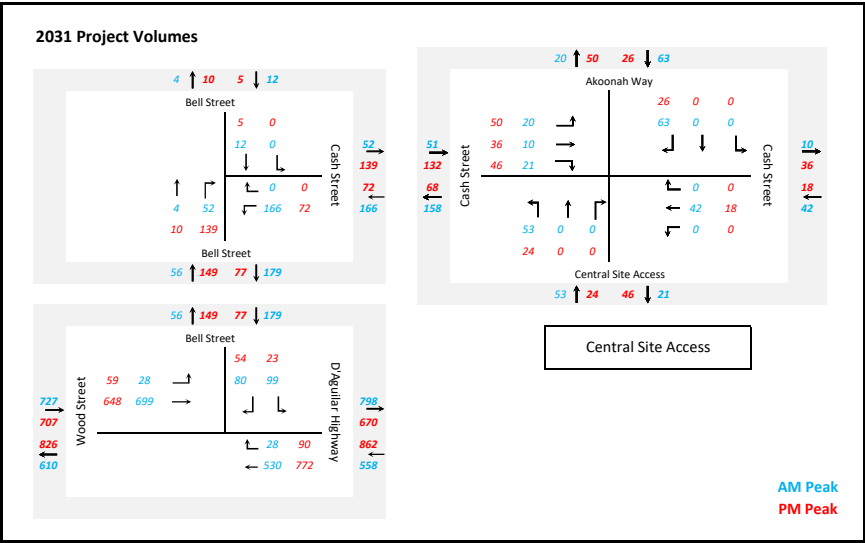
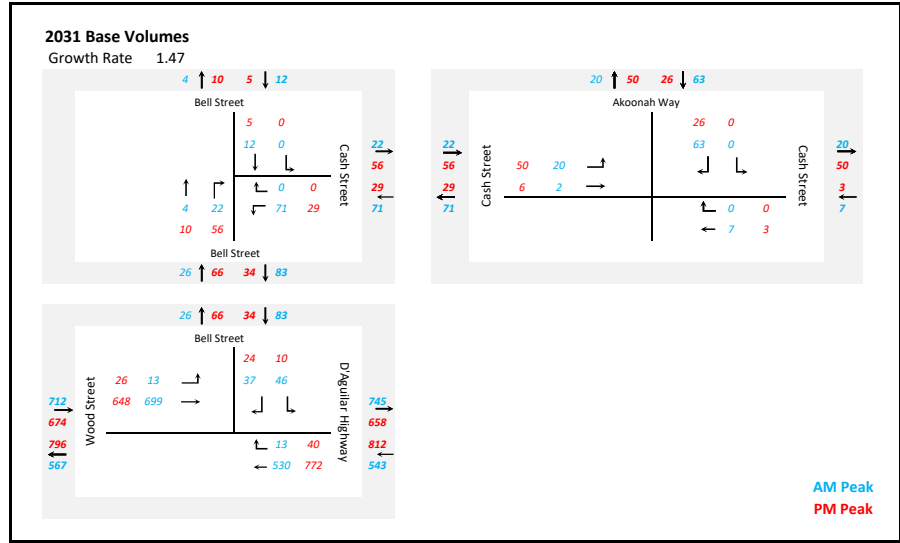
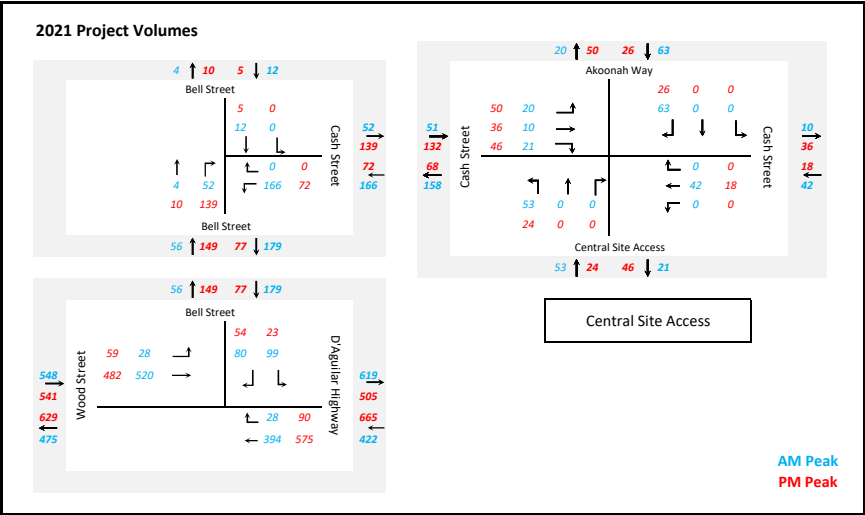
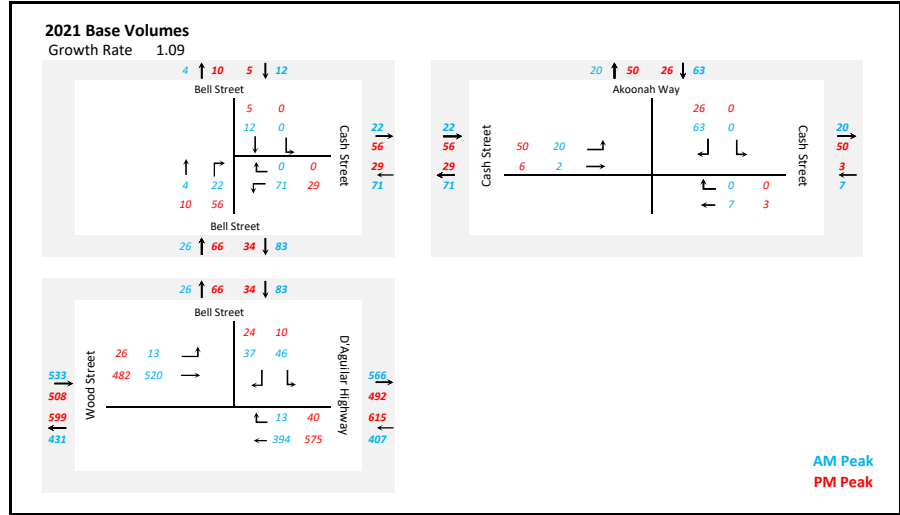
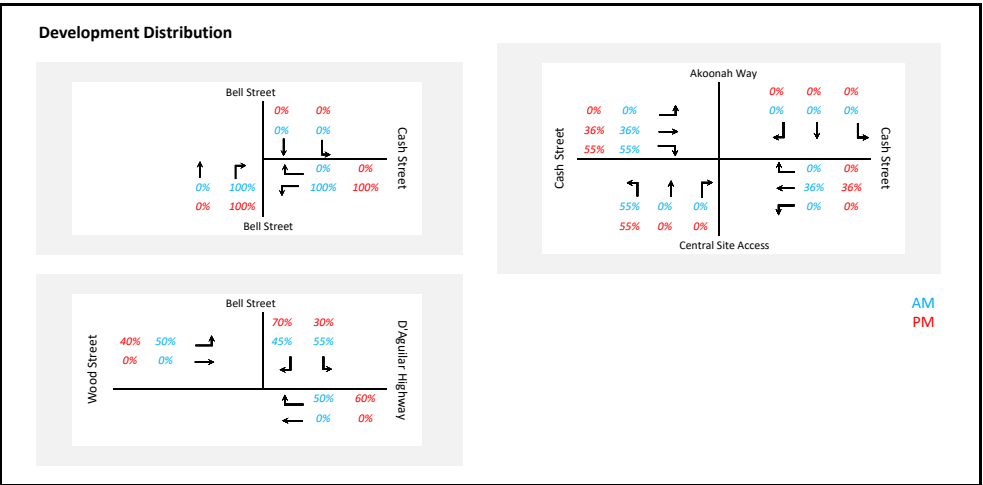
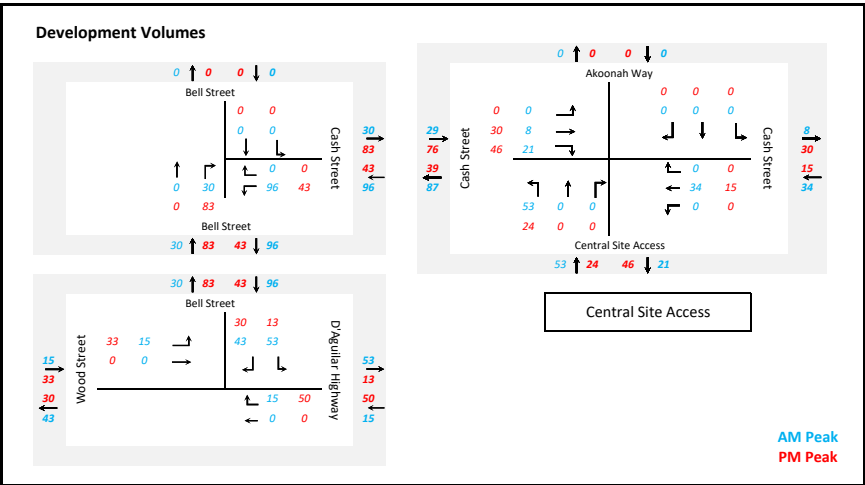
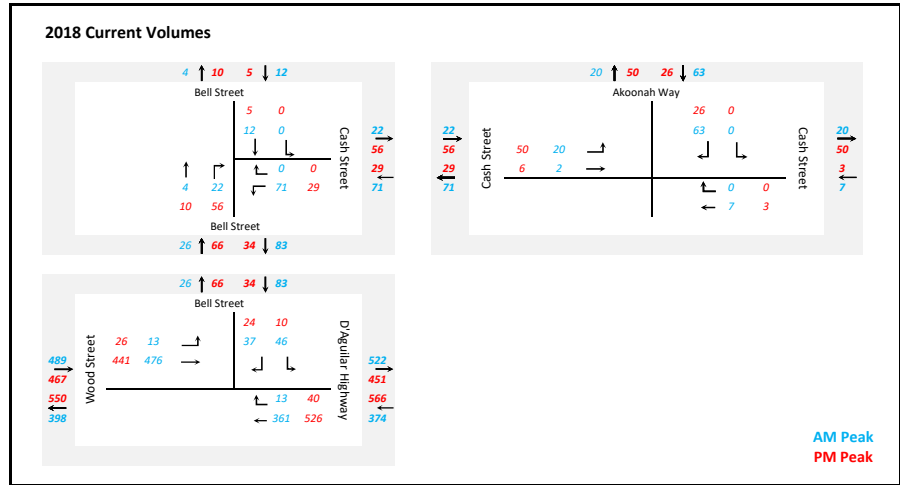
TTM CONSULTING PTY LTD
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P.O. BOX 12015, BRISBANE, QLD, 4003
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E: ttmbri@ttmgroup.com.au W: www.ttmgroup.com.au

| | |
|---------------|---|
| PROJECT | 22-80 CASH STREET AND 1901 D'AGUILAR HIGHWAY, D'AGUILAR |
| DRAWING TITLE | AV SWEPT PATHS D'AGUILAR HIGHWAY AND BELL STREET |

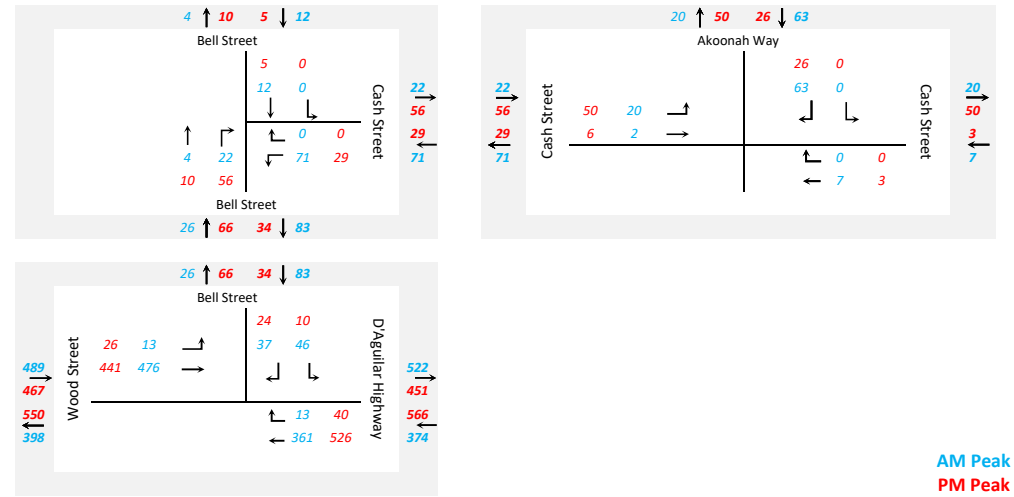
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| DATE | 20 Aug 2019 | SHEET | 1 OF 1 |

\\synergy\projects\18bri\18bri0545 22-80 cash street & 1901 d'aguiar highway, d'aguiar\3 - plans\19 08 16\18bri0545-01b.dwg

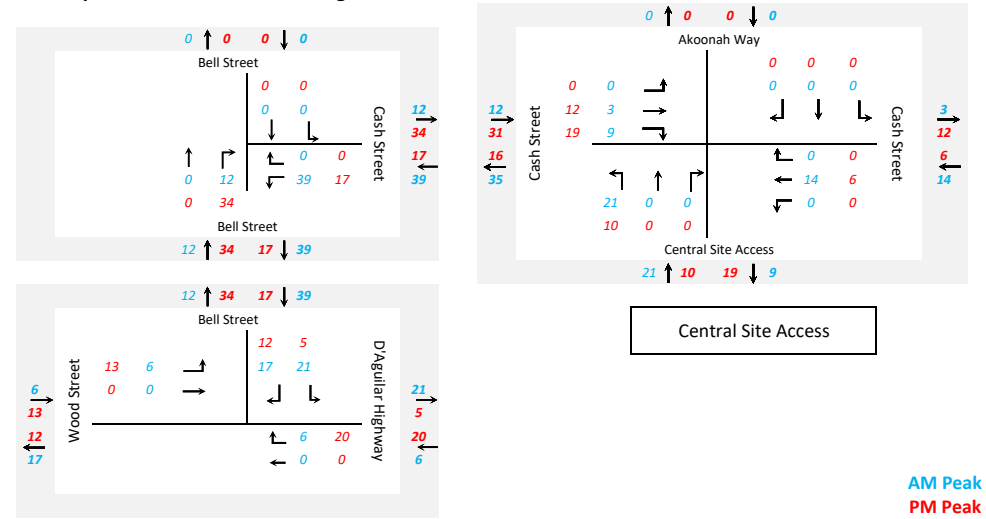
Appendix D Traffic Volume Diagrams



2018 Current Volumes

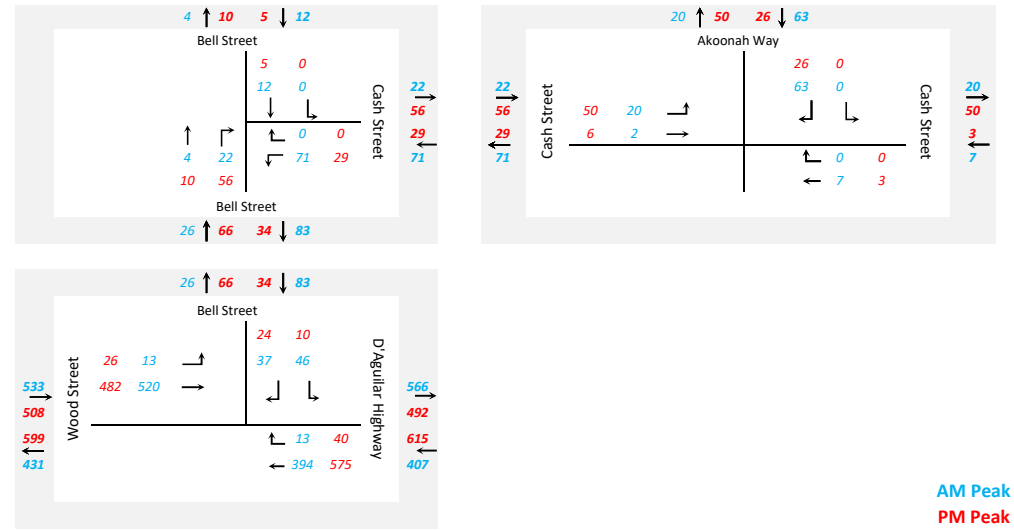


Development Volumes - 60 dwellings

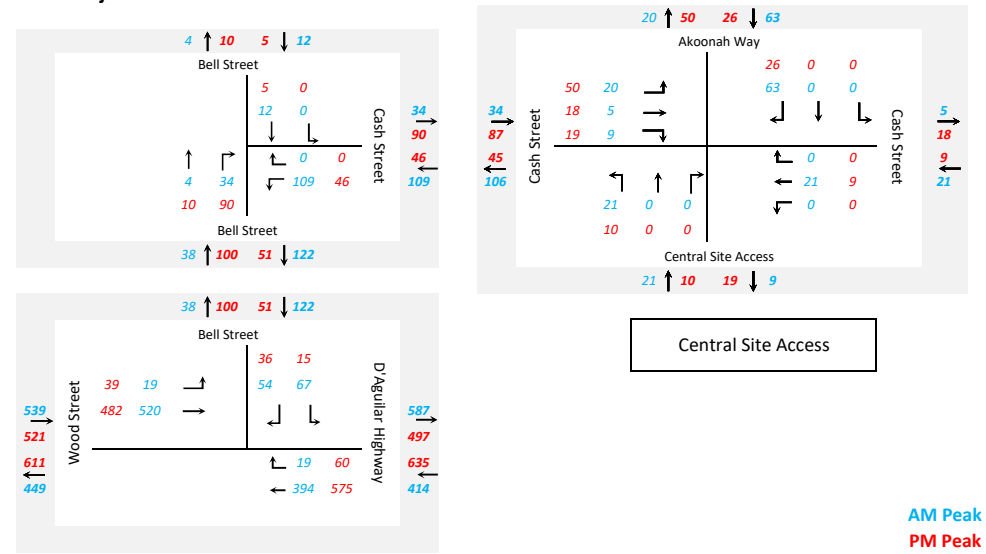


2021 Base Volumes

Growth Rate 1.09

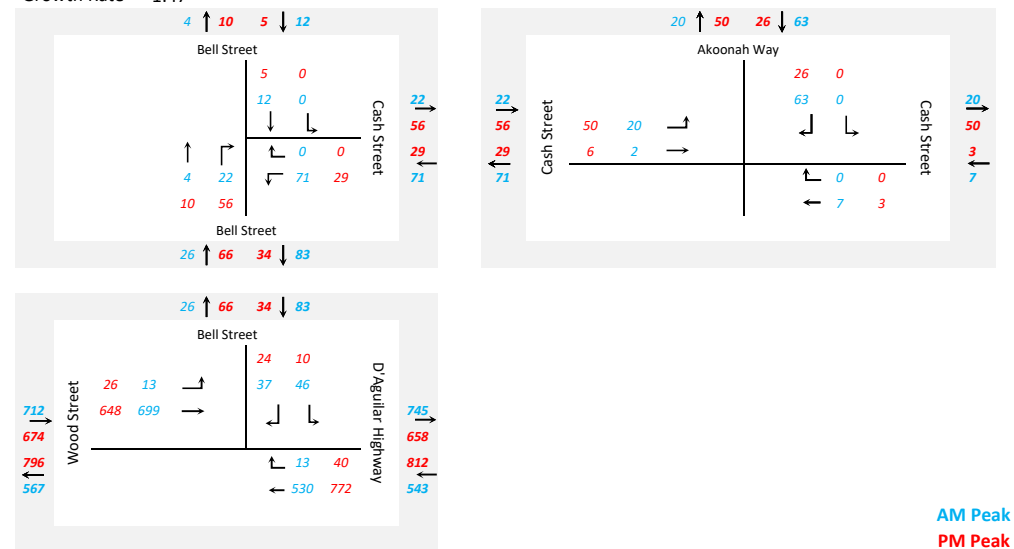


2021 Project Volumes

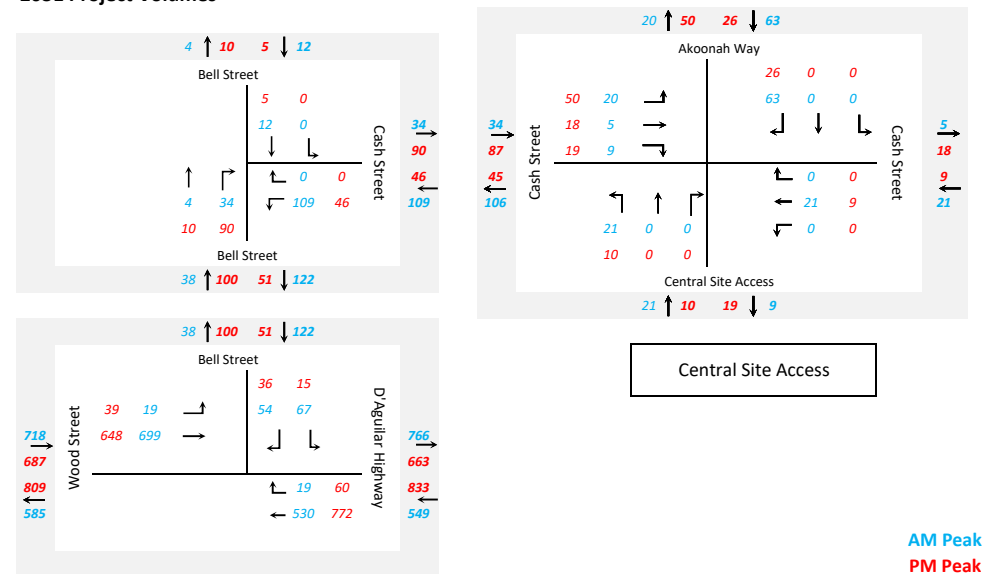


2031 Base Volumes

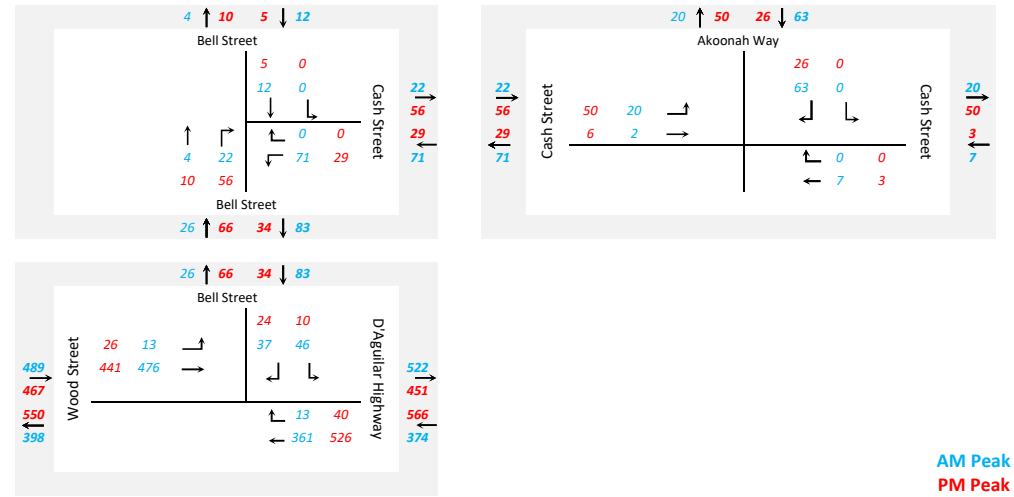
Growth Rate 1.47



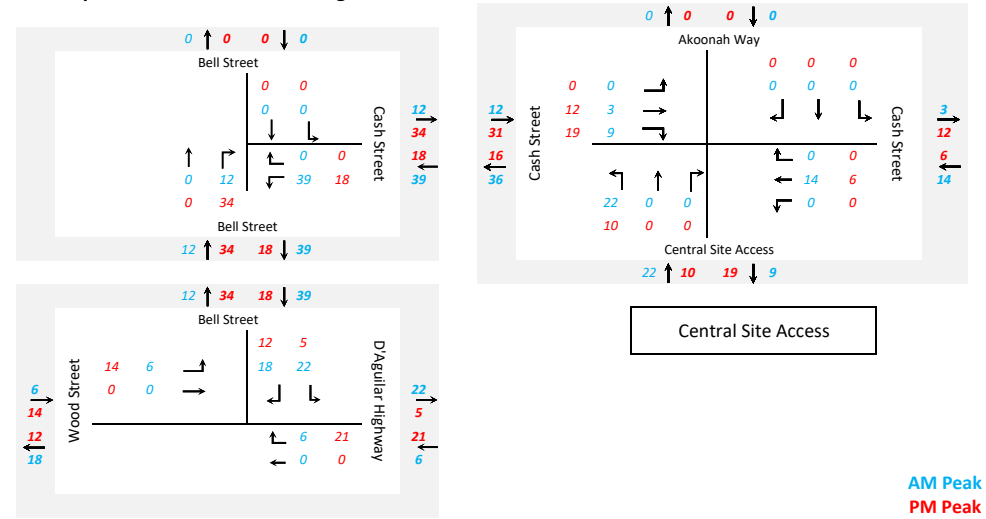
2031 Project Volumes



2018 Current Volumes

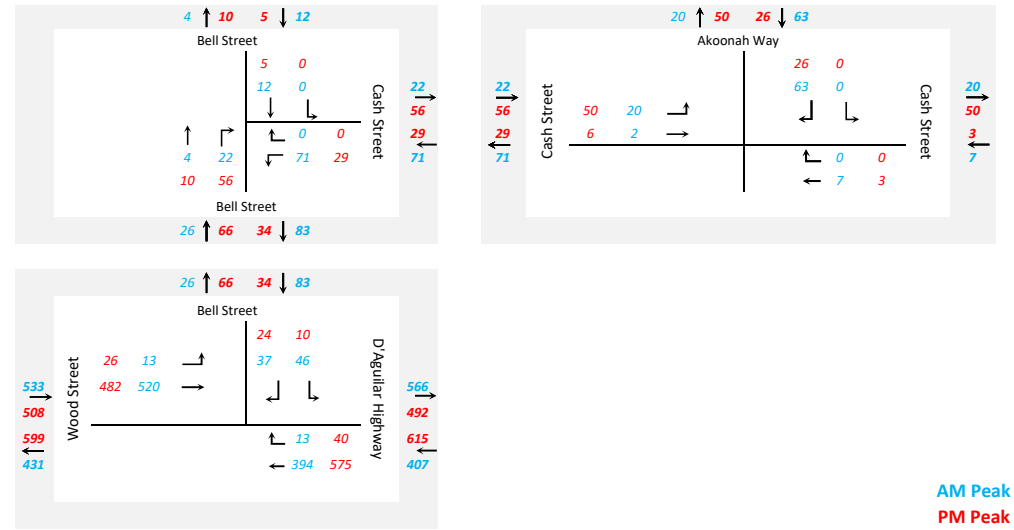


Development Volumes - 61 dwellings

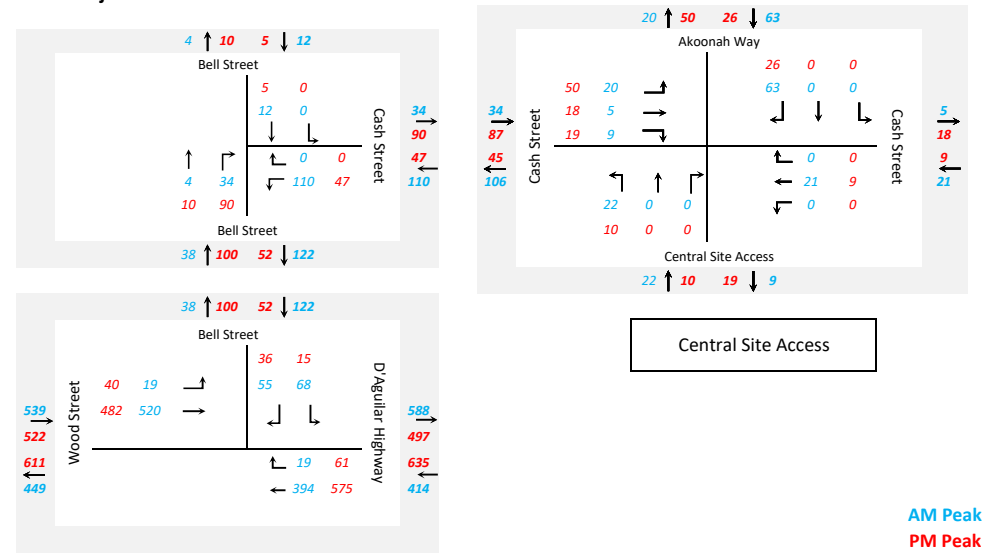


2021 Base Volumes

Growth Rate 1.09

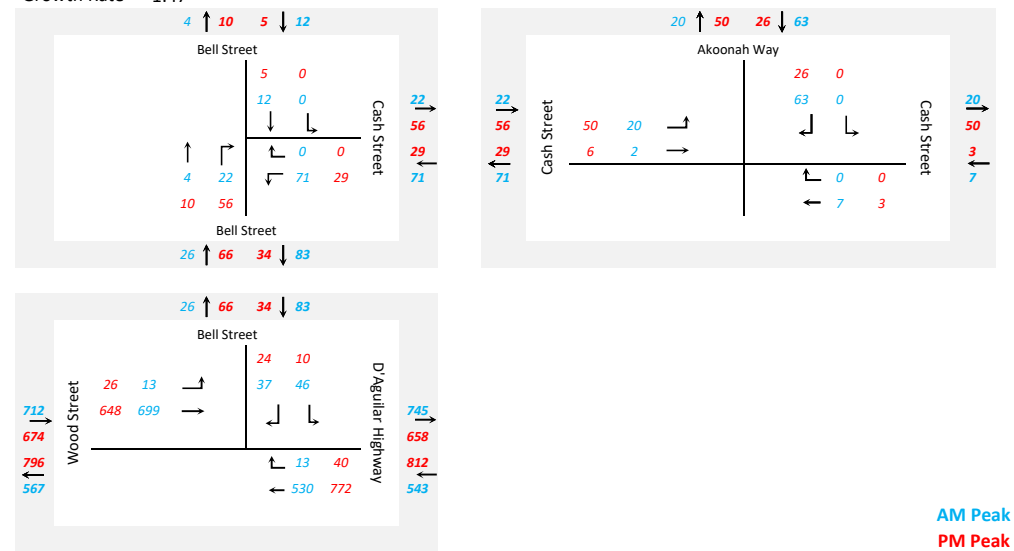


2021 Project Volumes

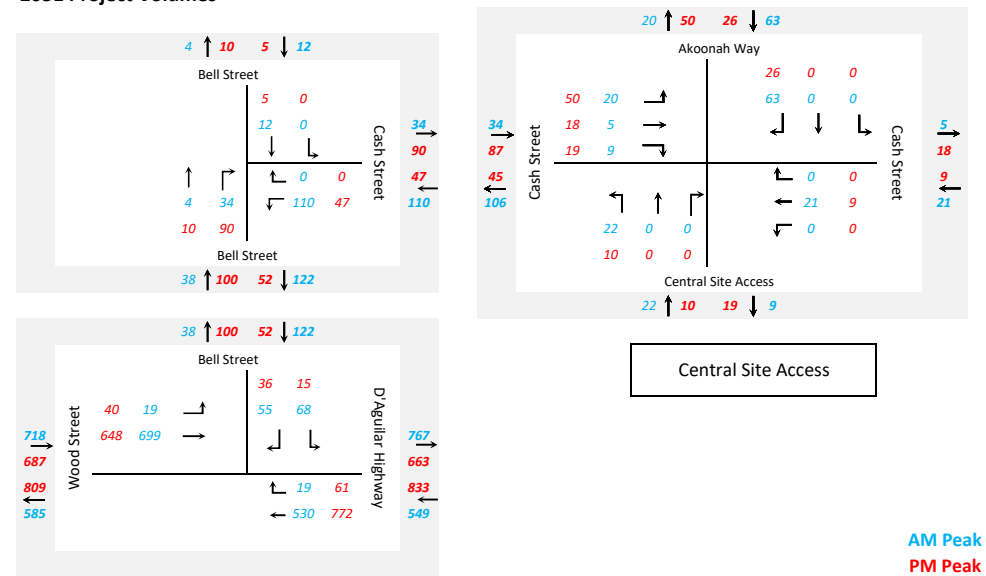


2031 Base Volumes

Growth Rate 1.47



2031 Project Volumes



Appendix E Sidra Intersection Analysis

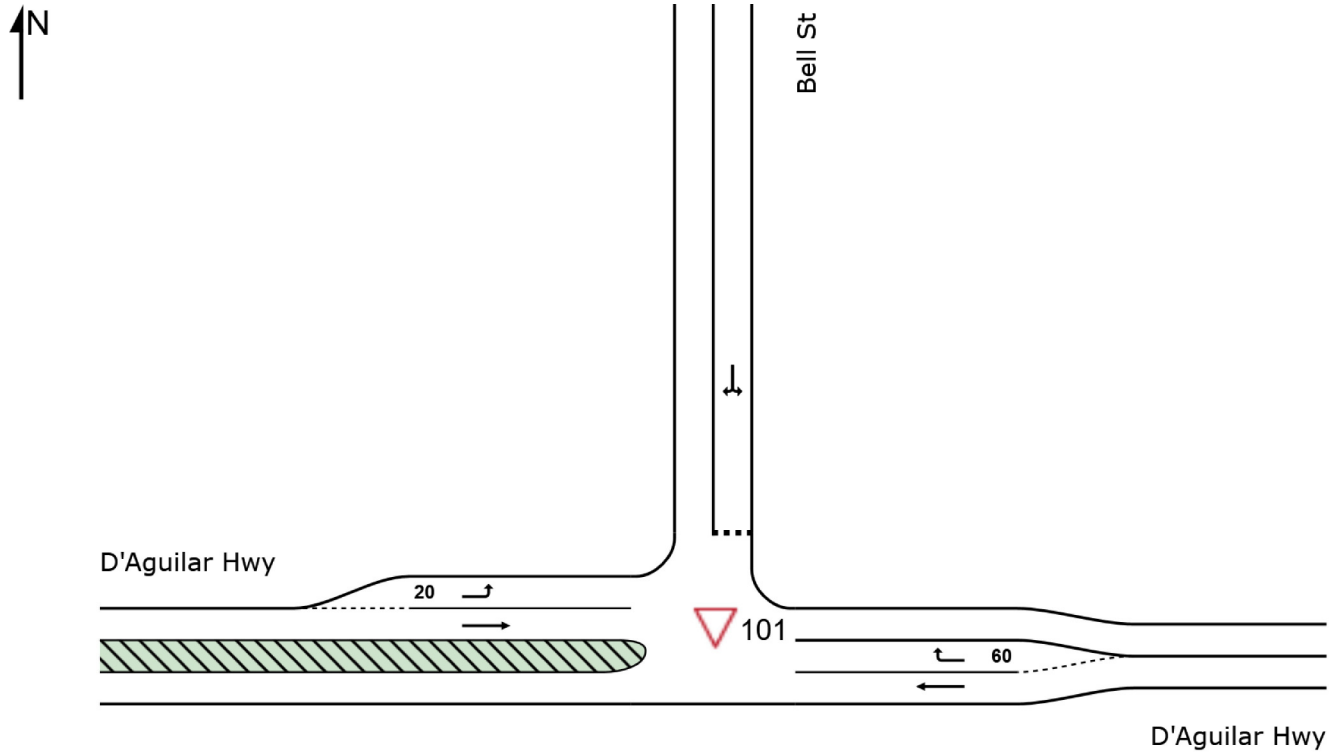
SITE LAYOUT

▽ Site: 101 [D'Aguilar Hwy / Bell St 2018 Existing Volumes AM- SIDRA]

D'Aguilar Hwy / Bell St Intersection

Site Category: (None)

Giveway / Yield (Two-Way)



SIDRA INTERSECTION 8.0 | Copyright © 2000-2019 Akcelik and Associates Pty Ltd | sidrasolutions.com

Organisation: TTM CONSULTING PTY LTD | Created: Wednesday, 10 July 2019 5:10:58 PM

Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar Hwy_Bell St & Bell St_Cash St_190710_S8.sip8

MOVEMENT SUMMARY

▽ Site: 101 [D'Aguilar Hwy / Bell St 2018 Existing Volumes AM- SIDRA]

D'Aguilar Hwy / Bell St Intersection
Site Category: (None)
Giveaway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|--------------------|------------|---------------|-------------------|------------------|--------------------------------|------------|--------------|---------------------|------------------|--------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: D'Aguilar Hwy | | | | | | | | | | | | |
| 5 | T1 | 380 | 12.0 | 0.210 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 60.0 |
| 6 | R2 | 14 | 4.0 | 0.018 | 8.3 | LOS A | 0.1 | 0.5 | 0.51 | 0.68 | 0.51 | 51.0 |
| Approach | | 394 | 11.7 | 0.210 | 0.3 | NA | 0.1 | 0.5 | 0.02 | 0.02 | 0.02 | 59.6 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 48 | 0.0 | 0.216 | 8.7 | LOS A | 0.8 | 5.5 | 0.67 | 0.86 | 0.70 | 47.9 |
| 9 | R2 | 39 | 2.0 | 0.216 | 19.9 | LOS C | 0.8 | 5.5 | 0.67 | 0.86 | 0.70 | 47.7 |
| Approach | | 87 | 0.9 | 0.216 | 13.7 | LOS B | 0.8 | 5.5 | 0.67 | 0.86 | 0.70 | 47.8 |
| West: D'Aguilar Hwy | | | | | | | | | | | | |
| 10 | L2 | 14 | 4.0 | 0.008 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.58 | 0.00 | 53.5 |
| 11 | T1 | 501 | 10.0 | 0.274 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| Approach | | 515 | 9.8 | 0.274 | 0.2 | NA | 0.0 | 0.0 | 0.00 | 0.02 | 0.00 | 59.7 |
| All Vehicles | | 996 | 9.8 | 0.274 | 1.4 | NA | 0.8 | 5.5 | 0.07 | 0.09 | 0.07 | 58.4 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Organisation: TTM CONSULTING PTY LTD | Processed: Thursday, 11 July 2019 8:52:49 AM

Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar Hwy_Bell St & Bell St_Cash St_190710_S8.sip8

MOVEMENT SUMMARY

▽ Site: 101 [D'Aguilar Hwy / Bell St 2021 Base Volumes AM- SIDRA]

D'Aguilar Hwy / Bell St Intersection
Site Category: (None)
Giveaway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|--------------------|------------|---------------|-------------------|------------------|--------------------------------|------------|--------------|---------------------|------------------|--------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: D'Aguilar Hwy | | | | | | | | | | | | |
| 5 | T1 | 415 | 12.0 | 0.229 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| 6 | R2 | 14 | 4.0 | 0.019 | 8.7 | LOS A | 0.1 | 0.5 | 0.53 | 0.70 | 0.53 | 50.7 |
| Approach | | 428 | 11.7 | 0.229 | 0.3 | NA | 0.1 | 0.5 | 0.02 | 0.02 | 0.02 | 59.6 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 48 | 0.0 | 0.249 | 9.6 | LOS A | 0.9 | 6.4 | 0.72 | 0.91 | 0.80 | 46.6 |
| 9 | R2 | 39 | 2.0 | 0.249 | 23.4 | LOS C | 0.9 | 6.4 | 0.72 | 0.91 | 0.80 | 46.5 |
| Approach | | 87 | 0.9 | 0.249 | 15.8 | LOS C | 0.9 | 6.4 | 0.72 | 0.91 | 0.80 | 46.6 |
| West: D'Aguilar Hwy | | | | | | | | | | | | |
| 10 | L2 | 14 | 4.0 | 0.008 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.58 | 0.00 | 53.5 |
| 11 | T1 | 547 | 10.0 | 0.299 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| Approach | | 561 | 9.9 | 0.299 | 0.2 | NA | 0.0 | 0.0 | 0.00 | 0.01 | 0.00 | 59.7 |
| All Vehicles | | 1077 | 9.9 | 0.299 | 1.5 | NA | 0.9 | 6.4 | 0.07 | 0.09 | 0.07 | 58.3 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Organisation: TTM CONSULTING PTY LTD | Processed: Thursday, 11 July 2019 8:52:49 AM

Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar Hwy_Bell St & Bell St_Cash St_190710_S8.sip8

MOVEMENT SUMMARY

▽ Site: 101 [D'Aguilar Hwy / Bell St 2021 Project Volumes AM - 60 DWELLINGS]

D'Aguilar Hwy / Bell St Intersection
Site Category: (None)
Giveaway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|--------------------|------------|---------------|-------------------|------------------|-----------------------|------------------|--------------|---------------------|------------------|--------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back Vehicles veh | Queue Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: D'Aguilar Hwy | | | | | | | | | | | | |
| 5 | T1 | 415 | 6.0 | 0.222 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 60.0 |
| 6 | R2 | 20 | 2.0 | 0.028 | 8.7 | LOS A | 0.1 | 0.7 | 0.54 | 0.71 | 0.54 | 50.8 |
| Approach | | 435 | 5.8 | 0.222 | 0.4 | NA | 0.1 | 0.7 | 0.02 | 0.03 | 0.02 | 59.5 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 71 | 0.0 | 0.372 | 11.1 | LOS B | 1.6 | 11.2 | 0.76 | 0.97 | 0.99 | 45.4 |
| 9 | R2 | 57 | 5.0 | 0.372 | 26.4 | LOS D | 1.6 | 11.2 | 0.76 | 0.97 | 0.99 | 45.1 |
| Approach | | 127 | 2.2 | 0.372 | 17.9 | LOS C | 1.6 | 11.2 | 0.76 | 0.97 | 0.99 | 45.3 |
| West: D'Aguilar Hwy | | | | | | | | | | | | |
| 10 | L2 | 20 | 3.0 | 0.011 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.58 | 0.00 | 53.5 |
| 11 | T1 | 547 | 10.0 | 0.299 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| Approach | | 567 | 9.8 | 0.299 | 0.2 | NA | 0.0 | 0.0 | 0.00 | 0.02 | 0.00 | 59.7 |
| All Vehicles | | 1129 | 7.4 | 0.372 | 2.3 | NA | 1.6 | 11.2 | 0.09 | 0.13 | 0.12 | 57.5 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: \\TTMFPS01\Synergy\BR\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis
18BRT0545_D'Aguilar Hwy_Bell St_190813.sip8

MOVEMENT SUMMARY

▽ Site: 101 [D'Aguilar Hwy / Bell St 2021 Project Volumes AM - 61 DWELLINGS]

D'Aguilar Hwy / Bell St Intersection
Site Category: (None)
Giveaway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|--------------------|------------|---------------|-------------------|------------------|--------------------------------|------------|--------------|---------------------|------------------|--------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: D'Aguilar Hwy | | | | | | | | | | | | |
| 5 | T1 | 415 | 6.0 | 0.222 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 60.0 |
| 6 | R2 | 20 | 2.0 | 0.028 | 8.7 | LOS A | 0.1 | 0.7 | 0.54 | 0.71 | 0.54 | 50.8 |
| Approach | | 435 | 5.8 | 0.222 | 0.4 | NA | 0.1 | 0.7 | 0.02 | 0.03 | 0.02 | 59.5 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 72 | 0.0 | 0.379 | 11.2 | LOS B | 1.6 | 11.5 | 0.76 | 0.97 | 1.00 | 45.3 |
| 9 | R2 | 58 | 5.0 | 0.379 | 26.5 | LOS D | 1.6 | 11.5 | 0.76 | 0.97 | 1.00 | 45.1 |
| Approach | | 129 | 2.2 | 0.379 | 18.1 | LOS C | 1.6 | 11.5 | 0.76 | 0.97 | 1.00 | 45.2 |
| West: D'Aguilar Hwy | | | | | | | | | | | | |
| 10 | L2 | 20 | 3.0 | 0.011 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.58 | 0.00 | 53.5 |
| 11 | T1 | 547 | 10.0 | 0.299 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| Approach | | 567 | 9.8 | 0.299 | 0.2 | NA | 0.0 | 0.0 | 0.00 | 0.02 | 0.00 | 59.7 |
| All Vehicles | | 1132 | 7.4 | 0.379 | 2.3 | NA | 1.6 | 11.5 | 0.10 | 0.13 | 0.12 | 57.5 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: \\TTMFPS01\Synergy\BR\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis
\\18BRT0545_D'Aguilar Hwy_Bell St_190813.sip8

MOVEMENT SUMMARY

▽ Site: 101 [D'Aguilar Hwy / Bell St 2021 Project Volumes AM- SIDRA]

D'Aguilar Hwy / Bell St Intersection
Site Category: (None)
Giveaway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|--------------------|------------|---------------|-------------------|------------------|--------------------------------|------------|--------------|---------------------|------------------|--------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: D'Aguilar Hwy | | | | | | | | | | | | |
| 5 | T1 | 415 | 12.0 | 0.231 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| 6 | R2 | 29 | 4.0 | 0.042 | 9.0 | LOS A | 0.2 | 1.1 | 0.54 | 0.74 | 0.54 | 50.5 |
| Approach | | 444 | 11.5 | 0.231 | 0.6 | NA | 0.2 | 1.1 | 0.04 | 0.05 | 0.04 | 59.2 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 104 | 0.0 | 0.554 | 14.1 | LOS B | 2.9 | 20.2 | 0.80 | 1.07 | 1.33 | 43.4 |
| 9 | R2 | 84 | 2.0 | 0.554 | 30.7 | LOS D | 2.9 | 20.2 | 0.80 | 1.07 | 1.33 | 43.3 |
| Approach | | 188 | 0.9 | 0.554 | 21.5 | LOS C | 2.9 | 20.2 | 0.80 | 1.07 | 1.33 | 43.4 |
| West: D'Aguilar Hwy | | | | | | | | | | | | |
| 10 | L2 | 29 | 4.0 | 0.016 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.58 | 0.00 | 53.5 |
| 11 | T1 | 547 | 10.0 | 0.299 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| Approach | | 577 | 9.7 | 0.299 | 0.3 | NA | 0.0 | 0.0 | 0.00 | 0.03 | 0.00 | 59.6 |
| All Vehicles | | 1209 | 9.0 | 0.554 | 3.7 | NA | 2.9 | 20.2 | 0.14 | 0.20 | 0.22 | 56.2 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar Hwy_Bell St & Bell St_Cash St_190710_S8.sip8

MOVEMENT SUMMARY

▽ Site: 101 [D'Aguilar Hwy / Bell St 2018 Existing Volumes PM- SIDRA]

D'Aguilar Hwy / Bell St Intersection
Site Category: (None)
Giveaway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|--------------------|------------|---------------|-------------------|------------------|--------------------------------|------------|--------------|---------------------|------------------|--------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: D'Aguilar Hwy | | | | | | | | | | | | |
| 5 | T1 | 554 | 6.0 | 0.297 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| 6 | R2 | 42 | 2.0 | 0.052 | 8.1 | LOS A | 0.2 | 1.4 | 0.50 | 0.71 | 0.50 | 51.2 |
| Approach | | 596 | 5.7 | 0.297 | 0.6 | NA | 0.2 | 1.4 | 0.04 | 0.05 | 0.04 | 59.2 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 11 | 0.0 | 0.152 | 8.0 | LOS A | 0.5 | 3.6 | 0.78 | 0.89 | 0.78 | 44.2 |
| 9 | R2 | 25 | 5.0 | 0.152 | 25.2 | LOS D | 0.5 | 3.6 | 0.78 | 0.89 | 0.78 | 43.9 |
| Approach | | 36 | 3.5 | 0.152 | 20.2 | LOS C | 0.5 | 3.6 | 0.78 | 0.89 | 0.78 | 44.0 |
| West: D'Aguilar Hwy | | | | | | | | | | | | |
| 10 | L2 | 27 | 3.0 | 0.015 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.58 | 0.00 | 53.5 |
| 11 | T1 | 464 | 10.0 | 0.254 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| Approach | | 492 | 9.6 | 0.254 | 0.3 | NA | 0.0 | 0.0 | 0.00 | 0.03 | 0.00 | 59.5 |
| All Vehicles | | 1123 | 7.4 | 0.297 | 1.1 | NA | 0.5 | 3.6 | 0.04 | 0.07 | 0.04 | 58.7 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar Hwy_Bell St & Bell St_Cash St_190710_S8.sip8

MOVEMENT SUMMARY

▽ Site: 101 [D'Aguilar Hwy / Bell St 2021 Base Volumes PM- SIDRA]

D'Aguilar Hwy / Bell St Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|--------------------|------------|---------------|-------------------|------------------|--------------------------------|------------|--------------|---------------------|------------------|--------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: D'Aguilar Hwy | | | | | | | | | | | | |
| 5 | T1 | 605 | 6.0 | 0.325 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| 6 | R2 | 42 | 2.0 | 0.056 | 8.5 | LOS A | 0.2 | 1.5 | 0.53 | 0.73 | 0.53 | 50.9 |
| Approach | | 647 | 5.7 | 0.325 | 0.6 | NA | 0.2 | 1.5 | 0.03 | 0.05 | 0.03 | 59.2 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 11 | 0.0 | 0.185 | 8.7 | LOS A | 0.6 | 4.3 | 0.83 | 0.93 | 0.85 | 42.1 |
| 9 | R2 | 25 | 5.0 | 0.185 | 30.6 | LOS D | 0.6 | 4.3 | 0.83 | 0.93 | 0.85 | 41.9 |
| Approach | | 36 | 3.5 | 0.185 | 24.2 | LOS C | 0.6 | 4.3 | 0.83 | 0.93 | 0.85 | 42.0 |
| West: D'Aguilar Hwy | | | | | | | | | | | | |
| 10 | L2 | 27 | 3.0 | 0.015 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.58 | 0.00 | 53.5 |
| 11 | T1 | 507 | 10.0 | 0.277 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| Approach | | 535 | 9.6 | 0.277 | 0.3 | NA | 0.0 | 0.0 | 0.00 | 0.03 | 0.00 | 59.6 |
| All Vehicles | | 1218 | 7.4 | 0.325 | 1.2 | NA | 0.6 | 4.3 | 0.04 | 0.07 | 0.04 | 58.7 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar Hwy_Bell St & Bell St_Cash St_190710_S8.sip8

MOVEMENT SUMMARY

Site: 101 [D'Aguilar Hwy / Bell St 2021 Project Volumes PM - 60 DWELLINGS]

D'Aguilar Hwy / Bell St Intersection
Site Category: (None)
Giveaway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|--------------------|------------|---------------|-------------------|------------------|--------------------------------|------------|--------------|---------------------|------------------|--------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: D'Aguilar Hwy | | | | | | | | | | | | |
| 5 | T1 | 605 | 6.0 | 0.324 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| 6 | R2 | 63 | 2.0 | 0.085 | 8.7 | LOS A | 0.3 | 2.3 | 0.54 | 0.76 | 0.54 | 50.8 |
| Approach | | 668 | 5.6 | 0.324 | 0.9 | NA | 0.3 | 2.3 | 0.05 | 0.07 | 0.05 | 58.9 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 16 | 0.0 | 0.291 | 11.0 | LOS B | 1.0 | 7.3 | 0.85 | 0.97 | 0.98 | 40.4 |
| 9 | R2 | 38 | 5.0 | 0.291 | 34.9 | LOS D | 1.0 | 7.3 | 0.85 | 0.97 | 0.98 | 40.2 |
| Approach | | 54 | 3.5 | 0.291 | 27.9 | LOS D | 1.0 | 7.3 | 0.85 | 0.97 | 0.98 | 40.2 |
| West: D'Aguilar Hwy | | | | | | | | | | | | |
| 10 | L2 | 41 | 3.0 | 0.023 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.58 | 0.00 | 53.5 |
| 11 | T1 | 507 | 10.0 | 0.277 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| Approach | | 548 | 9.5 | 0.277 | 0.4 | NA | 0.0 | 0.0 | 0.00 | 0.04 | 0.00 | 59.4 |
| All Vehicles | | 1271 | 7.2 | 0.324 | 1.8 | NA | 1.0 | 7.3 | 0.06 | 0.10 | 0.07 | 58.0 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: \\TTMFPS01\Synergy\BR\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis
18BRT0545_D'Aguilar Hwy_Bell St_190813.sip8

MOVEMENT SUMMARY

 **Site: 101 [D'Aguilar Hwy / Bell St 2021 Project Volumes PM - 61 DWELLINGS]**

D'Aguilar Hwy / Bell St Intersection
Site Category: (None)
Giveaway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|--------------------|------------|---------------|-------------------|------------------|--------------------------------|------------|--------------|---------------------|------------------|--------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: D'Aguilar Hwy | | | | | | | | | | | | |
| 5 | T1 | 605 | 6.0 | 0.324 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| 6 | R2 | 64 | 2.0 | 0.086 | 8.7 | LOS A | 0.3 | 2.3 | 0.54 | 0.76 | 0.54 | 50.8 |
| Approach | | 669 | 5.6 | 0.324 | 0.9 | NA | 0.3 | 2.3 | 0.05 | 0.07 | 0.05 | 58.9 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 16 | 0.0 | 0.292 | 11.0 | LOS B | 1.0 | 7.3 | 0.85 | 0.97 | 0.98 | 40.4 |
| 9 | R2 | 38 | 5.0 | 0.292 | 35.0 | LOS E | 1.0 | 7.3 | 0.85 | 0.97 | 0.98 | 40.1 |
| Approach | | 54 | 3.5 | 0.292 | 28.0 | LOS D | 1.0 | 7.3 | 0.85 | 0.97 | 0.98 | 40.2 |
| West: D'Aguilar Hwy | | | | | | | | | | | | |
| 10 | L2 | 42 | 3.0 | 0.023 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.58 | 0.00 | 53.5 |
| 11 | T1 | 507 | 10.0 | 0.277 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| Approach | | 549 | 9.5 | 0.277 | 0.5 | NA | 0.0 | 0.0 | 0.00 | 0.04 | 0.00 | 59.4 |
| All Vehicles | | 1273 | 7.2 | 0.324 | 1.8 | NA | 1.0 | 7.3 | 0.06 | 0.10 | 0.07 | 58.0 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Organisation: TTM CONSULTING PTY LTD | Processed: Monday, 19 August 2019 2:56:53 PM

Project: \\TTMFPS01\Synergy\BR\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis
18BRT0545_D'Aguilar Hwy_Bell St_190813.sip8

MOVEMENT SUMMARY

Site: 101 [D'Aguilar Hwy / Bell St 2021 Project Volumes PM- SIDRA]

D'Aguilar Hwy / Bell St Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|--------------------|------------|---------------|-------------------|------------------|--------------------------------|------------|--------------|---------------------|------------------|--------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: D'Aguilar Hwy | | | | | | | | | | | | |
| 5 | T1 | 605 | 6.0 | 0.325 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| 6 | R2 | 95 | 2.0 | 0.131 | 9.0 | LOS A | 0.5 | 3.5 | 0.56 | 0.79 | 0.56 | 50.6 |
| Approach | | 700 | 5.5 | 0.325 | 1.3 | NA | 0.5 | 3.5 | 0.08 | 0.11 | 0.08 | 58.5 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 24 | 0.0 | 0.471 | 16.0 | LOS C | 1.8 | 13.3 | 0.88 | 1.04 | 1.22 | 37.4 |
| 9 | R2 | 57 | 5.0 | 0.471 | 43.2 | LOS E | 1.8 | 13.3 | 0.88 | 1.04 | 1.22 | 37.2 |
| Approach | | 81 | 3.5 | 0.471 | 35.1 | LOS E | 1.8 | 13.3 | 0.88 | 1.04 | 1.22 | 37.3 |
| West: D'Aguilar Hwy | | | | | | | | | | | | |
| 10 | L2 | 62 | 3.0 | 0.034 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.58 | 0.00 | 53.5 |
| 11 | T1 | 507 | 10.0 | 0.277 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| Approach | | 569 | 9.2 | 0.277 | 0.6 | NA | 0.0 | 0.0 | 0.00 | 0.06 | 0.00 | 59.2 |
| All Vehicles | | 1351 | 6.9 | 0.471 | 3.0 | NA | 1.8 | 13.3 | 0.09 | 0.14 | 0.11 | 56.8 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Organisation: TTM CONSULTING PTY LTD | Processed: Thursday, 11 July 2019 8:52:52 AM

Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar Hwy_Bell St & Bell St_Cash St_190710_S8.sip8

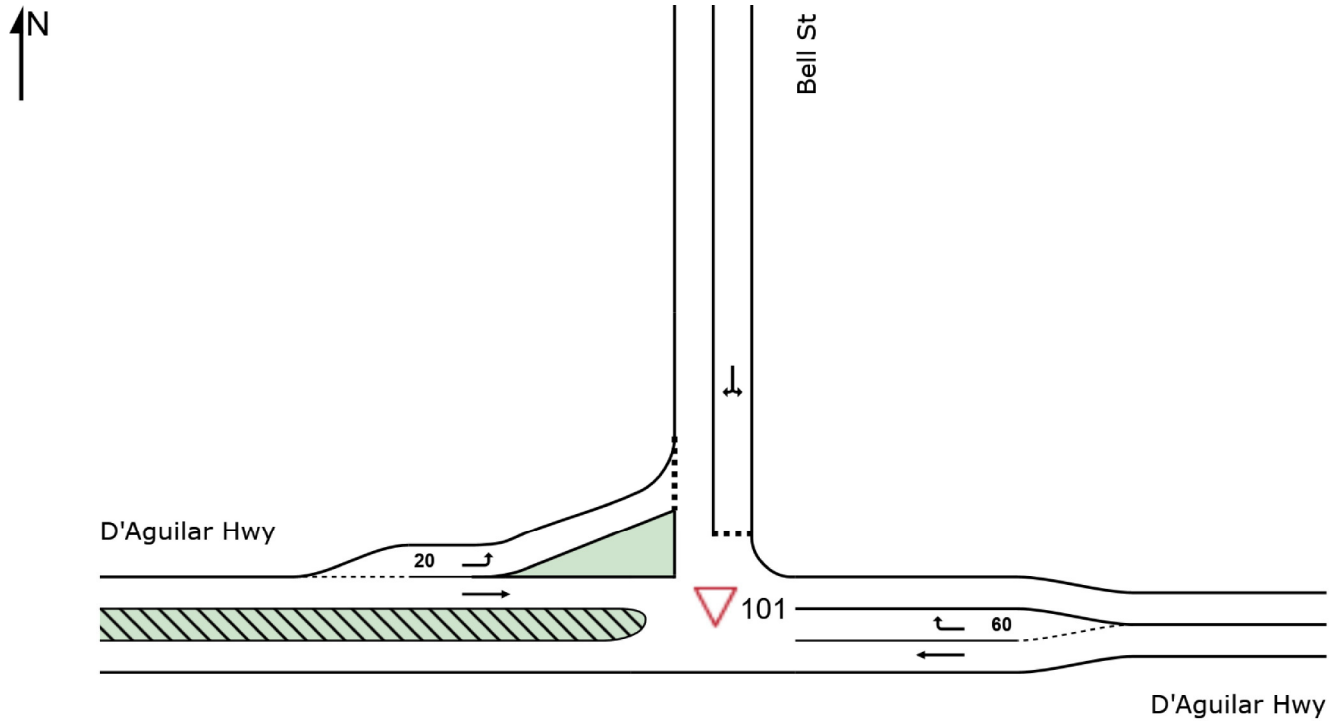
SITE LAYOUT

▽ Site: 101 [D'Aguilar Hwy / Bell St 2021 Project Volumes PM - Upgrade- SIDRA]

D'Aguilar Hwy / Bell St Intersection

Site Category: (None)

Giveway / Yield (Two-Way)



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Organisation: TTM CONSULTING PTY LTD | Created: Wednesday, 10 July 2019 5:10:59 PM

Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar Hwy_Bell St & Bell St_Cash St_190710_S8.sip8

MOVEMENT SUMMARY

Site: 101 [D'Aguilar Hwy / Bell St 2021 Project Volumes AM - Upgrade- SIDRA]

D'Aguilar Hwy / Bell St Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|--------------------|------------|---------------|-------------------|------------------|--------------------------------|------------|--------------|---------------------|------------------|--------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: D'Aguilar Hwy | | | | | | | | | | | | |
| 5 | T1 | 415 | 12.0 | 0.231 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| 6 | R2 | 29 | 4.0 | 0.031 | 7.9 | LOS A | 0.1 | 0.9 | 0.54 | 0.69 | 0.54 | 51.3 |
| Approach | | 444 | 11.5 | 0.231 | 0.6 | NA | 0.1 | 0.9 | 0.04 | 0.05 | 0.04 | 59.3 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 104 | 0.0 | 0.431 | 10.6 | LOS B | 2.1 | 14.6 | 0.74 | 0.99 | 1.05 | 46.4 |
| 9 | R2 | 84 | 2.0 | 0.431 | 22.9 | LOS C | 2.1 | 14.6 | 0.74 | 0.99 | 1.05 | 46.3 |
| Approach | | 188 | 0.9 | 0.431 | 16.1 | LOS C | 2.1 | 14.6 | 0.74 | 0.99 | 1.05 | 46.4 |
| West: D'Aguilar Hwy | | | | | | | | | | | | |
| 10 | L2 | 29 | 4.0 | 0.019 | 5.7 | LOS A | 0.1 | 0.5 | 0.09 | 0.52 | 0.09 | 53.8 |
| 11 | T1 | 547 | 10.0 | 0.299 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| Approach | | 577 | 9.7 | 0.299 | 0.3 | LOS A | 0.1 | 0.5 | 0.00 | 0.03 | 0.00 | 59.6 |
| All Vehicles | | 1209 | 9.0 | 0.431 | 2.9 | NA | 2.1 | 14.6 | 0.13 | 0.18 | 0.18 | 56.9 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar Hwy_Bell St & Bell St_Cash St_190710_S8.sip8

MOVEMENT SUMMARY

Site: 101 [D'Aguilar Hwy / Bell St 2021 Project Volumes PM - Upgrade- SIDRA]

D'Aguilar Hwy / Bell St Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|--------------------|------------|---------------|-------------------|------------------|--------------------------------|------------|--------------|---------------------|------------------|--------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: D'Aguilar Hwy | | | | | | | | | | | | |
| 5 | T1 | 605 | 6.0 | 0.324 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| 6 | R2 | 95 | 2.0 | 0.093 | 7.8 | LOS A | 0.4 | 2.8 | 0.53 | 0.72 | 0.53 | 51.5 |
| Approach | | 700 | 5.5 | 0.324 | 1.1 | NA | 0.4 | 2.8 | 0.07 | 0.10 | 0.07 | 58.6 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 24 | 0.0 | 0.354 | 10.9 | LOS B | 1.3 | 9.6 | 0.84 | 0.98 | 1.04 | 41.8 |
| 9 | R2 | 57 | 5.0 | 0.354 | 30.9 | LOS D | 1.3 | 9.6 | 0.84 | 0.98 | 1.04 | 41.5 |
| Approach | | 81 | 3.5 | 0.354 | 24.9 | LOS C | 1.3 | 9.6 | 0.84 | 0.98 | 1.04 | 41.6 |
| West: D'Aguilar Hwy | | | | | | | | | | | | |
| 10 | L2 | 62 | 3.0 | 0.042 | 5.9 | LOS A | 0.2 | 1.2 | 0.19 | 0.52 | 0.19 | 53.5 |
| 11 | T1 | 507 | 10.0 | 0.277 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.00 | 0.00 | 59.9 |
| Approach | | 569 | 9.2 | 0.277 | 0.7 | LOS A | 0.2 | 1.2 | 0.02 | 0.06 | 0.02 | 59.2 |
| All Vehicles | | 1351 | 6.9 | 0.354 | 2.3 | NA | 1.3 | 9.6 | 0.10 | 0.13 | 0.11 | 57.4 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Organisation: TTM CONSULTING PTY LTD | Processed: Thursday, 11 July 2019 8:52:52 AM

Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar Hwy_Bell St & Bell St_Cash St_190710_S8.sip8

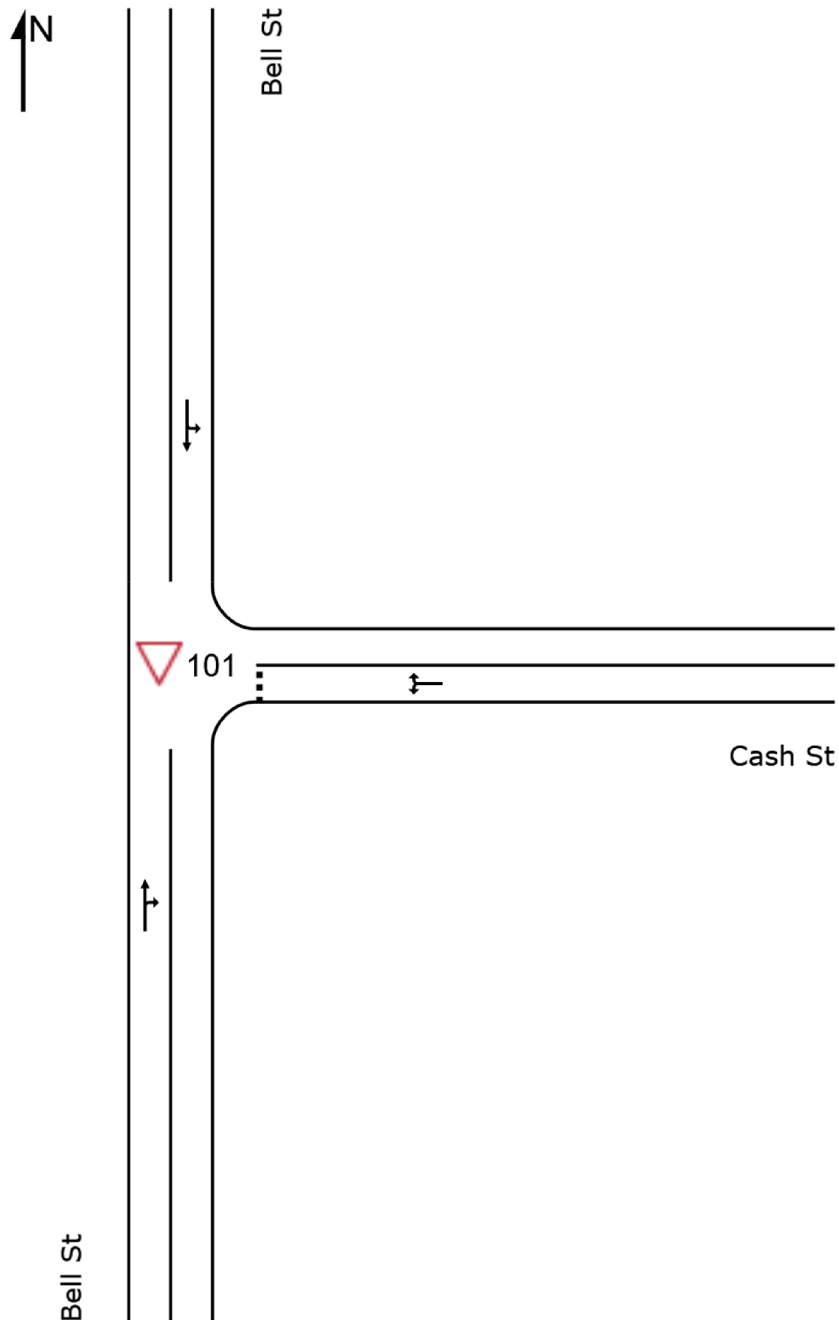
SITE LAYOUT

▽ Site: 101 [Bell St / Cash St 2018 Existing Volumes AM]

Bell St / Cash St Intersection

Site Category: (None)

Giveway / Yield (Two-Way)



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Organisation: Microsoft | Created: Thursday, 11 July 2019 9:06:58 AM

Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar Hwy_Bell St & Bell St_Cash St_190227_S8.sip8

MOVEMENT SUMMARY

▽ Site: 101 [Bell St / Cash St 2018 Existing Volumes AM]

Bell St / Cash St Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| South: Bell St | | | | | | | | | | | | |
| 2 | T1 | 4 | 3.0 | 0.015 | 0.0 | LOS A | 0.1 | 0.5 | 0.06 | 0.48 | 0.06 | 55.5 |
| 3 | R2 | 23 | 3.0 | 0.015 | 5.6 | LOS A | 0.1 | 0.5 | 0.06 | 0.48 | 0.06 | 53.6 |
| Approach | | 27 | 3.0 | 0.015 | 4.7 | NA | 0.1 | 0.5 | 0.06 | 0.48 | 0.06 | 53.9 |
| East: Cash St | | | | | | | | | | | | |
| 4 | L2 | 75 | 3.0 | 0.048 | 5.6 | LOS A | 0.2 | 1.4 | 0.06 | 0.55 | 0.06 | 53.3 |
| 6 | R2 | 1 | 3.0 | 0.048 | 5.6 | LOS A | 0.2 | 1.4 | 0.06 | 0.55 | 0.06 | 52.9 |
| Approach | | 76 | 3.0 | 0.048 | 5.6 | LOS A | 0.2 | 1.4 | 0.06 | 0.55 | 0.06 | 53.3 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 1 | 3.0 | 0.007 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 57.8 |
| 8 | T1 | 13 | 3.0 | 0.007 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 59.6 |
| Approach | | 14 | 3.0 | 0.007 | 0.4 | NA | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 59.4 |
| All Vehicles | | 117 | 3.0 | 0.048 | 4.8 | NA | 0.2 | 1.4 | 0.05 | 0.48 | 0.05 | 54.1 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Organisation: Microsoft | Processed: Thursday, 11 July 2019 9:23:40 AM

Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar

Hwy_Bell St & Bell St_Cash St_190227_S8.sip8

MOVEMENT SUMMARY

▽ Site: 101 [Bell St / Cash St 2021 Base Volumes AM]

Bell St / Cash St Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| South: Bell St | | | | | | | | | | | | |
| 2 | T1 | 4 | 3.0 | 0.015 | 0.0 | LOS A | 0.1 | 0.5 | 0.06 | 0.48 | 0.06 | 55.5 |
| 3 | R2 | 23 | 3.0 | 0.015 | 5.6 | LOS A | 0.1 | 0.5 | 0.06 | 0.48 | 0.06 | 53.6 |
| Approach | | 27 | 3.0 | 0.015 | 4.7 | NA | 0.1 | 0.5 | 0.06 | 0.48 | 0.06 | 53.9 |
| East: Cash St | | | | | | | | | | | | |
| 4 | L2 | 75 | 3.0 | 0.048 | 5.6 | LOS A | 0.2 | 1.4 | 0.06 | 0.55 | 0.06 | 53.3 |
| 6 | R2 | 1 | 3.0 | 0.048 | 5.6 | LOS A | 0.2 | 1.4 | 0.06 | 0.55 | 0.06 | 52.9 |
| Approach | | 76 | 3.0 | 0.048 | 5.6 | LOS A | 0.2 | 1.4 | 0.06 | 0.55 | 0.06 | 53.3 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 1 | 3.0 | 0.007 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 57.8 |
| 8 | T1 | 13 | 3.0 | 0.007 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 59.6 |
| Approach | | 14 | 3.0 | 0.007 | 0.4 | NA | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 59.4 |
| All Vehicles | | 117 | 3.0 | 0.048 | 4.8 | NA | 0.2 | 1.4 | 0.05 | 0.48 | 0.05 | 54.1 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Organisation: Microsoft | Processed: Thursday, 11 July 2019 9:23:40 AM

Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar

Hwy_Bell St & Bell St_Cash St_190227_S8.sip8

MOVEMENT SUMMARY

▽ Site: 101 [Bell St / Cash St 2021 Project Volumes AM]

Bell St / Cash St Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| South: Bell St | | | | | | | | | | | | |
| 2 | T1 | 4 | 3.0 | 0.034 | 0.0 | LOS A | 0.2 | 1.1 | 0.06 | 0.53 | 0.06 | 55.2 |
| 3 | R2 | 56 | 3.0 | 0.034 | 5.6 | LOS A | 0.2 | 1.1 | 0.06 | 0.53 | 0.06 | 53.3 |
| Approach | | 60 | 3.0 | 0.034 | 5.2 | NA | 0.2 | 1.1 | 0.06 | 0.53 | 0.06 | 53.4 |
| East: Cash St | | | | | | | | | | | | |
| 4 | L2 | 175 | 3.0 | 0.110 | 5.6 | LOS A | 0.5 | 3.4 | 0.06 | 0.55 | 0.06 | 53.3 |
| 6 | R2 | 1 | 3.0 | 0.110 | 5.8 | LOS A | 0.5 | 3.4 | 0.06 | 0.55 | 0.06 | 52.9 |
| Approach | | 176 | 3.0 | 0.110 | 5.6 | LOS A | 0.5 | 3.4 | 0.06 | 0.55 | 0.06 | 53.3 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 1 | 3.0 | 0.007 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 57.8 |
| 8 | T1 | 13 | 3.0 | 0.007 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 59.6 |
| Approach | | 14 | 3.0 | 0.007 | 0.4 | NA | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 59.4 |
| All Vehicles | | 249 | 3.0 | 0.110 | 5.2 | NA | 0.5 | 3.4 | 0.06 | 0.52 | 0.06 | 53.6 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Organisation: Microsoft | Processed: Thursday, 11 July 2019 9:23:40 AM

Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar

Hwy_Bell St & Bell St_Cash St_190227_S8.sip8

MOVEMENT SUMMARY

▽ Site: 101 [Bell St / Cash St 2031 Base Volumes AM]

Bell St / Cash St Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| South: Bell St | | | | | | | | | | | | |
| 2 | T1 | 4 | 3.0 | 0.015 | 0.0 | LOS A | 0.1 | 0.5 | 0.06 | 0.48 | 0.06 | 55.5 |
| 3 | R2 | 23 | 3.0 | 0.015 | 5.6 | LOS A | 0.1 | 0.5 | 0.06 | 0.48 | 0.06 | 53.6 |
| Approach | | 27 | 3.0 | 0.015 | 4.7 | NA | 0.1 | 0.5 | 0.06 | 0.48 | 0.06 | 53.9 |
| East: Cash St | | | | | | | | | | | | |
| 4 | L2 | 75 | 3.0 | 0.048 | 5.6 | LOS A | 0.2 | 1.4 | 0.06 | 0.55 | 0.06 | 53.3 |
| 6 | R2 | 1 | 3.0 | 0.048 | 5.6 | LOS A | 0.2 | 1.4 | 0.06 | 0.55 | 0.06 | 52.9 |
| Approach | | 76 | 3.0 | 0.048 | 5.6 | LOS A | 0.2 | 1.4 | 0.06 | 0.55 | 0.06 | 53.3 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 1 | 3.0 | 0.007 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 57.8 |
| 8 | T1 | 13 | 3.0 | 0.007 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 59.6 |
| Approach | | 14 | 3.0 | 0.007 | 0.4 | NA | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 59.4 |
| All Vehicles | | 117 | 3.0 | 0.048 | 4.8 | NA | 0.2 | 1.4 | 0.05 | 0.48 | 0.05 | 54.1 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar

Hwy_Bell St & Bell St_Cash St_190227_S8.sip8

MOVEMENT SUMMARY

▽ Site: 101 [Bell St / Cash St 2031 Project Volumes AM]

Bell St / Cash St Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| South: Bell St | | | | | | | | | | | | |
| 2 | T1 | 4 | 3.0 | 0.034 | 0.0 | LOS A | 0.2 | 1.1 | 0.06 | 0.53 | 0.06 | 55.2 |
| 3 | R2 | 56 | 3.0 | 0.034 | 5.6 | LOS A | 0.2 | 1.1 | 0.06 | 0.53 | 0.06 | 53.3 |
| Approach | | 60 | 3.0 | 0.034 | 5.2 | NA | 0.2 | 1.1 | 0.06 | 0.53 | 0.06 | 53.4 |
| East: Cash St | | | | | | | | | | | | |
| 4 | L2 | 178 | 3.0 | 0.112 | 5.6 | LOS A | 0.5 | 3.5 | 0.06 | 0.55 | 0.06 | 53.3 |
| 6 | R2 | 1 | 3.0 | 0.112 | 5.8 | LOS A | 0.5 | 3.5 | 0.06 | 0.55 | 0.06 | 52.9 |
| Approach | | 179 | 3.0 | 0.112 | 5.6 | LOS A | 0.5 | 3.5 | 0.06 | 0.55 | 0.06 | 53.3 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 1 | 3.0 | 0.007 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 57.8 |
| 8 | T1 | 13 | 3.0 | 0.007 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 59.6 |
| Approach | | 14 | 3.0 | 0.007 | 0.4 | NA | 0.0 | 0.0 | 0.00 | 0.05 | 0.00 | 59.4 |
| All Vehicles | | 253 | 3.0 | 0.112 | 5.2 | NA | 0.5 | 3.5 | 0.06 | 0.52 | 0.06 | 53.6 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar

Hwy_Bell St & Bell St_Cash St_190227_S8.sip8

MOVEMENT SUMMARY

▽ Site: 101 [Bell St / Cash St 2018 Existing Volumes PM]

Bell St / Cash St Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| South: Bell St | | | | | | | | | | | | |
| 2 | T1 | 11 | 3.0 | 0.039 | 0.0 | LOS A | 0.2 | 1.3 | 0.04 | 0.49 | 0.04 | 55.6 |
| 3 | R2 | 59 | 3.0 | 0.039 | 5.5 | LOS A | 0.2 | 1.3 | 0.04 | 0.49 | 0.04 | 53.7 |
| Approach | | 69 | 3.0 | 0.039 | 4.7 | NA | 0.2 | 1.3 | 0.04 | 0.49 | 0.04 | 54.0 |
| East: Cash St | | | | | | | | | | | | |
| 4 | L2 | 31 | 3.0 | 0.020 | 5.6 | LOS A | 0.1 | 0.6 | 0.03 | 0.56 | 0.03 | 53.4 |
| 6 | R2 | 1 | 3.0 | 0.020 | 5.8 | LOS A | 0.1 | 0.6 | 0.03 | 0.56 | 0.03 | 53.0 |
| Approach | | 32 | 3.0 | 0.020 | 5.6 | LOS A | 0.1 | 0.6 | 0.03 | 0.56 | 0.03 | 53.4 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 1 | 3.0 | 0.003 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 0.00 | 57.4 |
| 8 | T1 | 5 | 3.0 | 0.003 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 0.00 | 59.1 |
| Approach | | 6 | 3.0 | 0.003 | 0.9 | NA | 0.0 | 0.0 | 0.00 | 0.10 | 0.00 | 58.8 |
| All Vehicles | | 107 | 3.0 | 0.039 | 4.7 | NA | 0.2 | 1.3 | 0.03 | 0.49 | 0.03 | 54.1 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Project: L:\Synergy\Projects\18BRT\18BRT0545 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar\6 - Analysis\18BRT0545_D'Aguilar

Hwy_Bell St & Bell St_Cash St_190227_S8.sip8

MOVEMENT SUMMARY

Site: 101 [Bell St / Cash St 2021 Base Volumes PM]

Bell St / Cash St Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| South: Bell St | | | | | | | | | | | | |
| 2 | T1 | 11 | 3.0 | 0.039 | 0.0 | LOS A | 0.2 | 1.3 | 0.04 | 0.49 | 0.04 | 55.6 |
| 3 | R2 | 59 | 3.0 | 0.039 | 5.5 | LOS A | 0.2 | 1.3 | 0.04 | 0.49 | 0.04 | 53.7 |
| Approach | | 69 | 3.0 | 0.039 | 4.7 | NA | 0.2 | 1.3 | 0.04 | 0.49 | 0.04 | 54.0 |
| East: Cash St | | | | | | | | | | | | |
| 4 | L2 | 31 | 3.0 | 0.020 | 5.6 | LOS A | 0.1 | 0.6 | 0.03 | 0.56 | 0.03 | 53.4 |
| 6 | R2 | 1 | 3.0 | 0.020 | 5.8 | LOS A | 0.1 | 0.6 | 0.03 | 0.56 | 0.03 | 53.0 |
| Approach | | 32 | 3.0 | 0.020 | 5.6 | LOS A | 0.1 | 0.6 | 0.03 | 0.56 | 0.03 | 53.4 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 1 | 3.0 | 0.003 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 0.00 | 57.4 |
| 8 | T1 | 5 | 3.0 | 0.003 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 0.00 | 59.1 |
| Approach | | 6 | 3.0 | 0.003 | 0.9 | NA | 0.0 | 0.0 | 0.00 | 0.10 | 0.00 | 58.8 |
| All Vehicles | | 107 | 3.0 | 0.039 | 4.7 | NA | 0.2 | 1.3 | 0.03 | 0.49 | 0.03 | 54.1 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Hwy_Bell St & Bell St_Cash St_190227_S8.sip8

MOVEMENT SUMMARY

▽ Site: 101 [Bell St / Cash St 2021 Project Volumes PM]

Bell St / Cash St Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| South: Bell St | | | | | | | | | | | | |
| 2 | T1 | 11 | 3.0 | 0.089 | 0.0 | LOS A | 0.4 | 3.1 | 0.04 | 0.54 | 0.04 | 55.2 |
| 3 | R2 | 146 | 3.0 | 0.089 | 5.5 | LOS A | 0.4 | 3.1 | 0.04 | 0.54 | 0.04 | 53.3 |
| Approach | | 157 | 3.0 | 0.089 | 5.2 | NA | 0.4 | 3.1 | 0.04 | 0.54 | 0.04 | 53.4 |
| East: Cash St | | | | | | | | | | | | |
| 4 | L2 | 76 | 3.0 | 0.048 | 5.6 | LOS A | 0.2 | 1.4 | 0.03 | 0.56 | 0.03 | 53.4 |
| 6 | R2 | 1 | 3.0 | 0.048 | 6.1 | LOS A | 0.2 | 1.4 | 0.03 | 0.56 | 0.03 | 53.0 |
| Approach | | 77 | 3.0 | 0.048 | 5.6 | LOS A | 0.2 | 1.4 | 0.03 | 0.56 | 0.03 | 53.4 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 1 | 3.0 | 0.003 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 0.00 | 57.4 |
| 8 | T1 | 5 | 3.0 | 0.003 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 0.00 | 59.1 |
| Approach | | 6 | 3.0 | 0.003 | 0.9 | NA | 0.0 | 0.0 | 0.00 | 0.10 | 0.00 | 58.8 |
| All Vehicles | | 240 | 3.0 | 0.089 | 5.2 | NA | 0.4 | 3.1 | 0.04 | 0.53 | 0.04 | 53.5 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Hwy_Bell St & Bell St_Cash St_190227_S8.sip8

MOVEMENT SUMMARY

▽ Site: 101 [Bell St / Cash St 2031 Base Volumes PM]

Bell St / Cash St Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| South: Bell St | | | | | | | | | | | | |
| 2 | T1 | 11 | 3.0 | 0.039 | 0.0 | LOS A | 0.2 | 1.3 | 0.04 | 0.49 | 0.04 | 55.6 |
| 3 | R2 | 59 | 3.0 | 0.039 | 5.5 | LOS A | 0.2 | 1.3 | 0.04 | 0.49 | 0.04 | 53.7 |
| Approach | | 69 | 3.0 | 0.039 | 4.7 | NA | 0.2 | 1.3 | 0.04 | 0.49 | 0.04 | 54.0 |
| East: Cash St | | | | | | | | | | | | |
| 4 | L2 | 31 | 3.0 | 0.020 | 5.6 | LOS A | 0.1 | 0.6 | 0.03 | 0.56 | 0.03 | 53.4 |
| 6 | R2 | 1 | 3.0 | 0.020 | 5.8 | LOS A | 0.1 | 0.6 | 0.03 | 0.56 | 0.03 | 53.0 |
| Approach | | 32 | 3.0 | 0.020 | 5.6 | LOS A | 0.1 | 0.6 | 0.03 | 0.56 | 0.03 | 53.4 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 1 | 3.0 | 0.003 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 0.00 | 57.4 |
| 8 | T1 | 5 | 3.0 | 0.003 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 0.00 | 59.1 |
| Approach | | 6 | 3.0 | 0.003 | 0.9 | NA | 0.0 | 0.0 | 0.00 | 0.10 | 0.00 | 58.8 |
| All Vehicles | | 107 | 3.0 | 0.039 | 4.7 | NA | 0.2 | 1.3 | 0.03 | 0.49 | 0.03 | 54.1 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Hwy_Bell St & Bell St_Cash St_190227_S8.sip8

MOVEMENT SUMMARY

▽ Site: 101 [Bell St / Cash St 2031 Project Volumes PM]

Bell St / Cash St Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| South: Bell St | | | | | | | | | | | | |
| 2 | T1 | 11 | 3.0 | 0.090 | 0.0 | LOS A | 0.4 | 3.1 | 0.04 | 0.54 | 0.04 | 55.2 |
| 3 | R2 | 148 | 3.0 | 0.090 | 5.5 | LOS A | 0.4 | 3.1 | 0.04 | 0.54 | 0.04 | 53.3 |
| Approach | | 159 | 3.0 | 0.090 | 5.2 | NA | 0.4 | 3.1 | 0.04 | 0.54 | 0.04 | 53.4 |
| East: Cash St | | | | | | | | | | | | |
| 4 | L2 | 77 | 3.0 | 0.049 | 5.6 | LOS A | 0.2 | 1.4 | 0.03 | 0.56 | 0.03 | 53.4 |
| 6 | R2 | 1 | 3.0 | 0.049 | 6.1 | LOS A | 0.2 | 1.4 | 0.03 | 0.56 | 0.03 | 53.0 |
| Approach | | 78 | 3.0 | 0.049 | 5.6 | LOS A | 0.2 | 1.4 | 0.03 | 0.56 | 0.03 | 53.4 |
| North: Bell St | | | | | | | | | | | | |
| 7 | L2 | 1 | 3.0 | 0.003 | 5.6 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 0.00 | 57.4 |
| 8 | T1 | 5 | 3.0 | 0.003 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.10 | 0.00 | 59.1 |
| Approach | | 6 | 3.0 | 0.003 | 0.9 | NA | 0.0 | 0.0 | 0.00 | 0.10 | 0.00 | 58.8 |
| All Vehicles | | 243 | 3.0 | 0.090 | 5.2 | NA | 0.4 | 3.1 | 0.04 | 0.54 | 0.04 | 53.5 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Hwy_Bell St & Bell St_Cash St_190227_S8.sip8

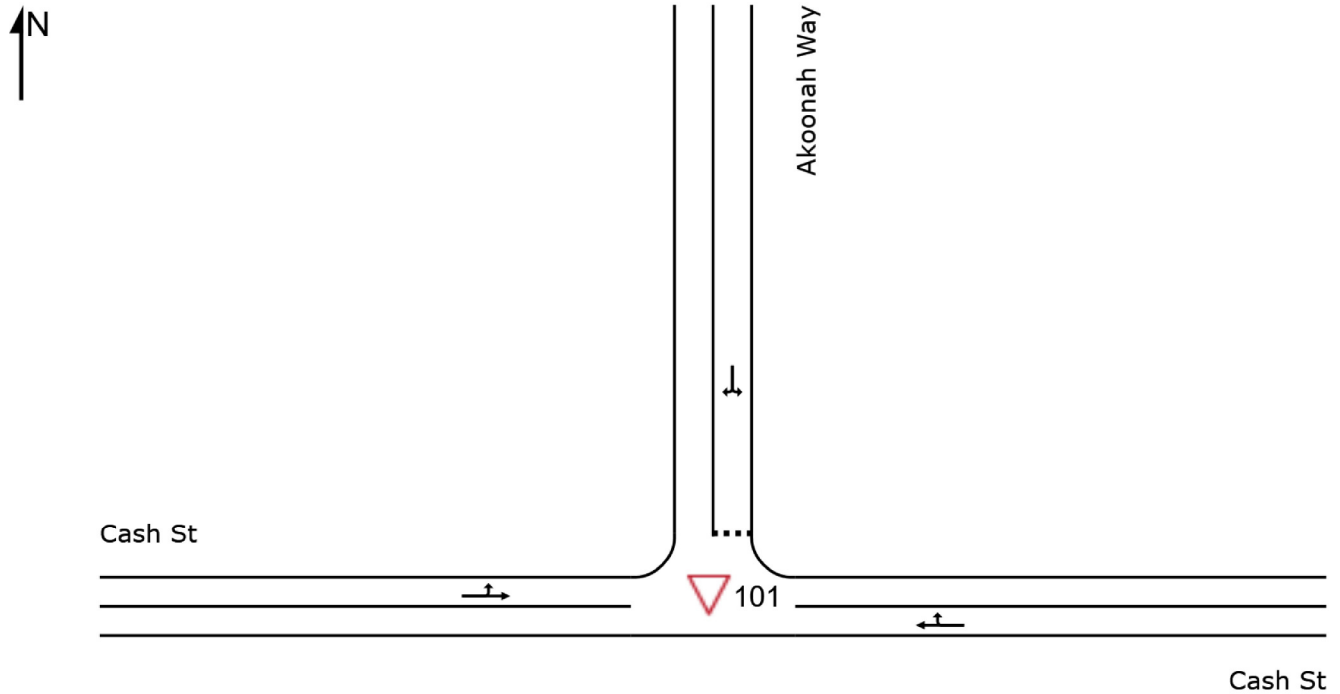
SITE LAYOUT

▽ Site: 101 [Cash St / Akoonah Way 2018 Volumes AM]

Cash St / Akoonah Way Intersection

Site Category: (None)

Giveway / Yield (Two-Way)



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MOVEMENT SUMMARY

▽ Site: 101 [Cash St / Akoonah Way 2018 Volumes AM]

Cash St / Akoonah Way Intersection

Site Category: (None)

Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: Cash St | | | | | | | | | | | | |
| 5 | T1 | 7 | 0.0 | 0.004 | 0.0 | LOS A | 0.0 | 0.0 | 0.02 | 0.08 | 0.02 | 58.7 |
| 6 | R2 | 1 | 0.0 | 0.004 | 5.5 | LOS A | 0.0 | 0.0 | 0.02 | 0.08 | 0.02 | 56.2 |
| Approach | | 8 | 0.0 | 0.004 | 0.7 | NA | 0.0 | 0.0 | 0.02 | 0.08 | 0.02 | 58.4 |
| North: Akoonah Way | | | | | | | | | | | | |
| 7 | L2 | 1 | 0.0 | 0.053 | 5.5 | LOS A | 0.2 | 1.2 | 0.06 | 0.58 | 0.06 | 51.6 |
| 9 | R2 | 66 | 0.0 | 0.053 | 5.5 | LOS A | 0.2 | 1.2 | 0.06 | 0.58 | 0.06 | 52.0 |
| Approach | | 67 | 0.0 | 0.053 | 5.5 | LOS A | 0.2 | 1.2 | 0.06 | 0.58 | 0.06 | 52.0 |
| West: Cash St | | | | | | | | | | | | |
| 10 | L2 | 21 | 0.0 | 0.013 | 5.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.53 | 0.00 | 53.1 |
| 11 | T1 | 2 | 0.0 | 0.013 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.53 | 0.00 | 52.8 |
| Approach | | 23 | 0.0 | 0.013 | 5.0 | NA | 0.0 | 0.0 | 0.00 | 0.53 | 0.00 | 53.1 |
| All Vehicles | | 99 | 0.0 | 0.053 | 5.0 | NA | 0.2 | 1.2 | 0.04 | 0.52 | 0.04 | 52.6 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Hwy_Bell St & Bell St_Cash St_190227_S8.sip8

MOVEMENT SUMMARY

Site: 101 [Cash St / Central Site Access / Akoonah Way 2021 Base Volumes AM]

Cash St / Akoonah Way Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: Cash St | | | | | | | | | | | | |
| 5 | T1 | 7 | 0.0 | 0.004 | 0.0 | LOS A | 0.0 | 0.0 | 0.02 | 0.08 | 0.02 | 58.7 |
| 6 | R2 | 1 | 0.0 | 0.004 | 5.5 | LOS A | 0.0 | 0.0 | 0.02 | 0.08 | 0.02 | 56.2 |
| Approach | | 8 | 0.0 | 0.004 | 0.7 | NA | 0.0 | 0.0 | 0.02 | 0.08 | 0.02 | 58.4 |
| North: Akoonah Way | | | | | | | | | | | | |
| 7 | L2 | 1 | 0.0 | 0.053 | 5.5 | LOS A | 0.2 | 1.2 | 0.06 | 0.58 | 0.06 | 51.6 |
| 9 | R2 | 66 | 0.0 | 0.053 | 5.5 | LOS A | 0.2 | 1.2 | 0.06 | 0.58 | 0.06 | 52.0 |
| Approach | | 67 | 0.0 | 0.053 | 5.5 | LOS A | 0.2 | 1.2 | 0.06 | 0.58 | 0.06 | 52.0 |
| West: Cash St | | | | | | | | | | | | |
| 10 | L2 | 21 | 0.0 | 0.013 | 5.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.53 | 0.00 | 53.1 |
| 11 | T1 | 2 | 0.0 | 0.013 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.53 | 0.00 | 52.8 |
| Approach | | 23 | 0.0 | 0.013 | 5.0 | NA | 0.0 | 0.0 | 0.00 | 0.53 | 0.00 | 53.1 |
| All Vehicles | | 99 | 0.0 | 0.053 | 5.0 | NA | 0.2 | 1.2 | 0.04 | 0.52 | 0.04 | 52.6 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 101 [Cash St / Central Site Access / Akoonah Way 2031 Base Volumes AM]

Cash St / Akoonah Way Intersection
 Site Category: (None)
 Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------|------------------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back Vehicles veh | of Queue Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: Cash St | | | | | | | | | | | | |
| 5 | T1 | 7 | 0.0 | 0.004 | 0.0 | LOS A | 0.0 | 0.0 | 0.02 | 0.08 | 0.02 | 58.7 |
| 6 | R2 | 1 | 0.0 | 0.004 | 5.5 | LOS A | 0.0 | 0.0 | 0.02 | 0.08 | 0.02 | 56.2 |
| Approach | | 8 | 0.0 | 0.004 | 0.7 | NA | 0.0 | 0.0 | 0.02 | 0.08 | 0.02 | 58.4 |
| North: Akoonah Way | | | | | | | | | | | | |
| 7 | L2 | 1 | 0.0 | 0.053 | 5.5 | LOS A | 0.2 | 1.2 | 0.06 | 0.58 | 0.06 | 51.6 |
| 9 | R2 | 66 | 0.0 | 0.053 | 5.5 | LOS A | 0.2 | 1.2 | 0.06 | 0.58 | 0.06 | 52.0 |
| Approach | | 67 | 0.0 | 0.053 | 5.5 | LOS A | 0.2 | 1.2 | 0.06 | 0.58 | 0.06 | 52.0 |
| West: Cash St | | | | | | | | | | | | |
| 10 | L2 | 21 | 0.0 | 0.013 | 5.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.53 | 0.00 | 53.1 |
| 11 | T1 | 2 | 0.0 | 0.013 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.53 | 0.00 | 52.8 |
| Approach | | 23 | 0.0 | 0.013 | 5.0 | NA | 0.0 | 0.0 | 0.00 | 0.53 | 0.00 | 53.1 |
| All Vehicles | | 99 | 0.0 | 0.053 | 5.0 | NA | 0.2 | 1.2 | 0.04 | 0.52 | 0.04 | 52.6 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 101 [Cash St / Akoonah Way 2018 Volumes PM]

Cash St / Akoonah Way Intersection
 Site Category: (None)
 Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: Cash St | | | | | | | | | | | | |
| 5 | T1 | 3 | 0.0 | 0.002 | 0.1 | LOS A | 0.0 | 0.0 | 0.08 | 0.15 | 0.08 | 57.4 |
| 6 | R2 | 1 | 0.0 | 0.002 | 5.6 | LOS A | 0.0 | 0.0 | 0.08 | 0.15 | 0.08 | 55.2 |
| Approach | | 4 | 0.0 | 0.002 | 1.4 | NA | 0.0 | 0.0 | 0.08 | 0.15 | 0.08 | 56.7 |
| North: Akoonah Way | | | | | | | | | | | | |
| 7 | L2 | 1 | 0.0 | 0.023 | 5.6 | LOS A | 0.1 | 0.5 | 0.08 | 0.57 | 0.08 | 51.6 |
| 9 | R2 | 27 | 0.0 | 0.023 | 5.6 | LOS A | 0.1 | 0.5 | 0.08 | 0.57 | 0.08 | 51.9 |
| Approach | | 28 | 0.0 | 0.023 | 5.6 | LOS A | 0.1 | 0.5 | 0.08 | 0.57 | 0.08 | 51.9 |
| West: Cash St | | | | | | | | | | | | |
| 10 | L2 | 53 | 0.0 | 0.032 | 5.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 53.2 |
| 11 | T1 | 6 | 0.0 | 0.032 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 52.9 |
| Approach | | 59 | 0.0 | 0.032 | 5.0 | NA | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 53.2 |
| All Vehicles | | 92 | 0.0 | 0.032 | 5.0 | NA | 0.1 | 0.5 | 0.03 | 0.52 | 0.03 | 52.9 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 101 [Cash St / Central Site Access / Akoonah Way 2021 Base Volumes PM]

Cash St / Akoonah Way Intersection
Site Category: (None)
Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: Cash St | | | | | | | | | | | | |
| 5 | T1 | 3 | 0.0 | 0.002 | 0.1 | LOS A | 0.0 | 0.0 | 0.08 | 0.15 | 0.08 | 57.4 |
| 6 | R2 | 1 | 0.0 | 0.002 | 5.6 | LOS A | 0.0 | 0.0 | 0.08 | 0.15 | 0.08 | 55.2 |
| Approach | | 4 | 0.0 | 0.002 | 1.4 | NA | 0.0 | 0.0 | 0.08 | 0.15 | 0.08 | 56.7 |
| North: Akoonah Way | | | | | | | | | | | | |
| 7 | L2 | 1 | 0.0 | 0.023 | 5.6 | LOS A | 0.1 | 0.5 | 0.08 | 0.57 | 0.08 | 51.6 |
| 9 | R2 | 27 | 0.0 | 0.023 | 5.6 | LOS A | 0.1 | 0.5 | 0.08 | 0.57 | 0.08 | 51.9 |
| Approach | | 28 | 0.0 | 0.023 | 5.6 | LOS A | 0.1 | 0.5 | 0.08 | 0.57 | 0.08 | 51.9 |
| West: Cash St | | | | | | | | | | | | |
| 10 | L2 | 53 | 0.0 | 0.032 | 5.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 53.2 |
| 11 | T1 | 6 | 0.0 | 0.032 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 52.9 |
| Approach | | 59 | 0.0 | 0.032 | 5.0 | NA | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 53.2 |
| All Vehicles | | 92 | 0.0 | 0.032 | 5.0 | NA | 0.1 | 0.5 | 0.03 | 0.52 | 0.03 | 52.9 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

▽ Site: 101 [Cash St / Central Site Access / Akoonah Way 2031 Base Volumes PM]

Cash St / Akoonah Way Intersection
 Site Category: (None)
 Giveway / Yield (Two-Way)

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| East: Cash St | | | | | | | | | | | | |
| 5 | T1 | 3 | 0.0 | 0.002 | 0.1 | LOS A | 0.0 | 0.0 | 0.08 | 0.15 | 0.08 | 57.4 |
| 6 | R2 | 1 | 0.0 | 0.002 | 5.6 | LOS A | 0.0 | 0.0 | 0.08 | 0.15 | 0.08 | 55.2 |
| Approach | | 4 | 0.0 | 0.002 | 1.4 | NA | 0.0 | 0.0 | 0.08 | 0.15 | 0.08 | 56.7 |
| North: Akoonah Way | | | | | | | | | | | | |
| 7 | L2 | 1 | 0.0 | 0.023 | 5.6 | LOS A | 0.1 | 0.5 | 0.08 | 0.57 | 0.08 | 51.6 |
| 9 | R2 | 27 | 0.0 | 0.023 | 5.6 | LOS A | 0.1 | 0.5 | 0.08 | 0.57 | 0.08 | 51.9 |
| Approach | | 28 | 0.0 | 0.023 | 5.6 | LOS A | 0.1 | 0.5 | 0.08 | 0.57 | 0.08 | 51.9 |
| West: Cash St | | | | | | | | | | | | |
| 10 | L2 | 53 | 0.0 | 0.032 | 5.5 | LOS A | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 53.2 |
| 11 | T1 | 6 | 0.0 | 0.032 | 0.0 | LOS A | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 52.9 |
| Approach | | 59 | 0.0 | 0.032 | 5.0 | NA | 0.0 | 0.0 | 0.00 | 0.52 | 0.00 | 53.2 |
| All Vehicles | | 92 | 0.0 | 0.032 | 5.0 | NA | 0.1 | 0.5 | 0.03 | 0.52 | 0.03 | 52.9 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Vehicle movement LOS values are based on average delay per movement.

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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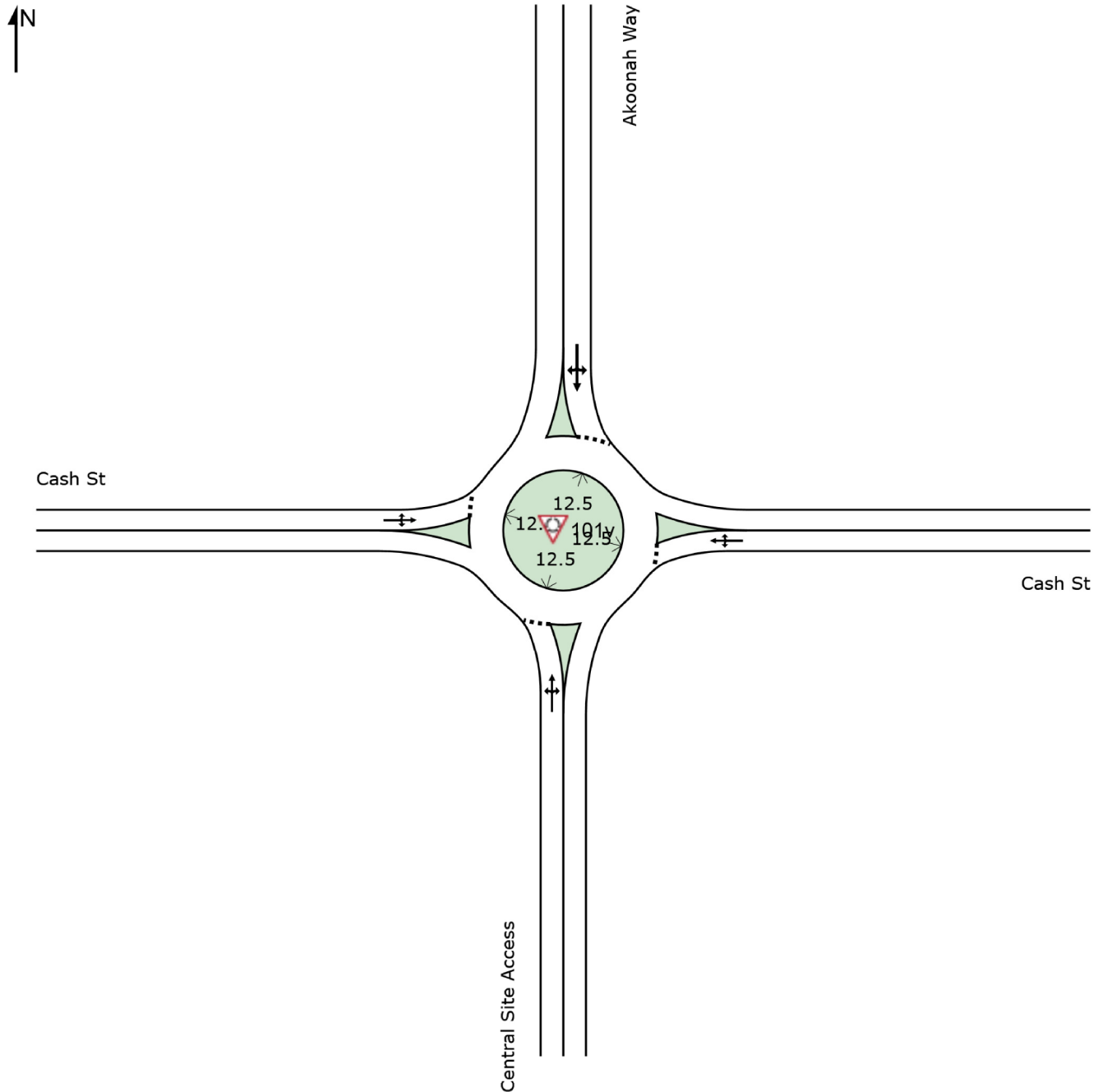
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SITE LAYOUT

 **Site: 101v [Cash St / Central Site Access / Akoonah Way 2021 Project Volumes AM]**

Cash St / Akoonah Way Intersection
Site Category: (None)
Roundabout



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MOVEMENT SUMMARY

 **Site: 101v [Cash St / Central Site Access / Akoonah Way 2021 Project Volumes AM]**

Cash St / Akoonah Way Intersection
Site Category: (None)
Roundabout

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| South: Central Site Access | | | | | | | | | | | | |
| 1 | L2 | 56 | 0.0 | 0.050 | 5.0 | LOS A | 0.3 | 1.9 | 0.30 | 0.52 | 0.30 | 49.5 |
| 2 | T1 | 1 | 0.0 | 0.050 | 5.1 | LOS A | 0.3 | 1.9 | 0.30 | 0.52 | 0.30 | 52.6 |
| 3 | R2 | 1 | 0.0 | 0.050 | 8.8 | LOS A | 0.3 | 1.9 | 0.30 | 0.52 | 0.30 | 48.8 |
| Approach | | 58 | 0.0 | 0.050 | 5.1 | LOS A | 0.3 | 1.9 | 0.30 | 0.52 | 0.30 | 49.5 |
| East: Cash St | | | | | | | | | | | | |
| 4 | L2 | 1 | 0.0 | 0.040 | 4.9 | LOS A | 0.2 | 1.6 | 0.28 | 0.46 | 0.28 | 47.4 |
| 5 | T1 | 44 | 0.0 | 0.040 | 5.0 | LOS A | 0.2 | 1.6 | 0.28 | 0.46 | 0.28 | 51.2 |
| 6 | R2 | 1 | 0.0 | 0.040 | 8.7 | LOS A | 0.2 | 1.6 | 0.28 | 0.46 | 0.28 | 52.4 |
| Approach | | 46 | 0.0 | 0.040 | 5.1 | LOS A | 0.2 | 1.6 | 0.28 | 0.46 | 0.28 | 51.2 |
| North: Akoonah Way | | | | | | | | | | | | |
| 7 | L2 | 1 | 0.0 | 0.053 | 4.5 | LOS A | 0.2 | 1.7 | 0.13 | 0.62 | 0.13 | 49.3 |
| 8 | T1 | 1 | 0.0 | 0.053 | 4.6 | LOS A | 0.2 | 1.7 | 0.13 | 0.62 | 0.13 | 49.8 |
| 9 | R2 | 66 | 0.0 | 0.053 | 8.2 | LOS A | 0.2 | 1.7 | 0.13 | 0.62 | 0.13 | 51.0 |
| Approach | | 68 | 0.0 | 0.053 | 8.1 | LOS A | 0.2 | 1.7 | 0.13 | 0.62 | 0.13 | 51.0 |
| West: Cash St | | | | | | | | | | | | |
| 10 | L2 | 21 | 0.0 | 0.035 | 4.3 | LOS A | 0.2 | 1.4 | 0.04 | 0.58 | 0.04 | 52.3 |
| 11 | T1 | 11 | 0.0 | 0.035 | 4.5 | LOS A | 0.2 | 1.4 | 0.04 | 0.58 | 0.04 | 51.1 |
| 12 | R2 | 22 | 0.0 | 0.035 | 8.1 | LOS A | 0.2 | 1.4 | 0.04 | 0.58 | 0.04 | 50.0 |
| Approach | | 54 | 0.0 | 0.035 | 5.9 | LOS A | 0.2 | 1.4 | 0.04 | 0.58 | 0.04 | 51.3 |
| All Vehicles | | 226 | 0.0 | 0.053 | 6.2 | LOS A | 0.3 | 1.9 | 0.18 | 0.55 | 0.18 | 50.8 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Hwy_Bell St & Bell St_Cash St_190227_S8.sip8

MOVEMENT SUMMARY

 **Site: 101v [Cash St / Central Site Access / Akoonah Way 2031 Project Volumes AM]**

Cash St / Akoonah Way Intersection
Site Category: (None)
Roundabout

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| South: Central Site Access | | | | | | | | | | | | |
| 1 | L2 | 56 | 0.0 | 0.050 | 5.0 | LOS A | 0.3 | 1.9 | 0.30 | 0.52 | 0.30 | 49.5 |
| 2 | T1 | 1 | 0.0 | 0.050 | 5.1 | LOS A | 0.3 | 1.9 | 0.30 | 0.52 | 0.30 | 52.6 |
| 3 | R2 | 1 | 0.0 | 0.050 | 8.8 | LOS A | 0.3 | 1.9 | 0.30 | 0.52 | 0.30 | 48.8 |
| Approach | | 58 | 0.0 | 0.050 | 5.1 | LOS A | 0.3 | 1.9 | 0.30 | 0.52 | 0.30 | 49.5 |
| East: Cash St | | | | | | | | | | | | |
| 4 | L2 | 1 | 0.0 | 0.040 | 4.9 | LOS A | 0.2 | 1.6 | 0.28 | 0.46 | 0.28 | 47.4 |
| 5 | T1 | 44 | 0.0 | 0.040 | 5.0 | LOS A | 0.2 | 1.6 | 0.28 | 0.46 | 0.28 | 51.2 |
| 6 | R2 | 1 | 0.0 | 0.040 | 8.7 | LOS A | 0.2 | 1.6 | 0.28 | 0.46 | 0.28 | 52.4 |
| Approach | | 46 | 0.0 | 0.040 | 5.1 | LOS A | 0.2 | 1.6 | 0.28 | 0.46 | 0.28 | 51.2 |
| North: Akoonah Way | | | | | | | | | | | | |
| 7 | L2 | 1 | 0.0 | 0.053 | 4.5 | LOS A | 0.2 | 1.7 | 0.13 | 0.62 | 0.13 | 49.3 |
| 8 | T1 | 1 | 0.0 | 0.053 | 4.6 | LOS A | 0.2 | 1.7 | 0.13 | 0.62 | 0.13 | 49.8 |
| 9 | R2 | 66 | 0.0 | 0.053 | 8.2 | LOS A | 0.2 | 1.7 | 0.13 | 0.62 | 0.13 | 51.0 |
| Approach | | 68 | 0.0 | 0.053 | 8.1 | LOS A | 0.2 | 1.7 | 0.13 | 0.62 | 0.13 | 51.0 |
| West: Cash St | | | | | | | | | | | | |
| 10 | L2 | 21 | 0.0 | 0.035 | 4.3 | LOS A | 0.2 | 1.4 | 0.04 | 0.58 | 0.04 | 52.3 |
| 11 | T1 | 11 | 0.0 | 0.035 | 4.5 | LOS A | 0.2 | 1.4 | 0.04 | 0.58 | 0.04 | 51.1 |
| 12 | R2 | 22 | 0.0 | 0.035 | 8.1 | LOS A | 0.2 | 1.4 | 0.04 | 0.58 | 0.04 | 50.0 |
| Approach | | 54 | 0.0 | 0.035 | 5.9 | LOS A | 0.2 | 1.4 | 0.04 | 0.58 | 0.04 | 51.3 |
| All Vehicles | | 226 | 0.0 | 0.053 | 6.2 | LOS A | 0.3 | 1.9 | 0.18 | 0.55 | 0.18 | 50.8 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Hwy_Bell St & Bell St_Cash St_190227_S8.sip8

MOVEMENT SUMMARY

 **Site: 101v [Cash St / Central Site Access / Akoonah Way 2021 Project Volumes PM]**

Cash St / Akoonah Way Intersection
Site Category: (None)
Roundabout

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| South: Central Site Access | | | | | | | | | | | | |
| 1 | L2 | 25 | 0.0 | 0.022 | 4.6 | LOS A | 0.1 | 0.8 | 0.18 | 0.50 | 0.18 | 49.9 |
| 2 | T1 | 1 | 0.0 | 0.022 | 4.7 | LOS A | 0.1 | 0.8 | 0.18 | 0.50 | 0.18 | 53.0 |
| 3 | R2 | 1 | 0.0 | 0.022 | 8.4 | LOS A | 0.1 | 0.8 | 0.18 | 0.50 | 0.18 | 49.3 |
| Approach | | 27 | 0.0 | 0.022 | 4.8 | LOS A | 0.1 | 0.8 | 0.18 | 0.50 | 0.18 | 50.0 |
| East: Cash St | | | | | | | | | | | | |
| 4 | L2 | 1 | 0.0 | 0.018 | 4.8 | LOS A | 0.1 | 0.7 | 0.25 | 0.46 | 0.25 | 47.5 |
| 5 | T1 | 19 | 0.0 | 0.018 | 4.9 | LOS A | 0.1 | 0.7 | 0.25 | 0.46 | 0.25 | 51.3 |
| 6 | R2 | 1 | 0.0 | 0.018 | 8.6 | LOS A | 0.1 | 0.7 | 0.25 | 0.46 | 0.25 | 52.4 |
| Approach | | 21 | 0.0 | 0.018 | 5.1 | LOS A | 0.1 | 0.7 | 0.25 | 0.46 | 0.25 | 51.2 |
| North: Akoonah Way | | | | | | | | | | | | |
| 7 | L2 | 1 | 0.0 | 0.025 | 4.8 | LOS A | 0.1 | 0.8 | 0.22 | 0.61 | 0.22 | 49.2 |
| 8 | T1 | 1 | 0.0 | 0.025 | 4.9 | LOS A | 0.1 | 0.8 | 0.22 | 0.61 | 0.22 | 49.7 |
| 9 | R2 | 27 | 0.0 | 0.025 | 8.5 | LOS A | 0.1 | 0.8 | 0.22 | 0.61 | 0.22 | 50.9 |
| Approach | | 29 | 0.0 | 0.025 | 8.2 | LOS A | 0.1 | 0.8 | 0.22 | 0.61 | 0.22 | 50.8 |
| West: Cash St | | | | | | | | | | | | |
| 10 | L2 | 53 | 0.0 | 0.087 | 4.3 | LOS A | 0.5 | 3.7 | 0.04 | 0.57 | 0.04 | 52.5 |
| 11 | T1 | 38 | 0.0 | 0.087 | 4.5 | LOS A | 0.5 | 3.7 | 0.04 | 0.57 | 0.04 | 51.3 |
| 12 | R2 | 48 | 0.0 | 0.087 | 8.1 | LOS A | 0.5 | 3.7 | 0.04 | 0.57 | 0.04 | 50.2 |
| Approach | | 139 | 0.0 | 0.087 | 5.7 | LOS A | 0.5 | 3.7 | 0.04 | 0.57 | 0.04 | 51.6 |
| All Vehicles | | 217 | 0.0 | 0.087 | 5.8 | LOS A | 0.5 | 3.7 | 0.10 | 0.55 | 0.10 | 51.2 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Hwy_Bell St & Bell St_Cash St_190227_S8.sip8

MOVEMENT SUMMARY

 **Site: 101v [Cash St / Central Site Access / Akoonah Way 2031 Project Volumes PM]**

Cash St / Akoonah Way Intersection
Site Category: (None)
Roundabout

| Movement Performance - Vehicles | | | | | | | | | | | | |
|---------------------------------|------|-----------------------|---------------|------------------|----------------------|------------------|--------------------------------------|---------------|--------------|---------------------|------------------|-----------------------|
| Mov ID | Turn | Demand Total veh/h | Flows HV % | Deg. Satn v/c | Average Delay sec | Level of Service | 95% Back of Queue Vehicles veh | Distance m | Prop. Queued | Effective Stop Rate | Aver. No. Cycles | Average Speed km/h |
| South: Central Site Access | | | | | | | | | | | | |
| 1 | L2 | 25 | 0.0 | 0.022 | 4.6 | LOS A | 0.1 | 0.8 | 0.18 | 0.50 | 0.18 | 49.9 |
| 2 | T1 | 1 | 0.0 | 0.022 | 4.7 | LOS A | 0.1 | 0.8 | 0.18 | 0.50 | 0.18 | 53.0 |
| 3 | R2 | 1 | 0.0 | 0.022 | 8.4 | LOS A | 0.1 | 0.8 | 0.18 | 0.50 | 0.18 | 49.3 |
| Approach | | 27 | 0.0 | 0.022 | 4.8 | LOS A | 0.1 | 0.8 | 0.18 | 0.50 | 0.18 | 50.0 |
| East: Cash St | | | | | | | | | | | | |
| 4 | L2 | 1 | 0.0 | 0.018 | 4.8 | LOS A | 0.1 | 0.7 | 0.25 | 0.46 | 0.25 | 47.5 |
| 5 | T1 | 19 | 0.0 | 0.018 | 4.9 | LOS A | 0.1 | 0.7 | 0.25 | 0.46 | 0.25 | 51.3 |
| 6 | R2 | 1 | 0.0 | 0.018 | 8.6 | LOS A | 0.1 | 0.7 | 0.25 | 0.46 | 0.25 | 52.4 |
| Approach | | 21 | 0.0 | 0.018 | 5.1 | LOS A | 0.1 | 0.7 | 0.25 | 0.46 | 0.25 | 51.2 |
| North: Akoonah Way | | | | | | | | | | | | |
| 7 | L2 | 1 | 0.0 | 0.025 | 4.8 | LOS A | 0.1 | 0.8 | 0.22 | 0.61 | 0.22 | 49.2 |
| 8 | T1 | 1 | 0.0 | 0.025 | 4.9 | LOS A | 0.1 | 0.8 | 0.22 | 0.61 | 0.22 | 49.7 |
| 9 | R2 | 27 | 0.0 | 0.025 | 8.5 | LOS A | 0.1 | 0.8 | 0.22 | 0.61 | 0.22 | 50.9 |
| Approach | | 29 | 0.0 | 0.025 | 8.2 | LOS A | 0.1 | 0.8 | 0.22 | 0.61 | 0.22 | 50.8 |
| West: Cash St | | | | | | | | | | | | |
| 10 | L2 | 53 | 0.0 | 0.087 | 4.3 | LOS A | 0.5 | 3.7 | 0.04 | 0.57 | 0.04 | 52.5 |
| 11 | T1 | 38 | 0.0 | 0.087 | 4.5 | LOS A | 0.5 | 3.7 | 0.04 | 0.57 | 0.04 | 51.3 |
| 12 | R2 | 48 | 0.0 | 0.087 | 8.1 | LOS A | 0.5 | 3.7 | 0.04 | 0.57 | 0.04 | 50.2 |
| Approach | | 139 | 0.0 | 0.087 | 5.7 | LOS A | 0.5 | 3.7 | 0.04 | 0.57 | 0.04 | 51.6 |
| All Vehicles | | 217 | 0.0 | 0.087 | 5.8 | LOS A | 0.5 | 3.7 | 0.10 | 0.55 | 0.10 | 51.2 |

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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Hwy_Bell St & Bell St_Cash St_190227_S8.sip8

JFP URBAN CONSULTANTS

SITE BASED STORMWATER MANAGEMENT PLAN

Proposed Development at
22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR
for
DFC (PROJECT MANAGEMENT) PTY LTD



TOWN PLANNING

BRISBANE | SUNSHINE COAST | CENTRAL QLD

URBAN DESIGN + MASTER PLANNING

SURVEYING + SPATIAL SERVICES

CIVIL + STORMWATER ENGINEERING

LANDSCAPE ARCHITECTURE

ECOLOGY + ARBORICULTURE

Approved Subject to Conditions of Decision Notice DA/38032/2019/V3RL

ISO 9001 CERTIFIED

SITE BASED STORMWATER MANAGEMENT PLAN

Proposed Development at
 22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR
 for
 DFC (PROJECT MANAGEMENT) PTY LTD

M2584EA1_DA1_SBSMP –Revision C
 July 2019

JFP Urban Consultants Pty Ltd

Prepared by: C. Blair

Approved by: A. Fraser

| Revision | Date | Details | Prepared By | Approved By |
|----------|------------|---------------------------------|-------------|----------------|
| A | 13.02.2019 | For Client Review | CB | AF (RPEQ 5691) |
| B | 25.02.2019 | For Council Submission | CB | AF (RPEQ 5691) |
| C | 24.07.2019 | Response to Information Request | CB | AF (RPEQ 5691) |

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- Appendix F – Impact Mapping
- Appendix G – Sensitivity Scenario Flood Plans

1. INTRODUCTION

JFP Urban Consultants Pty Ltd has been commissioned by DFC (Project Management) Pty Ltd to compile this *Site Based Stormwater Management Plan* for the site located at 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar (the "site"). Refer to **Appendix A** for the proposed layout. Council application reference is **DA/38032/2019/V3RL**.

The analyses in this report present strategies for managing stormwater quantity and quality for the site generally in accordance with Moreton Bay Regional Council (MBRC) *Planning Scheme* (2016) and the *State Planning Policy* (2017). The report objective and scope of works are presented below.

Revision C (this report) has updates following revised site layout. Some changes were made to Pre-Development Scenario catchments, namely A1, A2, C & D. Please note, although there are some modelling changes, the overall objective and scope of works remain the same as previous revisions of this report.

Revision C report also provide responses to item 15 of MBRC Information Request dated 27 March 2019 (refer to **Section 1.2** for summary) and item 1 of State Assessment Referral Agency (SARA) Information Request dated 17 April 2019 (refer to **Section 1.3** for summary).

1.1 OBJECTIVE & SCOPE

The design objectives for this report are:

- Address stormwater quantity and flood management for the development.
- Address stormwater quality management for the development.

The scope of investigations undertaken for this report is as follows:

- Stormwater quantity and flood management:
 - Undertake hydrological and hydraulic analysis for the pre-development scenario.
 - Develop and model peak flow/flood mitigation strategies.
 - Undertake hydrological and hydraulic analysis for the post-development scenario incorporating peak flow/flood mitigation works.
 - Compare pre and post-development results to demonstrate no adverse impacts to upstream and downstream properties.
 - Undertake sensitivity scenarios and nominate minimum flood immunity levels for the new development.
- Stormwater quality
 - Develop a stormwater quality management strategy
 - Undertake MUSIC modelling to demonstrate that Water Quality Objectives can be achieved.

Based on the outcomes of the above investigations, this report provides recommendations, including concept drawings for stormwater management. These recommendations should be incorporated into future detailed design and subsequent construction documentation.

1.2 MBRC INFORMATION REQUEST ITEMS

Responses to the specific queries raised within Item 15 of the MBRC Information Request are summarised below:

Item 15) The provided stormwater management plan is generally acceptable in principal. Some further information and amendments are required on the stormwater management plan as listed below:

a) Provide advice on the anticipated volume of storage for the respective storm events for both storage devices.

Response: Please refer to **Table 17** within **Section 3.4.4**.

b) Provide flood plans/drawings that show the “was wet now dry” and “was dry now wet” scenarios for the modelled watercourses.

Response: These plans are included within **Appendix F**.

c) Amend the MUSIC model in accordance with the following:

- i. Include all developable land, no bypass from source nodes,*
- ii. Reconcile the land areas with the total title area and state the area of the land that cannot or will not be captured and treated.*
- iii. Amend the pervious/impervious ratio for all the Ground source nodes to the appropriate value for the Urban type at the relevant density.*

Response: All developable land is included within MUSIC model. The MUSIC model has been updated based on the updated layout and earthworks design. The “Ground” source nodes fraction impervious has been updated in accordance with *Table 3.5* of the *MUSIC Modelling Guidelines* (2010).

d) Include batters for the basins at 1 in 4 maximum slopes.

Response: All basins have been conceptually designed at 1:4 maximum slopes, with 1:6 maximum slopes at the access ramps. This will be incorporated in detailed design also.

1.3 SARA INFORMATION REQUEST ITEMS

Responses to each dot point of item 1 of SARA Information Request are summarised below:

Dot point 1) how does the proposed overland flow path contained within the 5m pathway between lot 148 and Lot 149, convey stormwater to flood storage A.

Response: The overland flow within the 5m pathway between lot 144 and Lot 145 will be collected by the internal road drainage which discharges into Flood Storage A. A pit is proposed at the end of the 5m pathway which will collect the minor storm runoff. The runoff from the external catchment "A2" will be considered when sizing the internal pipes under this portion of the internal road. The pathway will tie into the internal road so that any runoff in excess of the pipe capacity (during major storm events) will travel as overland flow to the road sag and ultimately discharge into Flood Storage A.

Dot Point 2) Some of the drawings do not provide adequate legends to be read correctly, for example Appendix C, Plan SK03 Issue B. Please provide a Stormwater Management Plan that includes correctly labelled plans.

Response: The concept plans and their legends in **Appendix C** have been updated.

Dot Point 3) Provide a plan that shows the finished ground levels of flood storage A and flood storage B and provide advice on whether the design of these storage areas ensures full discharge of stormwater post events.

Response: The proposed storage areas are 'dry' basins that will drain out at the cessation of the rain. The flood storage areas will be created using downstream embankments. The pipe outlets will be located at the invert level of the flood storage A and flood storage B. **Table 13** within **Section 3.4.3.1** has been updated for clarity. **Appendix C** includes concept engineering plans.

Dot Point 4) Provide confirmation that the recommendations of the stormwater management plan are not changed as a result of works recommended by the amended noise impact assessment which is likely to result in noise barriers along the southern boundary of the site (refer to Item 3).

Response: The amended Noise Impact Assessment prepared by TTM consulting does not require any noise barriers long the southern site boundary, therefore the recommendations of the stormwater management plan will not be affected by the proposed fence along the southern boundary of the site.

2. SITE CHARACTERISTICS

2.1 LOCATION

The site is located in Moreton Bay Regional Council (MBRC) local government area. The real property descriptions are Lot 1 on RP230991 & Lot 2 on RP80309. The street address is 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar. The total site area is 17.76ha.

The site is bounded by D'Aguilar Highway to the south, Cash Street to the north and private properties in other directions. Refer to **Figure 1**.

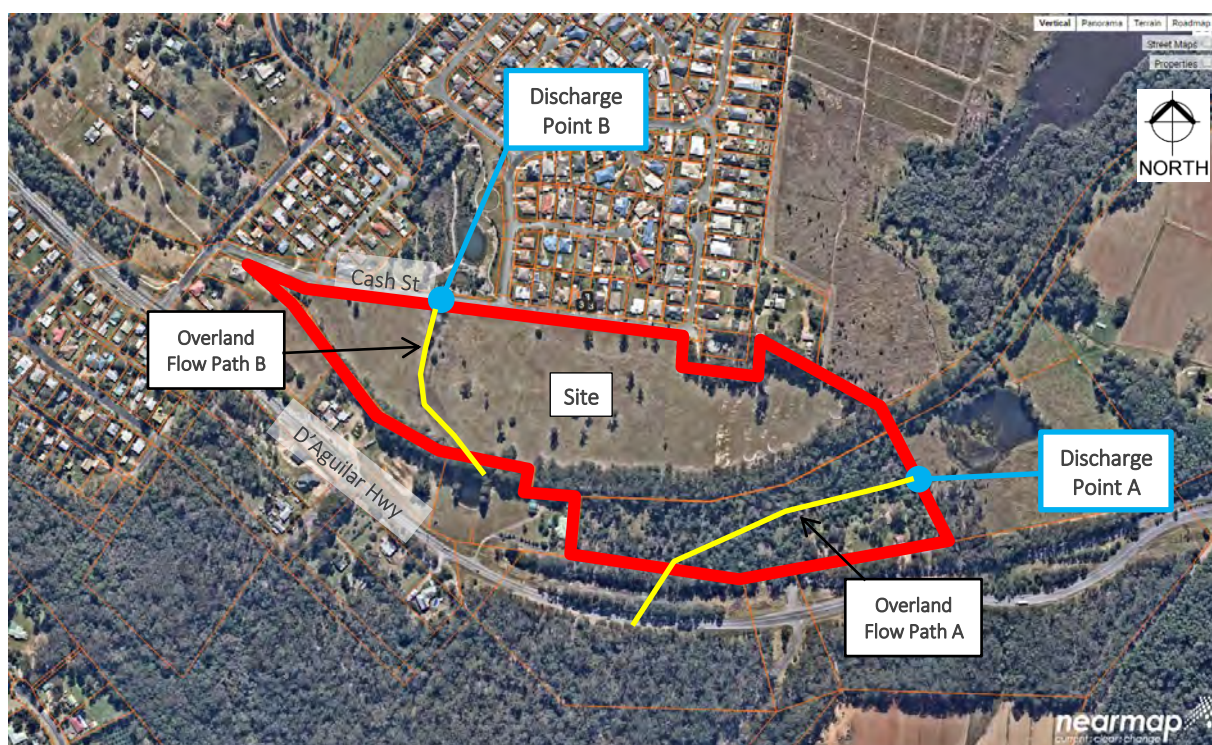


Figure 1 – Site Location (Source: Nearmap, Dec. 2018)

2.2 TOPOGRAPHY & DRAINAGE

The site contains a decommissioned railway cutting and embankment running east-west, generally following the alignment of the common boundary between existing Lot 1 on RP230991 and Lot 2 on RP80309. Across the whole site, the surface RLs range from approximately RL 158m AHD to approximately RL 139m AHD.

There is an existing ridge line approximately through the middle of the site which results in site sloping in two directions: to the north and to the east. The two key stormwater discharge points are identified as “Discharge Point A” to the east and “Discharge Point B” to the north as shown on **Figure 1** above.

As shown on **Figure 1**, there are two main overland flow paths traversing the site that convey upstream catchment runoff. They are identified in MBRC overlay “overland flow paths”. The site does not contain MBRC’s “flood hazard” overlay mapping.

The Overland Flow Path A conveys runoff from an external catchment to the south of D'Aguilar Highway. The external catchment runoff crosses D'Aguilar Highway via a 1 x 750Ø culvert and enters the site.

Overland Flow Path B has a smaller external catchment and the runoff enters the site via smaller culverts, a 1 x 375Ø and a 1 x 450Ø (obtained from field survey data). Overland flow path travels north toward Discharge Point B and travels across Cash Street via 1x1200Ø culvert.

Refer to Drawing No. **M2584EA1_DA1_SK01** in **Appendix C** for the Pre-Development Scenario contours and catchment delineation.

It is proposed to generally maintain overland flow paths A and B in the Post-Development Scenario. Development runoff will be discharged into the drainage reserve. The stormwater quantity and flooding analysis provide strategies to ensure no adverse impacts to the peak flow rates and flood levels in external properties.

2.3 LAND USE

Currently the site is largely being used as grazing land and contains predominately pervious surface. The majority of the trees are clustered in the southwestern area of the site.

Some clearing will be required to accommodate the proposed residential allotments. The fraction impervious value of the site will be increased in the post-development scenario. The hydrological and hydraulic strategies presented in this report provide solutions for managing stormwater and flooding.

3. STORMWATER QUANTITY & FLOODING

3.1 STORMWATER DISCHARGE STRATEGY

The development runoff will be discharged into the overland flow paths which exit the site at the east and south. The two locations where the overland flow paths exit the site are identified as:

- **Discharge Point A:** the eastern site boundary; and
- **Discharge Point B:** Site boundary at Cash Street.

3.2 MODELLING METHODOLOGY

A 1D-2D hydrological and hydraulic analysis has been undertaken using the XP-STORM version 2018.2.1. In the absence of gauged historical peak flow data for the contributing catchment, the XP-STORM catchments were verified against the Rational Method Calculation.

The standard AEP storm events 63% (1 in 1 year) through to the 1% AEP (1 in 100 year) were modelled. A range of standard duration storms were modelled. The following scenarios were investigated:

- Pre-Development Scenario
- Post-Development Scenario
- High Manning's n Scenario (1% AEP, $n = 0.2$)
- Severe Blockage Scenarios (1% AEP, 100% culvert blockage)
- Climate Change Scenario (1% AEP with 20% increase in rainfall intensities)

3.3 PRE-DEVELOPMENT SCENARIO

3.3.1 RATIONAL METHOD CALCULATION

3.3.1.1 CATCHMENT DATA

The Rational Method Calculation has been undertaken for all the catchments in their pre-development (i.e. existing) condition. Refer to **Table 1** for the catchment data and refer to Drawing No. **M2584EA1_DA1_SK01** in **Appendix C** for the catchment plan.

The fraction impervious values were estimated based on a site visit and aerial imagery. The C_{10} values were obtained from *Table 4.5.3* and *Table 4.5.4* of the *QUDM* (2016) based on the estimated fraction impervious. Catchments A3 and B2 represent the site.

Table 1 – Pre-Development Scenario Catchment Data

| Catchment Name | Total Area (ha) | Fraction Impervious | C_{10} | Catchment Slope (%) |
|----------------|-----------------|---------------------|----------|---------------------|
| A1 | 7.20 | 11% | 0.706 | 2.9% |
| A2 | 1.80 | 13% | 0.707 | 1.8% |
| A3 | 10.18 | 0.3% | 0.700 | 2.7% |
| B1 | 5.62 | 10% | 0.705 | 2.4% |
| B2 | 7.75 | 0% | 0.700 | 3.5% |
| C | 13.70 | 0% | 0.700 | 2.0% |
| D | 13.43 | 8% | 0.704 | 3.2% |

3.3.1.2 TIME OF CONCENTRATION

The time of concentration (t_c) for each catchment was calculated using Friend's Overland Flow equation and stream flow travel time in accordance with the QUDM (2016). Refer to Table 2.

Table 2 – Time of Concentration (Pre-Development Scenario)

| Catchment | Overland Flow | | | | Stream Flow | | | Total Tc (mins) |
|-----------|---------------|------------------------|--------------|-------------|-------------|----------------|-------------|-----------------|
| | Length (m) | Upper Catch. Slope (%) | Horton n^* | Time (mins) | Length (m) | Velocity (m/s) | Time (mins) | |
| A1 | 100 | 1.5% | 0.035 | 16 | 185 | 0.9 | 3 | 19 |
| A2 | 100 | 2.9% | 0.035 | 14 | 145 | 0.9 | 3 | 17 |
| A3 | 100 | 3.5% | 0.035 | 14 | 330 | 0.9 | 6 | 20 |
| B1 | 100 | 3.5% | 0.035 | 14 | 240 | 0.9 | 4 | 18 |
| B2 | 100 | 4.5% | 0.035 | 13 | 200 | 0.9 | 4 | 17 |
| C | 100 | 1.5% | 0.035 | 16 | 640 | 0.9 | 12 | 28 |
| D | 100 | 4.6% | 0.035 | 13 | 390 | 0.9 | 7 | 20 |

3.3.1.3 RAINFALL DATA

Site specific 1987 rainfall Intensity -Frequency-Duration (IFD) data sourced from BoM. Source data is presented in Table 3 (raw data from BOM).

Table 3 – IFD Data

| 2yr 1hr (mm/hr) | 2yr 12hr (mm/hr) | 2yr 72hr (mm/hr) | 50yr 1hr (mm/hr) | 50yr 12hr (mm/hr) | 50yr 72hr (mm/hr) | F2 | F50 | Skew |
|-------------------|--------------------|--------------------|--------------------|---------------------|---------------------|------|-------|------|
| 47.58 | 10.11 | 3.29 | 86.89 | 20.76 | 7.21 | 4.39 | 17.34 | 0.19 |

3.3.1.4 RATIONAL METHOD PEAK FLOW RATES

Table 4 presents the Rational Method peak flow rates for the catchments.

Table 4 – Rational Method Peak Flow Rates

| Catchment | 63% AEP Q1 (m ³ /s) | 39% AEP Q2 (m ³ /s) | 20% AEP Q5 (m ³ /s) | 10% AEP Q10 (m ³ /s) | 5% AEP Q20 (m ³ /s) | 2% AEP Q50 (m ³ /s) | 1% AEP Q100 (m ³ /s) |
|-----------|--------------------------------|--------------------------------|--------------------------------|---------------------------------|--------------------------------|--------------------------------|---------------------------------|
| A1 | 0.76 | 1.03 | 1.45 | 1.69 | 2.06 | 2.63 | 3.07 |
| A2 | 0.21 | 0.28 | 0.40 | 0.47 | 0.56 | 0.72 | 0.84 |
| A3 | 1.06 | 1.45 | 2.01 | 2.38 | 2.87 | 3.66 | 4.25 |
| B1 | 0.63 | 0.85 | 1.19 | 1.40 | 1.69 | 2.16 | 2.51 |
| B2 | 0.89 | 1.22 | 1.70 | 2.00 | 2.42 | 3.10 | 3.60 |
| C | 1.19 | 1.63 | 2.30 | 2.69 | 3.24 | 4.17 | 4.86 |
| D | 1.39 | 1.88 | 2.64 | 3.10 | 3.75 | 4.80 | 5.58 |

3.3.2 XP-STORM HYDROLOGY

3.3.2.1 CATCHMENT DATA

The Pre-Development Scenario catchment data in **Table 1** was modelled in XP-STORM. The catchment delineation and the average slopes were determined from Lidar. The fraction impervious values were estimated based on the aerial imagery. Refer to Drawing No. **M2584EA1_DA1_SK01** in **Appendix C**.

3.3.2.2 RAINFALL DATA

The IFD data sourced from BoM presented in **Table 3** was coupled with the *Australian Rainfall & Runoff* (AR&R) 1987 temporal patterns (zone 3) to generate hydrographs in XP-STORM.

3.3.2.3 HYDROLOGICAL LOSSES

The following loss values have been adopted for the hydrological modelling. The loss values adopted are within the ranges recommended in AR&R (1987) for the South East Queensland.

Table 5 – Hydrological Losses

| Area Type | Initial Loss (mm) | Continuous Loss (mm/hr) | Hydrology Manning's n |
|------------------|-------------------|-------------------------|-----------------------|
| Impervious Areas | 0 | 0 | 0.014 |
| Pervious Areas | 10 | 2.5 | 0.030 |

3.3.2.4 BX FACTOR

The default Bx factor of 1 has been retained.

3.3.2.5 PRE-DEVELOPMENT PEAK FLOW RESULTS

The standard AEPs from 63% to 1% AEP were modelled in XP-STORM. Standard storm durations from 15 to 360 mins (6 hours) were modelled. **Table 6** and **Table 7** present the comparison of the XP-STORM peak flow rates to the Rational Method for the catchments in the Pre-Development Scenario.

Table 6 – XP-STORM Peak Flow (Pre-Development Scenario)

| Catchment | 63% AEP Q1 (m ³ /s) | 39% AEP Q2 (m ³ /s) | 20% AEP Q5 (m ³ /s) | 10% AEP Q10 (m ³ /s) | 5% AEP Q20 (m ³ /s) | 2% AEP Q50 (m ³ /s) | 1% AEP Q100 (m ³ /s) |
|-----------|--------------------------------------|--------------------------------------|--------------------------------------|---------------------------------------|--------------------------------------|--------------------------------------|---------------------------------------|
| A1 | 0.76 | 1.15 | 1.61 | 1.88 | 2.25 | 2.62 | 3.03 |
| A2 | 0.21 | 0.31 | 0.42 | 0.49 | 0.60 | 0.70 | 0.83 |
| A3 | 0.97 | 1.44 | 2.09 | 2.42 | 2.98 | 3.50 | 4.05 |
| B1 | 0.57 | 0.86 | 1.22 | 1.44 | 1.72 | 2.01 | 2.32 |
| B2 | 0.87 | 1.28 | 1.80 | 2.08 | 2.56 | 2.99 | 3.45 |
| C | 1.09 | 1.63 | 2.33 | 2.75 | 3.38 | 4.06 | 4.75 |
| D | 1.29 | 1.92 | 2.79 | 3.29 | 3.97 | 4.64 | 5.35 |

Table 7 – Variance between XP-STORM & Rational Method Peak Flow (Pre-Development)

| Catchment | 63% AEP Q1 | 39% AEP Q2 | 20% AEP Q5 | 10% AEP Q10 | 5% AEP Q20 | 2% AEP Q50 | 1% AEP Q100 |
|-----------|---------------|---------------|---------------|----------------|---------------|---------------|----------------|
| A1 | 0% | 11% | 11% | 11% | 9% | 0% | -1% |
| A2 | -2% | 9% | 7% | 5% | 6% | -3% | -2% |
| A3 | -9% | -1% | 4% | 2% | 4% | -4% | -5% |
| B1 | -9% | 1% | 2% | 3% | 2% | -7% | -8% |
| B2 | -3% | 5% | 6% | 4% | 6% | -4% | -4% |
| C | -8% | 0% | 1% | 2% | 4% | -3% | -2% |
| D | -7% | 3% | 6% | 6% | 6% | -3% | -4% |

As can be seen, the peak flow rates between the Rational Method and the XP-STORM hydrological model are generally consistent for the majority of the catchments. The variance is generally $\pm 10\%$.

3.3.3 XP-STORM HYDRAULICS

3.3.3.1 2D TOPOGRAPHY

The 2D Digital Terrain Model (DTM) for the Pre-Development Scenario was created using Lidar. The site inspection undertaken on 10/01/2019 confirmed that Lidar provides an accurate representation of the site topography and surround. The following 2D grid parameters were adopted:

- 2m x 2m grid
- 1 second time step

3.3.3.2 SURFACE ROUGHNESS

The surface roughness Manning's n values were estimated from aerial imagery and a site inspection on 10 Jan. 2019. The following Manning's n values were adopted. Refer to **Figure 2** for the 2D land use mapping.

Table 8 – 2D Land Use Values

| Land Use | Manning's n |
|--|-------------|
| Roads | 0.015 |
| Waterbodies | 0.02 |
| Grass | 0.045 |
| Pasture & Meadow | 0.06 |
| Farmlands | 0.08 |
| Shrubbery | 0.10 |
| Forest/Dense vegetation | 0.15 |
| Buildings on ground and other obstructions | Blockage |

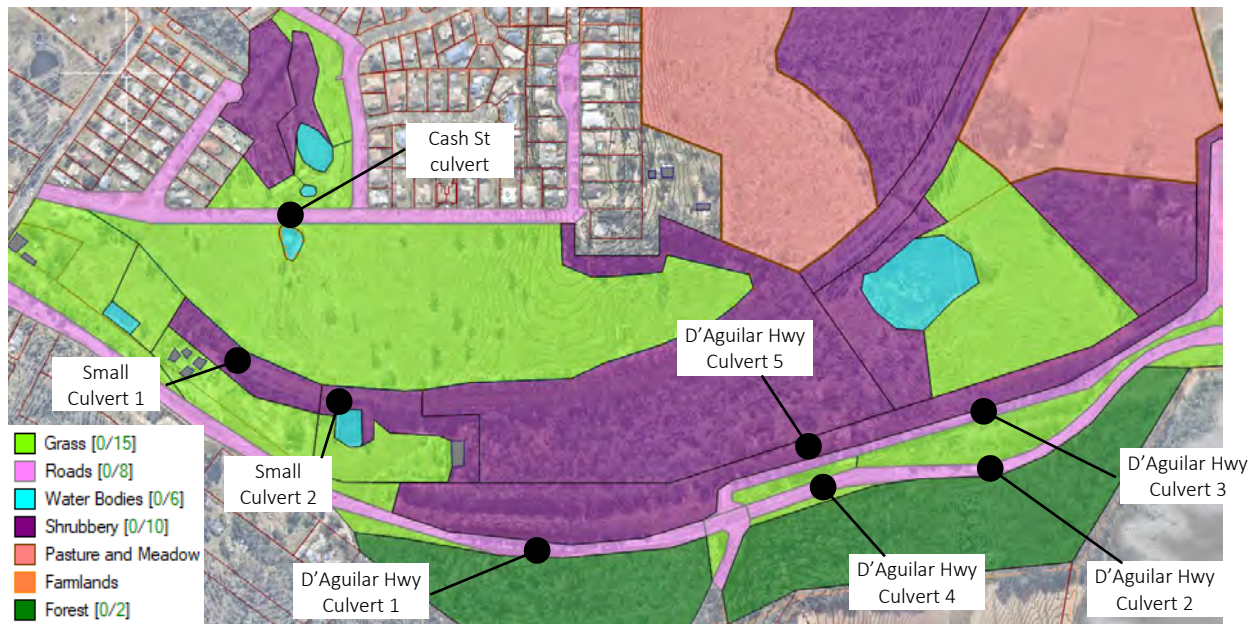


Figure 2 – 2D Land Use Mapping & Existing Culverts

3.3.3.3 1D STRUCTURES

1D links and nodes have been used to model the culverts. Refer to **Table 9** for the culverts modelled.

The culvert headwalls were linked to the 2D DTM at their invert levels. The road embankments were determined from the 2D DTM. The culverts were modelled with an entry loss of 0.5, an exit loss of 1.

Table 9 – Pre-Development Scenario Culverts

| Culvert Location/ Name | Size | Modelled Length (m) | Upstream IL (m AHD) | Downstream IL (m AHD) | Slope (%) |
|-------------------------|---------|---------------------|---------------------|-----------------------|-----------|
| Cash St Culvert | 1x1200Ø | 19.17 | 138.61 | 138.43 | 0.93% |
| Small Culvert 1 | 1x375Ø | 15.66 | 143.11 | 142.53 | 3.76% |
| Small Culvert 2 | 1x450Ø | 35.00 | 145.40 | 142.94 | 7.05% |
| D'Aguilar Hwy Culvert 1 | 1x750Ø | 38.19 | 145.80 | 145.54 | 0.68% |
| D'Aguilar Hwy Culvert 2 | 1x1200Ø | 41.97 | 143.31 | 143.10 | 0.51% |
| D'Aguilar Hwy Culvert 3 | 1x1350Ø | 16.27 | 142.83 | 142.52 | 1.91% |
| D'Aguilar Hwy Culvert 4 | 1x450Ø | 17.46 | 150.78 | 150.67 | 3.42% |
| D'Aguilar Hwy Culvert 5 | 1x450Ø | 11.10 | 150.27 | 149.89 | 1.91% |

Note: ILs of some external culverts were adjusted to match Lidar topography (so that the headwalls are not buried in the model), however the surveyed grades were maintained.

3.3.3.4 INITIAL WATER LEVELS

Initial water levels were adopted at each waterbody/farm dam corresponding to their standing water levels. The standing water levels were obtained from detailed field survey.

3.3.3.5 DOWNSTREAM BOUNDARY CONDITION

2D head boundaries to represent normal friction slopes have been adopted downstream of Discharge Points A & B.

3.3.4 PRE-DEVELOPMENT SCENARIO RESULTS

The standard AEPs from 63% to 1% AEP and standard storm durations from 15 to 360 minutes (6 hours) were modelled. The pre-development scenario flood depth and velocity plans are provided in **Appendix D**. The results show that up to 1% AEP overland flow flooding is maintained within the defined flow paths. Refer to **Figure 3** for an extract from the 1% AEP flood plan.

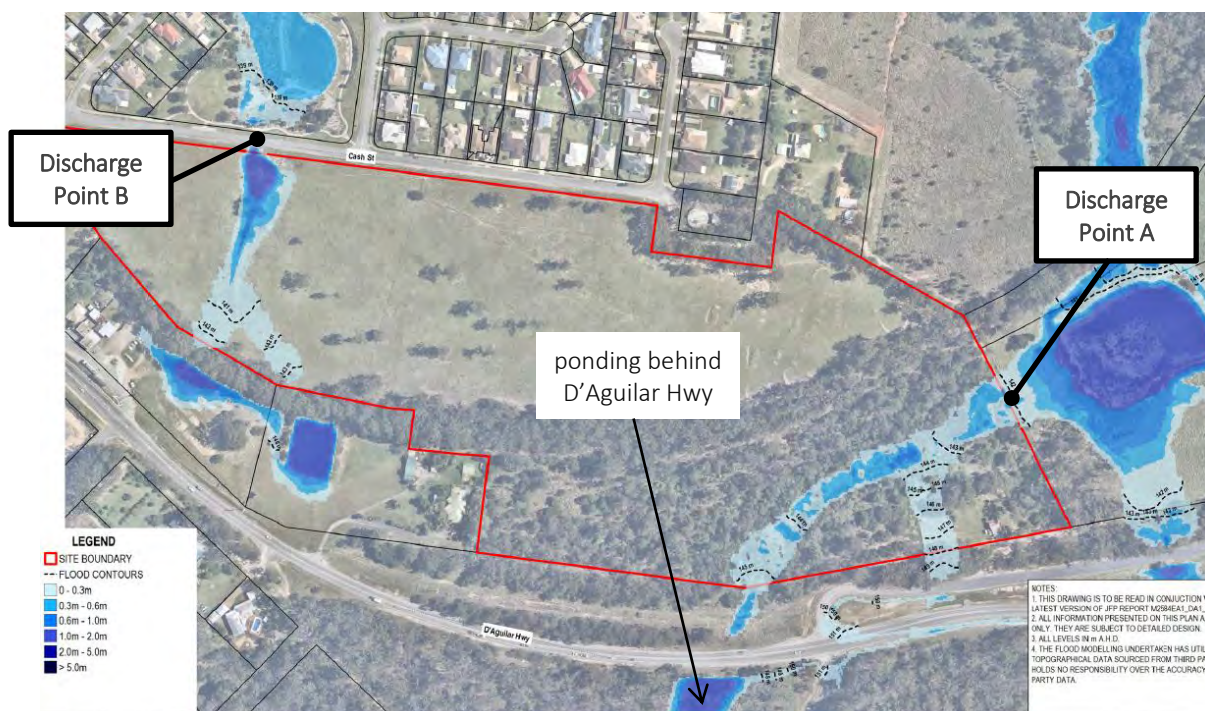


Figure 3 – 1% AEP Flood Depth (Pre-Development Scenario)

The hydraulic modelling results shows flood storage occurs at upstream of the 750Ø culvert across D'Aguilar Highway. We flag that any future upgrades to these culverts need to consider potential impact to downstream properties.

The existing 1 x 1200Ø RCP across Cash Street conveys 1% AEP flows without overtopping the road.

- Cash Street Road RL: 140.70m AHD (read at the crown)
- U/S 1% AEP WSL: 140.25m AHD

The peak flow rates at Discharge Points A & B were measured for the pre-development scenario. The peak flow rate at Discharge Point A has been measured using a PO (plot output) line. Discharge Point B peak flow rates were read at the 1x1200Ø RCP. Results are shown in **Table 10**. Refer to **Appendix B** for the flow hydrographs.

Table 10 – Pre-Development Scenario Peak Flow Rates at Discharge Point A & B

| AEP | Discharge Point A (m ³ /s) | Discharge Point B (m ³ /s) |
|-----|---------------------------------------|---------------------------------------|
| 63% | 1.05 | 0.89 |
| 39% | 1.50 | 1.28 |
| 20% | 2.14 | 1.72 |
| 10% | 2.45 | 1.97 |
| 5% | 2.99 | 2.34 |
| 2% | 3.54 | 2.65 |
| 1% | 4.08 | 2.87 |

3.4 POST-DEVELOPMENT SCENARIO

In the Post-Development Scenario, it is proposed to maintain the main overland flow paths. A 5m wide pathway is proposed between Lot 148 and Lot 149 for conveying runoff from the small external catchment “A2”. Conceptual sizing of this pathway is presented in **Section 3.4.1**.

A wider drainage path will be maintained between Lot 144 and Lot 145 for conveying runoff from the larger external catchment “A1”. New culverts are proposed at the road crossing. The Overland Flow Path B to the west remains largely un-encroached by the development footprint.

Peak flow mitigation is achieved at Discharge Point A & B via in-line flood storage which has have been modelled in XP-STORM. **Section 3.4.2** and **3.4.3** present the XP-STORM analysis.

3.4.1 5M WIDE PATHWAY

The Manning’s Equation has been used for sizing the overland flow path between Lot 144 and Lot 145 for conveying runoff from catchment “A2”. It is 5m wide and will contain a 1.5m wide concrete footpath for pedestrian movement. Lots 144 & 145 are required to be minimum 0.6m above the pathway.

Catchment “A2” is 1.80ha in size. Refer to Drawing No. **M2584EA1_DA1_SK02** in **Appendix C** for the catchment plan. The 1% peak flow rate entering the site is $0.15\text{m}^3/\text{s}$ (obtained from Pre-Development 1D-2D hydraulic model).

The Manning’s Equation has been used to size the 5m flow path for the 1% AEP peak flow. A Manning’s n value of 0.015 has been adopted for the concrete footpath and 0.05 for the remaining areas.

Table 11 – Manning’s Calculation

| Data | | | | Results | | | |
|---------------------------------------|-------------------|---------------|----------------|--------------------|-------------------|---|-------------------|
| Design Q (m^3/s) | Base Width (m) | Depth (mm) | Long. Slope | Flow Depth (mm) | Velocity (m/s) | DV Product (m^2/s) | Freeboard (mm) |
| 0.15 | 5.0 | 600 | 2% | 63 | 0.59 | 0.04 | 537 |

Figure 4 illustrates the cross section. The pathway will tie into the internal road reserve and be conveyed to the Overland Flow Path A.

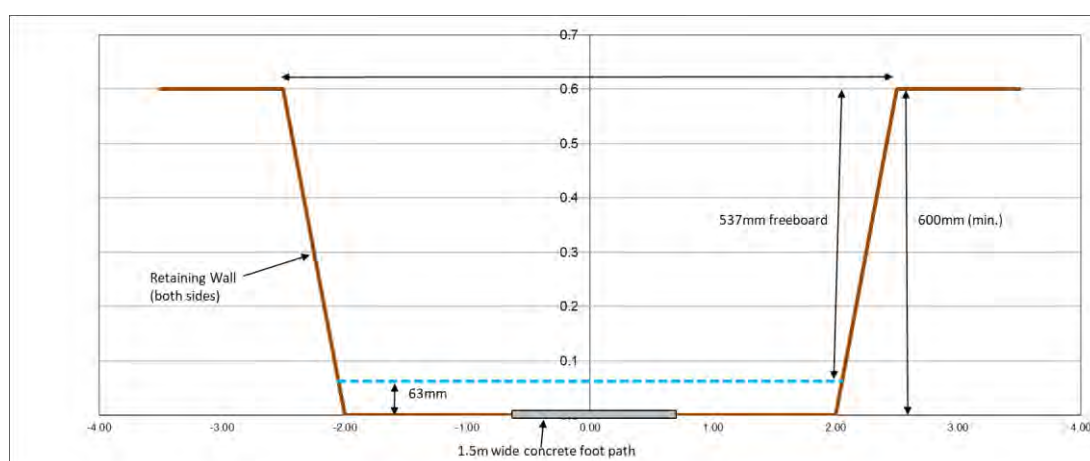


Figure 4 – 5m wide Pathway Overland Flow (not to scale)

The above pathway is to tie into the internal road network and the runoff will ultimately discharge into the overland flow path A.

3.4.2 XP-STORM HYDROLOGY

3.4.2.1 CATCHMENT DATA

Catchments A3 & B2 from the Pre-Development Scenario have changed in the Post-Development Scenario. The other catchments are external to the site and remained unchanged. Refer to **Table 12** for the post-development site catchment data. Refer to Drawing No. **M2584EA1_DA1_SK02** in **Appendix C** for the catchment plan.

Table 12 – Post-Development Scenario Catchment Data

| Post-Dev Catchment Name | Total Area (ha) | Fraction Impervious | C ₁₀ | Catchment Slope (%) |
|----------------------------|-----------------|------------------------|-----------------|------------------------|
| A3.1 | 8.47 | 55% | 0.79 | 0.5% |
| A3.2 | 1.51 | 30% | 0.75 | 2.7% |
| B2.1 | 7.29 | 55% | 0.79 | 0.5% |
| B2.2 | 0.96 | 55% | 0.79 | 0.5% |
| B2.3 | 0.60 | 55% | 0.79 | 0.5% |

Flood storage is proposed within the overland flow paths for peak flow attenuation and to ensure no adverse flood level impacts to upstream or downstream properties. Refer to **Section 3.4.3.1** for the flood storage areas modelled.

3.4.2.2 RAINFALL DATA

As per the Pre-Development Scenario.

3.4.2.3 HYDROLOGICAL LOSSES

As per the Pre-Development Scenario.

3.4.2.4 BX FACTOR

As per the Pre-Development Scenario, the default Bx factor of 1 has been retained.

3.4.3 XP-STORM HYDRAULICS

3.4.3.1 FLOOD STORAGE

Flood storage is proposed to mitigate peak flow rates discharging from the site. They are proposed to be formed via embankments prior to Discharge Point A and B. This has been modelled with downstream embankment formed using XP-STORM's elevation shapes. The concept locations of the storage areas are identified on **Figure 5** and the parameters are presented in **Table 13**.

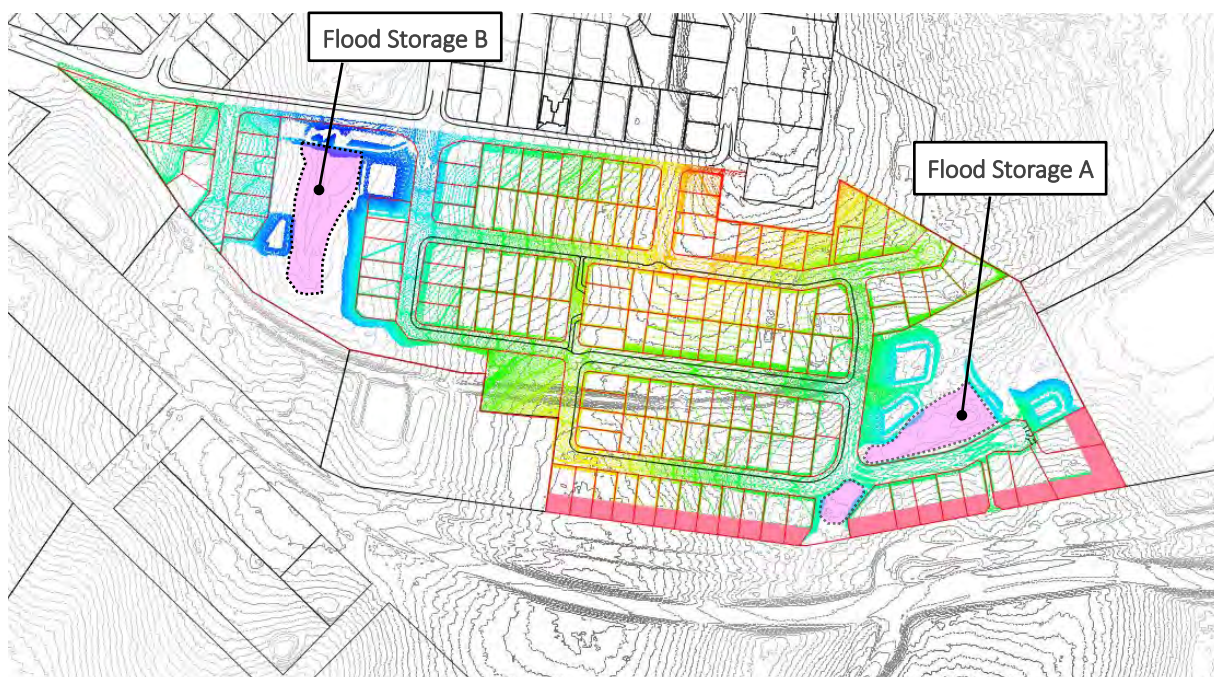


Figure 5 – Flood Storage Locations

Table 13 – Flood Storage

| Flood Storage | Invert Level (m AHD) | Embank. RL (m AHD) | Weir Width (m) | Weir RL (m AHD) | Low Flow Pipe Dia. (mm) | *Pipe U/S IL (m AHD) |
|---------------|----------------------|--------------------|----------------|-----------------|-------------------------|----------------------|
| A | 142.83 | 144.85 | 16 | 144.00 | 675 | 142.83 |
| B | 139.16 | 141.40 | 5 | 140.60 | 675 | 139.16 |

* also represents the invert level of the storage area

3.4.3.2 2D TOPOGRAPHY

The 2D grid as per the Pre-Development Scenario. The 12d design tin has been overlayed to represent the development earthworks which includes the embankments and weirs associated with flood storage.

3.4.3.3 SURFACE ROUGHNESS

As per the Pre-Development Scenario.

3.4.3.4 1D STRUCTURES

As per the Pre-Development Scenario plus the following new culverts:

Table 14 – Post-Development Scenario New Culverts

| Culvert Location/ Name | Size | Modelled Length (m) | Upstream IL (m AHD) | Downstream IL (m AHD) | Slope (%) |
|---------------------------|----------|------------------------|------------------------|--------------------------|-----------|
| Extended Cash Street | 1x1200Ø | 30.24 | 138.71 | 138.43 | 0.93% |
| Internal Culvert | 3x750Ø | 25.00 | 143.83 | 143.51 | 1.28% |
| Flood Storage A pipe | 1 x 675Ø | 15.00 | 142.12 | 141.95 | 1.0% |
| Flood Storage B pipe | 1 x 675Ø | 10.00 | 139.16 | 139.10 | 0.6% |

3.4.3.5 INITIAL WATER LEVELS

As per the Pre-Development Scenario

3.4.3.6 DOWNSTREAM BOUNDARY CONDITION

As per the Pre-Development Scenario.

3.4.4 POST-DEVELOPMENT SCENARIO RESULTS & DEVELOPMENT IMPACT

The standard AEPs from 63% to 1% AEP and standard storm durations from 15 to 360 mins were modelled. **Table 15** presents the comparison of pre and post-development scenario peak flow rates at Discharge Point A and B. Refer to **Appendix B** for the flow hydrographs.

Table 15 – Post-Development Scenario Peak Flow Rates at Discharge Point A & B

| AEP | Discharge Point A | | | Discharge Point B | | |
|-----|----------------------------------|---------------------------------|---------------------------------|----------------------------------|---------------------------------|---------------------------------|
| | Post-Dev. (m ³ /s) | Pre-Dev. (m ³ /s) | Variance (m ³ /s) | Post-Dev. (m ³ /s) | Pre-Dev. (m ³ /s) | Variance (m ³ /s) |
| 63% | 0.86 | 1.05 | -0.18 | 0.72 | 0.89 | -0.17 |
| 39% | 1.27 | 1.50 | -0.23 | 0.86 | 1.28 | -0.42 |
| 20% | 1.88 | 2.14 | -0.26 | 1.11 | 1.72 | -0.61 |
| 10% | 2.17 | 2.45 | -0.28 | 1.38 | 1.97 | -0.59 |
| 5% | 2.66 | 2.99 | -0.33 | 1.71 | 2.34 | -0.63 |
| 2% | 3.08 | 3.54 | -0.47 | 1.91 | 2.65 | -0.74 |
| 1% | 3.74 | 4.08 | -0.34 | 2.30 | 2.87 | -0.57 |

As can be seen the above results show that the peak flow rates are not increased in the post-development scenario. There is a substantial reduction of peak flow rates at Discharge Point A during larger storm events which can be optimised by increasing the weir width. This can be investigated further during detailed design if required.

The flood levels upstream of Cash Street has decreased and the road remains flood free during 1% AEP:

- Cash Street Road RL: 140.70m AHD (at the crown)
- U/S 1% AEP max WSL: 140.09m AHD

The internal culverts (3x750Ø) crossing conveys the 1% AEP peak flow and does not overtop the road. This can be seen in flood plans provided in **Appendix E**.

- Internal Road Crossing RL: 146.05m AHD (at the crown) & 145.95m AHD (at kerb invert sag)
- U/S 1% AEP max. water level: 144.36m AHD

A sensitivity analysis has been undertaken to investigate an unlikely scenario of 100% culvert blockage. Refer to **Section 3.6.2**.

Table 16 presents the water levels within the proposed flood storage areas.

Table 16 – Flood Storage Water Levels

| AEP | Flood Storage A (m AHD) | Flood Storage B (m AHD) |
|----------------|-------------------------|-------------------------|
| 63% | 143.91 | 140.06 |
| 39% | 144.10 | 140.30 |
| 20% | 144.17 | 140.65 |
| 10% | 144.19 | 140.73 |
| 5% | 144.22 | 140.78 |
| 2% | 144.28 | 140.82 |
| 1% | 144.28 | 140.86 |
| Embank. RL | 144.85 | 141.40 |
| Freeboard (mm) | 570 | 540 |

Table 17 presents the flood storage behind the bunds during various storm events. Refer to **Appendix B** for stage vs storage relationship data.

Table 17 – Approximately Flood Storage Volumes

| AEP | Approx. Flood Storage A (m³) | Approx. Flood Storage B (m³) |
|-----|------------------------------|------------------------------|
| 63% | 1,722 | 616 |
| 39% | 2,667 | 1,211 |
| 20% | 3,058 | 2,603 |
| 10% | 3,170 | 3,001 |
| 5% | 3,346 | 3,266 |
| 2% | 3,525 | 3,491 |
| 1% | 3,704 | 3,730 |

The impact mapping of the flood levels and overland flow velocities are provided in **Appendix F**. The results show increased flood levels upstream of the proposed bunds which are expected. No material adverse impacts are noted within upstream or downstream properties.

Flood level reductions of approximately 10-20mm are noted within the watercourse to the east (past Discharge Point A) and reductions up to 30mm within the watercourse to the north of Cash Street (past Discharge Point B).

3.5 FLOOD IMMUNITY LEVELS

All new allotments are to provide a minimum of 500mm freeboard to adjacent Post-Development Scenario 1% AEP flood levels. The proposed lot levels in the concept bulk earthworks design provides ample freeboard. Refer to **Figure 6** and **Figure 7**. They show the concept lot levels and the 1% AEP flood levels. As can be seen, there are ample freeboard.

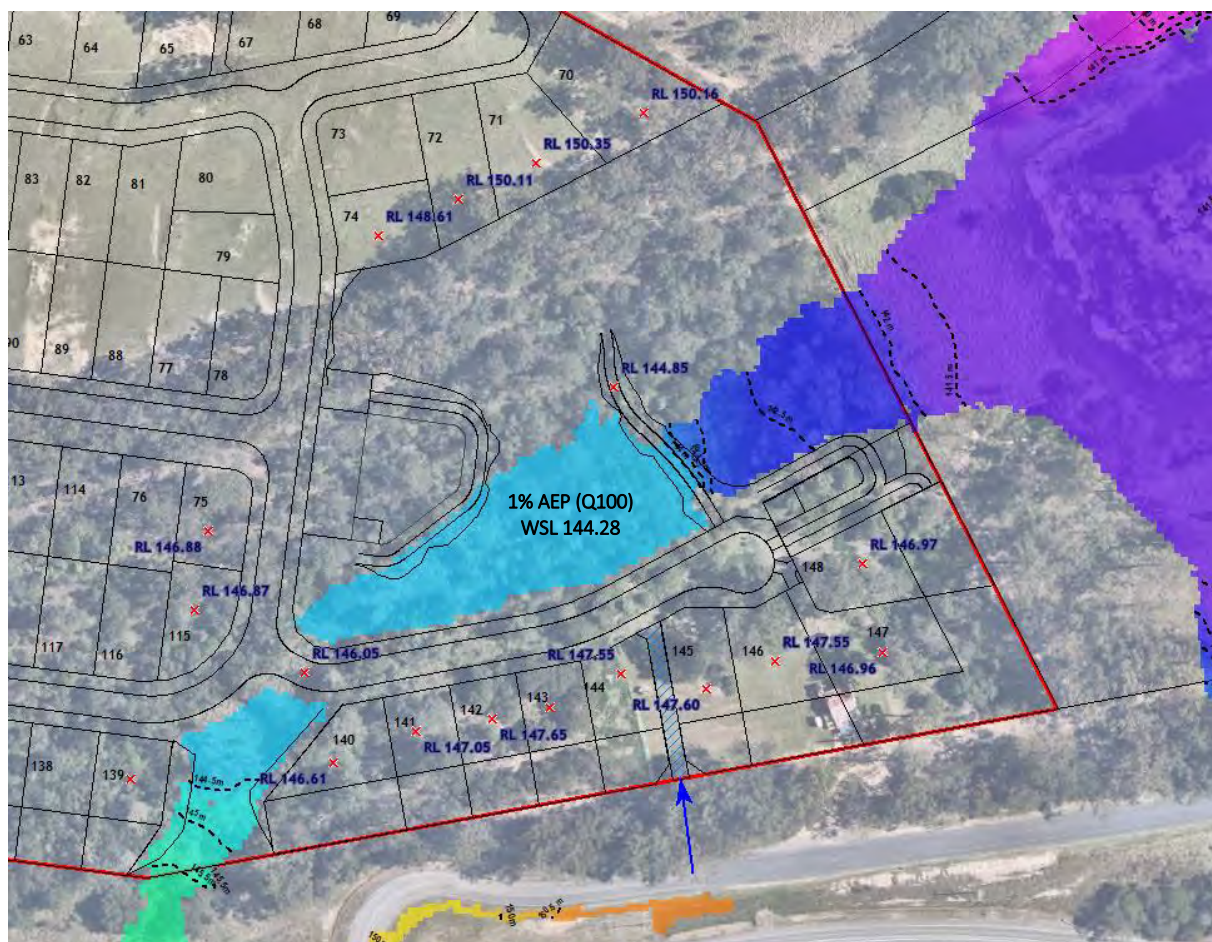


Figure 6 – Proposed Lot Levels & Post-Development 1% AEP Flood Levels (Overland Flow Path A)

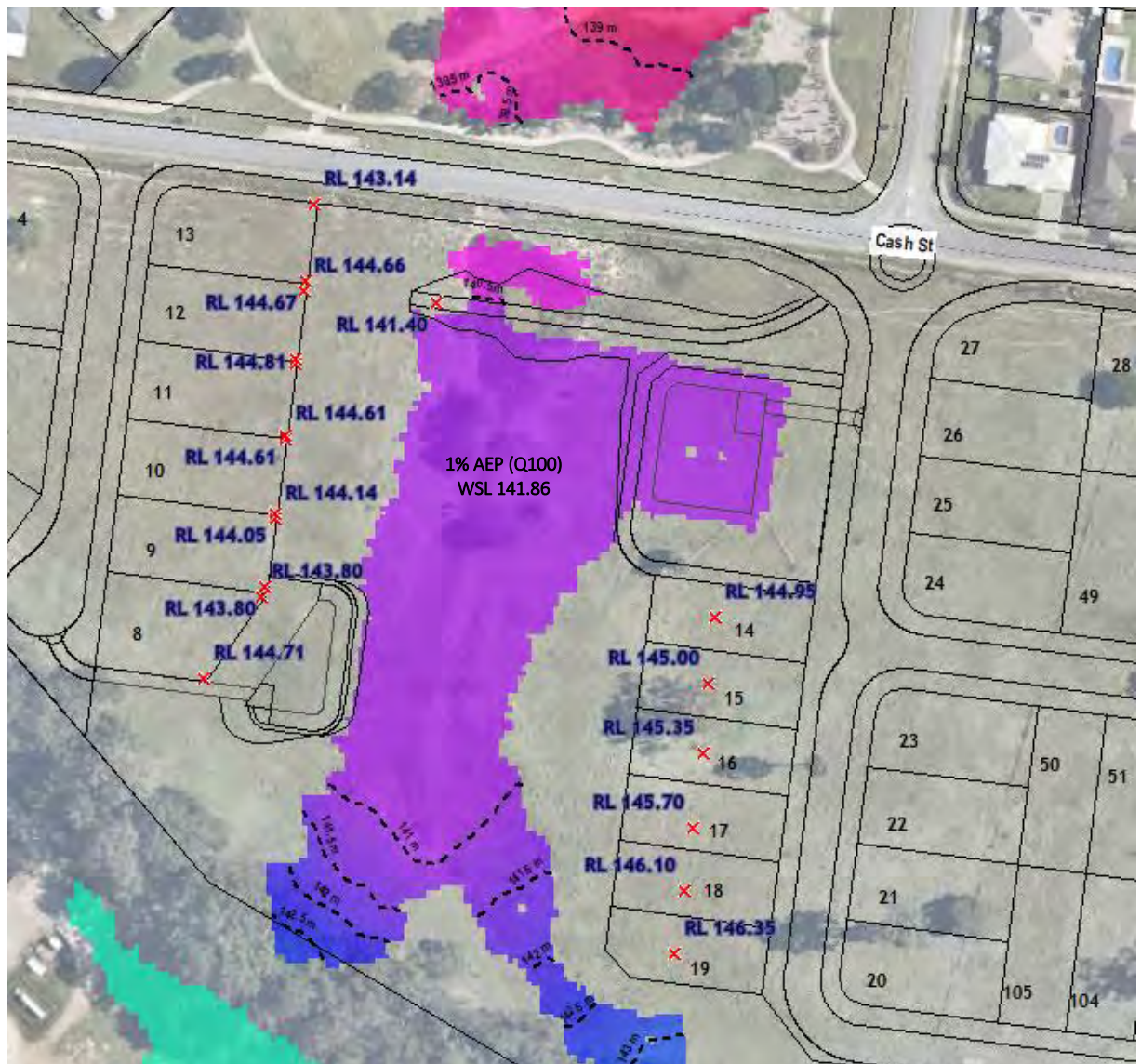


Figure 7 – Proposed Lot Levels & Post-Development 1% AEP Flood Levels (Overland Flow Path B)

Notwithstanding the above, all new allotments and the future dwellings are also required to achieve compliance with the relevant urban drainage flow conditions of the new roads. The internal drainage design will be undertaken during the detailed design phase.

3.6 SENSITIVITY SCENARIOS

3.6.1 HIGH MANNING'S N

An analysis of the 1% AEP has been undertaken with a higher Manning's n value of 0.2. The results show that the flood levels are generally increased by up to 130mm compared to the design scenario. Lot 140 & 141 is overtopped by approximately 50mm which is below the building step up. The buildings are not expected to be flooded. The new road crossing and the all other new allotments remain flood free. Refer to **Appendix G** for the flood depth plan.

3.6.2 SEVERE BLOCKAGE

A scenario of 100% blockage of the culverts inside and within immediate surrounds of the site (new and existing) has been undertaken. The 1% AEP design storm has been modelled. The results show that flood levels increase at the upstream end of the new 3x750Ø crossing until the road embankment is overtopped. The maximum depth at the crown is 269mm.

With the current lot layout and the preliminary earthworks design, no allotments/building envelopes are flooded. Refer to **Appendix G** for the flood depth plan.

3.6.3 CLIMATE CHANGE

For the climate change scenario, the 1% AEP rainfall intensities have been increased by 20%. The results show that the 1% AEP flood levels are generally increased by up to 50-70mm compared to the design scenario. The new road crossing and the new allotments remain flood free. Refer to **Appendix G** for the flood depth plan.

4. STORMWATER QUALITY

4.1 CONSTRUCTION PHASE STORMWATER QUALITY MANAGEMENT

4.1.1 INTRODUCTION

This section provides conceptual stormwater quality management strategies for construction phase. These strategies are applicable for all stages of the development. No modelling has been undertaken for the construction phase stormwater quality management. Detailed Erosion and Sediment Control Plans will be prepared during detailed design phase and implemented during construction.

4.1.2 POLLUTANTS

Typical pollutants generated during the construction phase of an urban development are shown in **Table 18**. These based on *Table C4.1 BCC's Subdivision & Development Guidelines Part C Section 4.1.1* (2008).

Table 18 – Construction Phase Pollutants

| Pollutant | Potential Source |
|------------------------|--|
| Litter | Paper, construction packaging, food packaging, cement bags, off-cuts. |
| Sediment | Unprotected exposed soils and stockpiles during earthworks and building works. |
| Hydrocarbons | Fuel/oil spills, leaks from construction equipment, and temporary car park areas. |
| Toxic Materials | Cement Slurry, asphalt primer, solvents, cleaning agents, washwaters (eg. from tile works) |
| pH altering substances | Cement slurry, acid sulfate soils, and washwaters |

4.1.3 WATER QUALITY OBJECTIVES

It is recommended that the amount of runoff crossing and leaving the site is kept to a minimum during the construction phase to restrict soil erosion and mobilisation of sediments and pollutants through and off the site. The *State Planning Policy* (2017) has the following objectives for construction phase stormwater quality management.

Table 19 – Construction Phase Performance Criteria

| Pollutant | Potential Source |
|------------------------|---|
| Total Suspended Solids | < 50mg/L |
| Turbidity | <10% above the receiving waters turbidity |
| pH | 6.5 – 8.5 |
| Litter | No visible oil, grease sheet or litter washed from site |

4.1.4 STORMWATER QUALITY MANAGEMENT STRATEGY

During construction phase a suitable Erosion and Sediment Control management strategy for the site will be adopted. This may include, but not limited to, devices such as temporary sediment basins, diversion drains, silt fences and suitable construction entry/exit pads. Erosion and Sediment Control Plans will be prepared during detailed design and implemented during construction activities.

4.1.5 MONITORING & MAINTENANCE

The general requirement of monitoring during the construction phase will be:

- Work activities to be restricted to designated construction areas.
- Earthworks and site clearing to be undertaken in accordance with the Erosion and Sediment Control Plans prepared during detailed design phase.
- Erosion and sediment control devices to be constructed in accordance with the Erosion and Sediment Control Plans prepared during detailed design phase.
- Inspect sediment fences and erosion and sediment control structures/devices on a weekly basis as well as after any rain event exceeding 25mm in 24hrs.
- Stormwater discharges from the site are not to have any adverse effect on the downstream environment.
- Monitor and record of the performance of the drainage control devices including water quality testing where required.
- Any failure in the stormwater system to be immediately rectified to prevent uncontrolled discharge from the site.
- Any failure to the stormwater system causing damage to surroundings should implement immediate remedial work to the damaged area.

4.1.6 RESPONSIBILITY & REPORTING

- The contractor shall be responsible for monitoring the performance of all drainage control and erosion and sediment control devices.
- Records of any failures to devices should be kept and reported to the Construction Manager.
- Regular inspections of the devices shall be reported to the Construction Manager.
- Inspections of the devices after heavy rainfall shall be reported to the Construction Manager.

4.2 OPERATIONAL PHASE STORMWATER QUALITY MANAGEMENT

4.2.1 INTRODUCTION

The site is greater than 2,500m² and triggers compliance with the *State Planning Policy* (2017) for stormwater quality management and meeting required Water Quality Objectives (WQOs). This is referred to in MBRC Planning's Scheme's *Integrated Design – Stormwater Management*.

4.2.2 POLLUTANTS

The key pollutants typically generated during the operational phase of an urban development are shown below (source: *Table C4.2 BCC's 2008 Subdivision & Development Guidelines Part C Section 4.1.1*).

- **Litter (gross pollutants)**
- **Sediment (total suspended solids)**
- Oxygen demanding substances (organic & chemical matter)
- **Nutrients (nitrogen & phosphorus)**
- Pathogens / Faecal coliforms (bacteria & viruses)
- Heavy metals (often associated with fine sediment)
- Surfactants (e.g. detergents from car washing)
- Organochlorines & organophosphates
- Thermal pollution
- pH altering substances

This report only addresses the key pollutants, which are highlighted in **bold text** above. Although not modelled, the proposed stormwater quality management devices will provide some treatment to other pollutants also. For instance, as heavy metals are predominately associated with fine sediment, devices that reduce total suspended solids will also reduce loads of heavy metals.

4.2.3 WATER QUALITY OBJECTIVES

Table 20 presents the WQOs required for the site in accordance with the *State Planning Policy* (2017).

Table 20 –Operational Phase Water Quality Objectives

| Pollutant | Load Based Pollutant Reduction WQO (%) |
|------------------------------|--|
| Total Suspended Solids (TSS) | 80 |
| Total Phosphorus (TP) | 60 |
| Total Nitrogen (TN) | 45 |
| Gross Pollutants (GP) | 90 |

4.2.4 STORMWATER QUALITY MANAGEMENT STRATEGY

For stormwater quality treatment, four (4) end of line bioretention basins are proposed. Bioretention systems utilise sandy loam soil-based media to filter runoff. Sediments and TSS are trapped within vegetation. The micro-organisms and vegetation remove dissolved nutrients (TP and TN) through biological uptake processes. The sub-soil drainage provided will collect the treated runoff and discharge into the drainage reserve. Refer to the concept Drawing No. **M2584EA1_DA1_SK03** in **Appendix C** for the conceptual locations of the bioretention basins.

Details on bioretention basin establishment and maintenance will be provided during Operational Works phase.

4.2.5 MUSIC MODELLING

Modelling of the operational phase stormwater quality management strategy has been undertaken using the MUSIC version 6.3. The following sections discuss the MUSIC modelling parameters. MUSIC modelling has been undertaken generally in accordance with Water by Design's *MUSIC Modelling Guidelines* (2010).

4.2.5.1 MUSIC RAINFALL PARAMETERS

The following rainfall parameters have been used:

- Dayboro Post Office (Station No. 40063) 6-minute pluviographic rainfall data was utilised for the MUSIC modelling as this is the nearest to the site which has 6-minute rainfall data.
- The 10-year period from 1st January 1980 to 31st December 1989 was modelled using a 6-minute time-step in accordance with *Table 3.1* of the *MUSIC Modelling Guidelines* (2010).
- The mean evapo-transpiration data from *Table 3.1* of the *MUSIC Modelling Guidelines* (2010).

4.2.5.2 SOURCE NODES

Source Nodes has been used to set up catchment details in MUSIC. The split catchment approach, where the surface types are split into roof, road and ground, has been adopted in accordance the *MUSIC Modelling Guidelines* (2010). The following parameters and assumptions have been adopted for the MUSIC modelling:

- The base flow and storm flow parameters for source nodes were taken from *Table 3.8* of the *MUSIC Modelling Guidelines* (2010) for 'urban residential' land use with stochastic flow generation.
- The rainfall-runoff parameters for source nodes were adopted from *Table 3.7* of the *MUSIC Modelling Guidelines* (2010) for 'urban residential' land use.
- Road area was measured from the layout presented in **Appendix A**.
- Roof area has been calculated based on 250m² per lot.

The modelled source node data are shown in **Table 21**. The catchment delineation is presented on Drawing No. **M2584EA1_DA1_SK03** in **Appendix C**.

The Ground Node fraction impervious has been updated in accordance with Table 3.5 of the MUSIC Modelling Guidelines (2010). As depicted on ROL plan in Appendix A, the development density is 10.7 dwellings/ha.

Table 21 – MUSIC Source Node Areas

| Treatment Device | Node Name | Area (ha) | Fi |
|------------------|-----------|-----------|------|
| Bioretention 1 | 1. Roof | 0.175 | 100% |
| | 1. Road | 0.202 | 60% |
| | 1. Ground | 0.542 | 16% |
| Bioretention 2 | 2. Roof | 1.700 | 100% |
| | 2. Road | 1.619 | 60% |
| | 2. Ground | 2.757 | 16% |
| Bioretention 3 | 3. Roof | 1.500 | 100% |
| | 3. Road | 1.238 | 60% |
| | 3. Ground | 2.120 | 16% |
| Bioretention 4 | 4. Roof | 0.325 | 100% |
| | 4. Road | 0.217 | 60% |
| | 4. Ground | 0.629 | 16% |

4.2.5.3 MUSIC LINKS

MUSIC links have been used to connect source nodes and treatment nodes. The default settings have been adopted for the model links. No routing has been incorporated. *Section 4.17* of the *MUSIC Modelling Guidelines* (2010) states that is a conservative approach because it assumes all flows and pollutants from the catchment arrive at the treatment node at the same time.

4.2.5.4 MUSIC TREATMENT NODE PARAMETERS

The proposed bioretention devices have been modelled using MUSIC's Bioretention Treatment Node. **Table 22** presents the parameters modelled.

Sediment forebays will be provided at the inlets, subject to detailed design. The sediment forebay areas are to be provided in addition to the filter media area nominated below.

Table 22 – MUSIC Bioretention Parameters

| Bioretention | Surface Area (ha) | Filter Area (m ²) | Extended Det. Depth (m) | Filter Media Depth (m) | ^A Modelled Overflow Weir (m) |
|--------------|-------------------|-------------------------------|-------------------------|------------------------|---|
| 1 | 135 | 120 | 0.30 | 0.5 | 13.5 |
| 2 | 875 | 800 | 0.30 | 0.5 | 87.5 |
| 3 | 550 | 500 | 0.30 | 0.5 | 55 |
| 4 | 165 | 150 | 0.30 | 0.5 | 16.5 |

^A 10% of the surface area

The following modelling parameters have been adopted for all the bioretention systems:

- 180mm/hr saturated hydraulic conductivity.
- 0.45mm filter median diameters.
- 400mg/kg TN content.
- 30mg/kg orthophosphate content.

4.2.5.5 MUSIC MODEL LAYOUT

The MUSIC model layout incorporating source nodes, links and treatment node is shown in **Figure 8**.

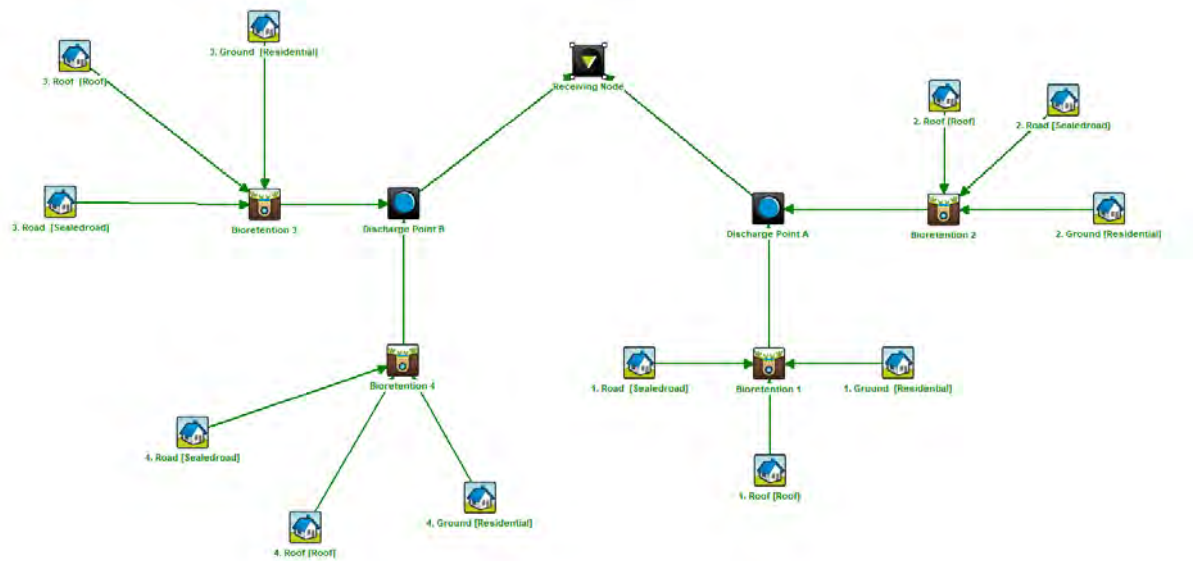


Figure 8 – MUSIC Layout

4.2.5.6 MUSIC RAESULTS

The MUSIC model results are shown in **Table 23**.

Table 23 – MUSIC Results

| Pollutant | WQO (%) | Reduction at Discharge Point A (%) | Reduction at Discharge Point B (%) | Overall Development Reduction (%) | WQO Achieved? |
|-----------|---------|------------------------------------|------------------------------------|-----------------------------------|---------------|
| TSS | 80 | 85 | 83 | 84 | Yes |
| TP | 60 | 78 | 74 | 76 | Yes |
| TN | 45 | 56 | 53 | 54 | Yes |
| GP | 90 | 100 | 100 | 100 | Yes |

The results demonstrate that the development overall achieves the required WQOs, and complies with the *State Planning Policy* (2017) with respect to stormwater quality.

4.3 WATERWAY STABILITY MANAGEMENT

The waterway stability management in accordance with the *State Planning Policy* (2017) is achieved as the 63% AEP (Q1) peak flow rates at Discharge Point A and B are not increased.

5. CONCLUSION & RECOMMENDATIONS

JFP Urban Consultants Pty Ltd has prepared this *Site Based Stormwater Management Plan* for the proposed residential subdivision at 22-80 Cash Street & 1901 D'Aguilar Highway, D'Aguilar. The analyses presented in this report achieve the following outcomes:

- The hydrological and hydraulic modelling undertaken has established the pre-development scenario flood conditions for a range of standard storm events. The results show that generally, up and including 1% AEP flooding is maintained within the defined overland flow paths.
- In the Post-Development Scenario, a 5m pathway is proposed between Lot 144 & Lot 145 for conveying overland flow from a small road reserve catchment. A wider drainage path is proposed between Lot 139 & Lot 140 as depicted in the lot layout and concept plans.
- 3 x 750Ø culverts are proposed at the crossing near Lot 139 & Lot 140.
- Peak flow mitigation is achieved at site boundaries (Discharge Point A and B) via inline flood storage create via new bunds. Consequently, there are no significantly adverse flood level increases upstream or downstream of the site.
- A comparison of the 1% AEP flood levels and the conceptual earthworks design levels show more than 500mm freeboard to the allotments.
- Sensitivity Scenario analyses have been undertaken for high Manning's n of 0.2, severe blockage of culverts and future climate change impacts. The internal road crossing is overtopped in the severe blockage (100% blockage) scenario. Apart from minor overtopping (~50mm) at Lot 140 & 141 all other lots remain flood free.
- Stormwater quality management will be achieved via five (5) end of line bioretention basins located within the fringes of the overland flow paths. MUSIC modelling show that the relevant WQOs are achieved.

It is recommended that the stormwater management strategies presented on this report are incorporated into future detailed design and subsequent construction. While variations to the concepts are allowed during detailed design phase, the design objectives are to be maintained.

6. DISCLAIMER

This report has been prepared for the purpose and exclusive use of DFC (Project Management) Pty Ltd as an investigation into the stormwater management issues related for the proposed development of the land described in the report. The information presented in this report is not to be used for any other purpose or by any other person or corporation.

JFP Urban Consultants Pty Ltd accepts no responsibility for any loss or damage suffered howsoever arising to any person or corporation who may use or rely on this report without further input and/or advice from JFP Urban Consultants Pty Ltd.

The investigations, calculations, analysis and recommendations presented in this report rely on information sourced from third-parties. JFP Urban Consultants Pty Ltd accepts no responsibility for the accuracy of the information sourced from third-parties.

7. APPENDICES

- Appendix A – Site Layout
- Appendix B – XP-STORM Data
- Appendix C – Catchment Plans
- Appendix D – Pre-Development Scenario Flood Plans
- Appendix E – Post-Development Scenario Flood Plans
- Appendix F – Impact Mapping
- Appendix G – Sensitivity Scenario Flood Plans



APPENDIX A – SITE LAYOUT

PROPERTY DESCRIPTION

LOT 1 ON RP230991 &
LOT 2 ON RP80309
PARISH OF DURUNDUR
COUNTY OF CANNING
TOTAL AREA 17.756ha

| STATISTICS | STAGE 1 | STAGE 2 | STAGE 3 | STAGE 4 | STAGE 5 | TOTAL |
|---------------------------------|---------|---------|---------|---------|---------|--------|
| NO. OF LOTS | 27 | 33 | 27 | 27 | 34 | 148 |
| LENGTH OF NEW 16.5m ROAD (m) | 350 | 260 | 330 | 390 | 475 | 1805 |
| DRAINAGE RESERVE AREA (ha) | 2.08 | 0 | 0 | 0 | 1.93 | 4.01 |
| STAGE AREA (ha) | 4.458 | 2.465 | 2.536 | 2.569 | 5.728 | 17.756 |
| DEVELOPABLE AREA (ha) | | | | | | 14.236 |
| DENSITY | | | | | | 10.7 |

NOTES

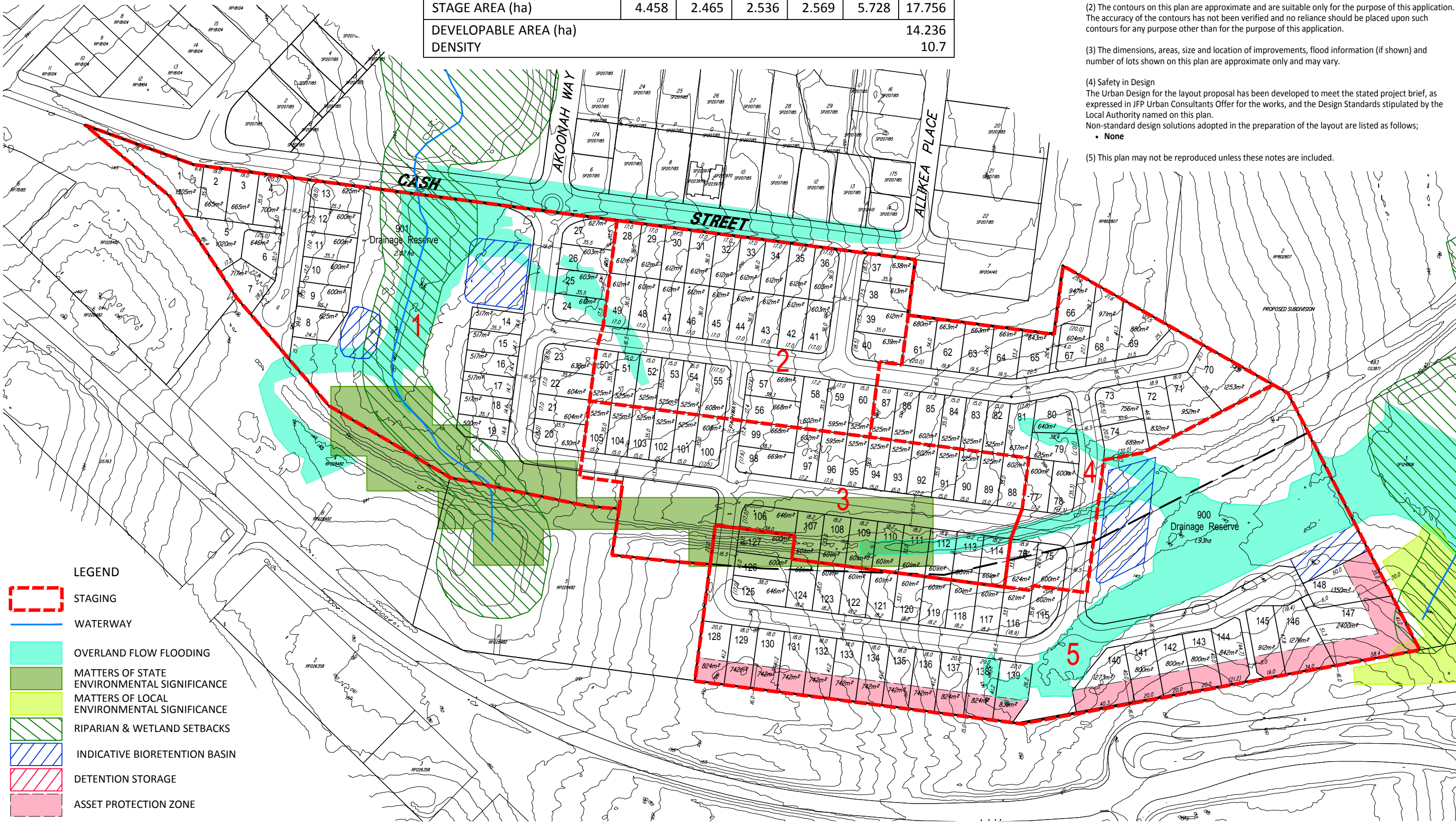
(1) This plan was prepared for the purpose and exclusive use of DFC (PROJECT MANAGEMENT) PTY LTD to accompany an application to MORETON BAY REGIONAL COUNCIL to Reconfigure the land described in the plan and is not to be used for any other purpose or by any other person or corporation. JFP URBAN CONSULTANTS PTY LTD accepts no responsibility for any loss or damage suffered howsoever arising to any person or corporation who may use or rely on this plan in contravention to the terms of this clause or clauses 2, 3, 4, 5 or 6 hereof.

(2) The contours on this plan are approximate and are suitable only for the purpose of this application. The accuracy of the contours has not been verified and no reliance should be placed upon such contours for any purpose other than for the purpose of this application.

(3) The dimensions, areas, size and location of improvements, flood information (if shown) and number of lots shown on this plan are approximate only and may vary.

(4) Safety in Design
The Urban Design for the layout proposal has been developed to meet the stated project brief, as expressed in JFP Urban Consultants Offer for the works, and the Design Standards stipulated by the Local Authority named on this plan.
Non-standard design solutions adopted in the preparation of the layout are listed as follows;
• None

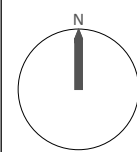
(5) This plan may not be reproduced unless these notes are included.



LEGEND

- STAGING
- WATERWAY
- OVERLAND FLOW FLOODING
- MATTERS OF STATE ENVIRONMENTAL SIGNIFICANCE
- MATTERS OF LOCAL ENVIRONMENTAL SIGNIFICANCE
- RIPARIAN & WETLAND SETBACKS
- INDICATIVE BIORETENTION BASIN
- DETENTION STORAGE
- ASSET PROTECTION ZONE

NORTH:



SCALE:



SCALE: @ A3 1:2500
THIS SCALE SHOWN IS ORIGINAL DRAWING SCALE - (A3 SIZE)
DO NOT SCALE FROM THIS DRAWING - USE ONLY DIMENSIONS PROVIDED - IF IN DOUBT PLEASE ENQUIRE

ISSUES:

| | | | |
|--------|--|----------|-------|
| E | LOTS 14 - 19 AMENDED | 08-07-19 | DWW |
| D | LOTS 14-19, 27 & ROUNDABOUT AMENDED | 28-06-19 | SCP |
| C | LAYOUT AMENDED | 30-05-19 | DWW |
| B | APZ, BIO BASINS & LOTS 148-149 AMENDED | 25-02-19 | SCP |
| A | ORIGINAL | 10-01-19 | TJM |
| ISSUE: | DETAILS: | DATE: | INIT: |

TITLE:

RECONFIGURATION PLAN
DFC (PROJECT MANAGEMENT) PTY LTD
CASH STREET, D'AGUILAR

DETAILS:

JOB NUMBER: M2584P_DA1 R1 E
PLAN: ISSUE:

SHEET: 1 OF 1

DATE: 8th July 2019

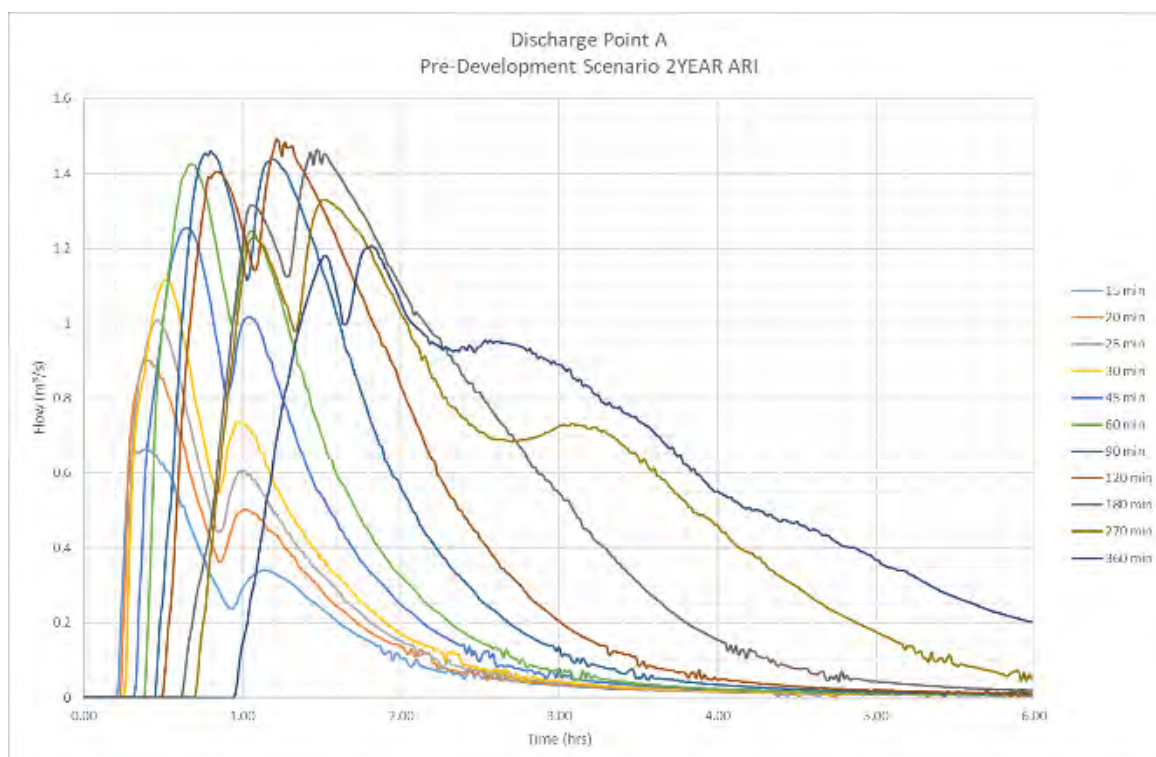
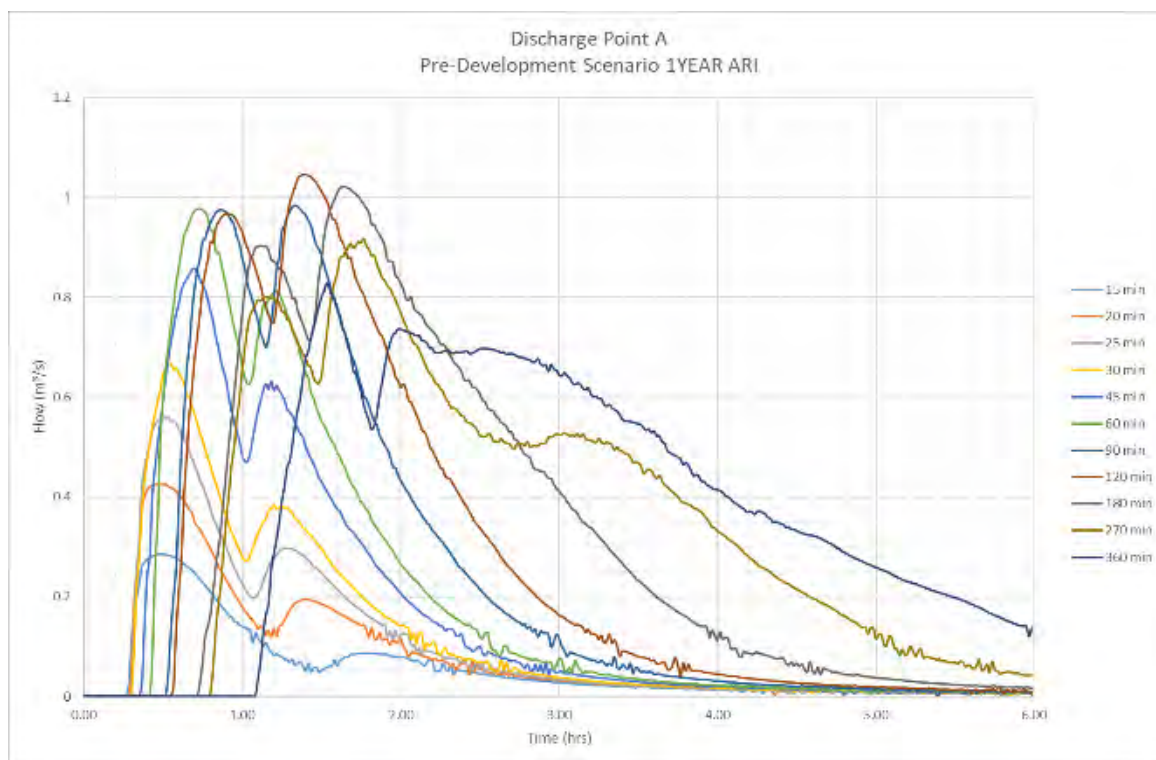
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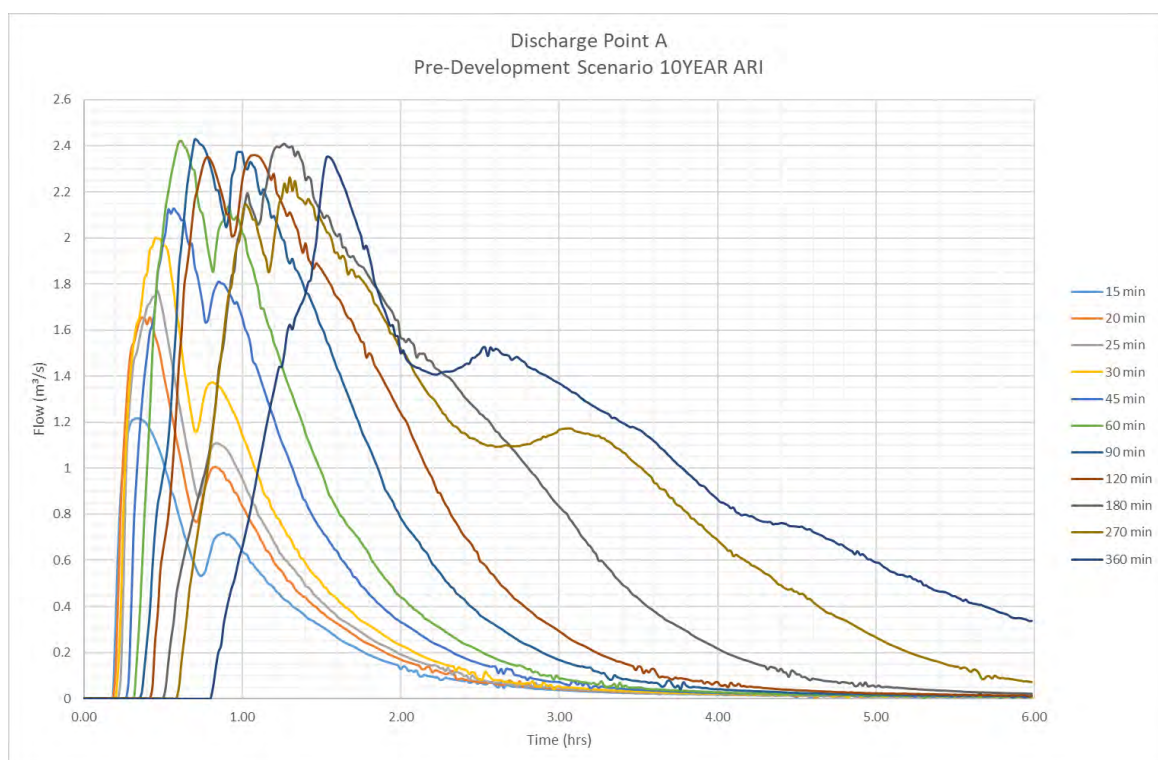
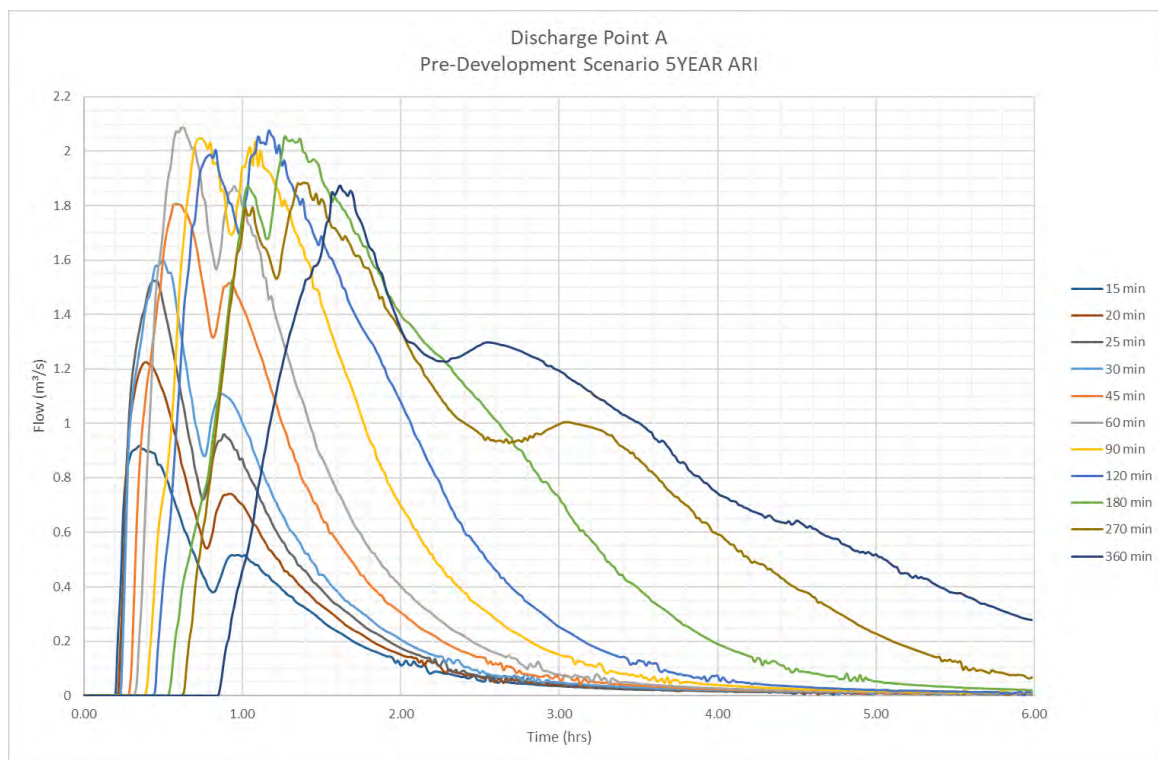
APPENDIX B – XP-STORM DATA

- Pre-Development Discharge Point A Hydrographs
- Post-Development Discharge Point A Hydrographs
- Pre-Development Discharge Point B Hydrographs
- Post-Development Discharge Point B Hydrographs
- Stage vs Storage Relationships

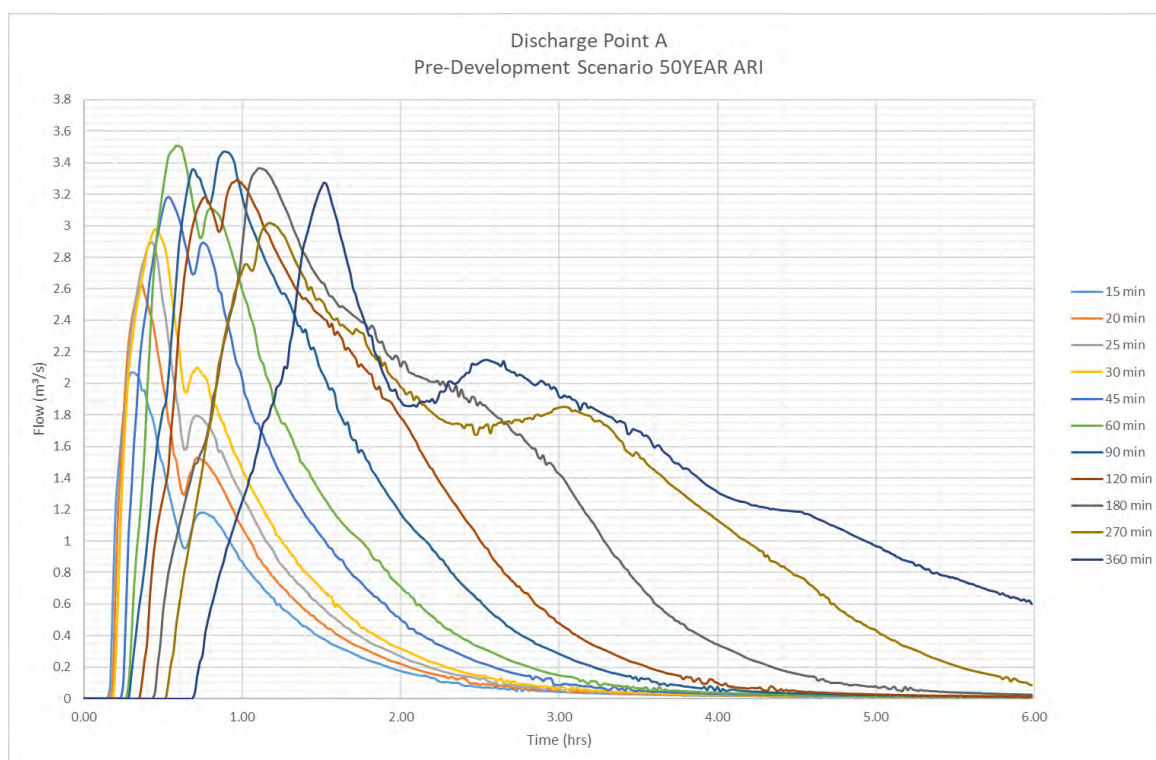
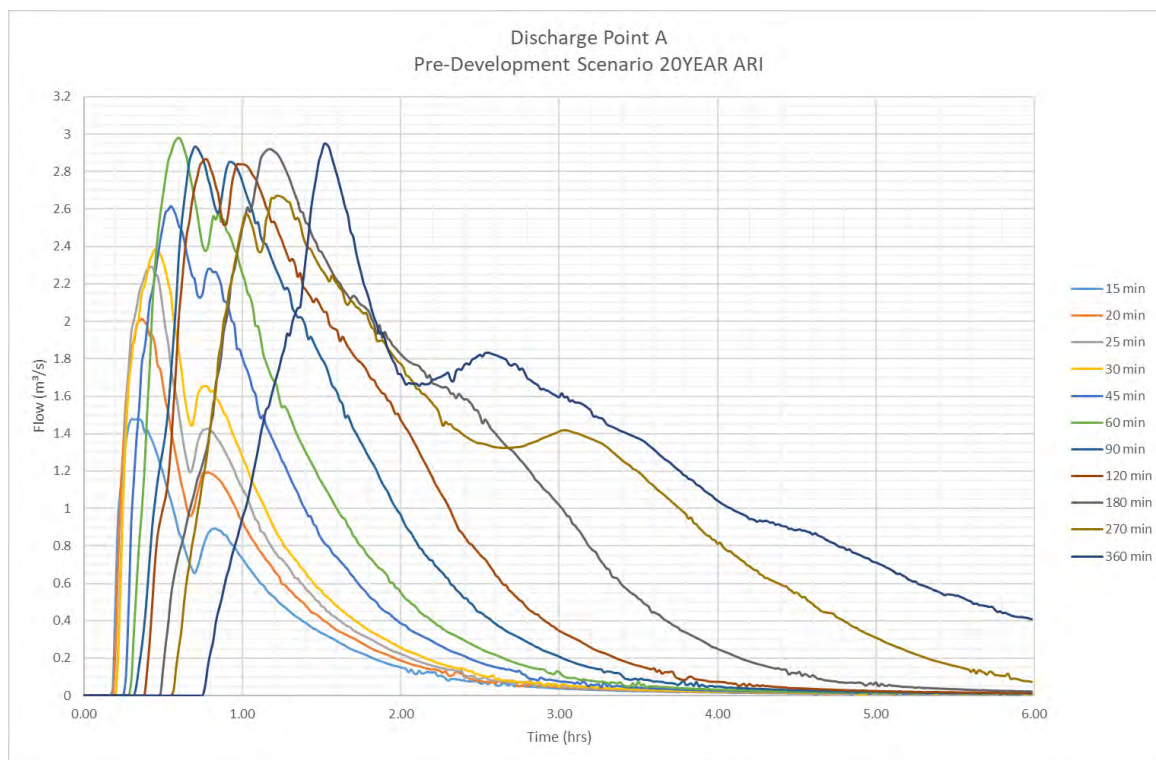
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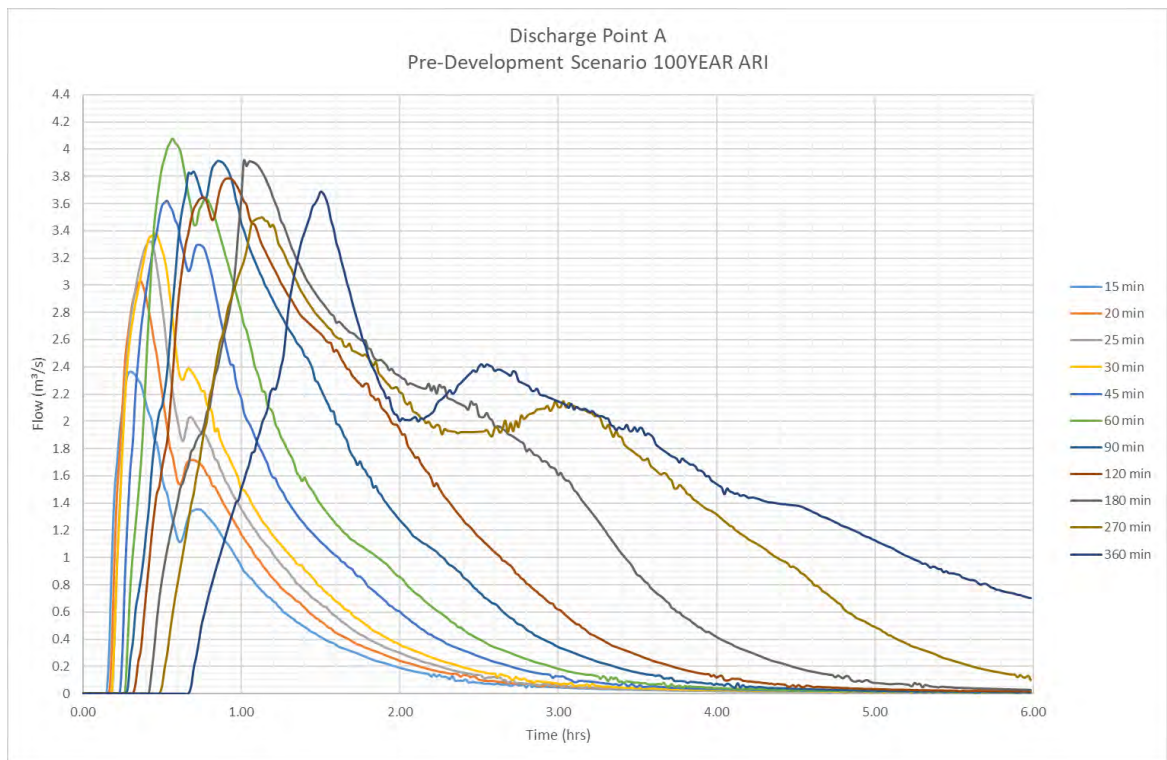
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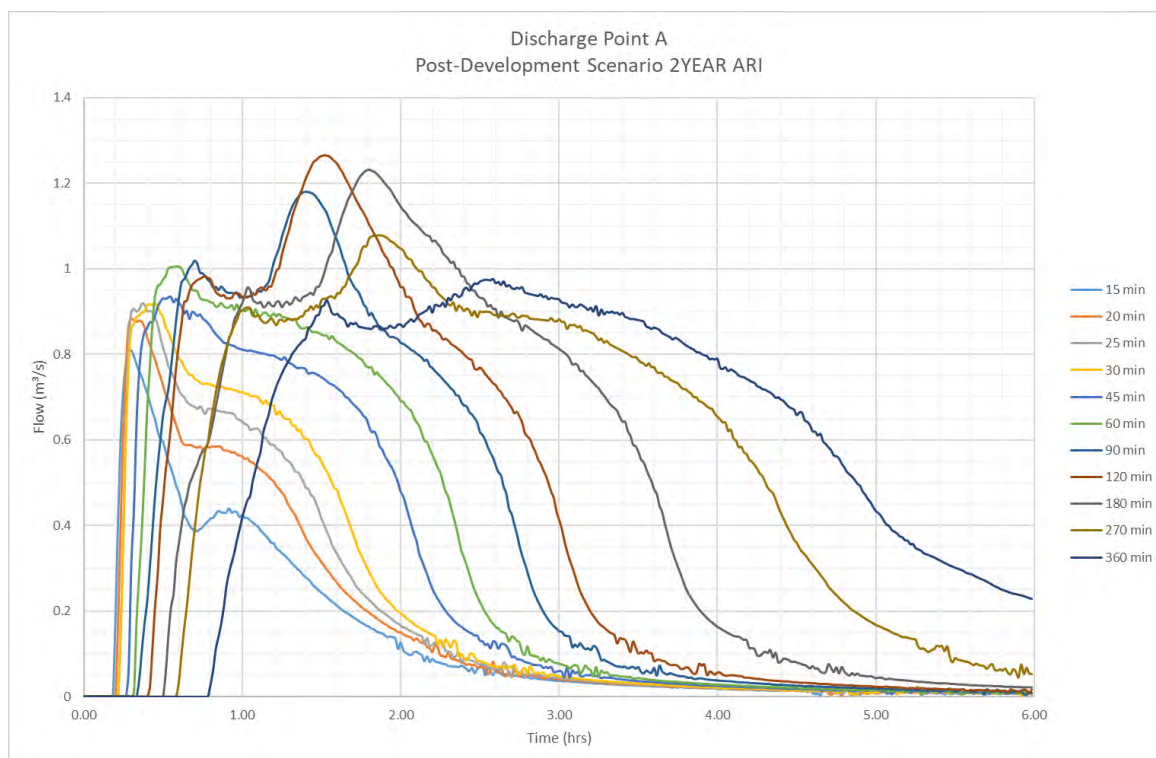
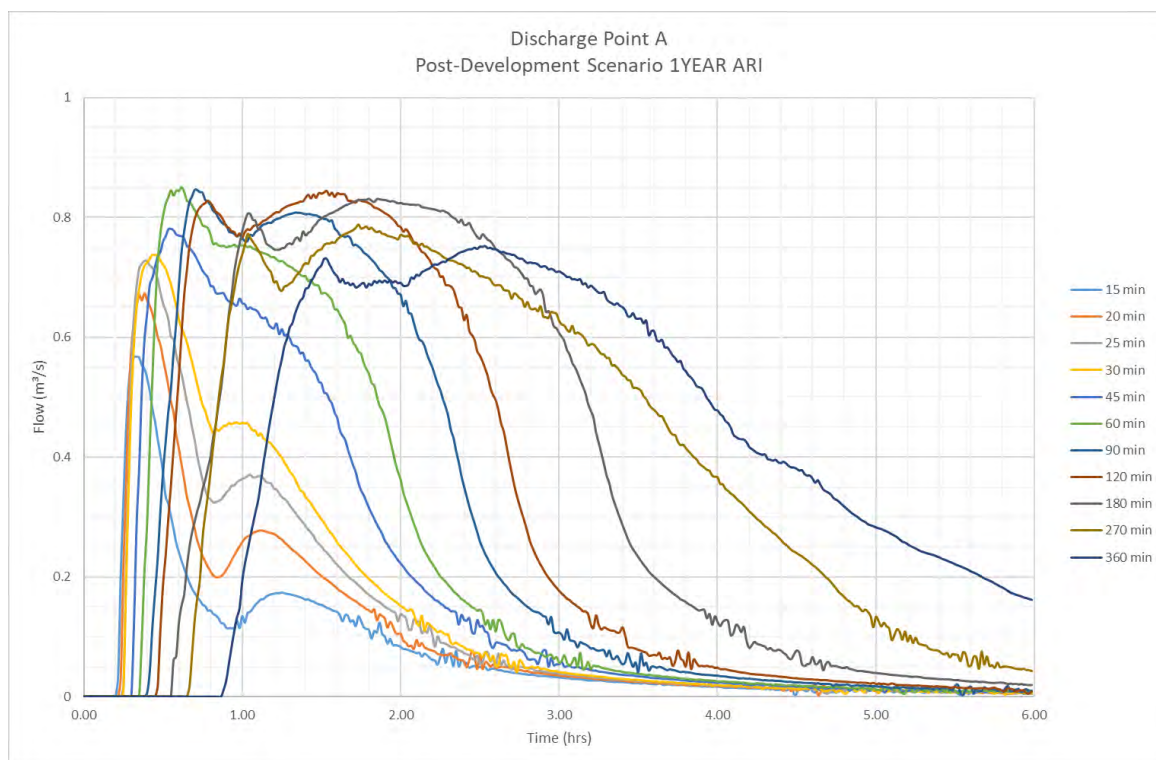
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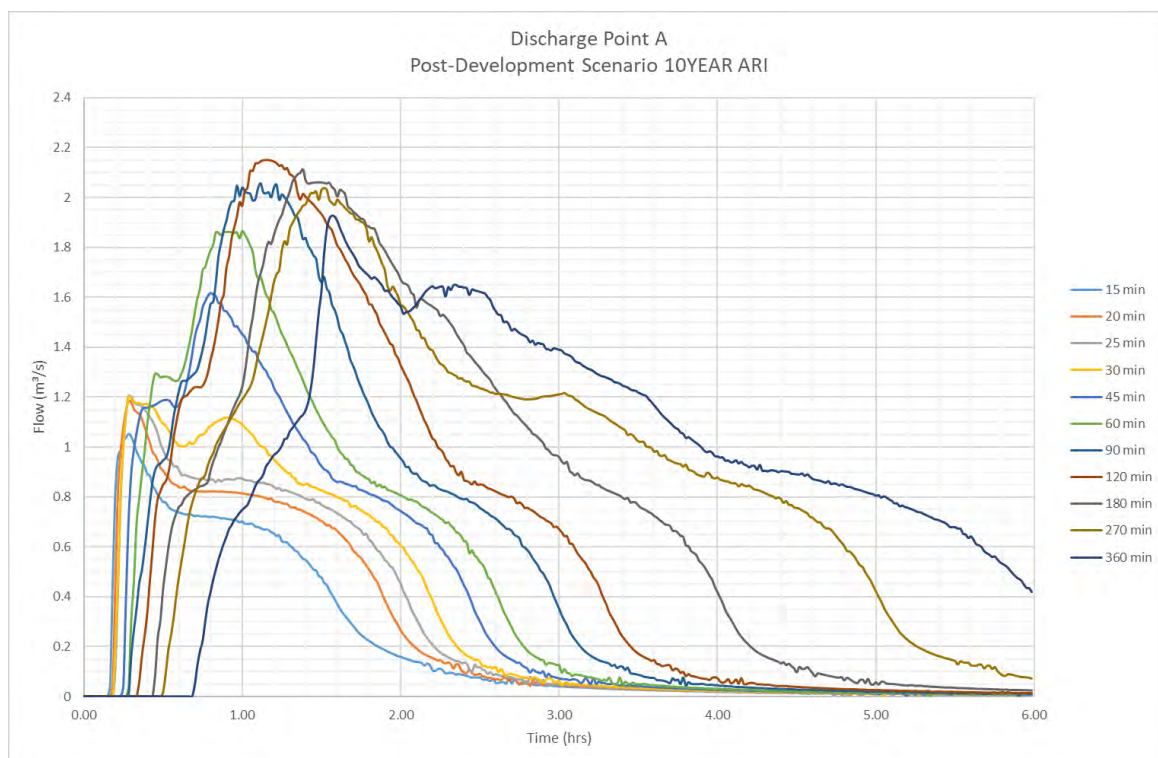
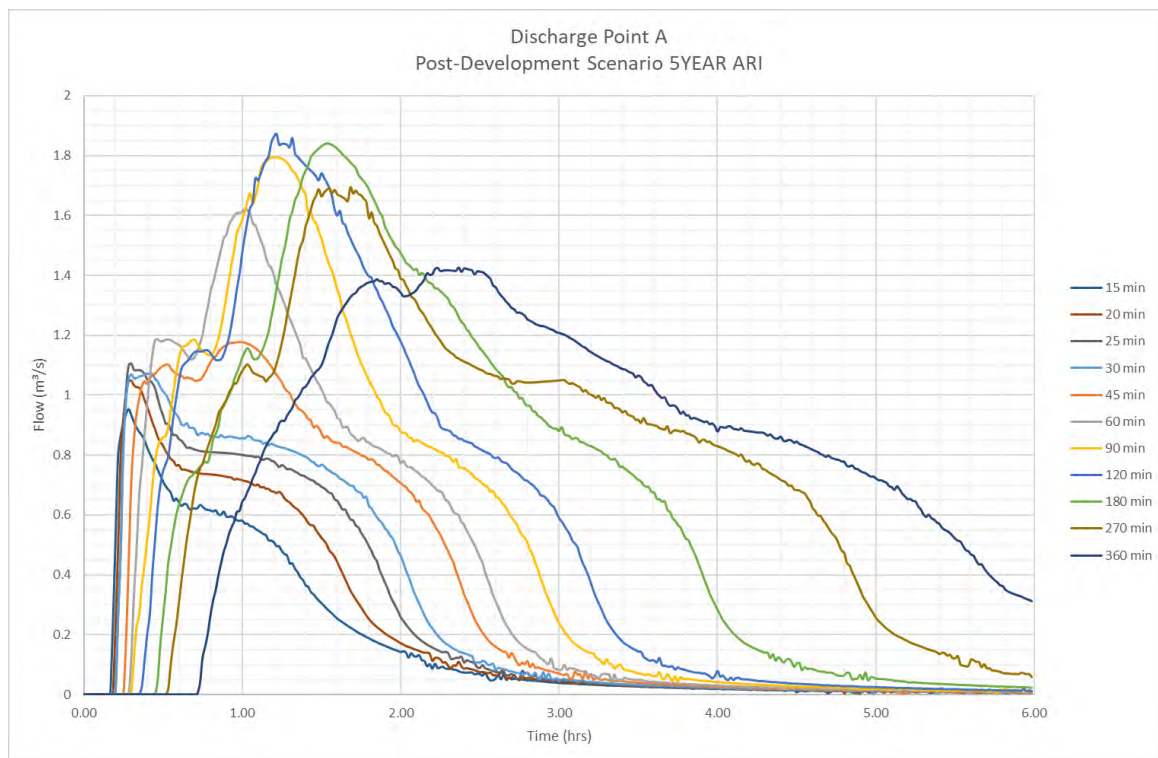
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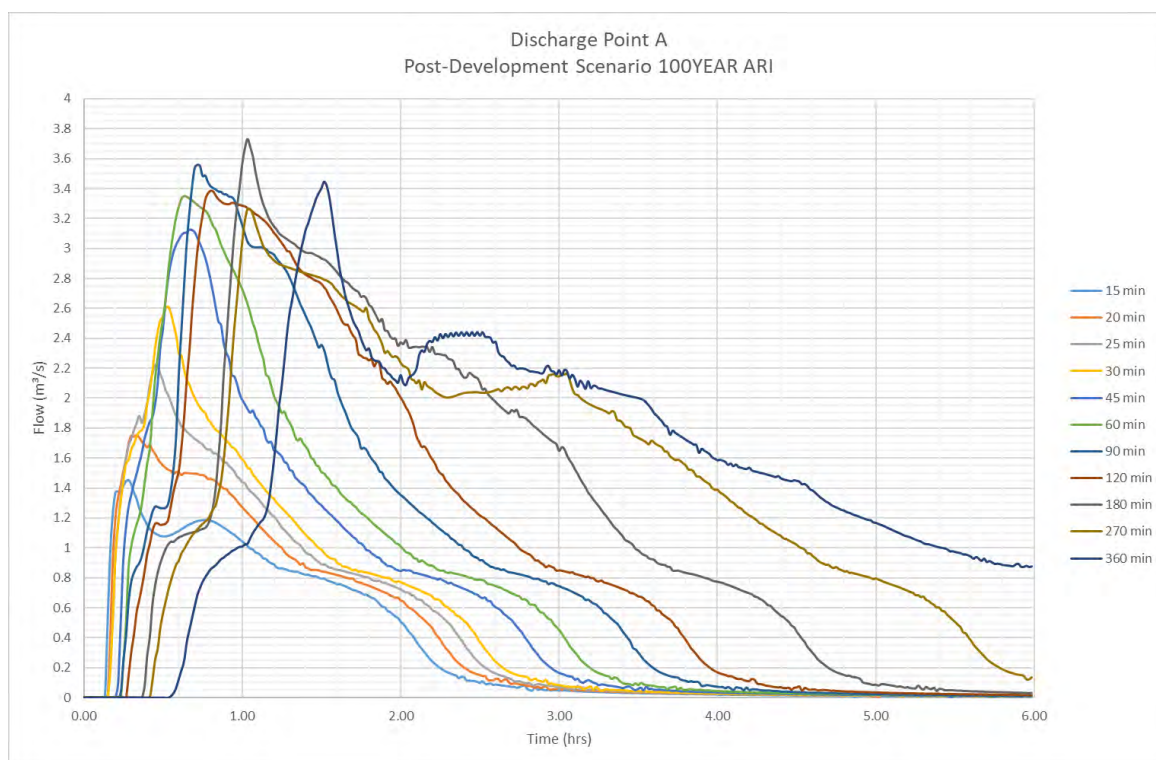
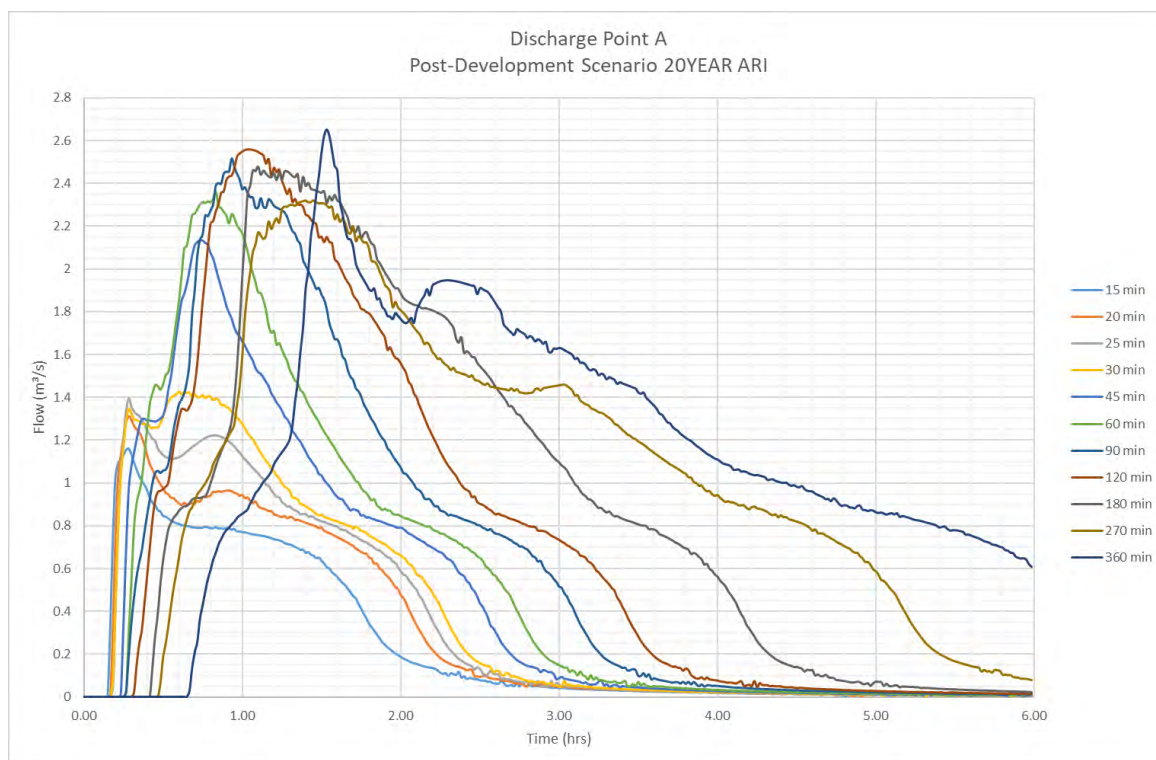
Post-Development Discharge Point A Hydrographs



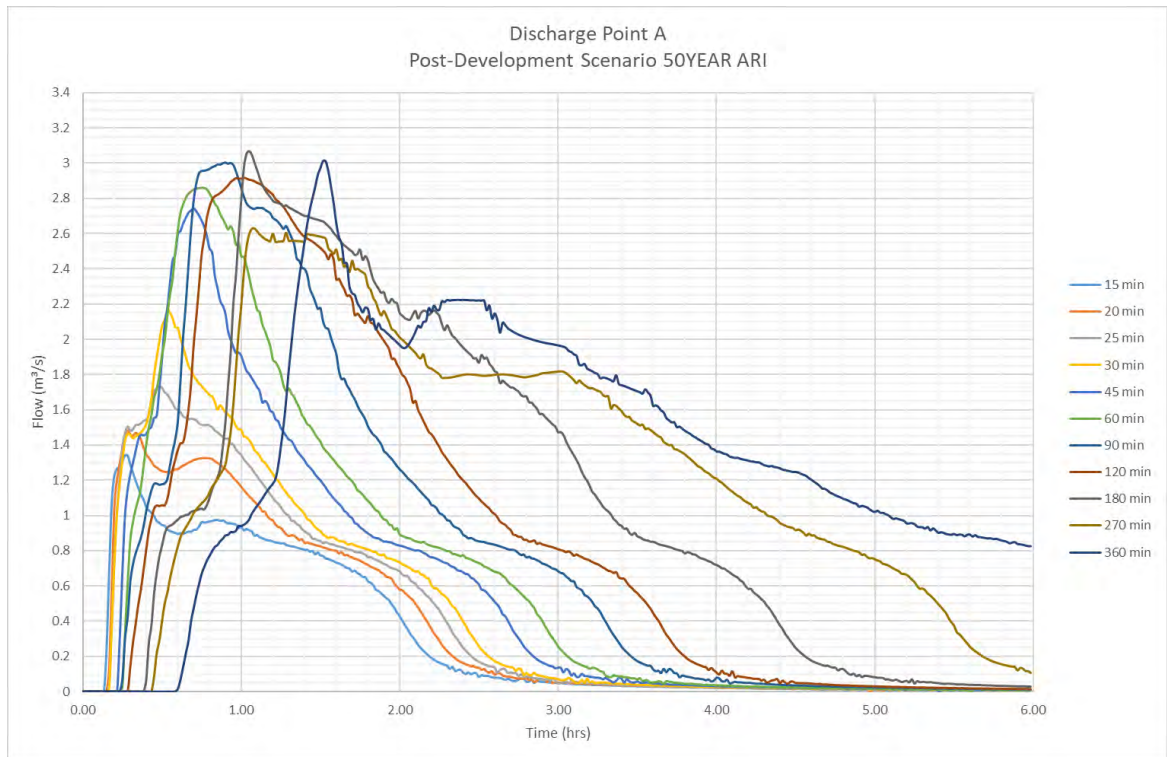
Post-Development Discharge Point A Hydrographs



Post-Development Discharge Point A Hydrographs

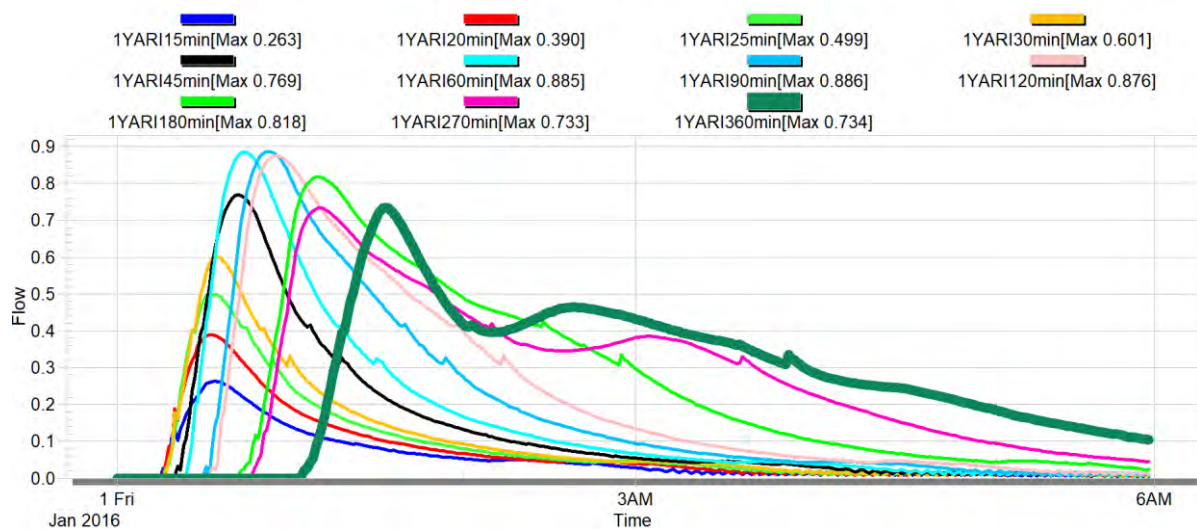


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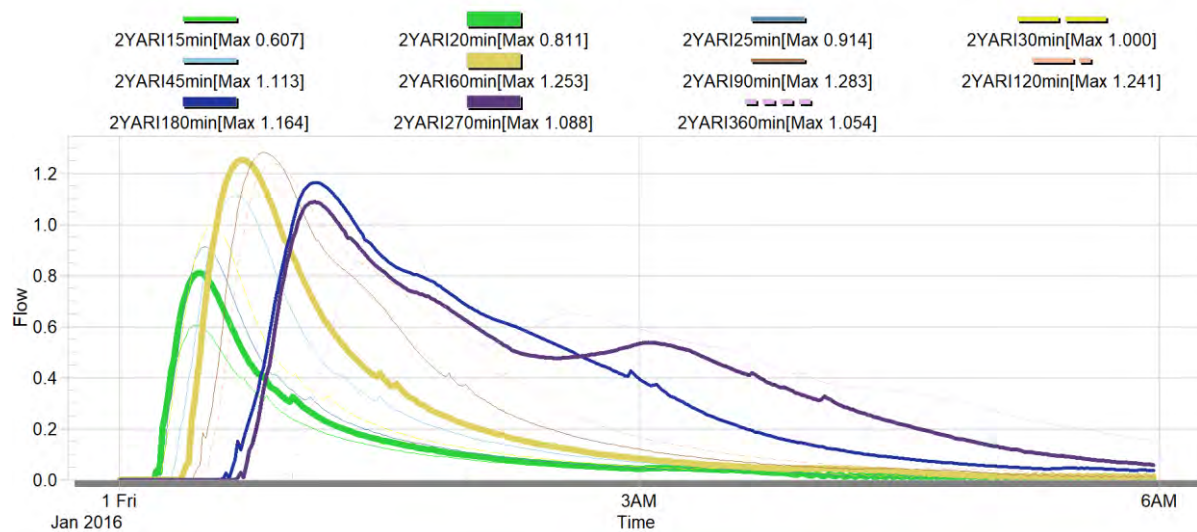


Pre-Development Discharge Point B Hydrographs

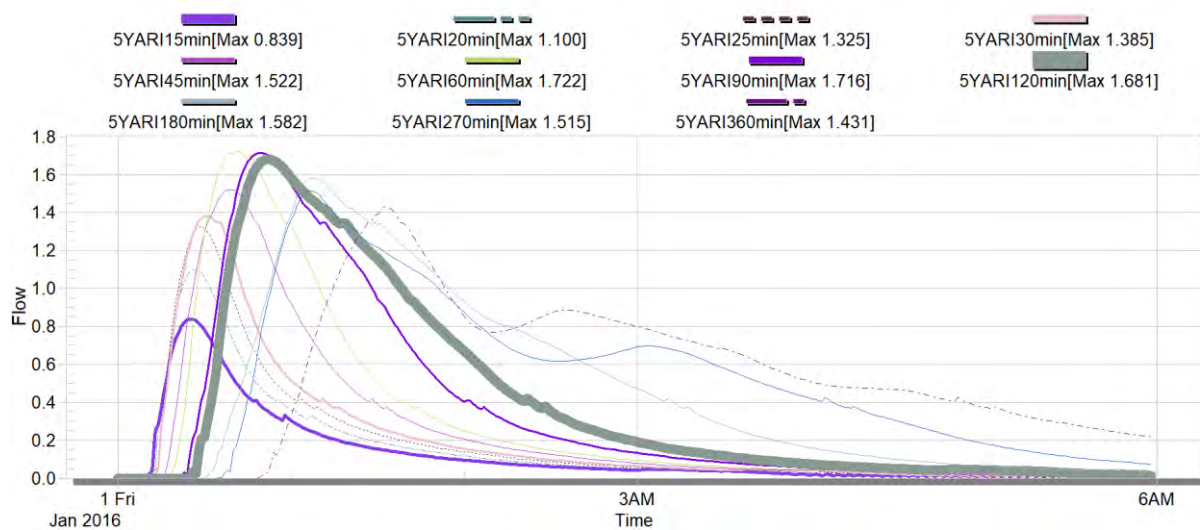
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Conduit 1x1200 from Ex Headwall to DS Headwall

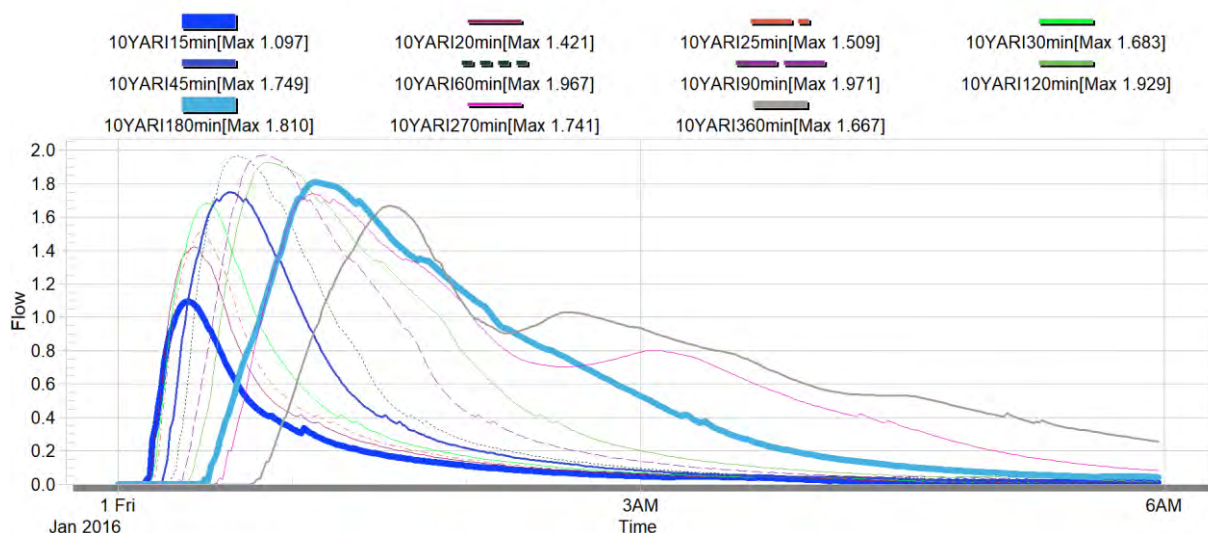


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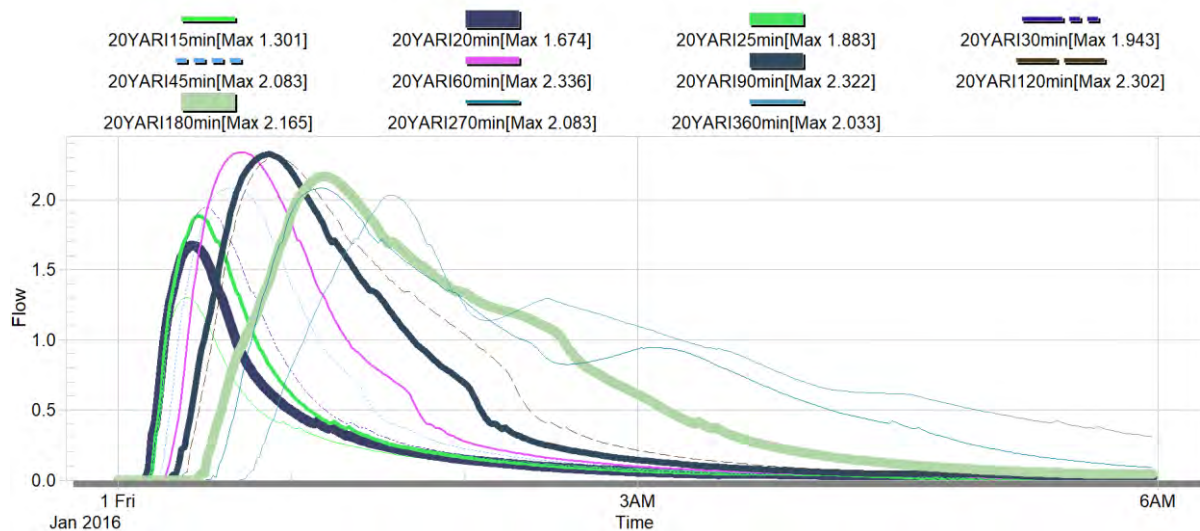


Pre-Development Discharge Point B Hydrographs

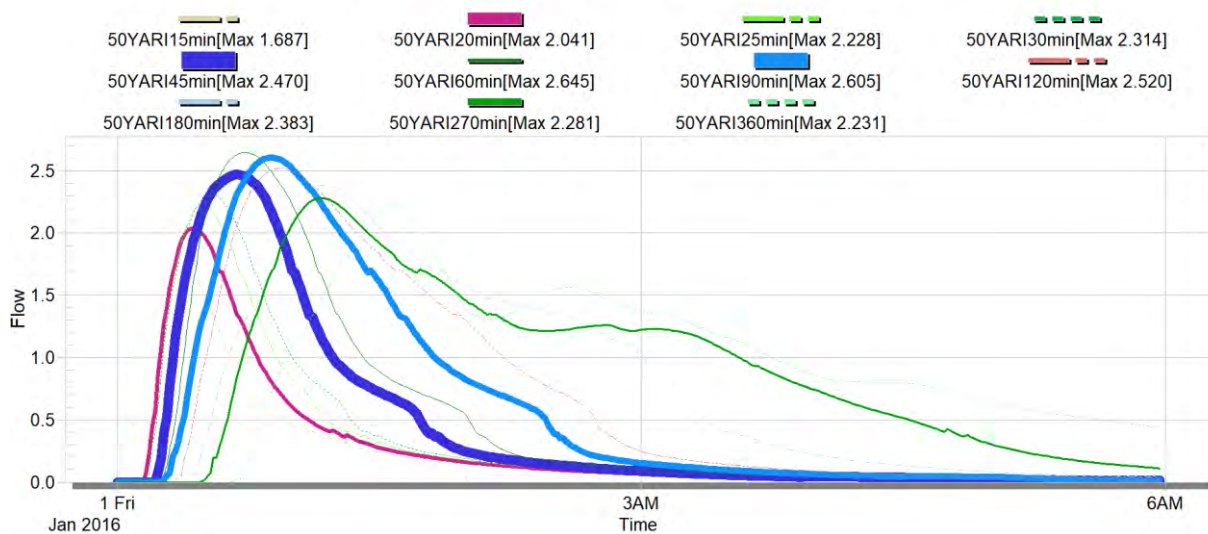
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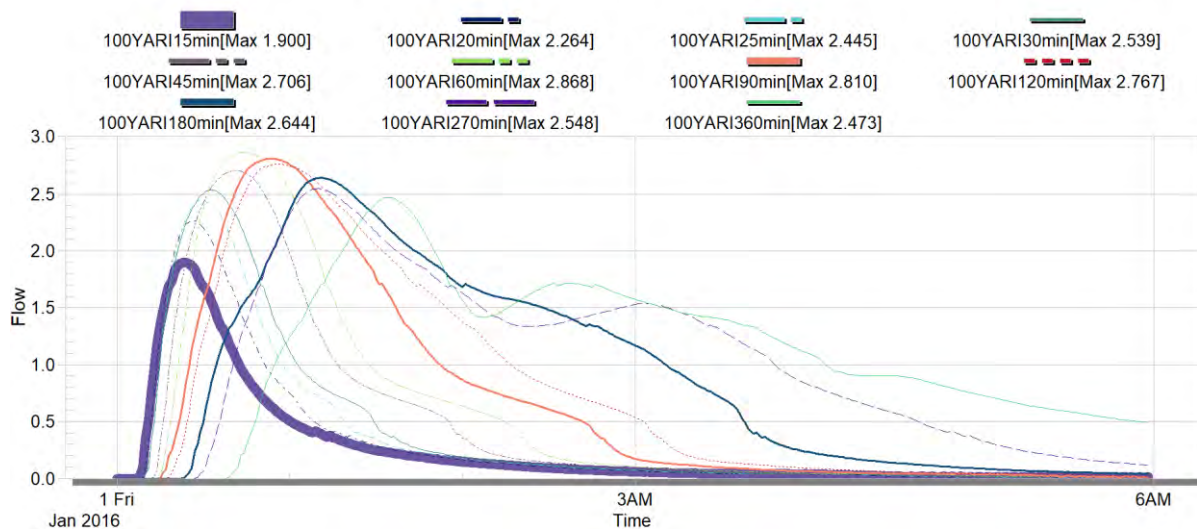


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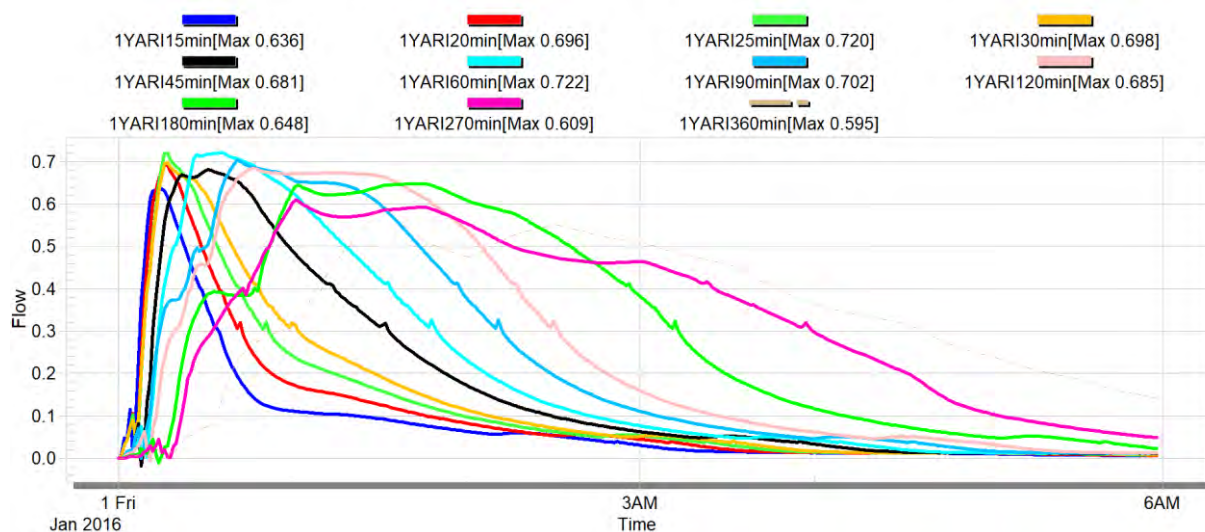
Pre-Development Discharge Point B Hydrographs

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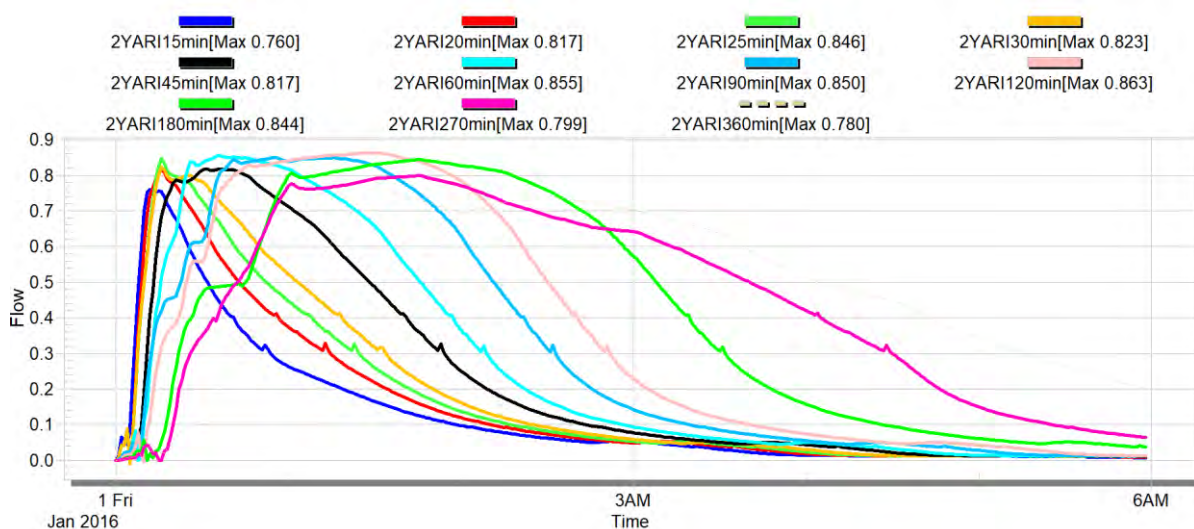


Post-Development Discharge Point B Hydrographs

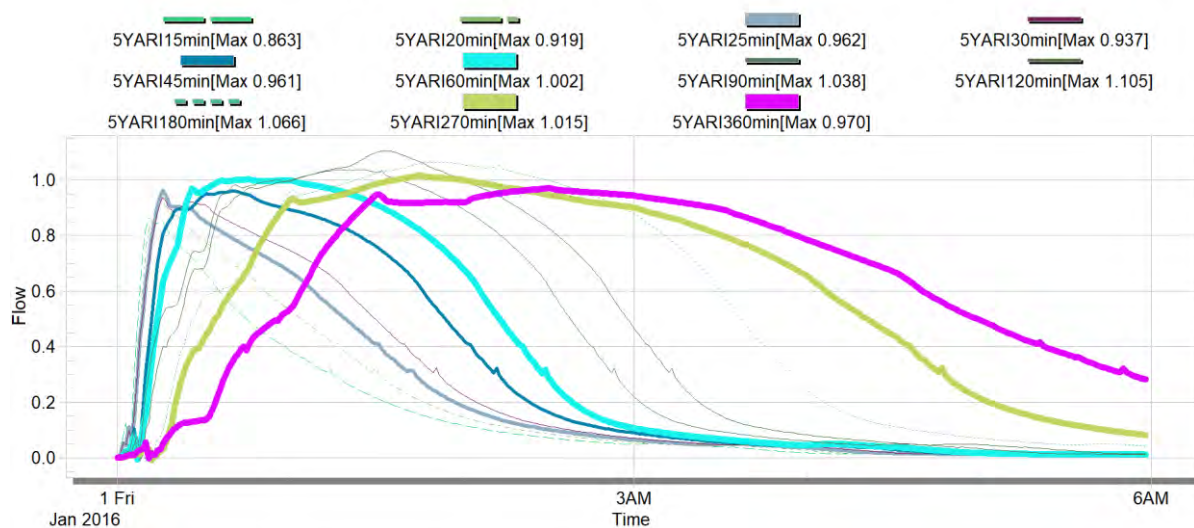
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Conduit 1x1200 from NewHeadwall to DS Headwall

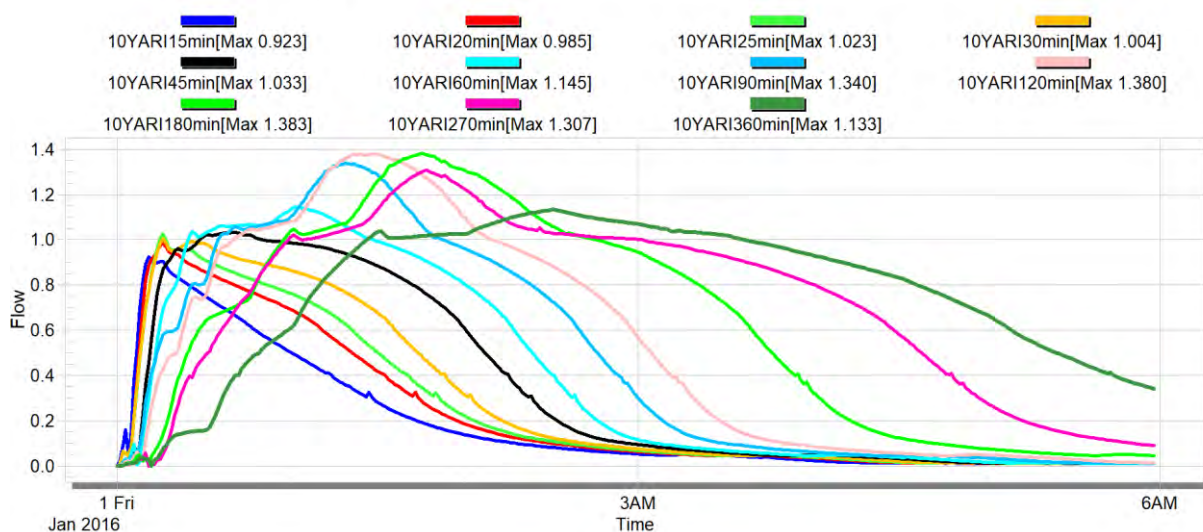


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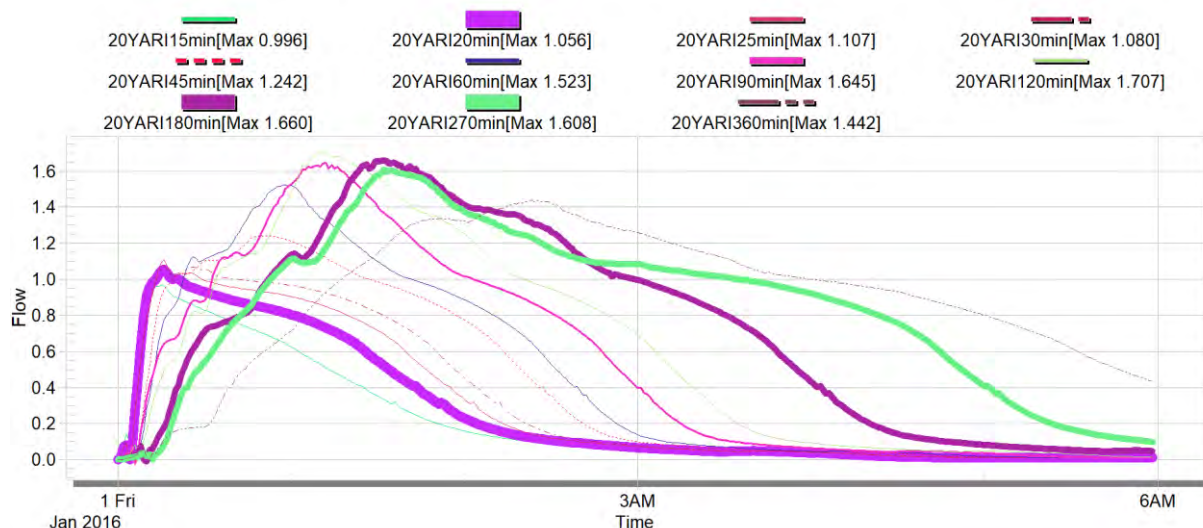


Post-Development Discharge Point B Hydrographs

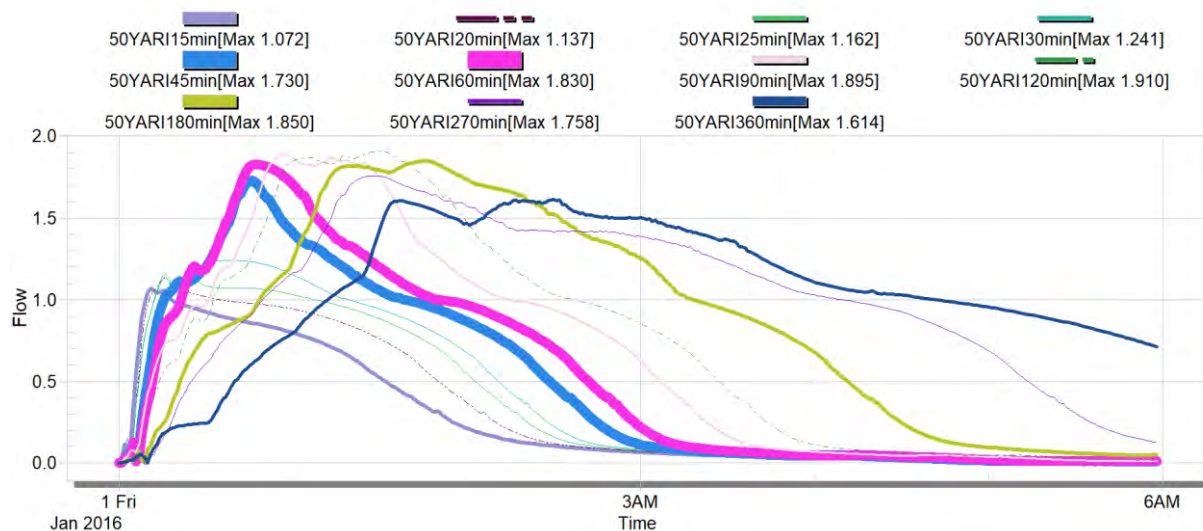
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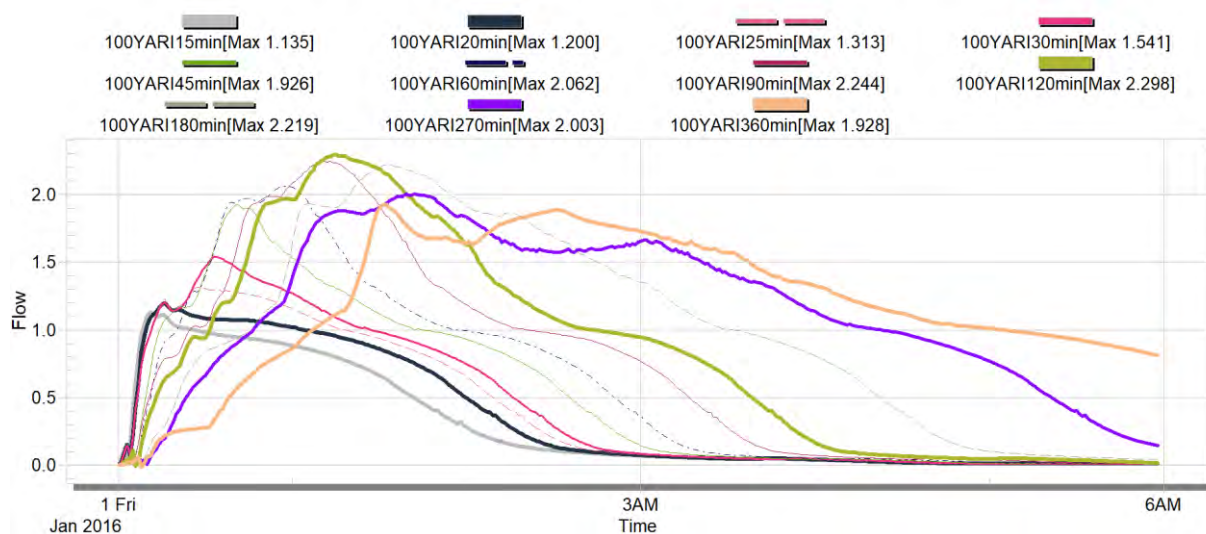


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Post-Development Discharge Point B Hydrographs

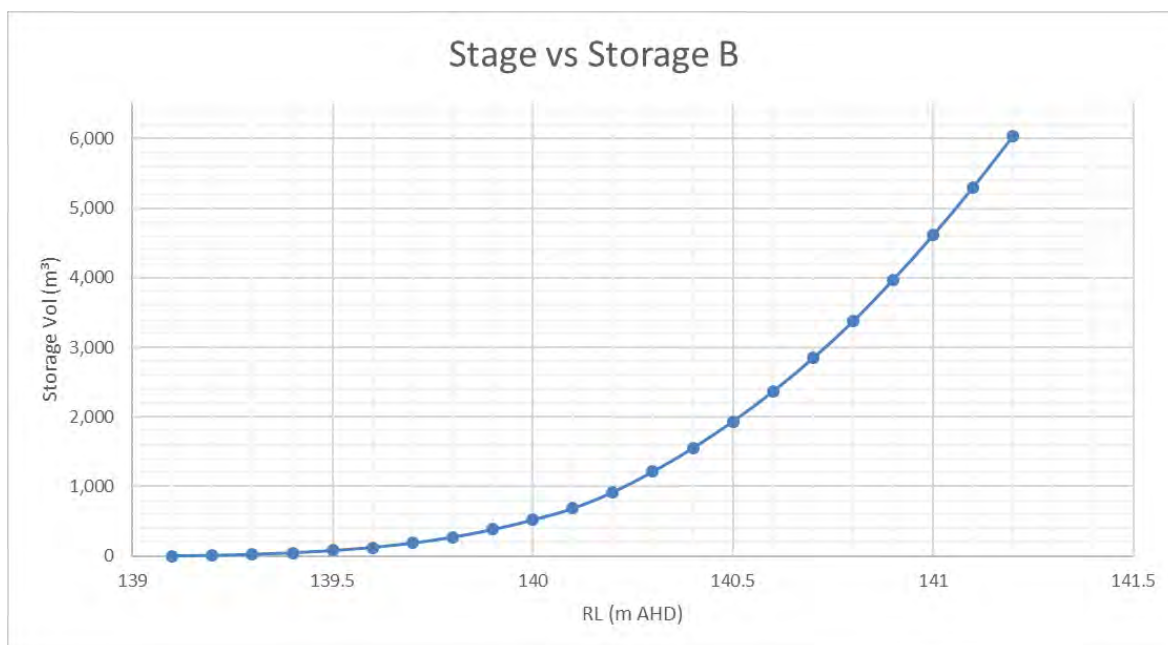
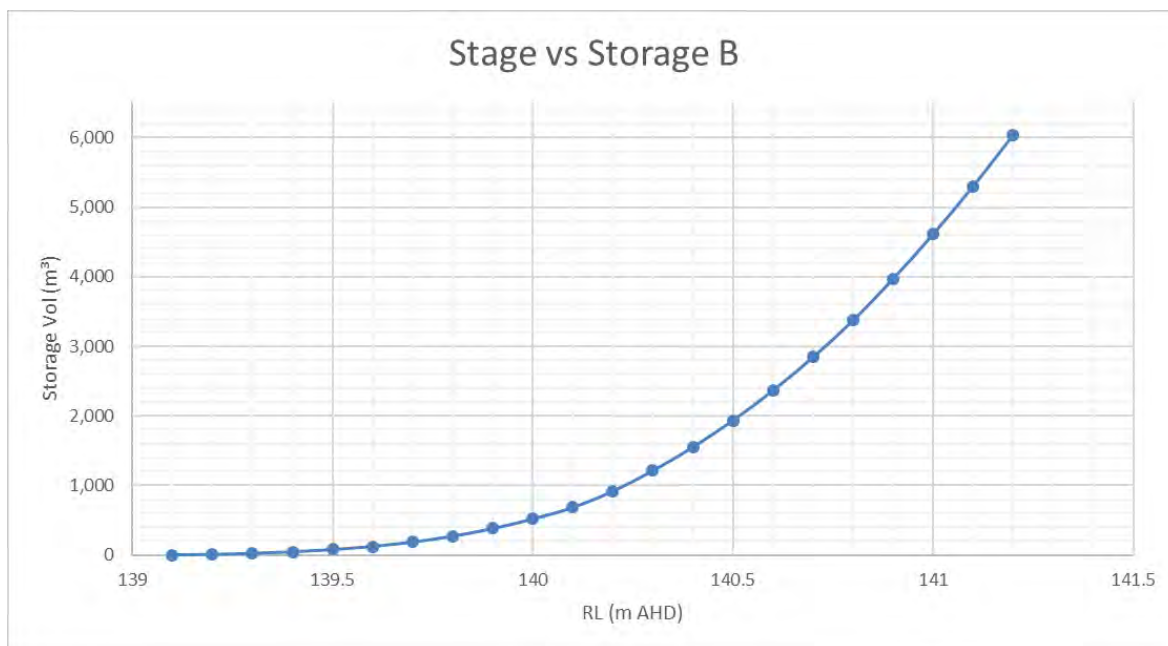
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Stage vs Storage

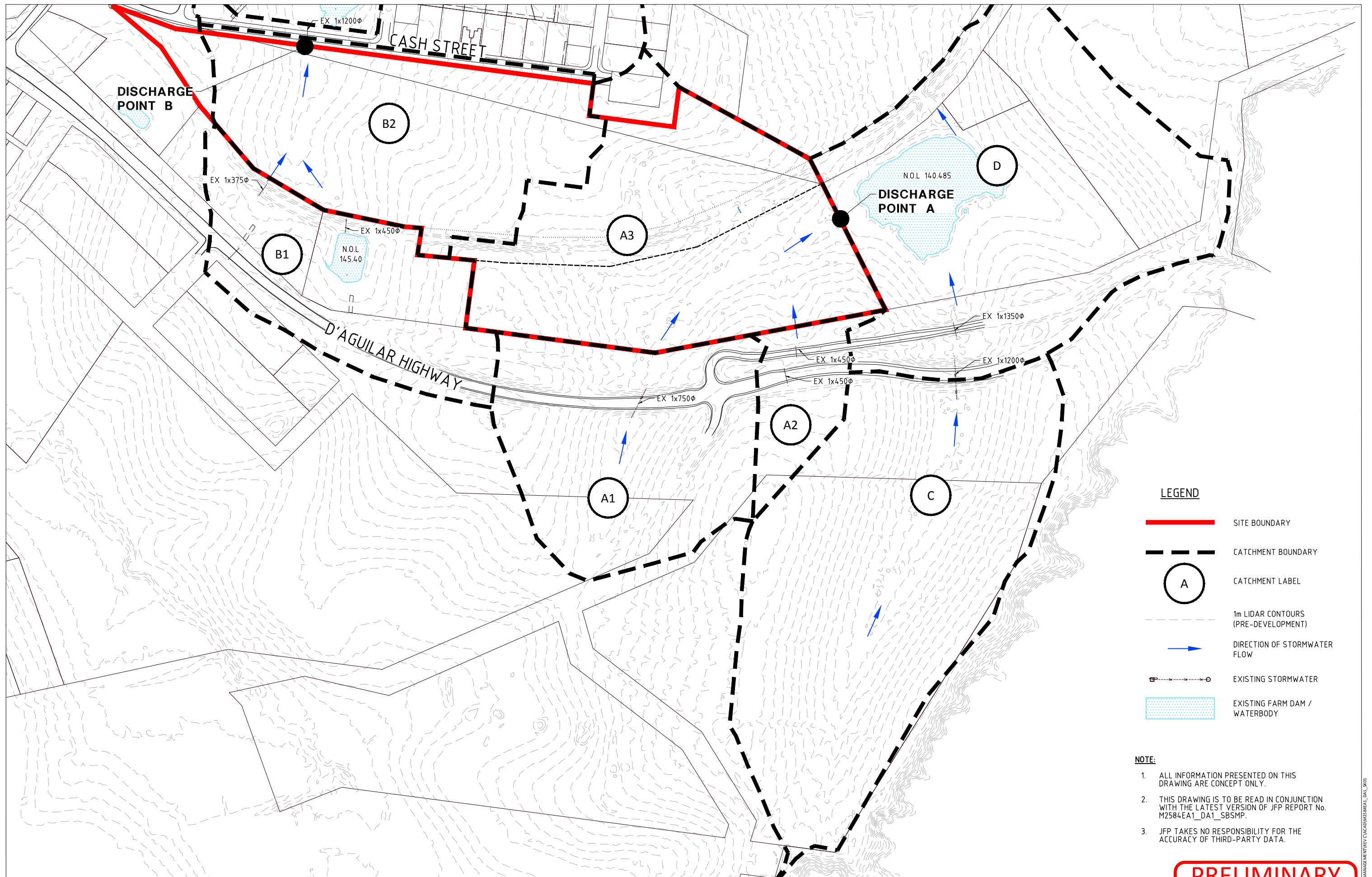
| STORAGE A | |
|------------|-------------------------|
| RL (m AHD) | Accumulated Volume (m³) |
| 142.83 | 0 |
| 142.9 | 3.4 |
| 143.0 | 24 |
| 143.1 | 57 |
| 143.2 | 107 |
| 143.3 | 189 |
| 143.4 | 315 |
| 143.5 | 482 |
| 143.6 | 685 |
| 143.7 | 927 |
| 143.8 | 1,255 |
| 143.9 | 1,675 |
| 144.0 | 2,146 |
| 144.1 | 2,667 |
| 144.2 | 3,226 |
| 144.3 | 3,823 |
| 144.4 | 4,483 |
| 144.5 | 5,201 |
| 144.6 | 5,951 |
| 144.7 | 6,740 |
| 144.8 | 7,569 |
| 144.85 | 7,998 |
| | |
| | |

| STORAGE B | |
|------------|-------------------------|
| RL (m AHD) | Accumulated Volume (m³) |
| 139.16 | 0 |
| 139.2 | 6 |
| 139.3 | 23 |
| 139.4 | 45 |
| 139.5 | 77 |
| 139.6 | 121 |
| 139.7 | 184 |
| 139.8 | 269 |
| 139.9 | 379 |
| 140 | 516 |
| 140.1 | 683 |
| 140.2 | 914 |
| 140.3 | 1,211 |
| 140.4 | 1550 |
| 140.5 | 1934 |
| 140.6 | 2364 |
| 140.7 | 2842 |
| 140.8 | 3372 |
| 140.9 | 3970 |
| 141 | 4612 |
| 141.1 | 5301 |
| 141.2 | 6038 |
| 141.3 | 6823 |
| 141.4 | 7655 |





APPENDIX C – CATCHMENT PLANS



LEGEND

- SITE BOUNDARY
- CATCHMENT BOUNDARY
- CATCHMENT LABEL
- 1m LIDAR CONTOURS (PRE-DEVELOPMENT)
- DIRECTION OF STORMWATER FLOW
- EXISTING STORMWATER
- EXISTING FARM DAM / WATERBODY

NOTE:

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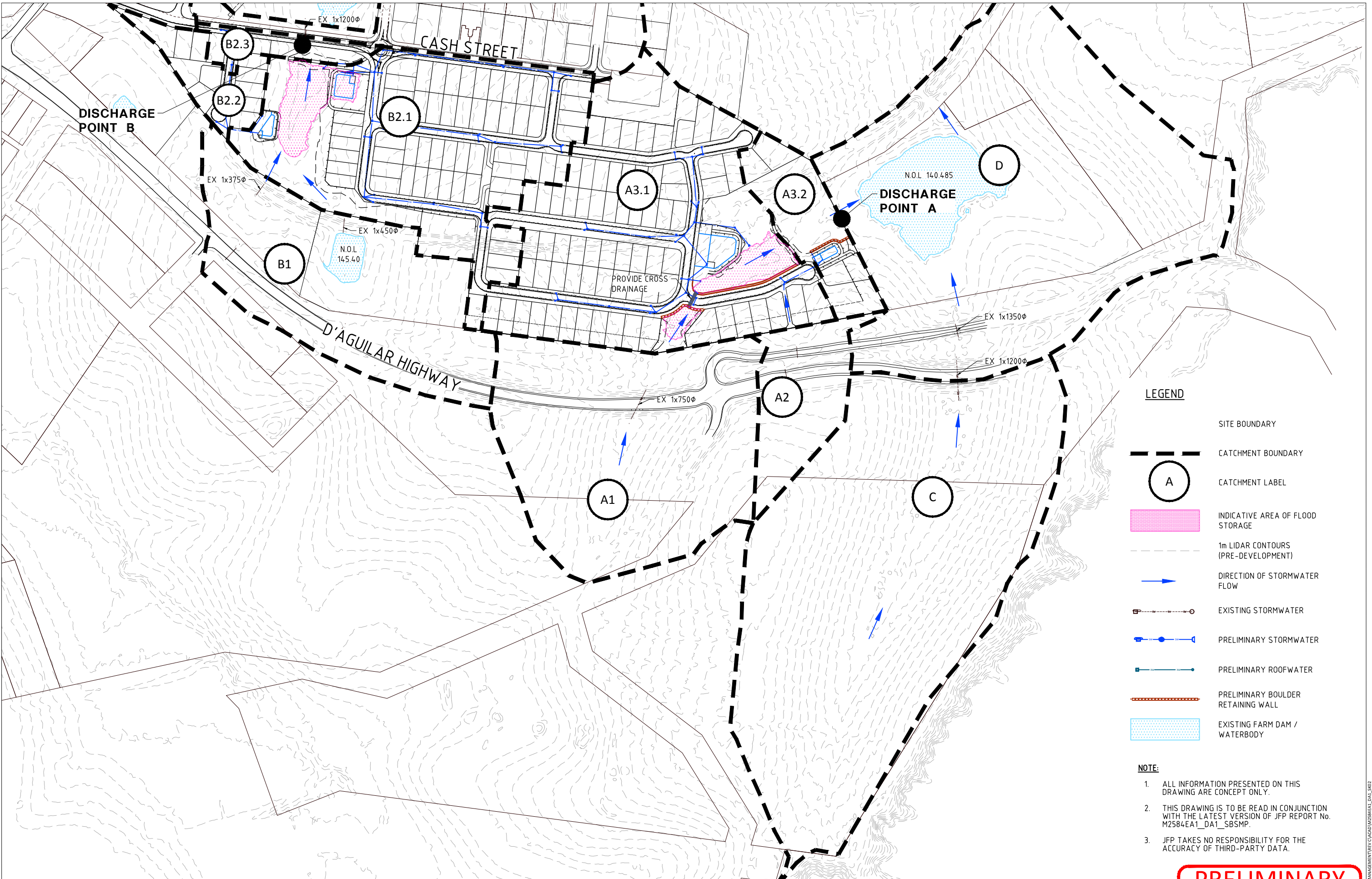
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SURVEYORS
ENGINEERS
LANDSCAPE ARCHITECTS

PRE-DEVELOPMENT CATCHMENT SCENARIO PLAN

22-80 CASH STREET & 1901 D'AGUILAR HIGHWAY, D'AGUILAR
DFC (PROJECT MANAGEMENT) PTY LTD

PRELIMINARY
NOT FOR CONSTRUCTION

| | | |
|--------------|-----------------------|--------|
| JOB: | PLAN: | ISSUE: |
| M2584EA1_DA1 | SK01 | C |
| SCALE: | 1:2000 @ A1 | |
| DATE: | 23/07/2019 | |
| DRAFTED BY: | CB | |
| FILE NAME: | M2584EA1_DA1_SK01.DWG | |



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POST-DEVELOPMENT CATCHMENT SCENARIO PLAN

22-80 CASH STREET & 1901 D'AGUILAR HIGHWAY, D'AGUILAR
DFC (PROJECT MANAGEMENT) PTY LTD

Approved Subject to Conditions of Decision Notice DA/38032/2019/V3RL

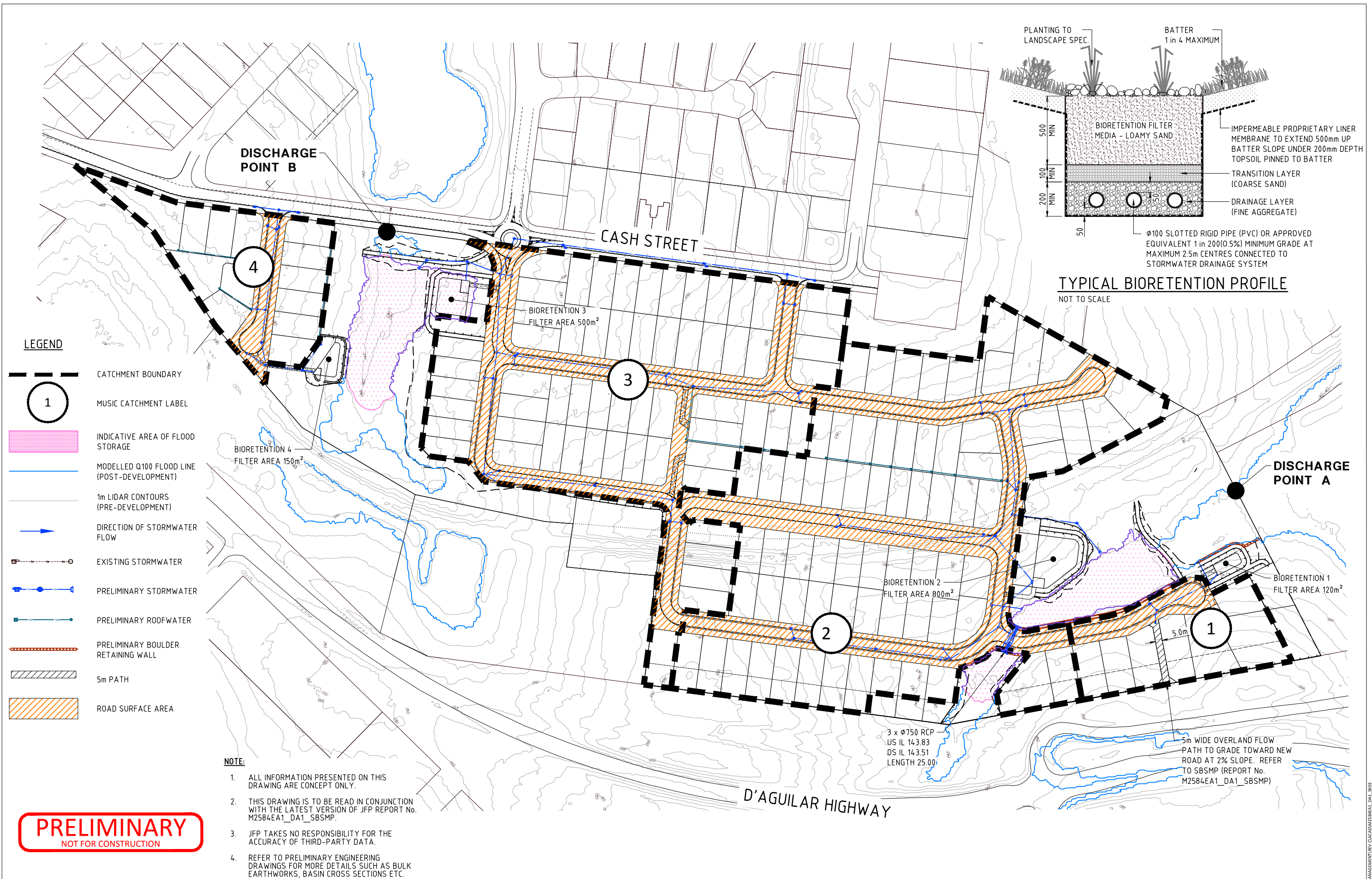
- LEGEND**
- SITE BOUNDARY
 - CATCHMENT BOUNDARY
 - CATCHMENT LABEL
 - INDICATIVE AREA OF FLOOD STORAGE
 - 1m LIDAR CONTOURS (PRE-DEVELOPMENT)
 - DIRECTION OF STORMWATER FLOW
 - EXISTING STORMWATER
 - PRELIMINARY STORMWATER
 - PRELIMINARY ROOFWATER
 - PRELIMINARY BOULDER RETAINING WALL
 - EXISTING FARM DAM / WATERBODY

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PLAN: SK02
ISSUE: C
SCALE: 1:2000 @ A1
DATE: 23/07/2019
DRAFTED BY: CB
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13/11/19



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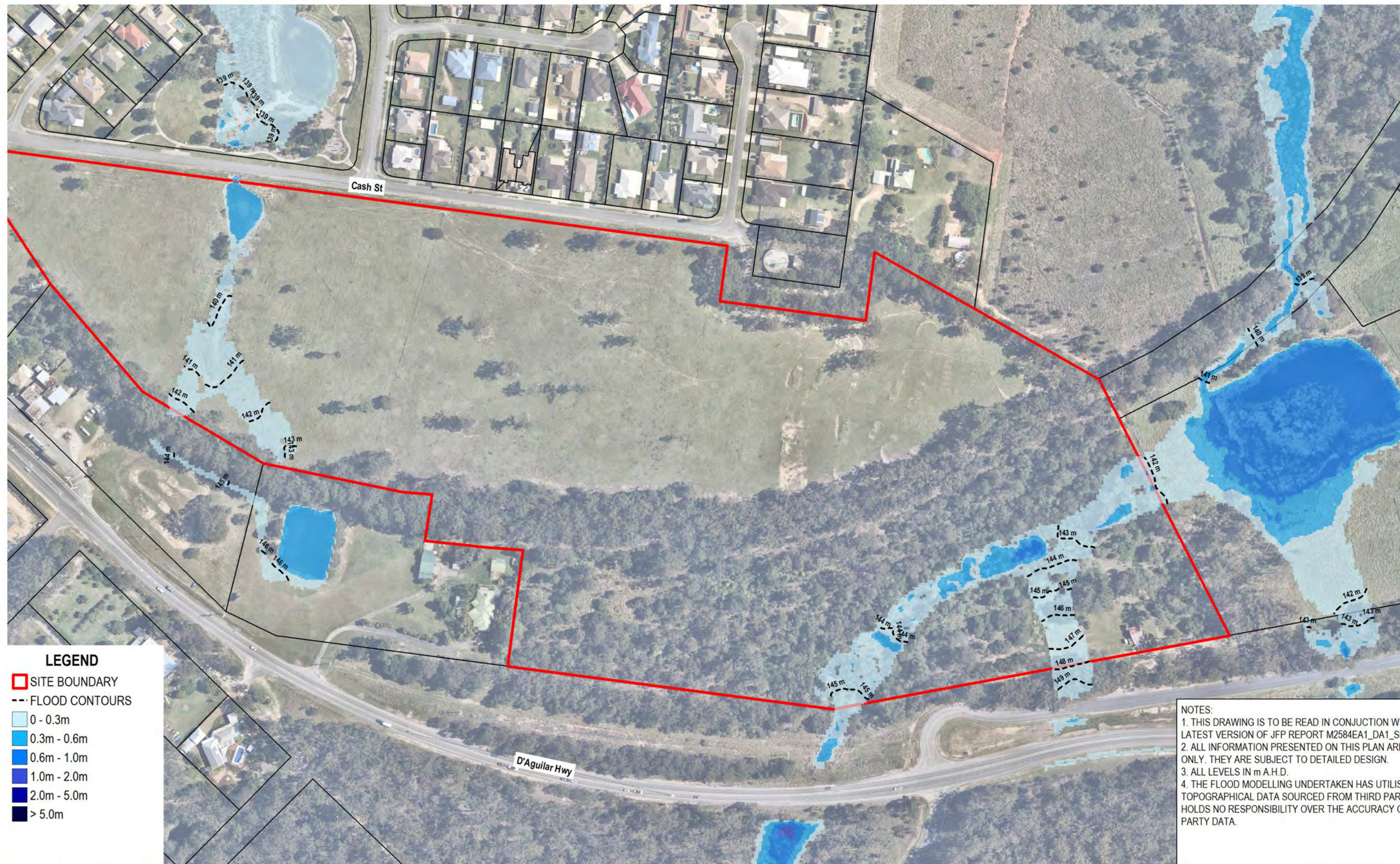
CONCEPT STORMWATER MANAGEMENT & MUSIC CATCHMENT PLAN

22-80 CASH STREET & 1901 D'AGUILAR HIGHWAY, D'AGUILAR
DFC (PROJECT MANAGEMENT) PTY LTD

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APPENDIX D – PRE-DEVELOPMENT SCENARIO FLOOD PLANS



LEGEND

- SITE BOUNDARY
- FLOOD CONTOURS
- 0 - 0.3m
- 0.3m - 0.6m
- 0.6m - 1.0m
- 1.0m - 2.0m
- 2.0m - 5.0m
- > 5.0m

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
3. ALL LEVELS IN m A.H.D.
4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

PRE-DEVELOPMENT 63% AEP MAX. FLOOD DEPTH PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS01

ISSUE

C

NORTH



SCALE: 1:2500 @ A3

DATE: 05/07/2019



LEGEND

- SITE BOUNDARY
- 0 - 0.5m/s
- 0.5 - 1.0m/s
- 1.0 - 2.0m/s
- 2.0 - 3.0m/s
- 3.0 - 5.0m/s
- > 5.0m/s

NOTES:
 1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

PRE-DEVELOPMENT 63% AEP VELOCITY PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS02

ISSUE

C

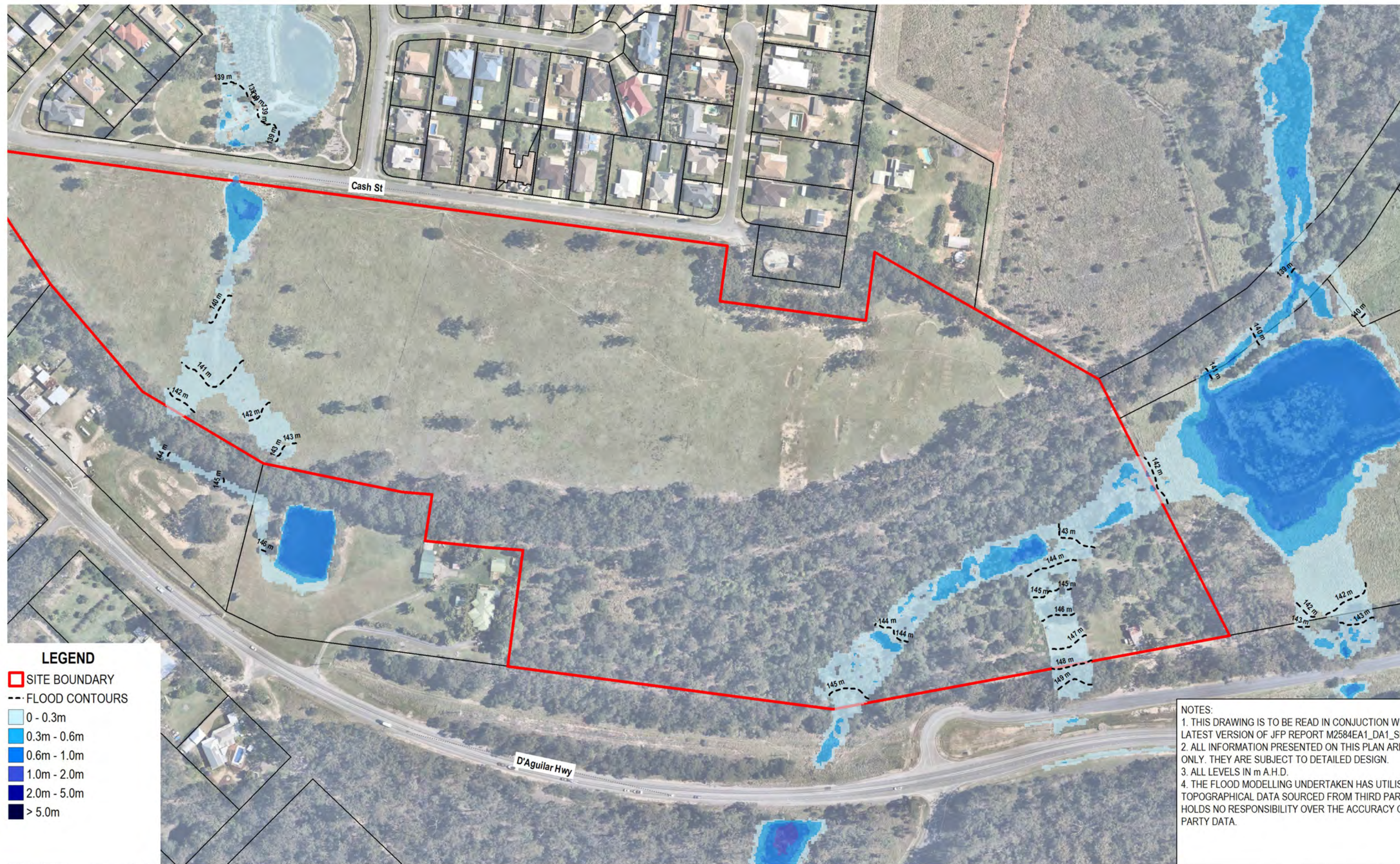
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SCALE: 1:2500 @ A3

DATE: 05/07/2019





LEGEND

- SITE BOUNDARY
- - - FLOOD CONTOURS
- 0 - 0.3m
- 0.3m - 0.6m
- 0.6m - 1.0m
- 1.0m - 2.0m
- 2.0m - 5.0m
- > 5.0m

- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

PRE-DEVELOPMENT 39% AEP MAX. FLOOD DEPTH PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS03

ISSUE

C

NORTH



SCALE: 1:2500 @ A3

DATE: 05/07/2019





LEGEND

- SITE BOUNDARY
- 0 - 0.5m/s
- 0.5 - 1.0m/s
- 1.0 - 2.0m/s
- 2.0 - 3.0m/s
- 3.0 - 5.0m/s
- > 5.0m/s

- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

PRE-DEVELOPMENT 39% AEP VELOCITY PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS04

ISSUE

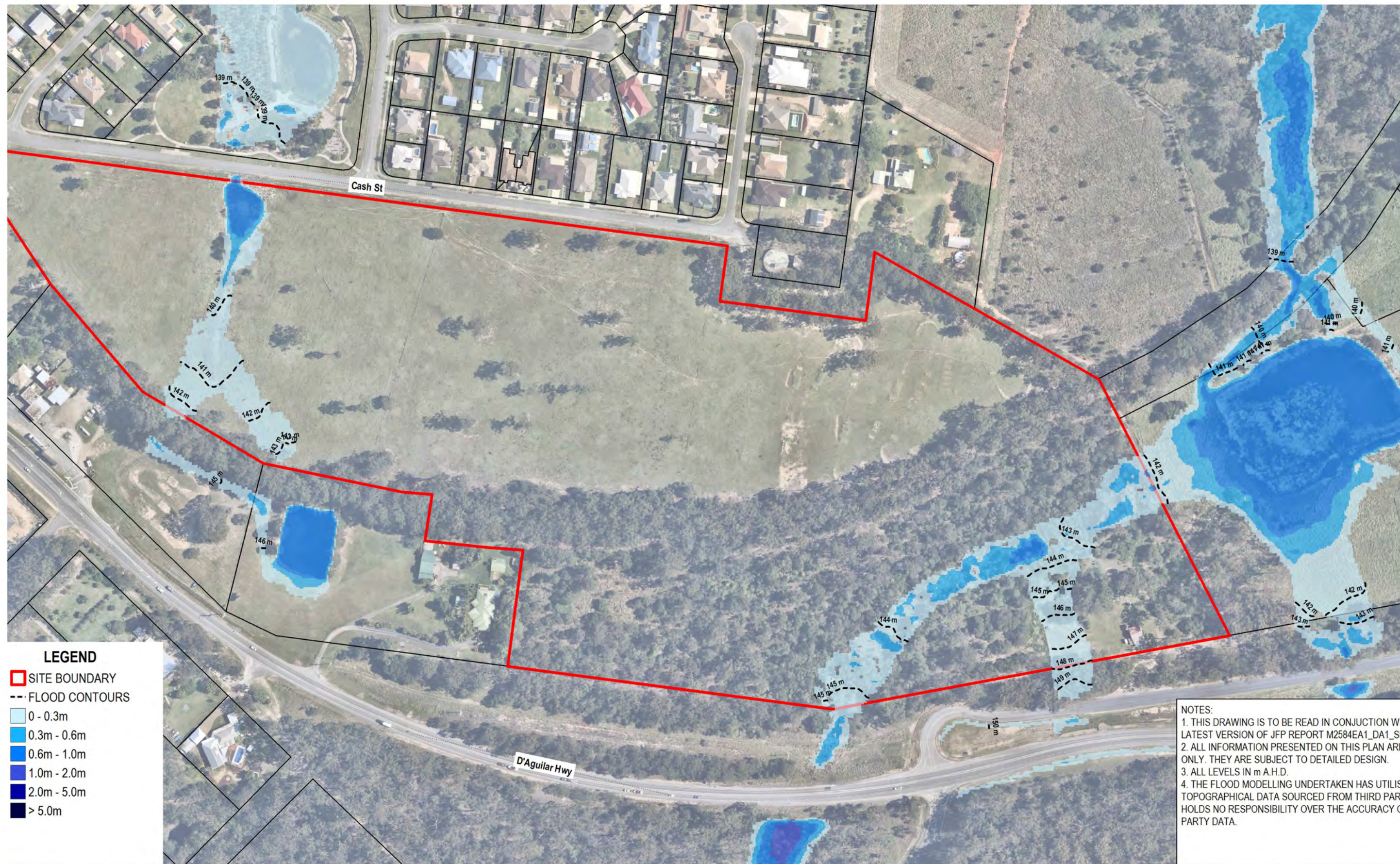
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NORTH

SCALE: 1:2500 @ A3

DATE: 05/07/2019





PRE-DEVELOPMENT 20% AEP MAX. FLOOD DEPTH PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS05

ISSUE

C

NORTH



SCALE: 1:2500 @ A3

DATE: 05/07/2019



LEGEND

- SITE BOUNDARY
- 0 - 0.5m/s
- 0.5 - 1.0m/s
- 1.0 - 2.0m/s
- 2.0 - 3.0m/s
- 3.0 - 5.0m/s
- > 5.0m/s

- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

PRE-DEVELOPMENT 20% AEP VELOCITY PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS06

ISSUE

C

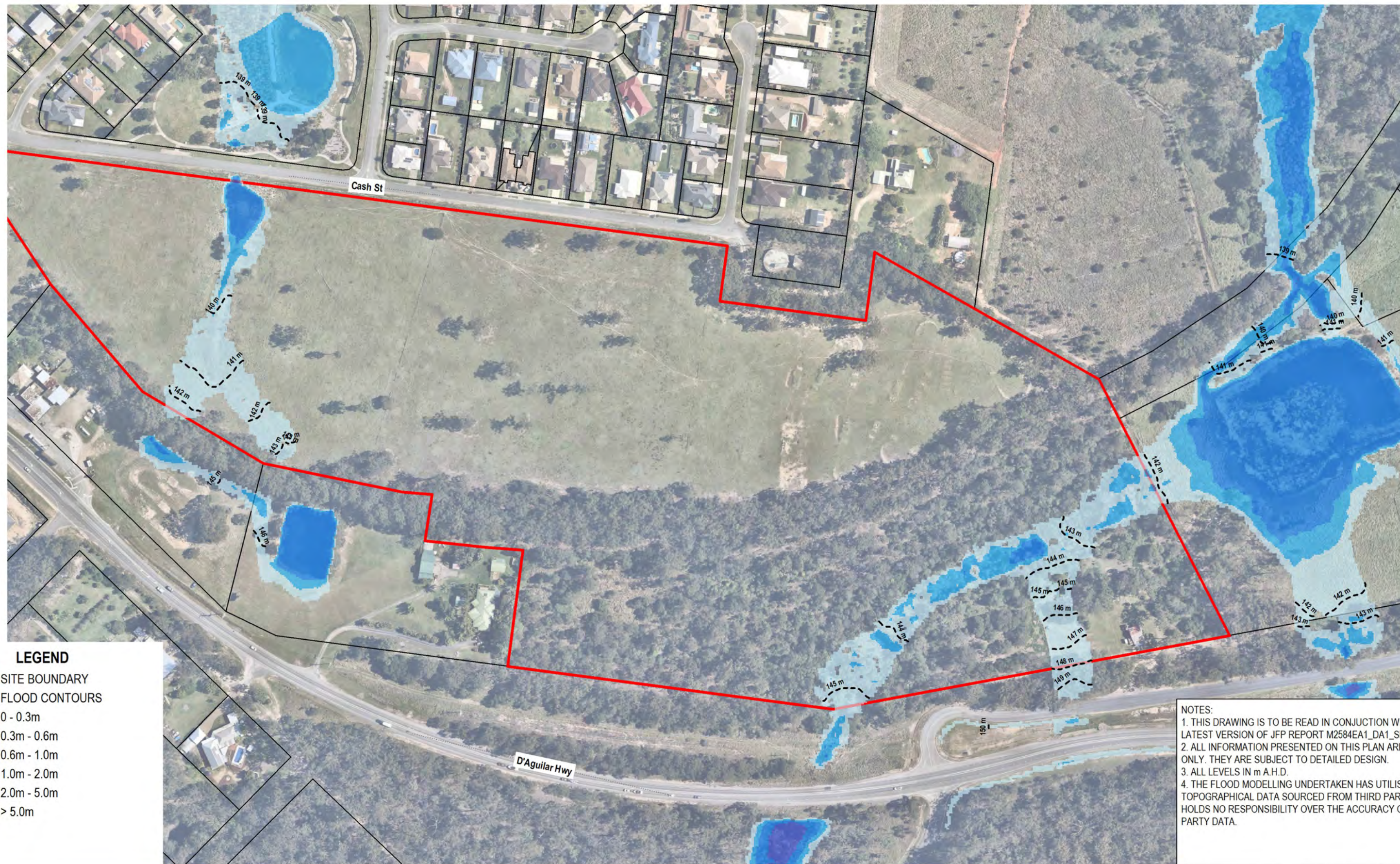
NORTH



SCALE: 1:2500 @ A3

DATE: 05/07/2019





LEGEND

- SITE BOUNDARY
- FLOOD CONTOURS
- 0 - 0.3m
- 0.3m - 0.6m
- 0.6m - 1.0m
- 1.0m - 2.0m
- 2.0m - 5.0m
- > 5.0m

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
3. ALL LEVELS IN m A.H.D.
4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

PRE-DEVELOPMENT 10% AEP MAX. FLOOD DEPTH PLAN

22 - 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS07

ISSUE

C

NORTH



SCALE: 1:2500 @ A3

DATE: 05/07/2019





PRE-DEVELOPMENT 10% AEP VELOCITY PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS08

ISSUE

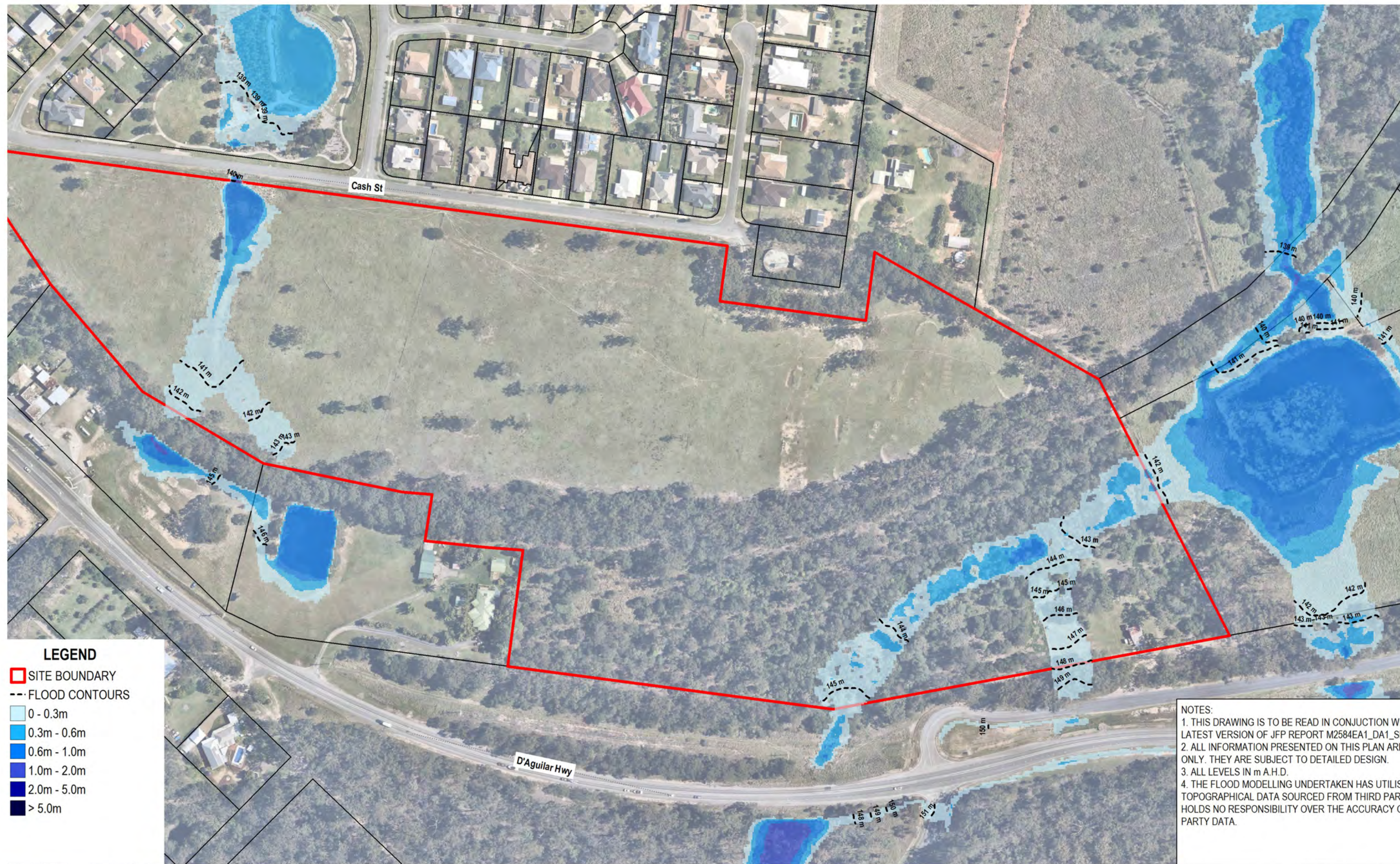
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SCALE: 1:2500 @ A3

DATE: 05/07/2019



PRE-DEVELOPMENT 5% AEP MAX. FLOOD DEPTH PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS09

ISSUE

C

NORTH



SCALE: 1:2500 @ A3

DATE: 05/07/2019



LEGEND

- SITE BOUNDARY
- 0 - 0.5m/s
- 0.5 - 1.0m/s
- 1.0 - 2.0m/s
- 2.0 - 3.0m/s
- 3.0 - 5.0m/s
- > 5.0m/s

- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

PRE-DEVELOPMENT 5% AEP VELOCITY PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS10

ISSUE

C

NORTH



SCALE: 1:2500 @ A3

DATE: 05/07/2019





PRE-DEVELOPMENT 2% AEP MAX. FLOOD DEPTH PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS11

ISSUE

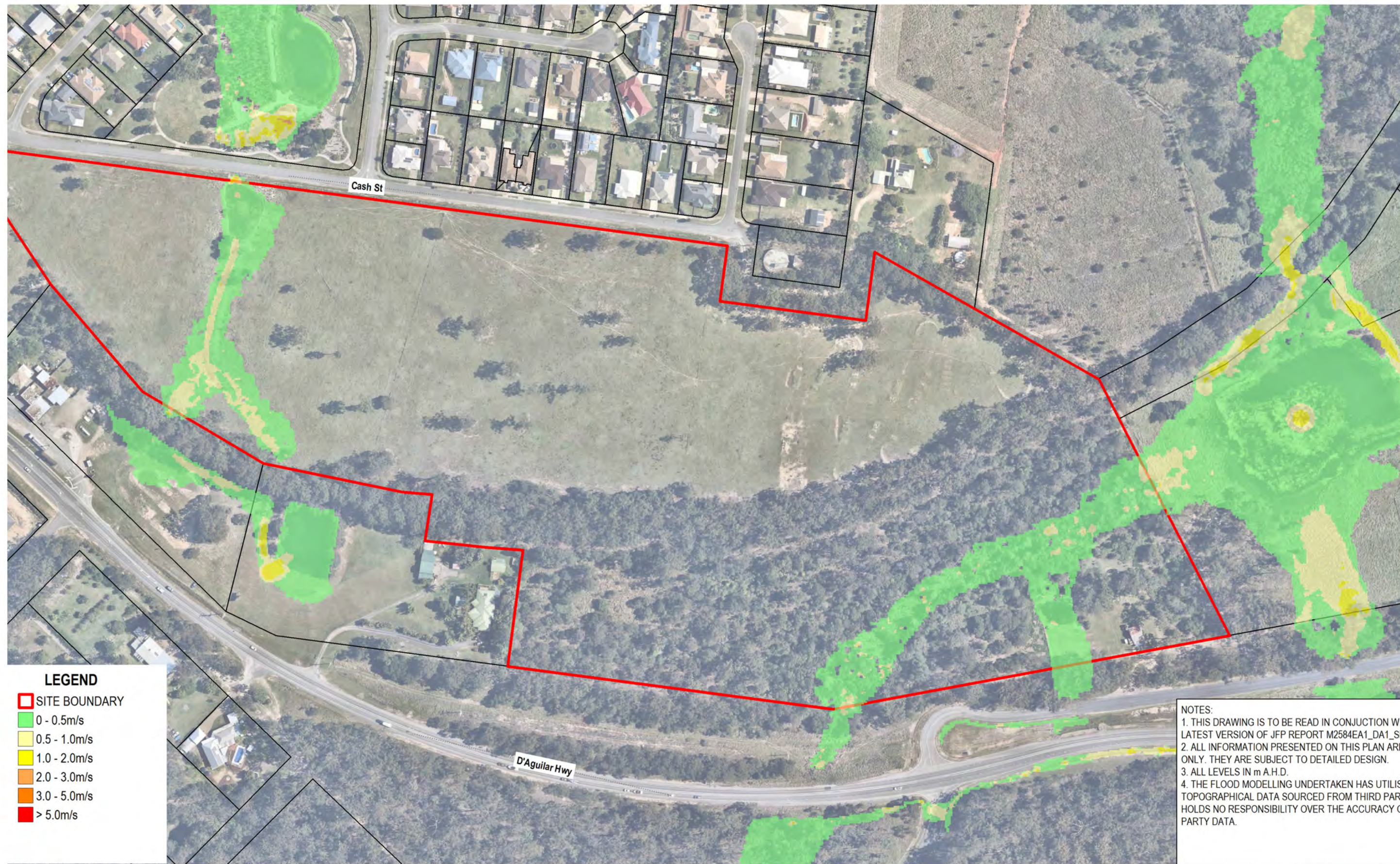
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NORTH

SCALE: 1:2500 @ A3

DATE: 05/07/2019





LEGEND

- SITE BOUNDARY
- 0 - 0.5m/s
- 0.5 - 1.0m/s
- 1.0 - 2.0m/s
- 2.0 - 3.0m/s
- 3.0 - 5.0m/s
- > 5.0m/s

- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

PRE-DEVELOPMENT 2% AEP VELOCITY PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS12

ISSUE

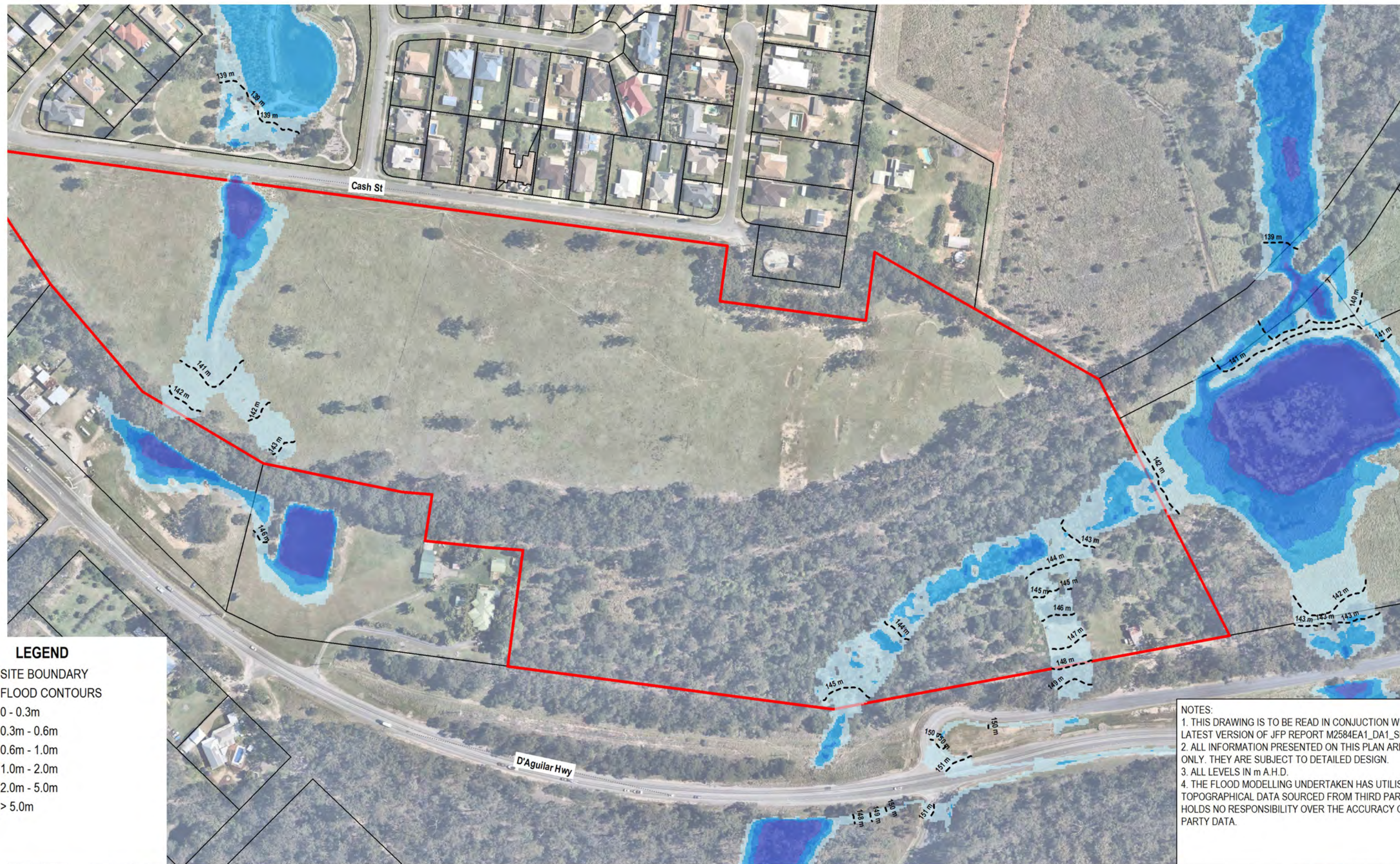
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NORTH



SCALE: 1:2500 @ A3

DATE: 05/07/2019



LEGEND

- SITE BOUNDARY
- FLOOD CONTOURS
- 0 - 0.3m
- 0.3m - 0.6m
- 0.6m - 1.0m
- 1.0m - 2.0m
- 2.0m - 5.0m
- > 5.0m

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
3. ALL LEVELS IN m A.H.D.
4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

PRE-DEVELOPMENT 1% AEP MAX. FLOOD DEPTH PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS13

ISSUE

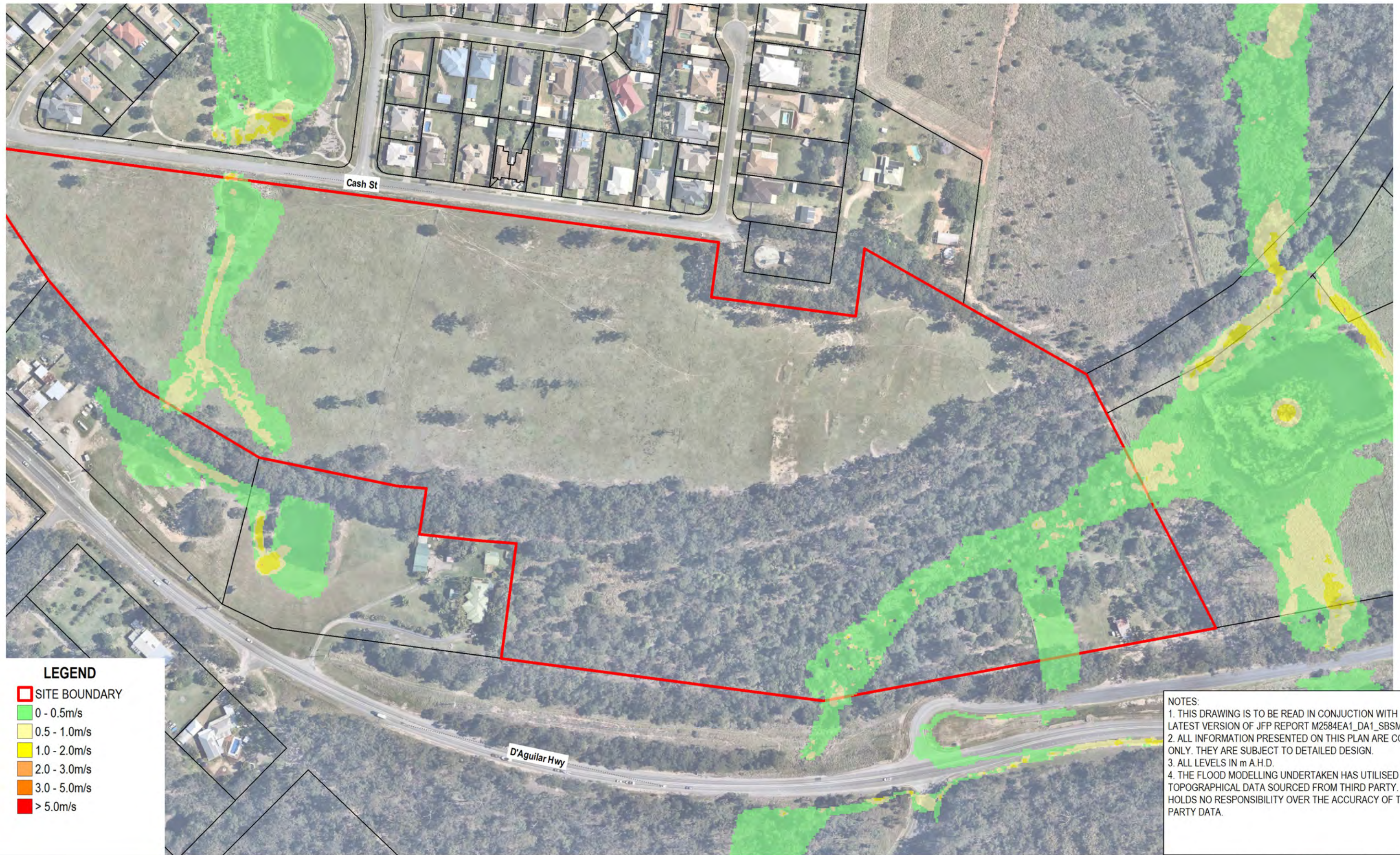
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NORTH



SCALE: 1:2500 @ A3

DATE: 05/07/2019



LEGEND

- ▬ SITE BOUNDARY
- 0 - 0.5m/s
- 0.5 - 1.0m/s
- 1.0 - 2.0m/s
- 2.0 - 3.0m/s
- 3.0 - 5.0m/s
- > 5.0m/s

- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

PRE-DEVELOPMENT 1% AEP VELOCITY PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS14

ISSUE

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NORTH

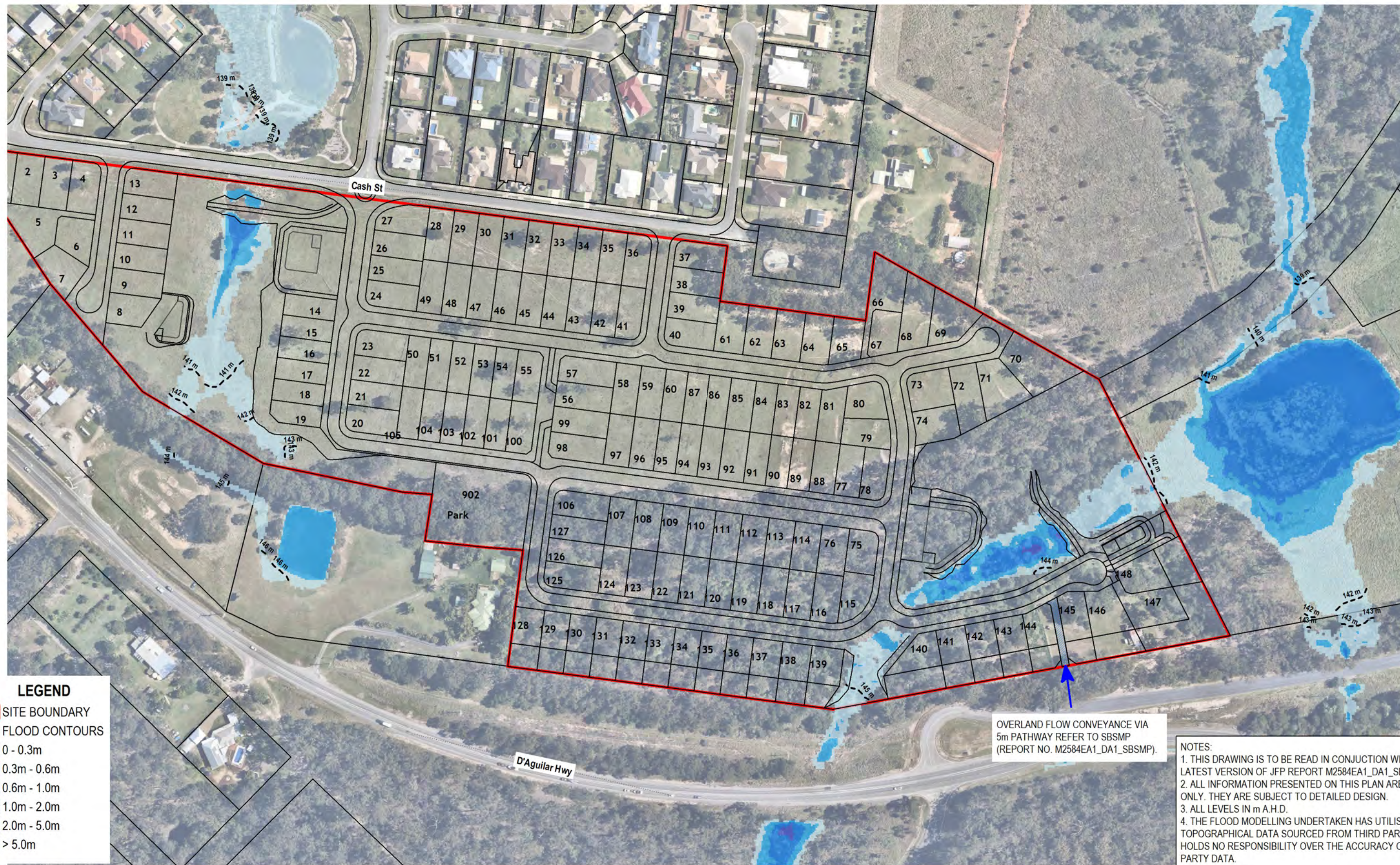


SCALE: 1:2500 @ A3

DATE: 05/07/2019



APPENDIX E – POST-DEVELOPMENT SCENARIO FLOOD PLANS



POST-DEVELOPMENT 63% AEP MAX. FLOOD DEPTH PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS15

ISSUE

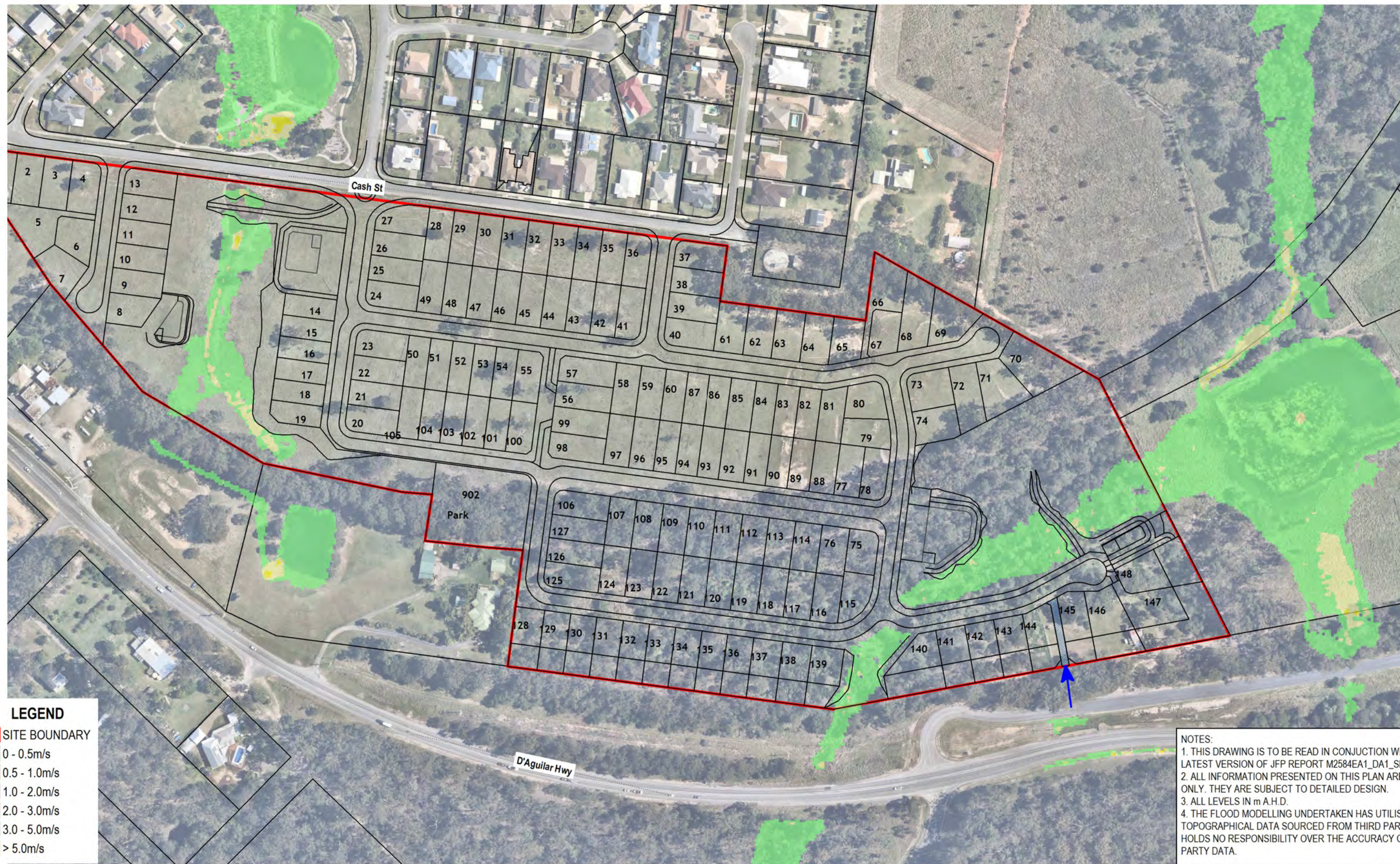
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NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



LEGEND

- SITE BOUNDARY
- 0 - 0.5m/s
- 0.5 - 1.0m/s
- 1.0 - 2.0m/s
- 2.0 - 3.0m/s
- 3.0 - 5.0m/s
- > 5.0m/s

- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
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 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

POST-DEVELOPMENT 63% AEP VELOCITY PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS16

ISSUE

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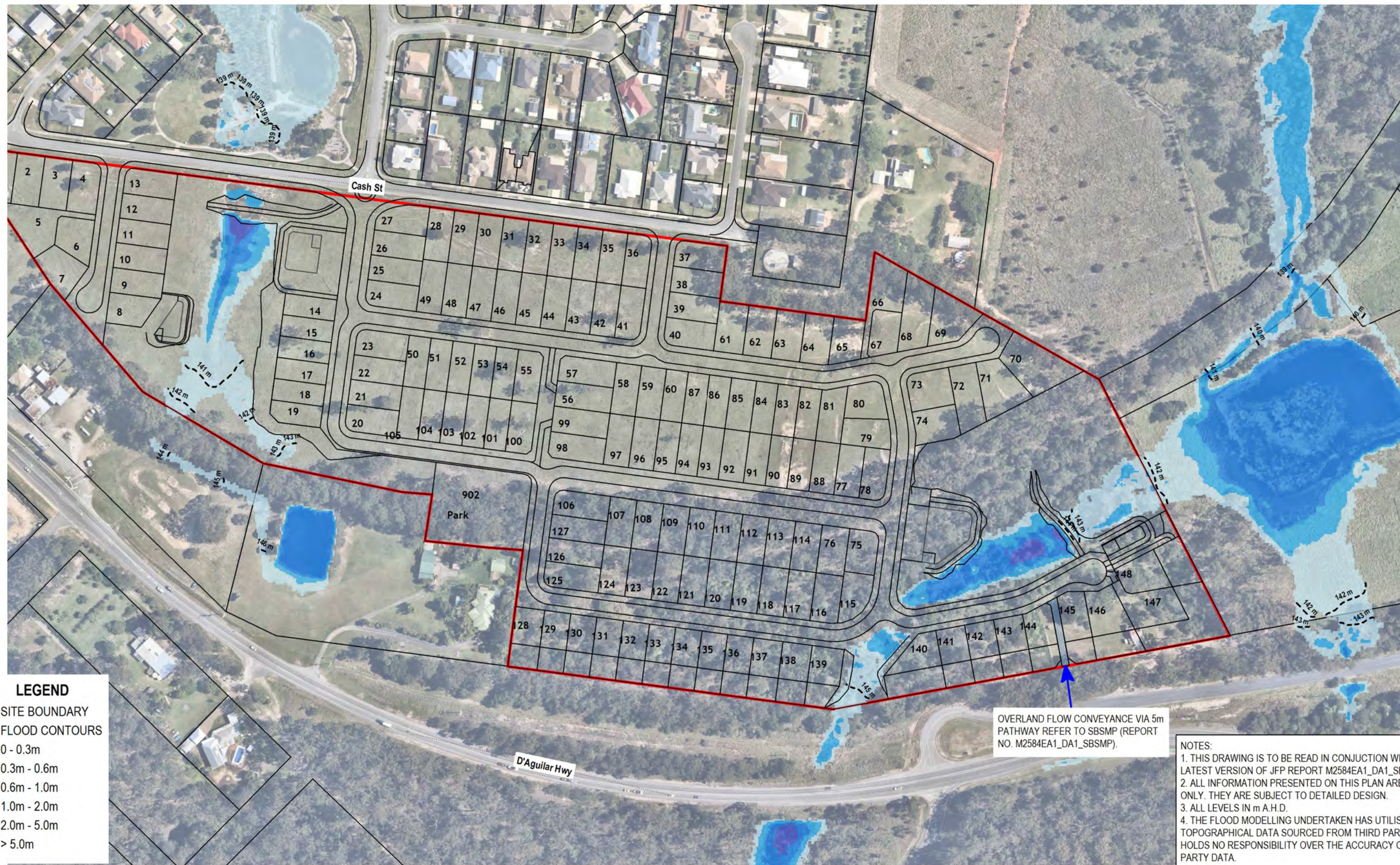
NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019





LEGEND

- SITE BOUNDARY
- FLOOD CONTOURS
- 0 - 0.3m
- 0.3m - 0.6m
- 0.6m - 1.0m
- 1.0m - 2.0m
- 2.0m - 5.0m
- > 5.0m

OVERLAND FLOW CONVEYANCE VIA 5m
PATHWAY REFER TO SBSMP (REPORT
NO. M2584EA1_DA1_SBSMP).

- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

POST-DEVELOPMENT 39% AEP MAX. FLOOD DEPTH PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS17

ISSUE

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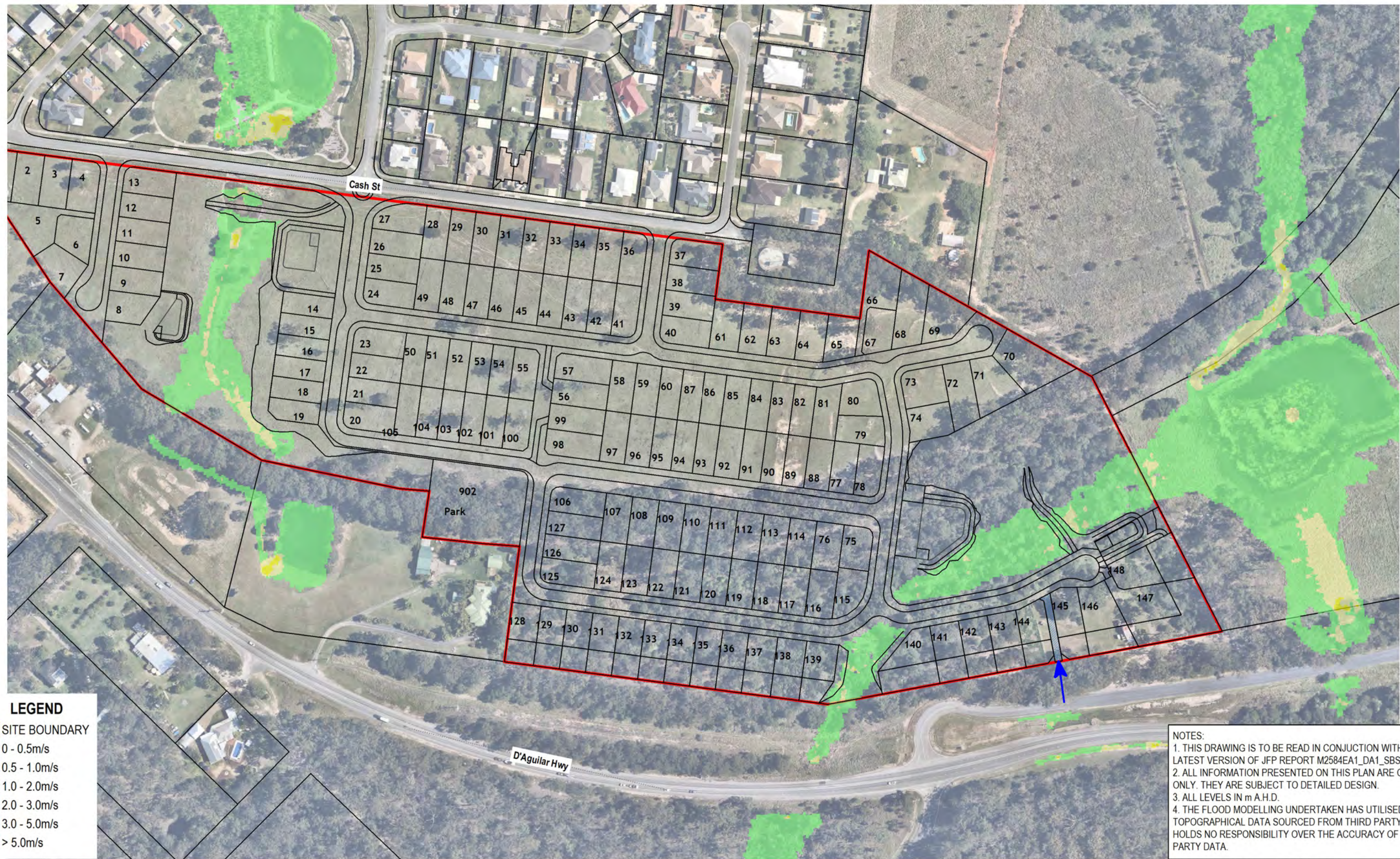
NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019





POST-DEVELOPMENT 39% AEP VELOCITY PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.
M2584EA1_DA1_GIS18

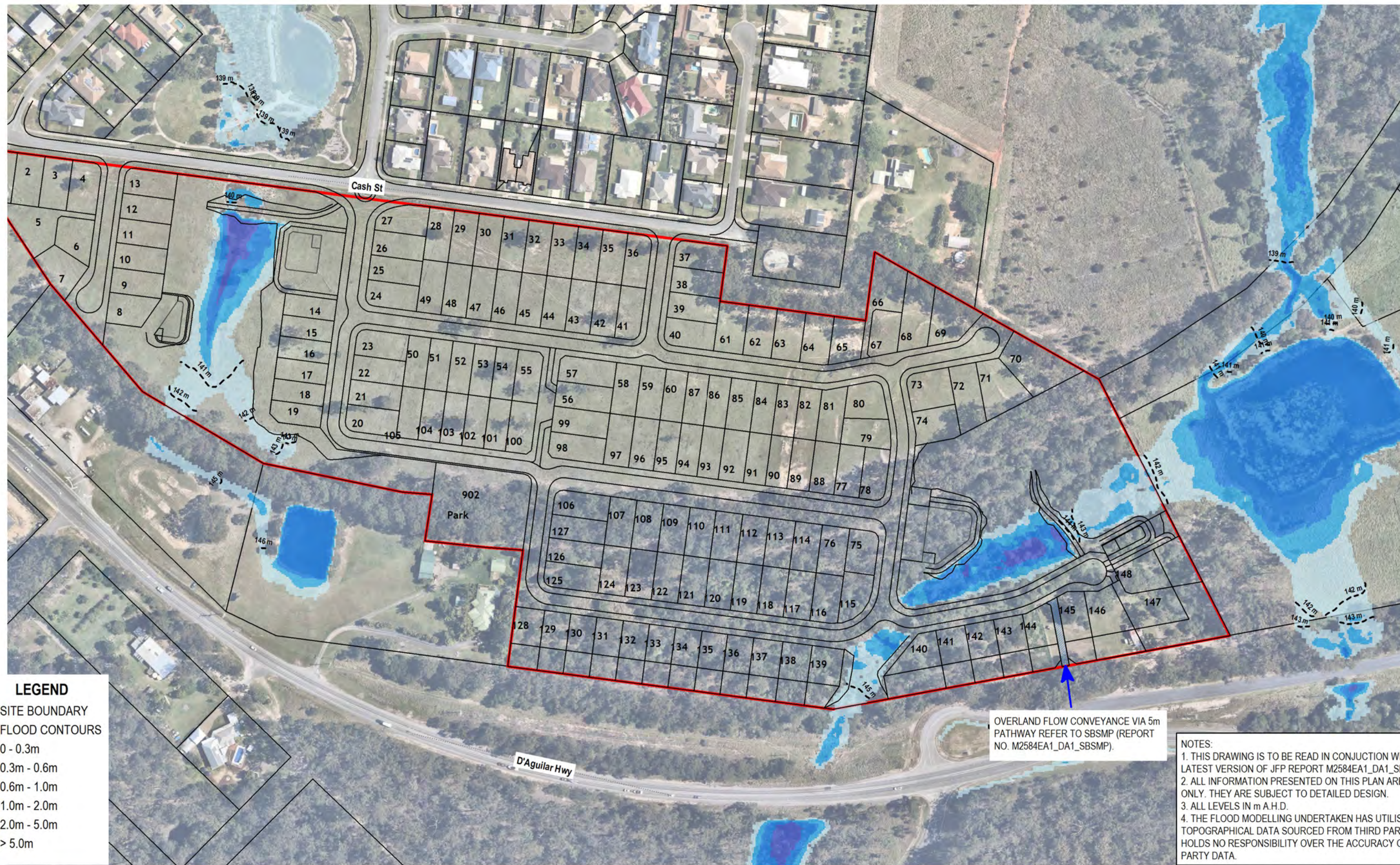
ISSUE
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NORTH

SCALE: 1:2500 @ A3

DATE: 12/7/2019





POST-DEVELOPMENT 20% AEP MAX. FLOOD DEPTH PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS19

ISSUE

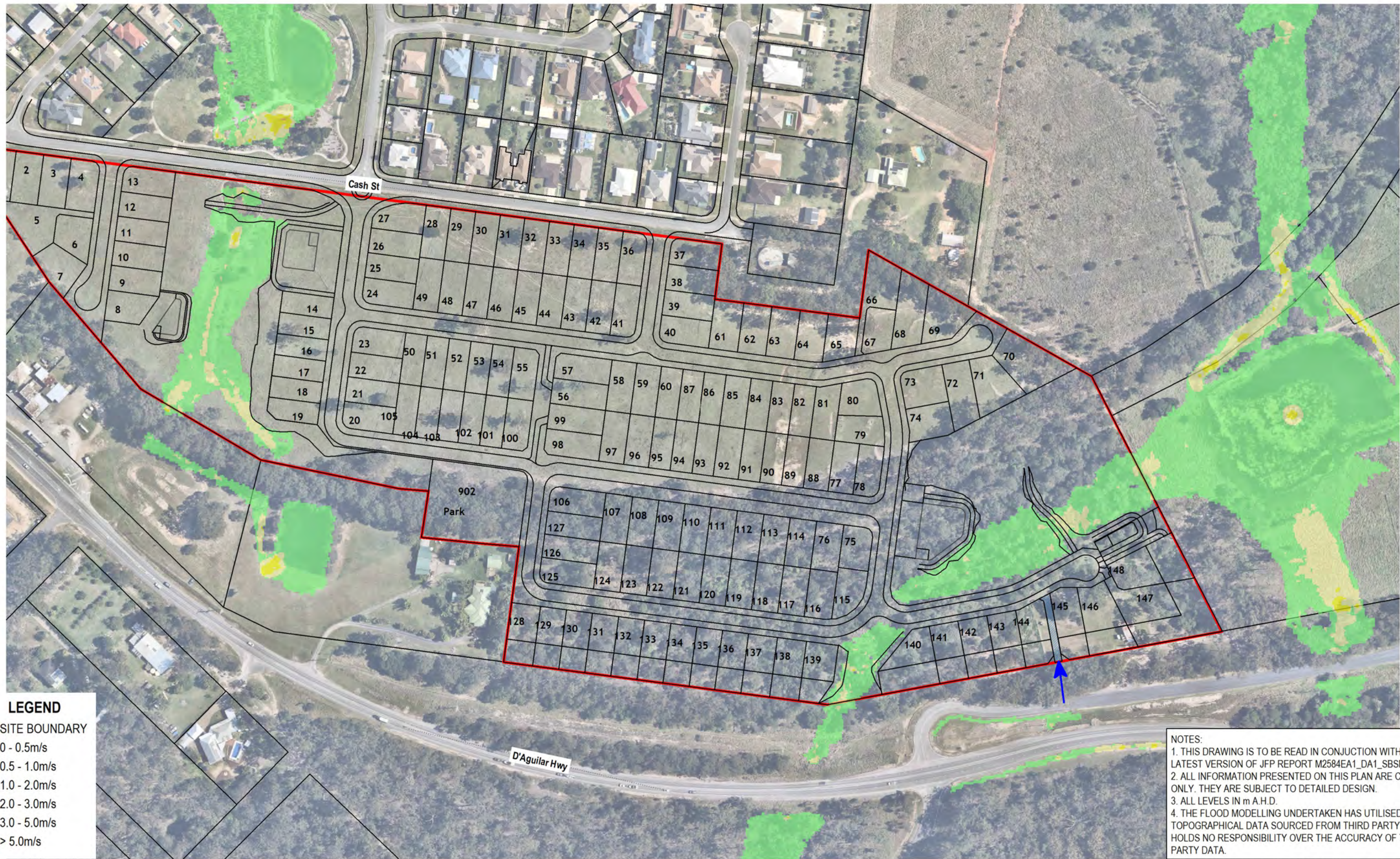
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NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



POST-DEVELOPMENT 20% AEP VELOCITY PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS20

ISSUE

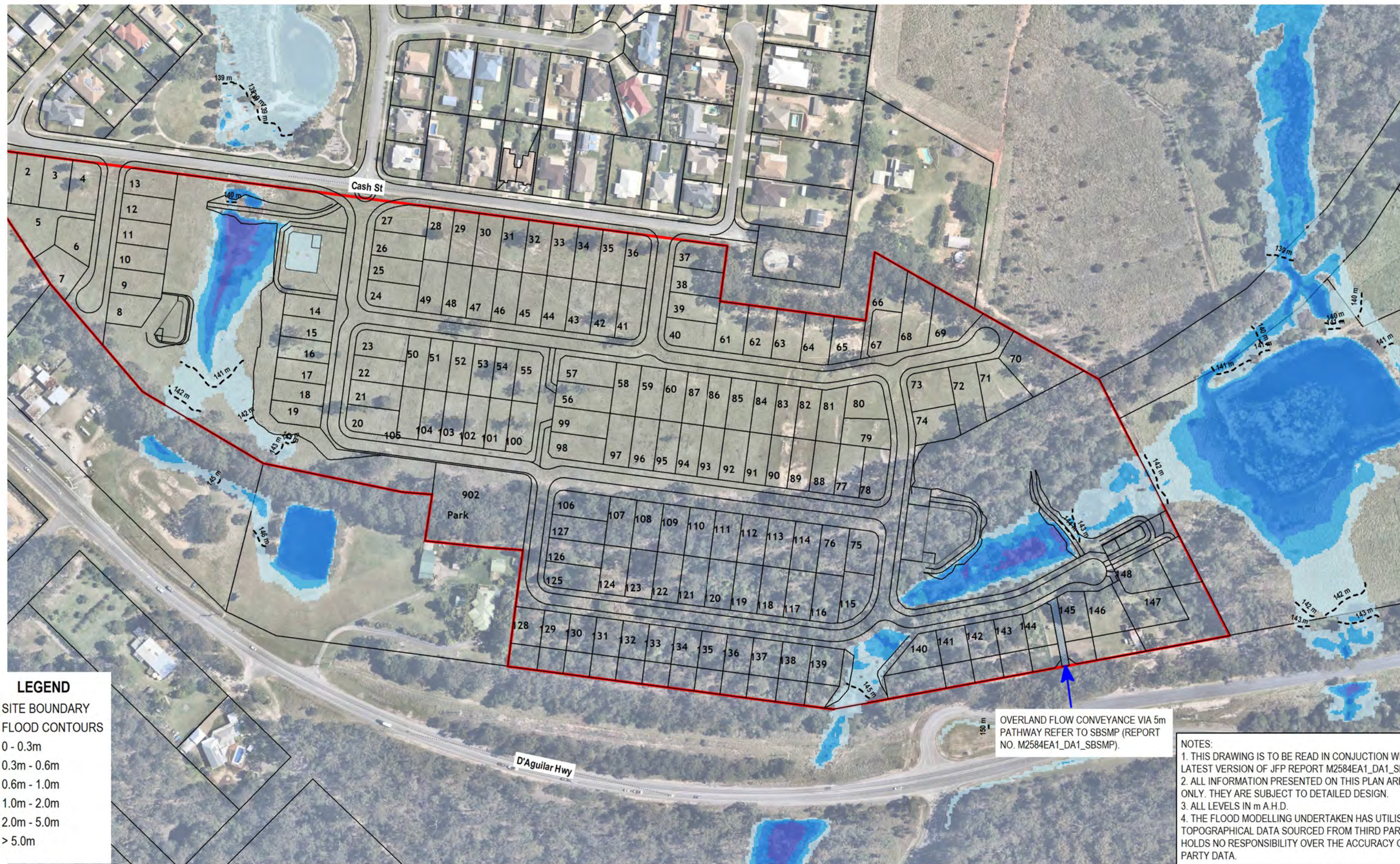
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NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



LEGEND

- SITE BOUNDARY
- FLOOD CONTOURS
- 0 - 0.3m
- 0.3m - 0.6m
- 0.6m - 1.0m
- 1.0m - 2.0m
- 2.0m - 5.0m
- > 5.0m

OVERLAND FLOW CONVEYANCE VIA 5m
PATHWAY REFER TO SBSMP (REPORT
NO. M2584EA1_DA1_SBSMP).

- NOTES:
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 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

POST-DEVELOPMENT 10% AEP MAX. FLOOD DEPTH PLAN

22 - 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS21

ISSUE

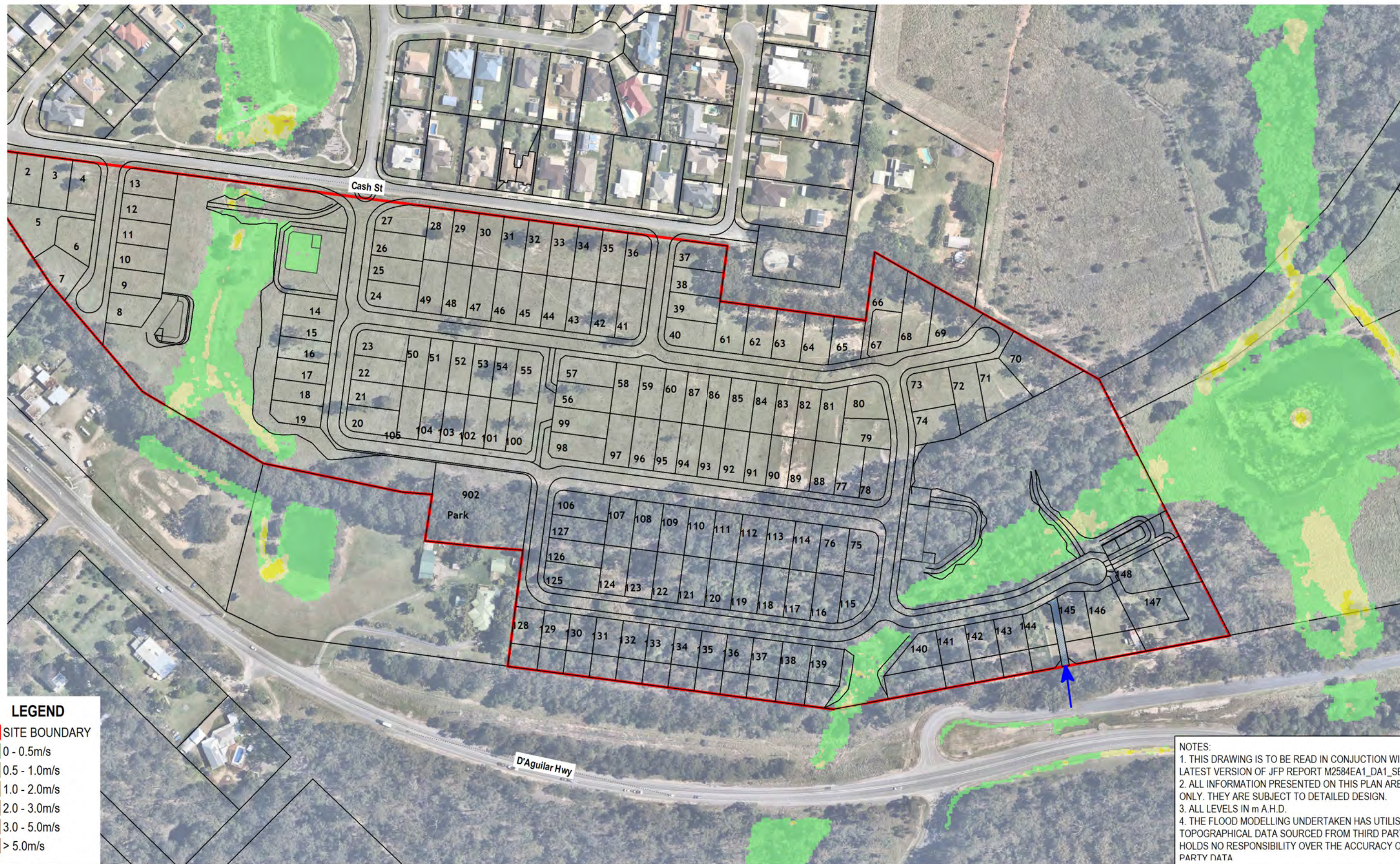
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SCALE: 1:2500 @ A3

DATE: 12/7/2019





POST-DEVELOPMENT 10% AEP VELOCITY PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS22

ISSUE

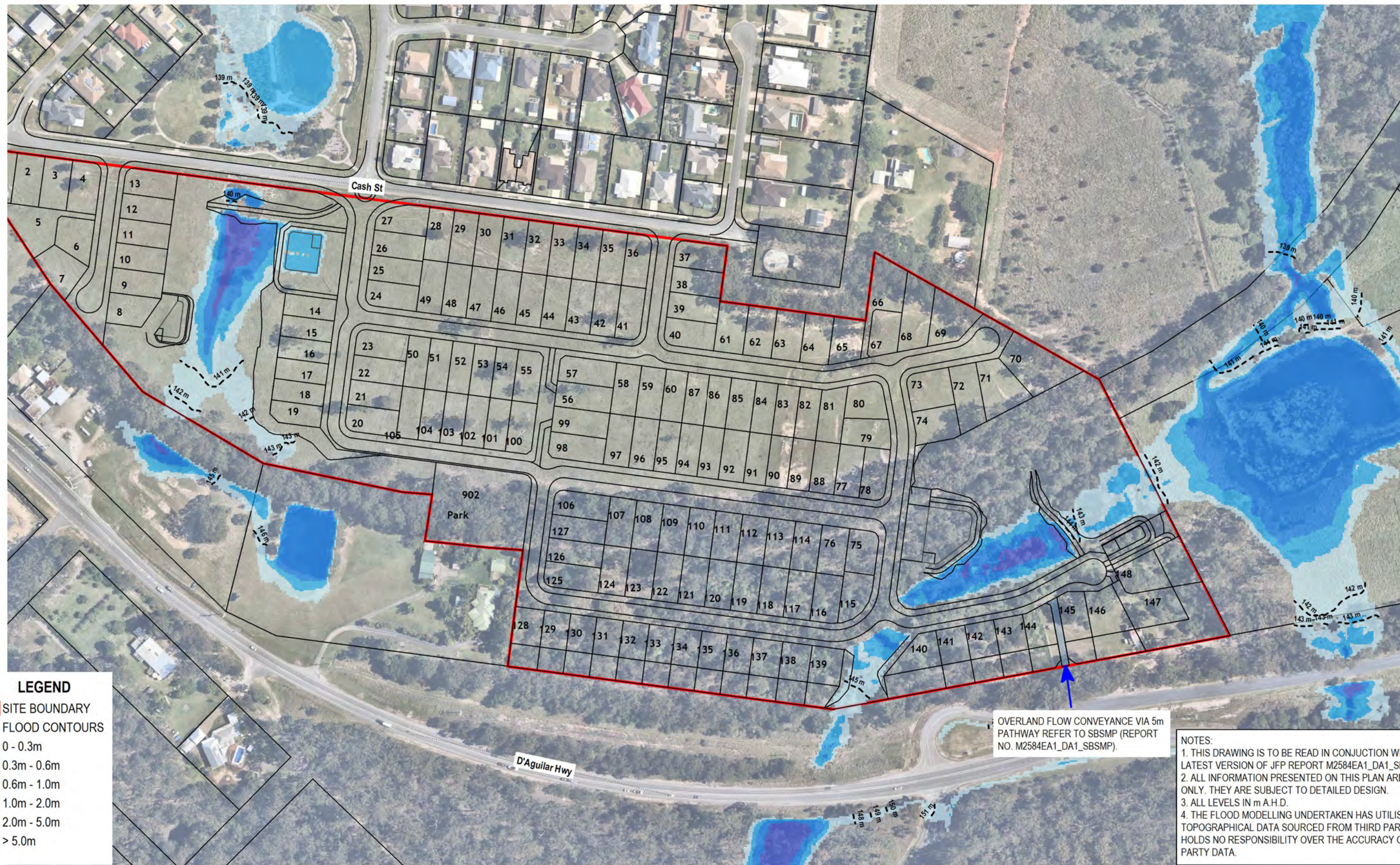
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NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



LEGEND

- SITE BOUNDARY
- FLOOD CONTOURS
- 0 - 0.3m
- 0.3m - 0.6m
- 0.6m - 1.0m
- 1.0m - 2.0m
- 2.0m - 5.0m
- > 5.0m

OVERLAND FLOW CONVEYANCE VIA 5m PATHWAY REFER TO SBSMP (REPORT NO. M2584EA1_DA1_SBSMP).

- NOTES:
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 - ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 - ALL LEVELS IN m A.H.D.
 - THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

POST-DEVELOPMENT 5% AEP MAX. FLOOD DEPTH PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS23

ISSUE

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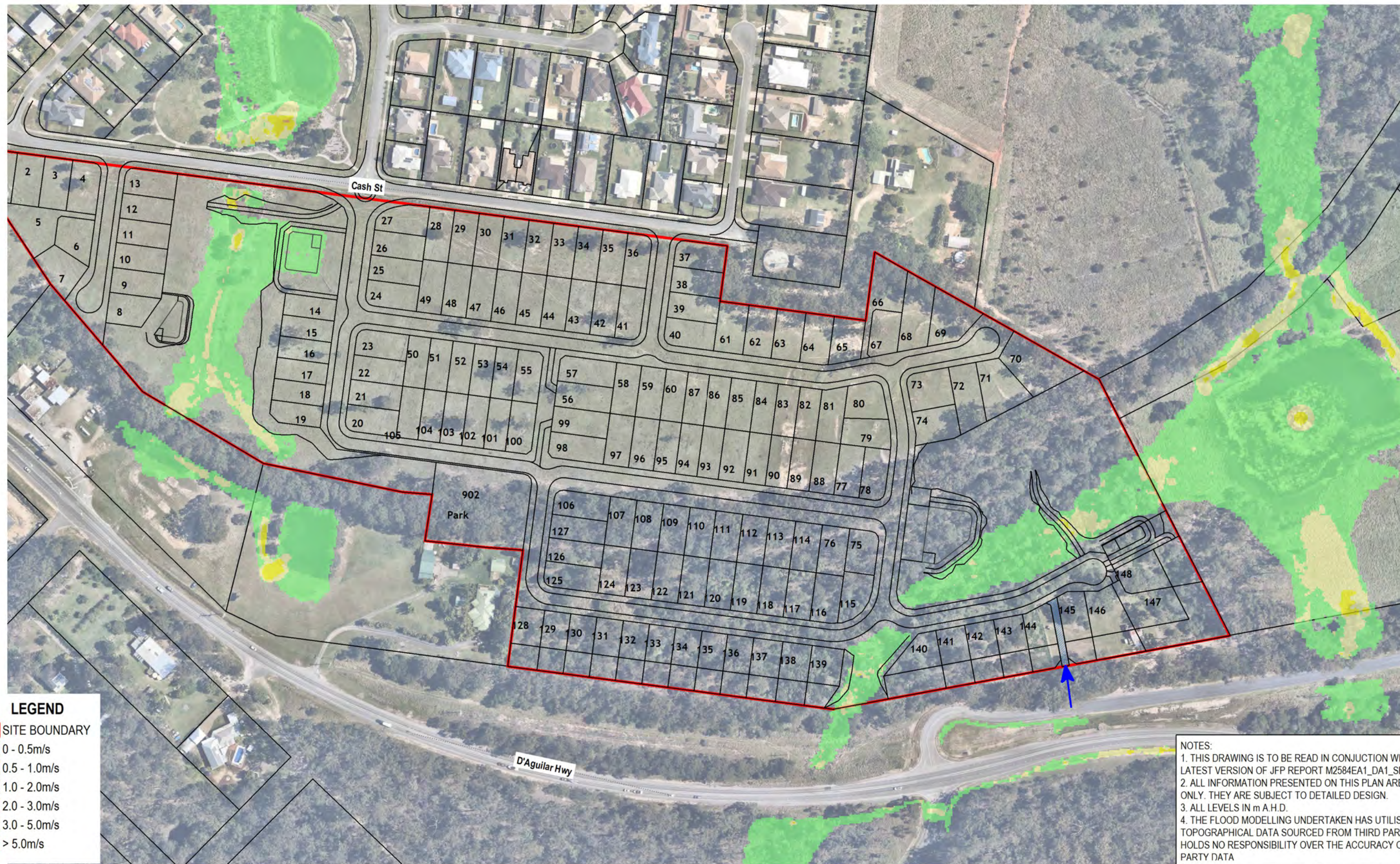
NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019





- LEGEND**
- SITE BOUNDARY
 - 0 - 0.5m/s
 - 0.5 - 1.0m/s
 - 1.0 - 2.0m/s
 - 2.0 - 3.0m/s
 - 3.0 - 5.0m/s
 - > 5.0m/s

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
3. ALL LEVELS IN m A.H.D.
4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA



POST-DEVELOPMENT 5% AEP VELOCITY PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

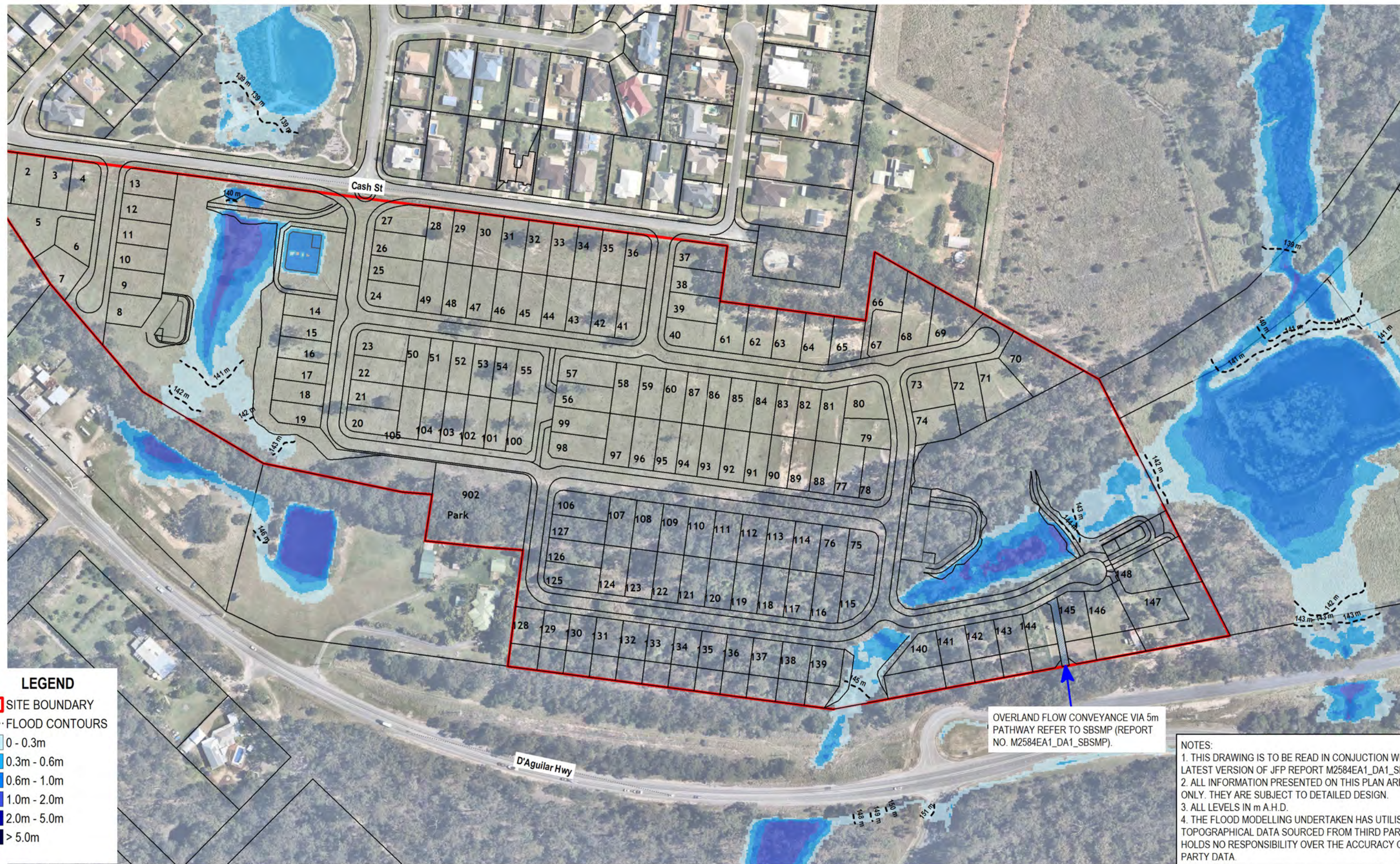
DRAWING NO.
M2584EA1_DA1_GIS24

ISSUE
C

SCALE: 1:2500 @ A3

DATE: 12/7/2019





LEGEND

- SITE BOUNDARY
- FLOOD CONTOURS
- 0 - 0.3m
- 0.3m - 0.6m
- 0.6m - 1.0m
- 1.0m - 2.0m
- 2.0m - 5.0m
- > 5.0m

OVERLAND FLOW CONVEYANCE VIA 5m
PATHWAY REFER TO SBSMP (REPORT
NO. M2584EA1_DA1_SBSMP).

- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

POST-DEVELOPMENT 2% AEP MAX. FLOOD DEPTH PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS25

ISSUE

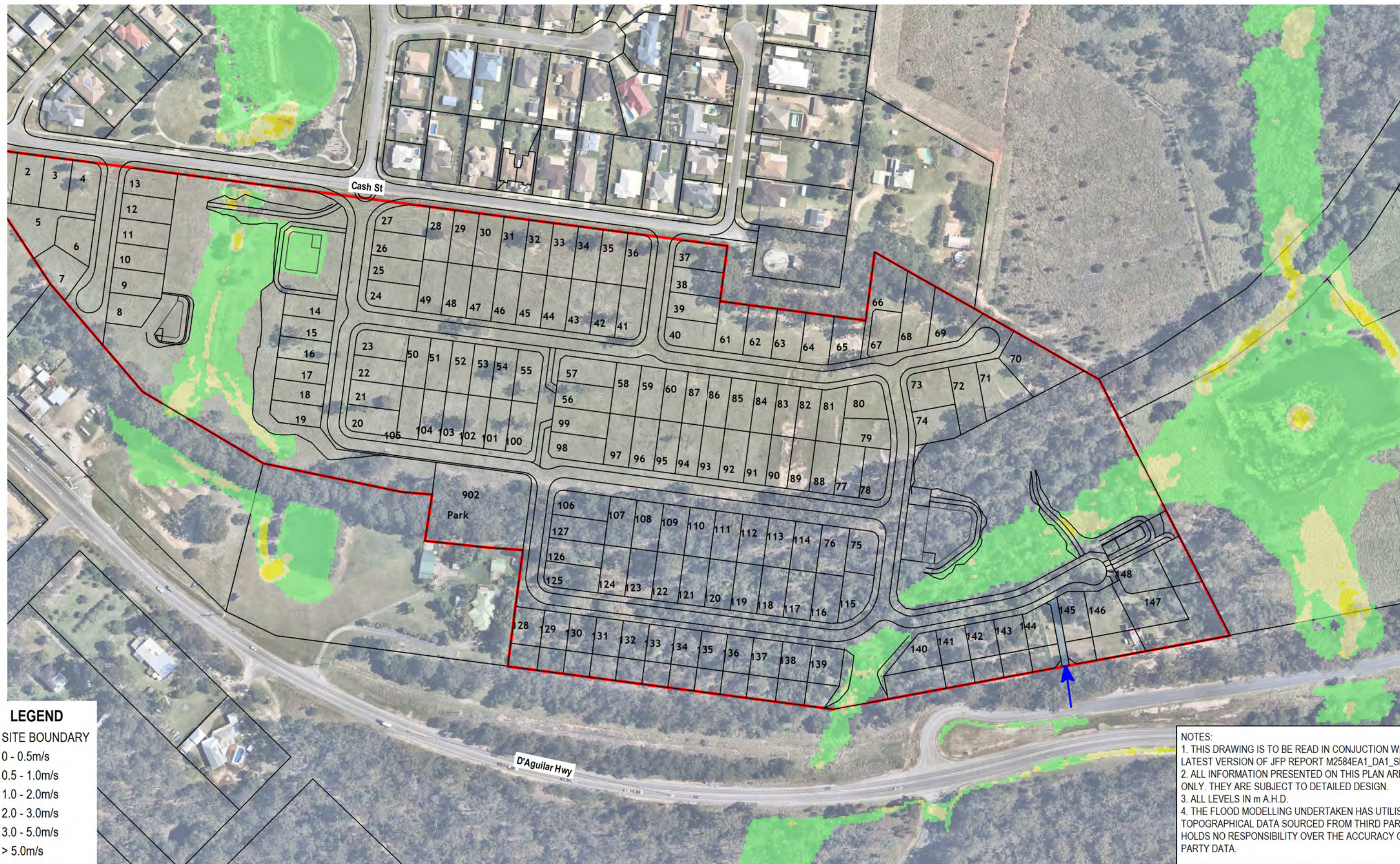
C

NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



POST-DEVELOPMENT 2% AEP VELOCITY PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS26

ISSUE

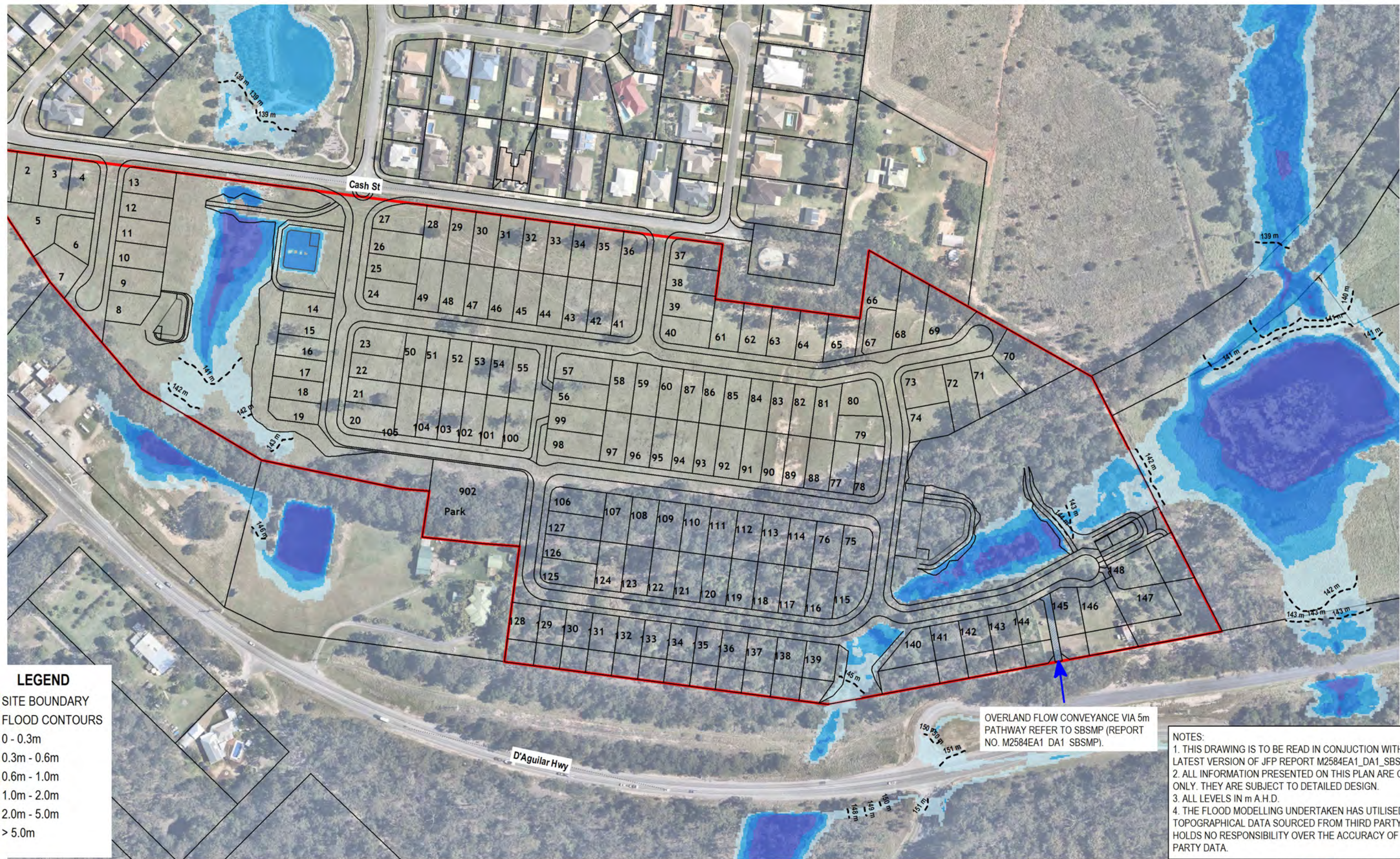
C

NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



POST-DEVELOPMENT 1% AEP MAX. FLOOD DEPTH PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.
M2584EA1_DA1_GIS27

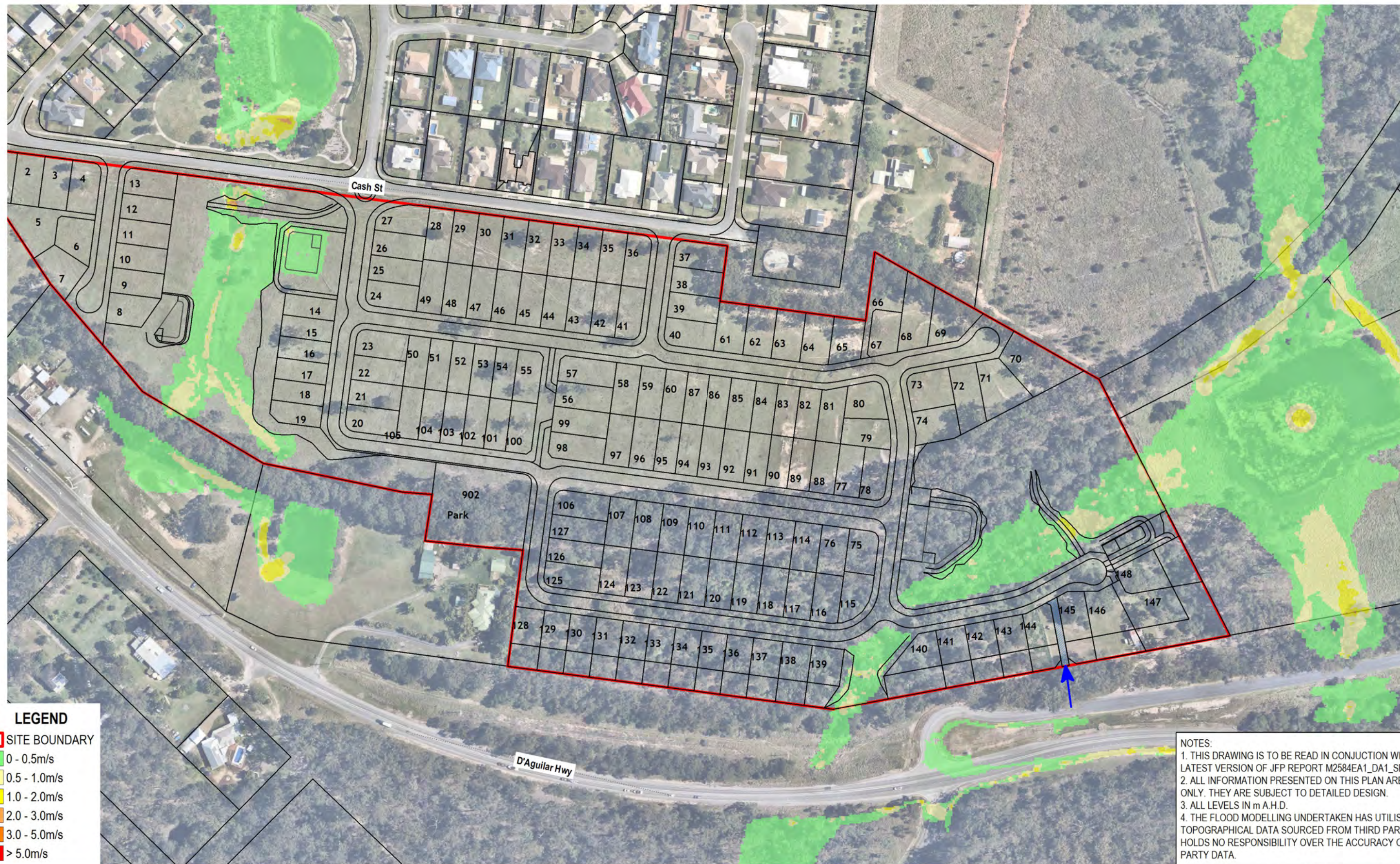
ISSUE
C

NORTH

SCALE: 1:2500 @ A3

DATE: 12/7/2019





POST-DEVELOPMENT 1% AEP VELOCITY PLAN

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS28

ISSUE

C

NORTH

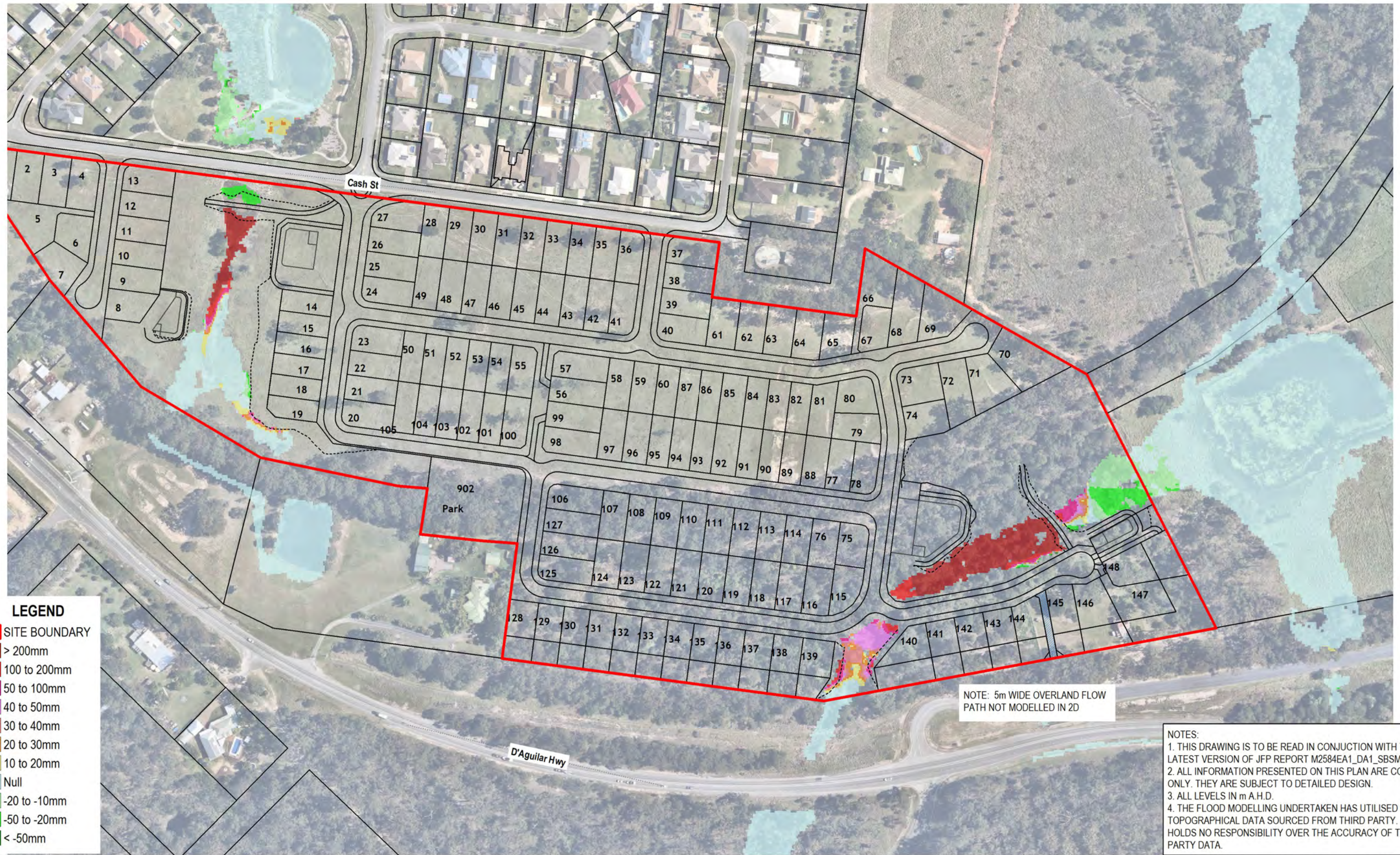


SCALE: 1:2500 @ A3

DATE: 12/7/2019



APPENDIX F – IMPACT MAPPING



- LEGEND**
- SITE BOUNDARY
 - > 200mm
 - 100 to 200mm
 - 50 to 100mm
 - 40 to 50mm
 - 30 to 40mm
 - 20 to 30mm
 - 10 to 20mm
 - Null
 - -20 to -10mm
 - -50 to -20mm
 - < -50mm

NOTE: 5m WIDE OVERLAND FLOW PATH NOT MODELLED IN 2D

- NOTES:**
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

POST-DEVELOPMENT 63% AEP FLOOD LEVEL CHANGES

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.
M2584EA1_DA1_GIS29

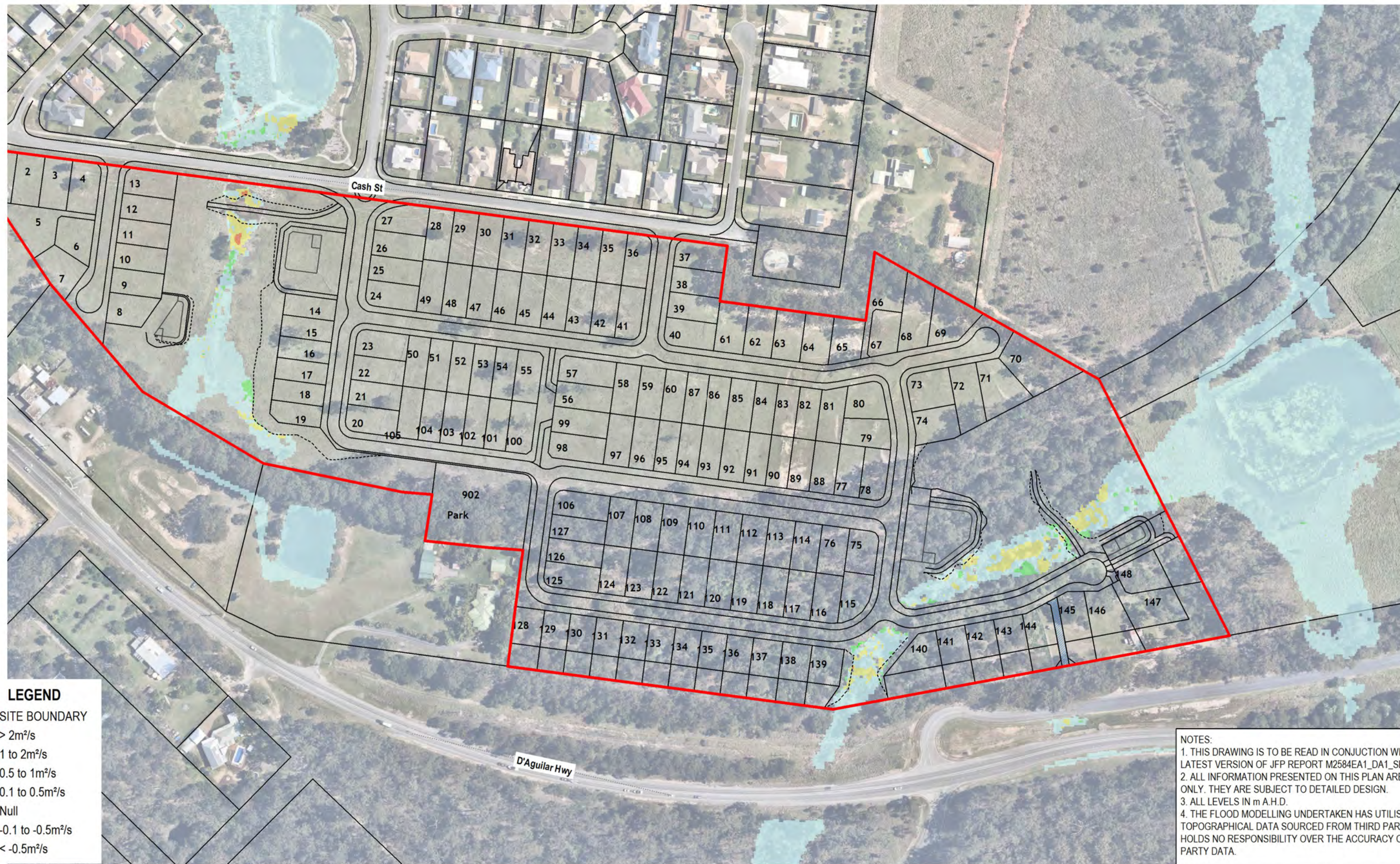
ISSUE
C

NORTH

SCALE: 1:2500 @ A3

DATE: 12/7/2019





LEGEND

- SITE BOUNDARY
- > 2m²/s
- 1 to 2m²/s
- 0.5 to 1m²/s
- 0.1 to 0.5m²/s
- Null
- 0.1 to -0.5m²/s
- < -0.5m²/s

- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

POST-DEVELOPMENT 63% AEP VELOCITY CHANGES

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS30

ISSUE

C

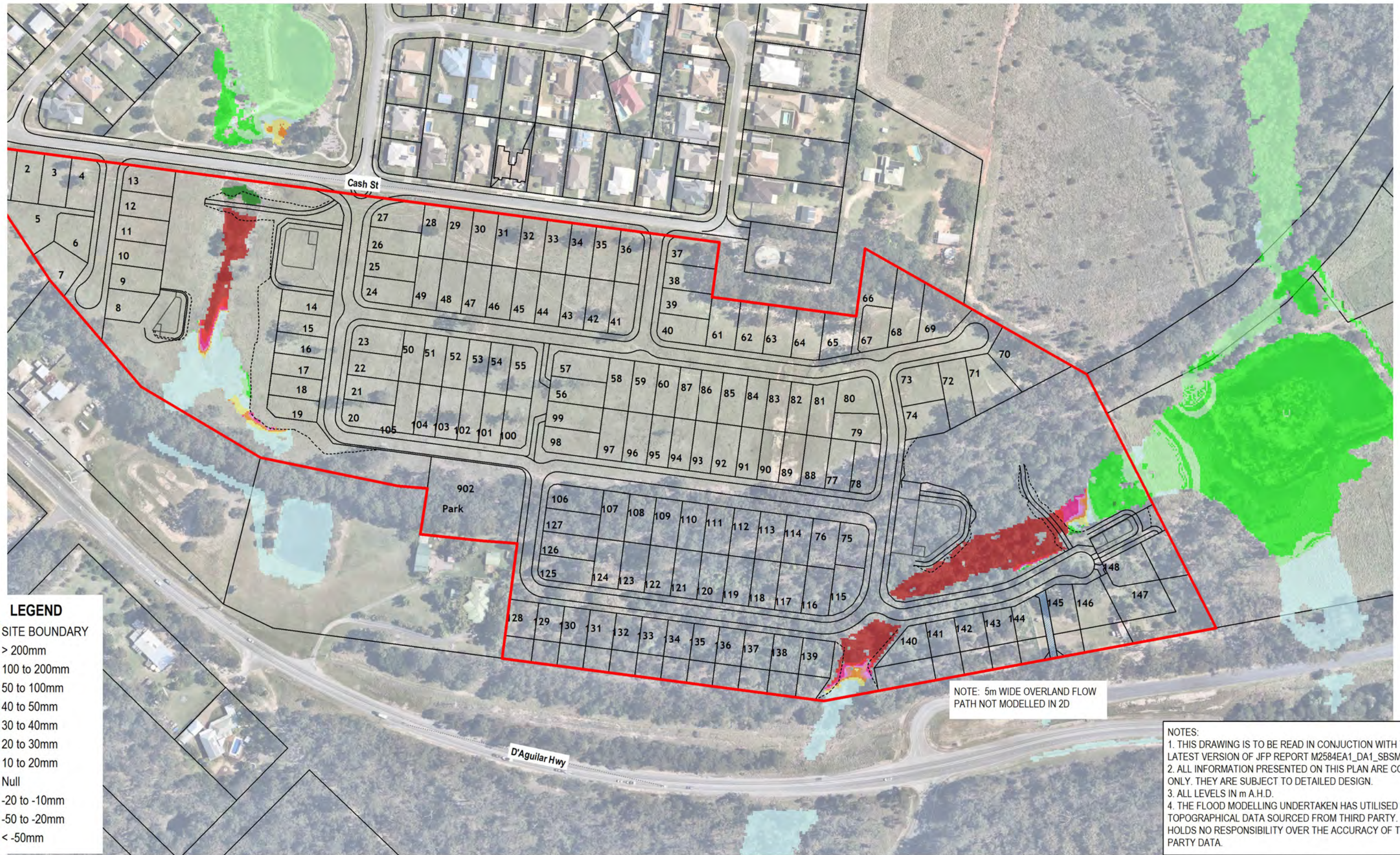
NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019





LEGEND

- SITE BOUNDARY
- > 200mm
- 100 to 200mm
- 50 to 100mm
- 40 to 50mm
- 30 to 40mm
- 20 to 30mm
- 10 to 20mm
- Null
- 20 to -10mm
- 50 to -20mm
- < -50mm

NOTE: 5m WIDE OVERLAND FLOW PATH NOT MODELLED IN 2D

- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

POST-DEVELOPMENT 39% AEP MAX. FLOOD LEVEL CHANGES

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.
M2584EA1_DA1_GIS31

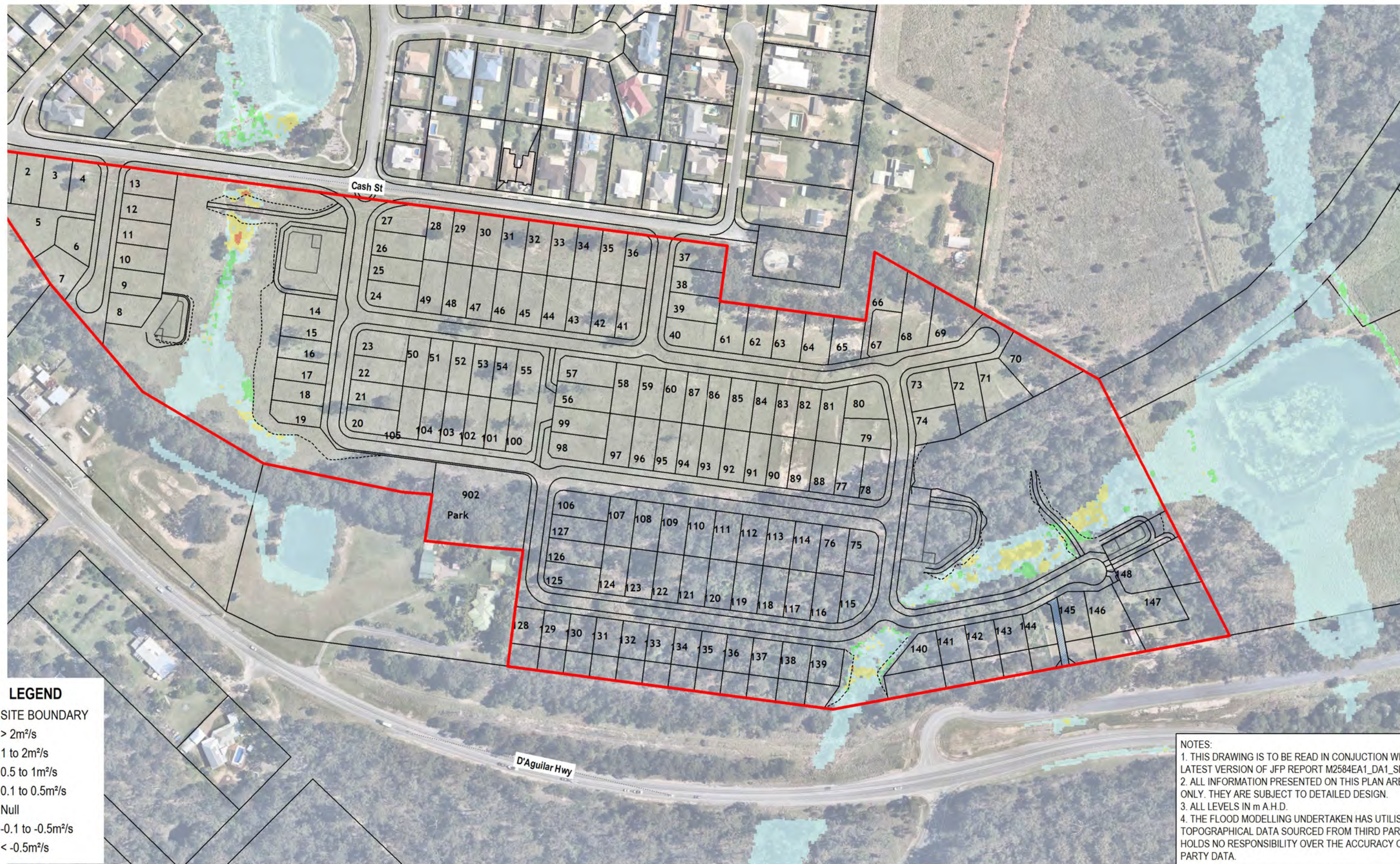
ISSUE
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NORTH

SCALE: 1:2500 @ A3

DATE: 12/7/2019





POST-DEVELOPMENT 39% AEP VELOCITY CHANGES

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS32

ISSUE

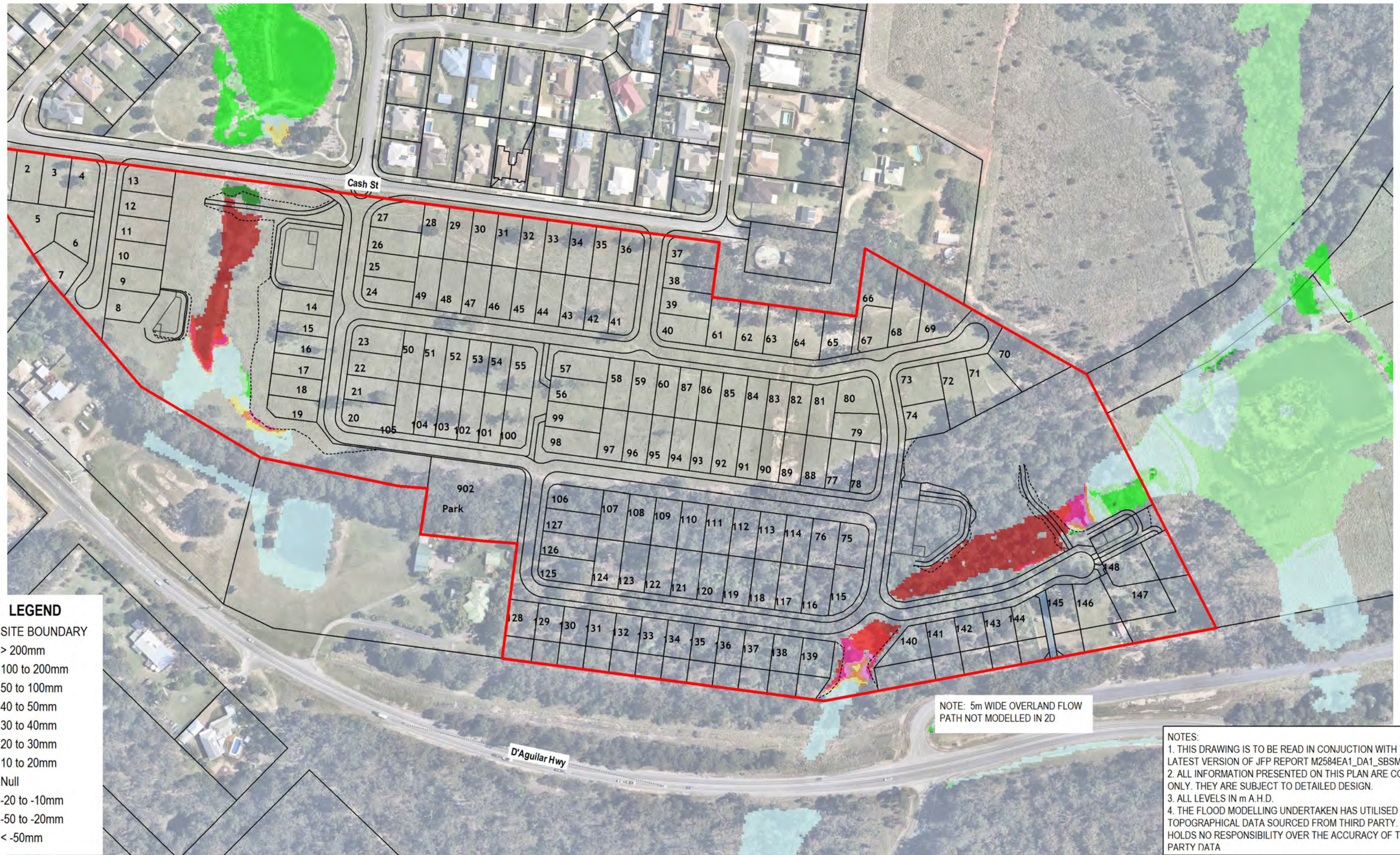
C

NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



- LEGEND**
- SITE BOUNDARY
 - > 200mm
 - 100 to 200mm
 - 50 to 100mm
 - 40 to 50mm
 - 30 to 40mm
 - 20 to 30mm
 - 10 to 20mm
 - Null
 - -20 to -10mm
 - -50 to -20mm
 - < -50mm

NOTE: 5m WIDE OVERLAND FLOW PATH NOT MODELLED IN 2D

NOTES:
 1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA



POST-DEVELOPMENT 20% AEP FLOOD LEVEL CHANGES

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.
M2584EA1_DA1_GIS33

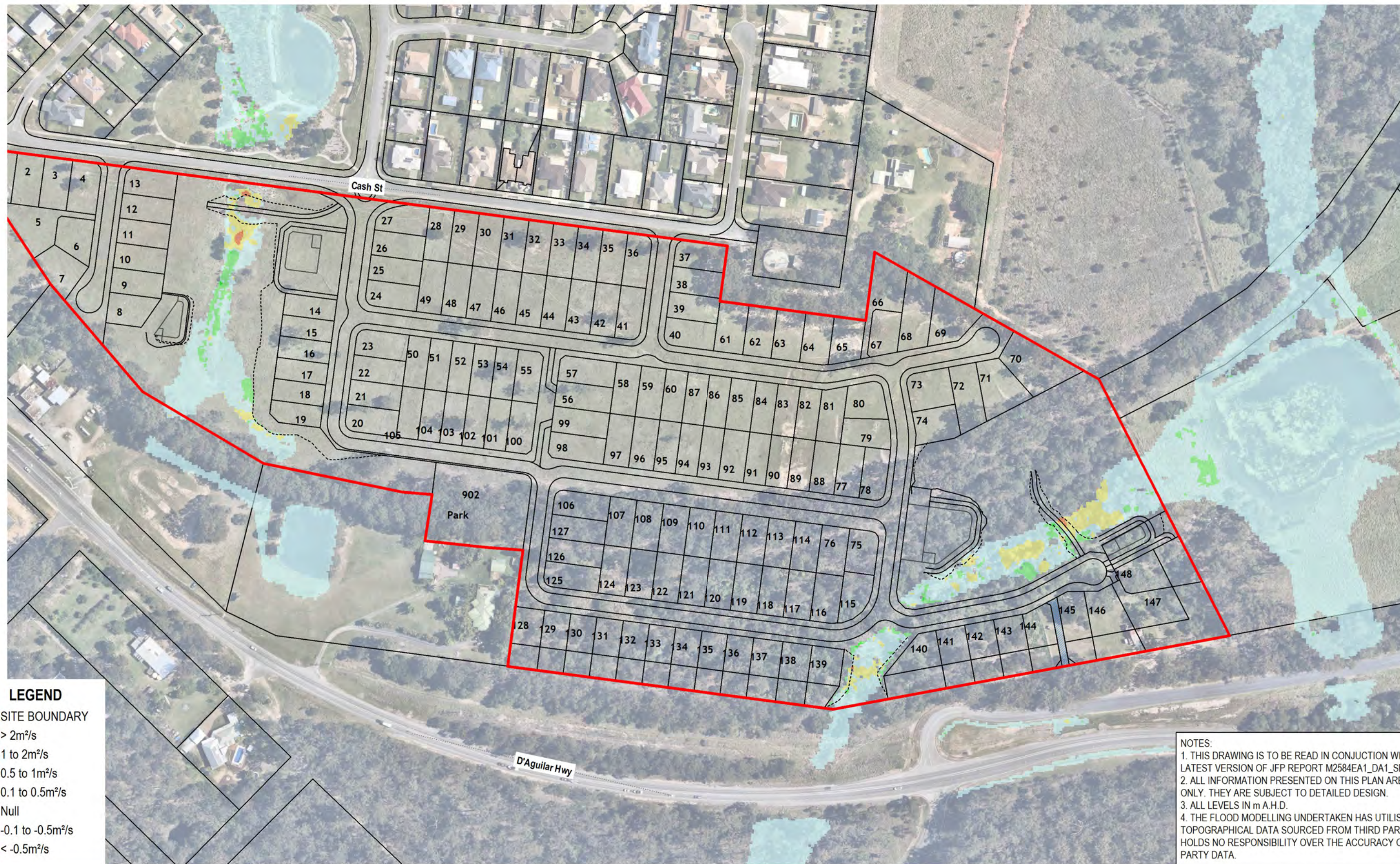
ISSUE
C

NORTH

SCALE: 1:2500 @ A3

DATE: 12/7/2019





POST-DEVELOPMENT 20% AEP VELOCITY CHANGES

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS34

ISSUE

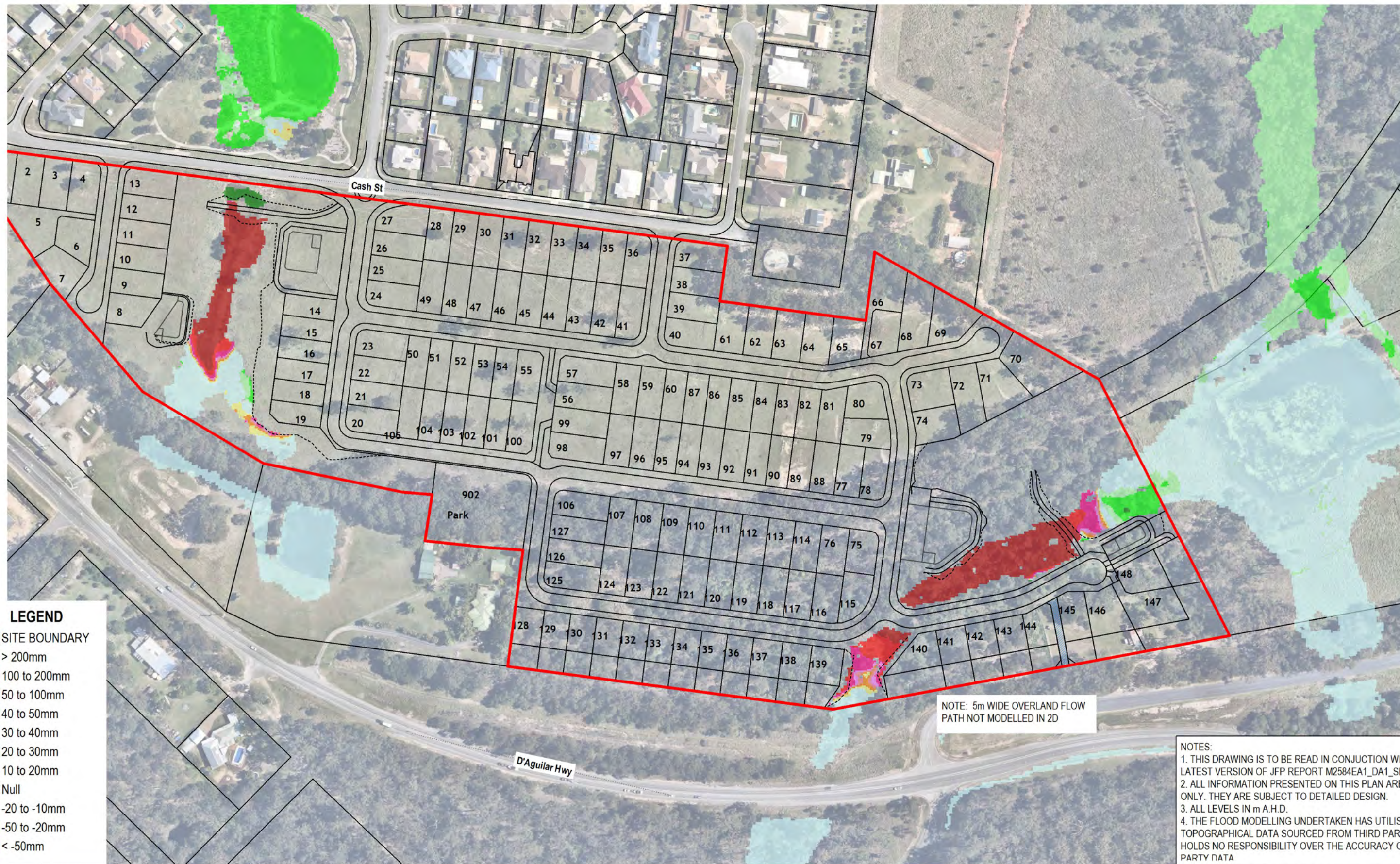
C

NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



LEGEND

- SITE BOUNDARY
- > 200mm
- 100 to 200mm
- 50 to 100mm
- 40 to 50mm
- 30 to 40mm
- 20 to 30mm
- 10 to 20mm
- Null
- 20 to -10mm
- 50 to -20mm
- < -50mm

NOTE: 5m WIDE OVERLAND FLOW PATH NOT MODELLED IN 2D

- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA

POST-DEVELOPMENT 10% AEP MAX. FLOOD LEVEL CHANGES

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.
M2584EA1_DA1_GIS35

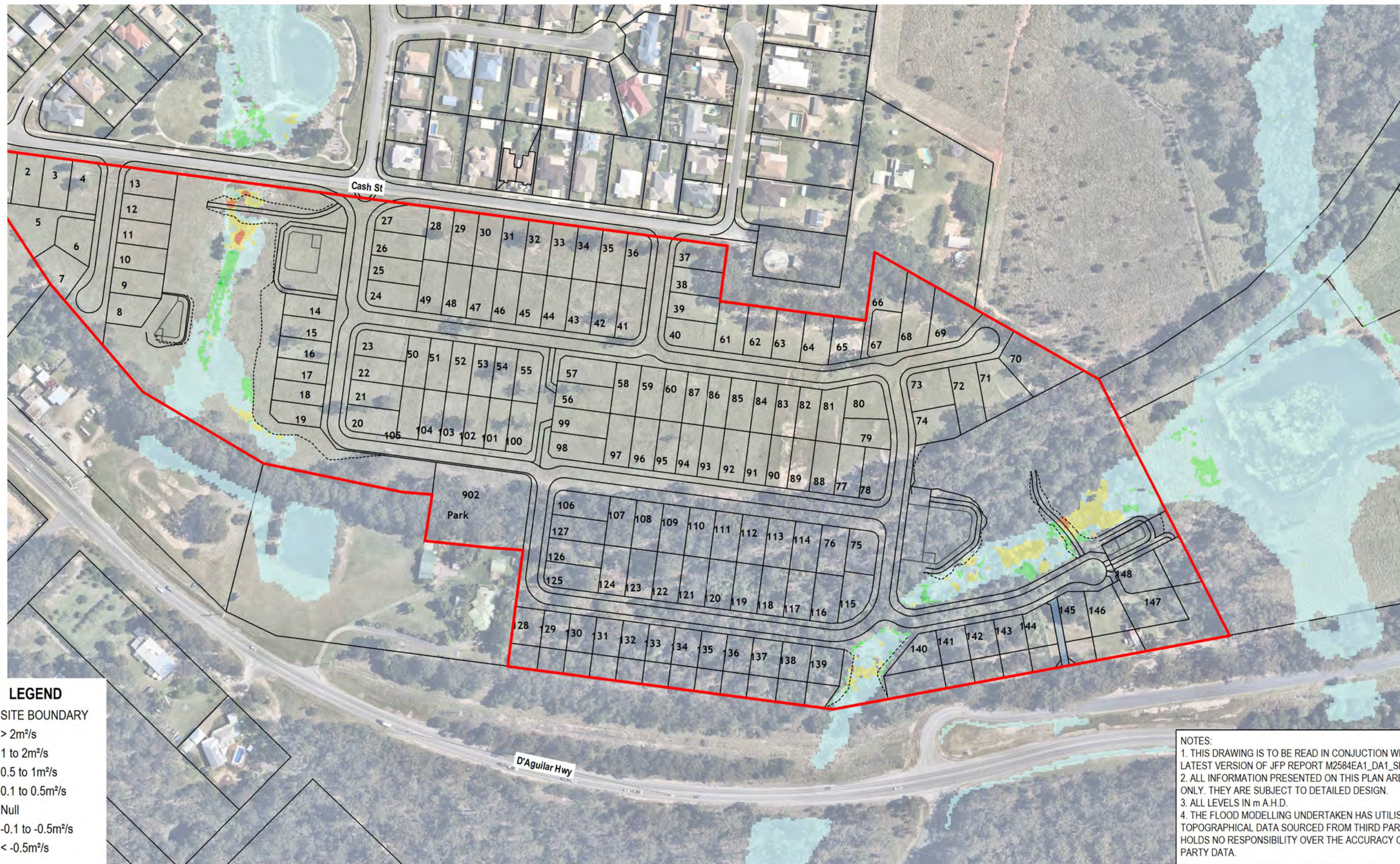
ISSUE
C



SCALE: 1:2500 @ A3

DATE: 12/7/2019





POST-DEVELOPMENT 10% AEP VELOCITY CHANGES

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS36

ISSUE

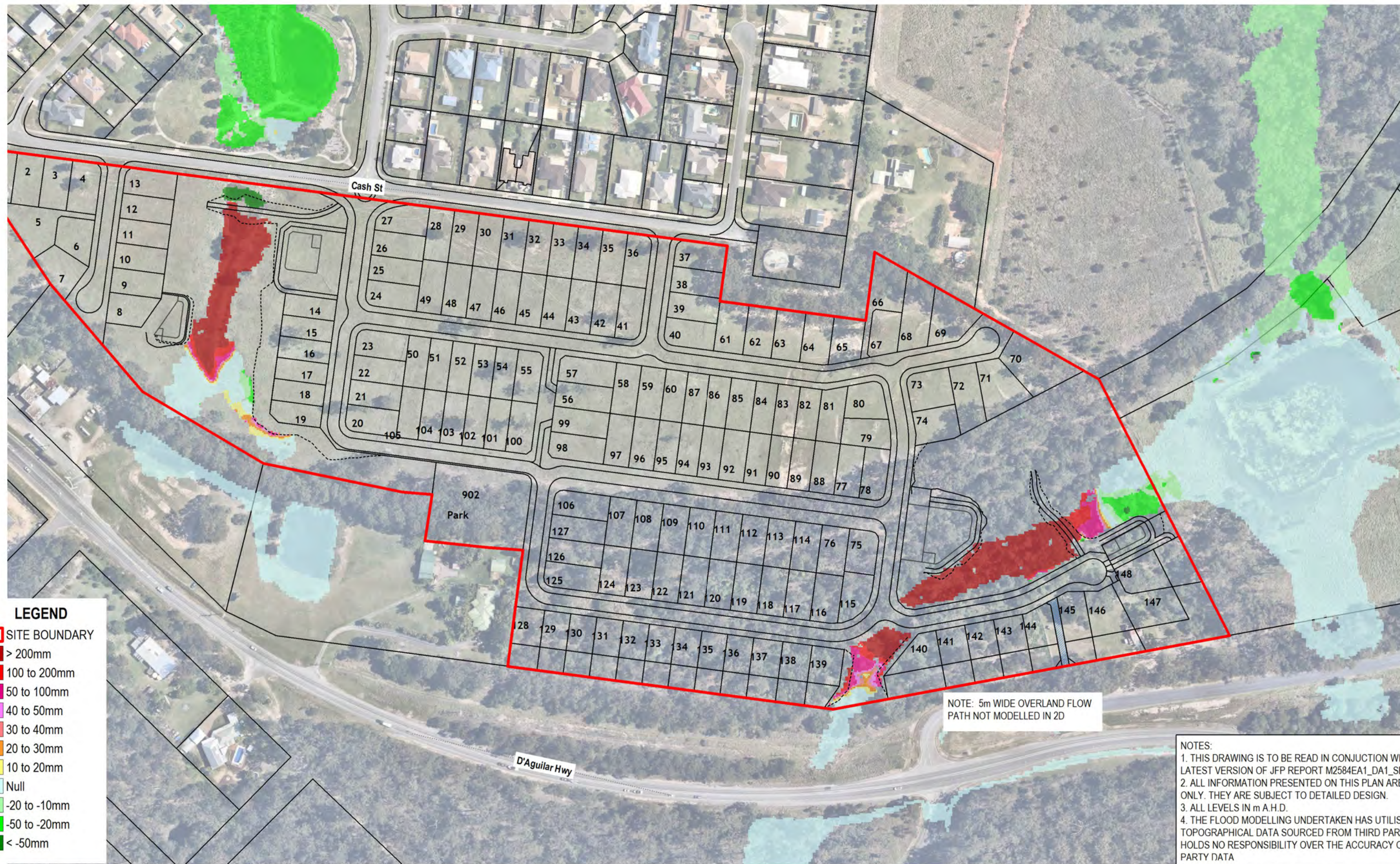
C

NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



LEGEND

- SITE BOUNDARY
- > 200mm
- 100 to 200mm
- 50 to 100mm
- 40 to 50mm
- 30 to 40mm
- 20 to 30mm
- 10 to 20mm
- Null
- 20 to -10mm
- 50 to -20mm
- < -50mm

NOTE: 5m WIDE OVERLAND FLOW PATH NOT MODELLED IN 2D

- NOTES:
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POST-DEVELOPMENT 5% AEP MAX. FLOOD LEVEL CHANGES

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS37

ISSUE

C

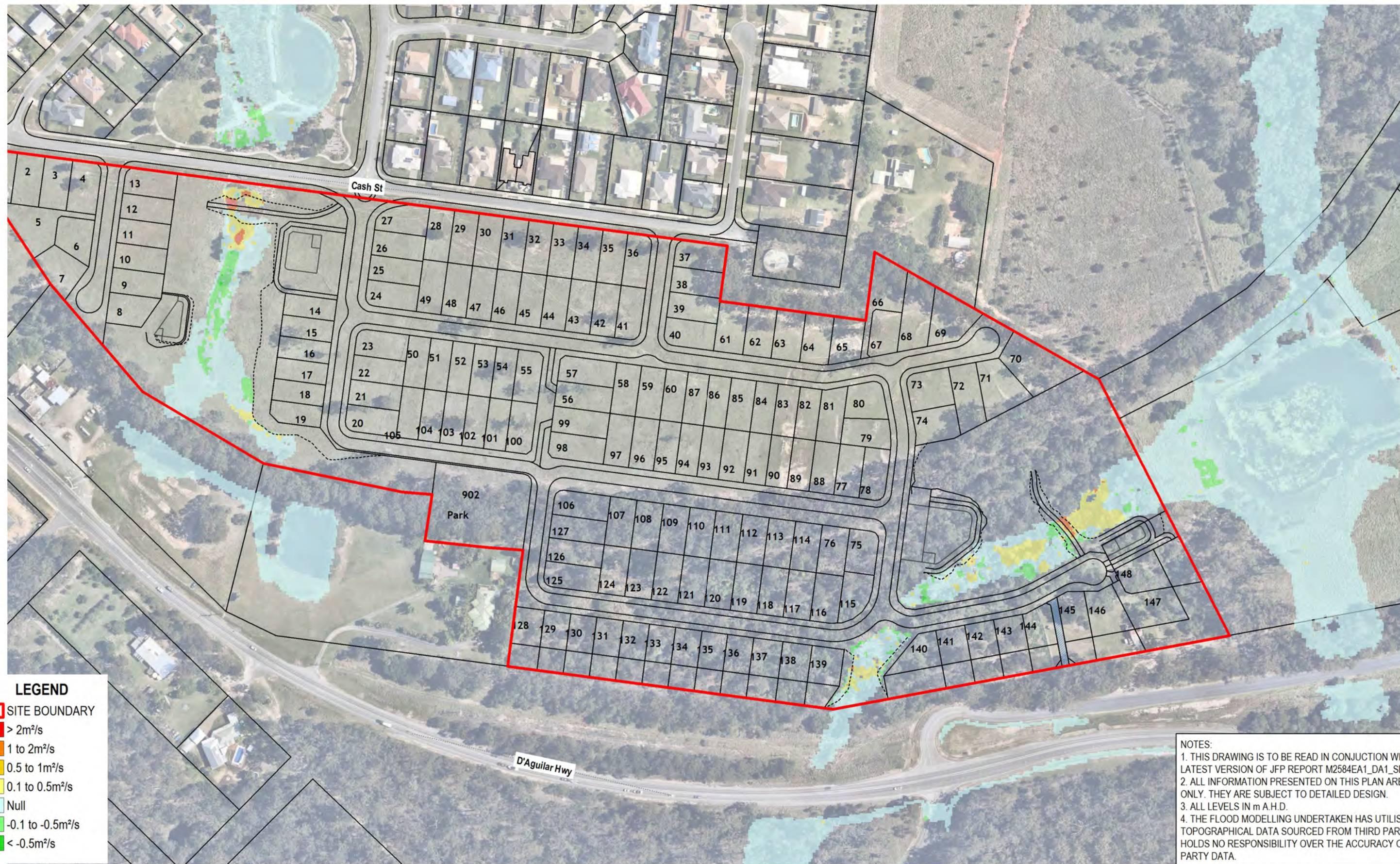
NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019





POST-DEVELOPMENT 5% AEP VELOCITY CHANGES

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS38

ISSUE

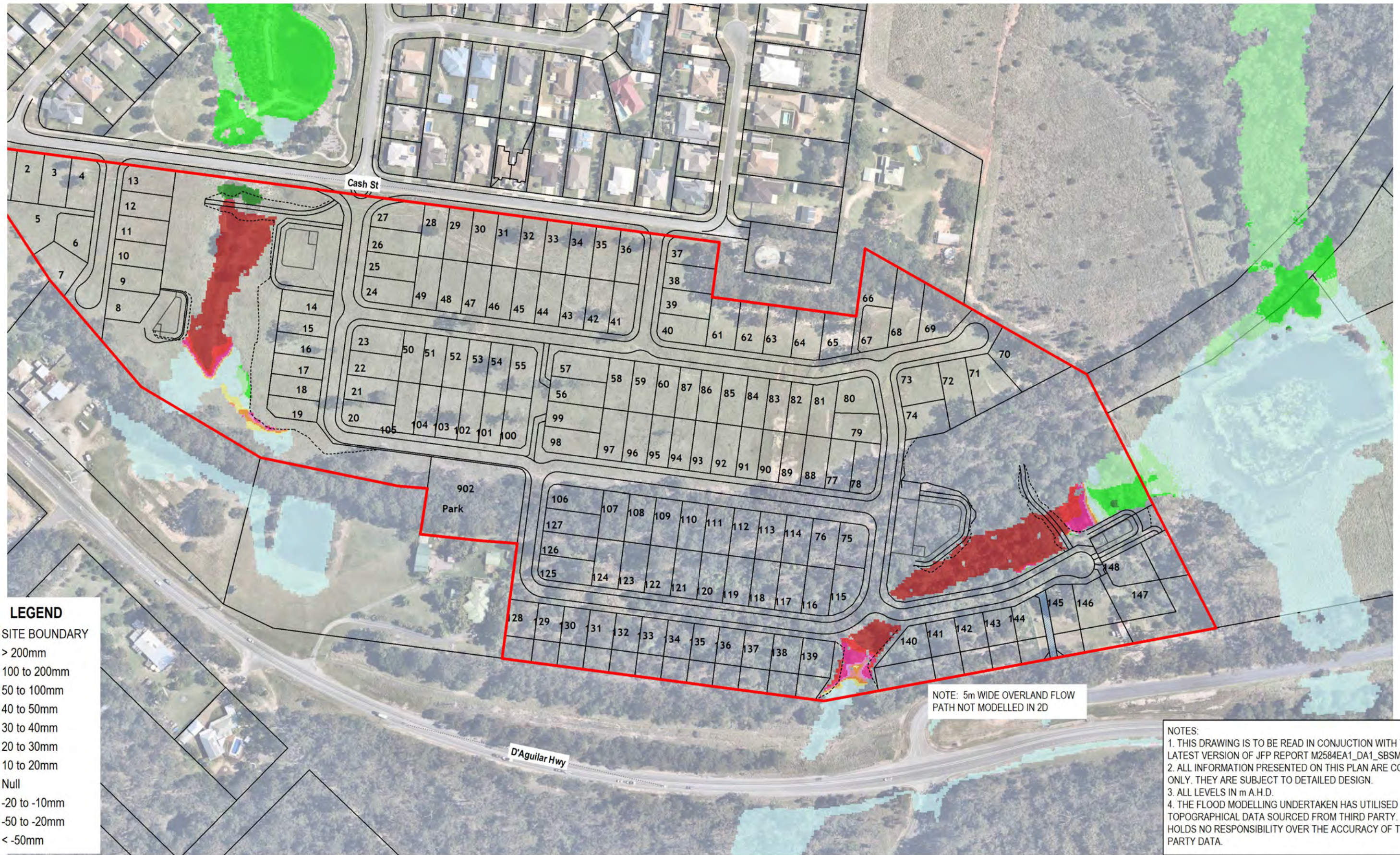
C

NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



LEGEND

- SITE BOUNDARY
- > 200mm
- 100 to 200mm
- 50 to 100mm
- 40 to 50mm
- 30 to 40mm
- 20 to 30mm
- 10 to 20mm
- Null
- 20 to -10mm
- 50 to -20mm
- < -50mm

NOTE: 5m WIDE OVERLAND FLOW PATH NOT MODELLED IN 2D

- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
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POST-DEVELOPMENT 2% AEP MAX. FLOOD LEVEL CHANGES

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS39

ISSUE

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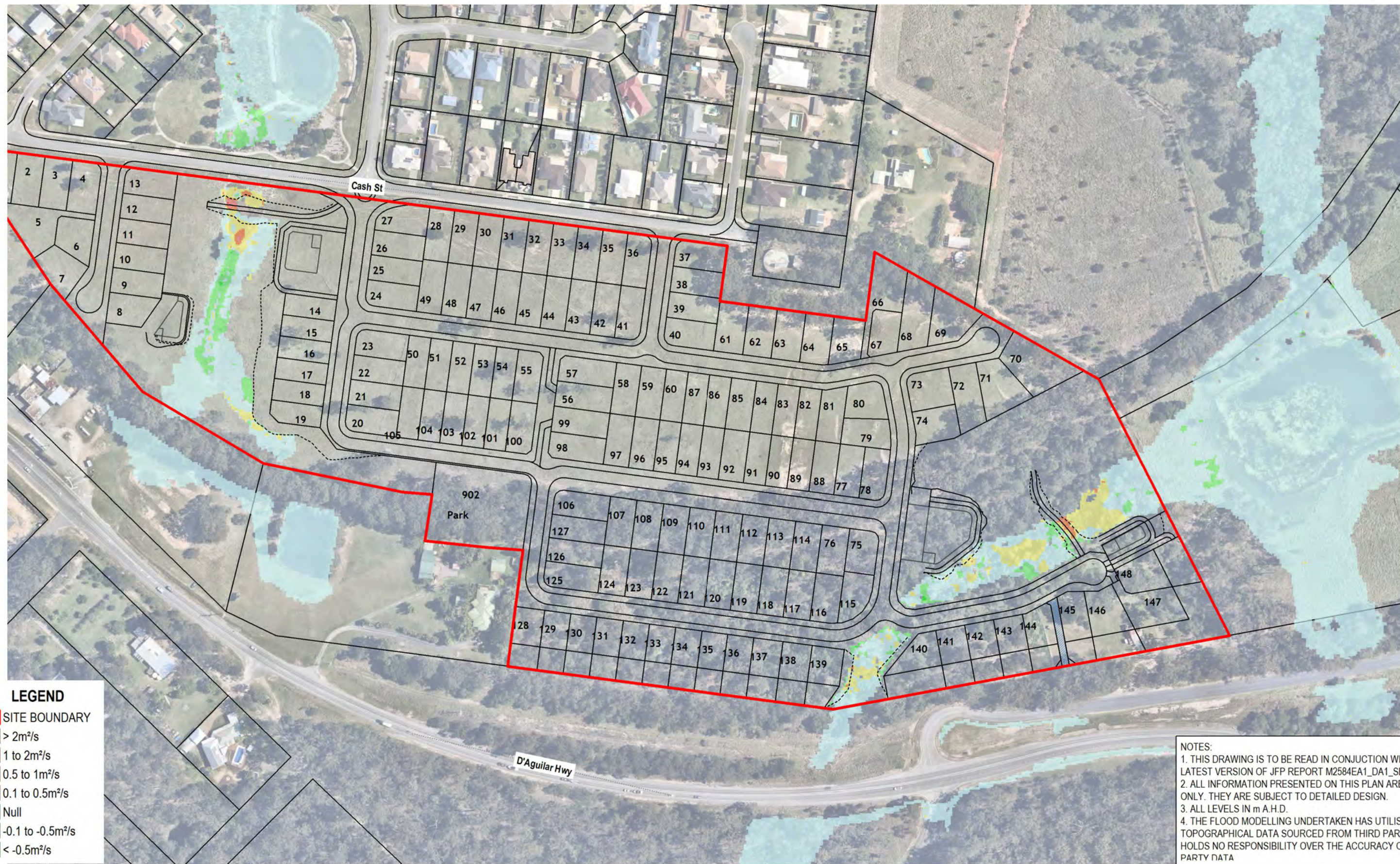
NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019





POST-DEVELOPMENT 2% AEP VELOCITY CHANGES

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS40

ISSUE

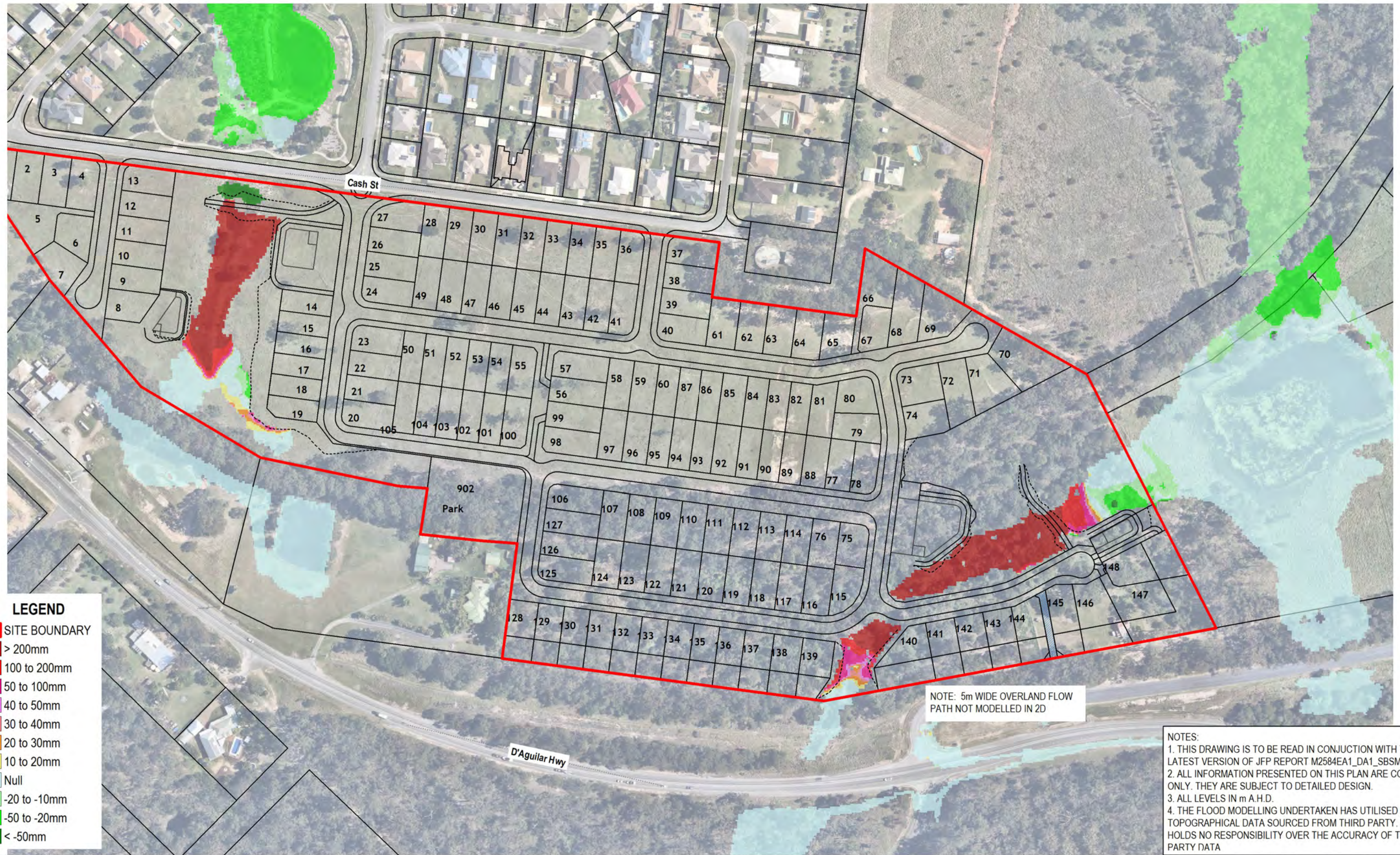
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NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



POST-DEVELOPMENT 1% AEP MAX. FLOOD LEVEL CHANGES

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS41

ISSUE

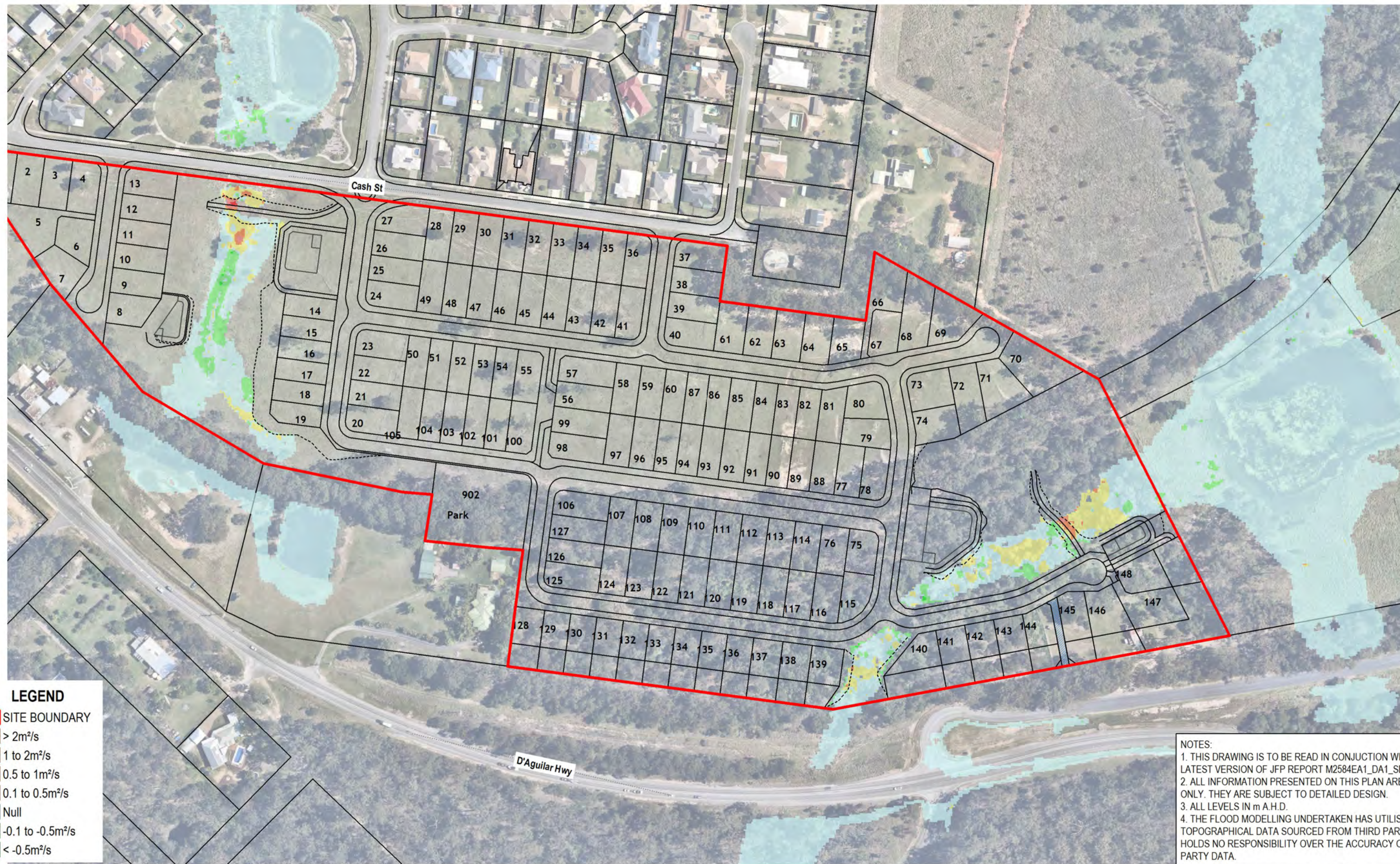
C

NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



POST-DEVELOPMENT 1% AEP VELOCITY CHANGES

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS42

ISSUE

C

NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



LEGEND

SITE BOUNDARY
 WAS DRY NOW WET
 WAS WET NOW DRY

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
3. ALL LEVELS IN m A.H.D.
4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA

POST-DEVELOPMENT 63% AEP WET & DRY CELLS

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

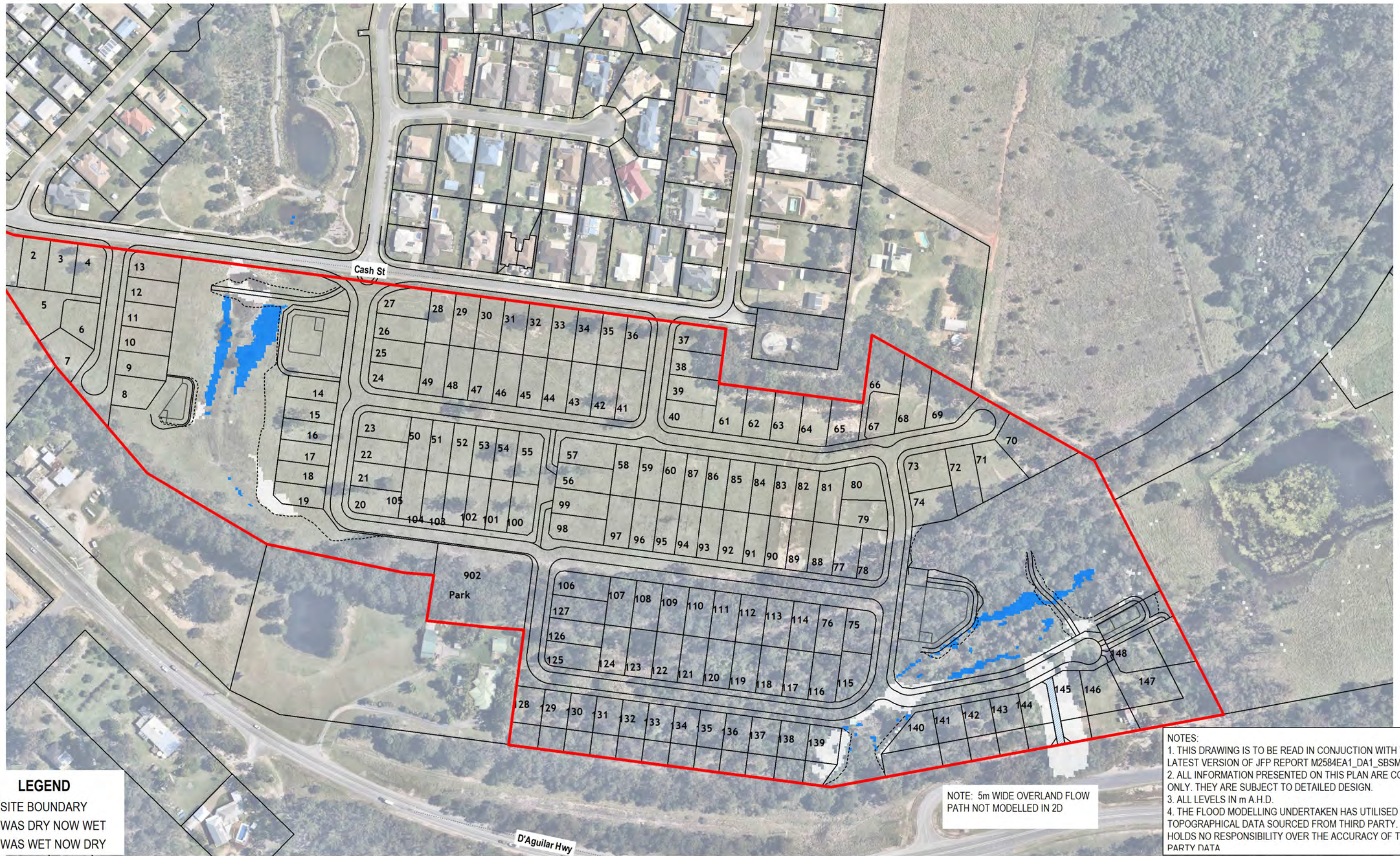
DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO. M2584EA1_DA1_GIS46

ISSUE A

SCALE: 1:2500 @ A3

DATE: 12/7/2019



- LEGEND**
- SITE BOUNDARY
 - WAS DRY NOW WET
 - WAS WET NOW DRY



POST-DEVELOPMENT 39% AEP WET & DRY CELLS

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.
M2584EA1_DA1_GIS47

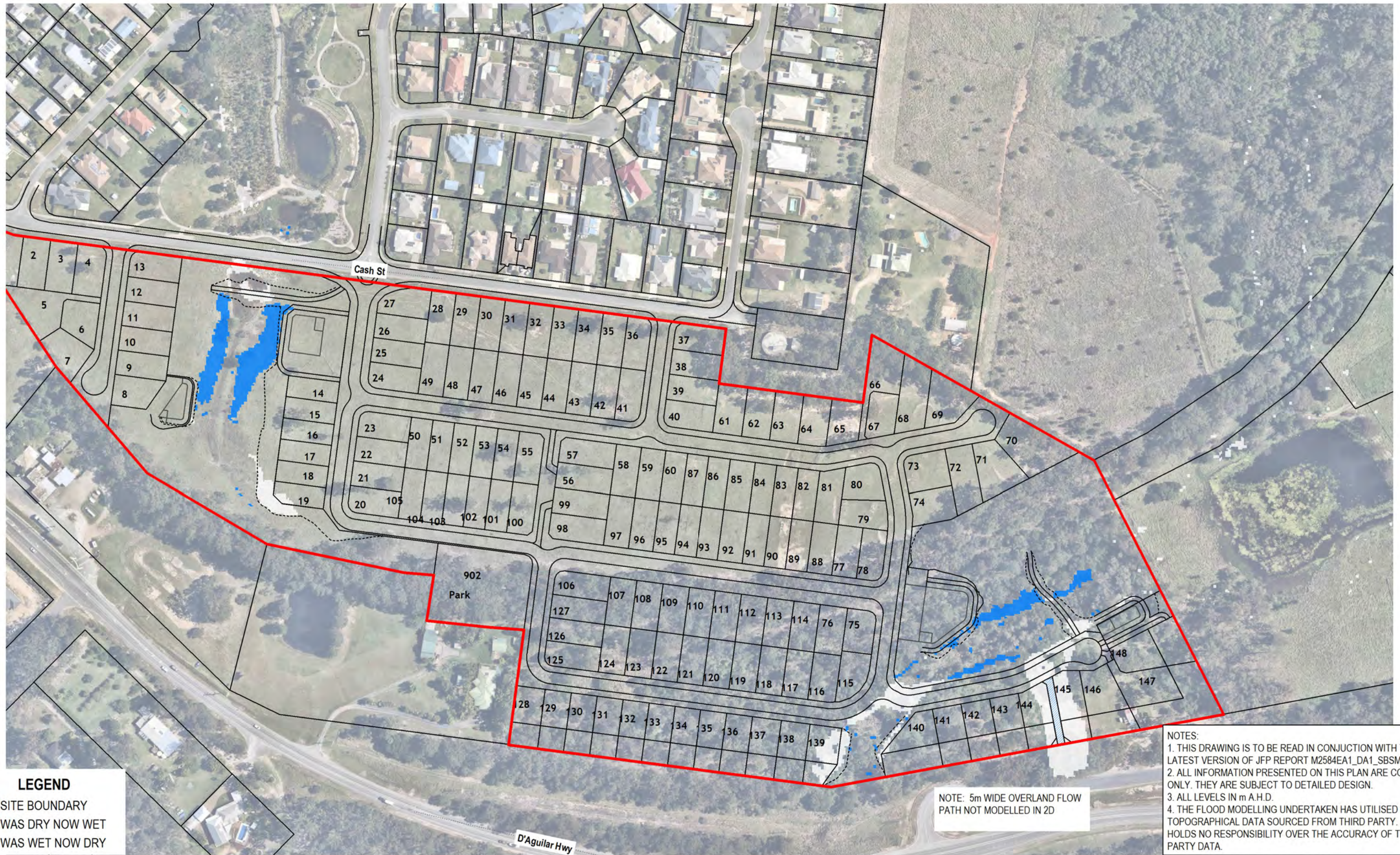
ISSUE
A

NORTH

SCALE: 1:2500 @ A3

DATE: 12/7/2019





LEGEND

- SITE BOUNDARY
- WAS DRY NOW WET
- WAS WET NOW DRY

- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

NOTE: 5m WIDE OVERLAND FLOW PATH NOT MODELLED IN 2D

POST-DEVELOPMENT 20% AEP WET & DRY CELLS

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS48

ISSUE

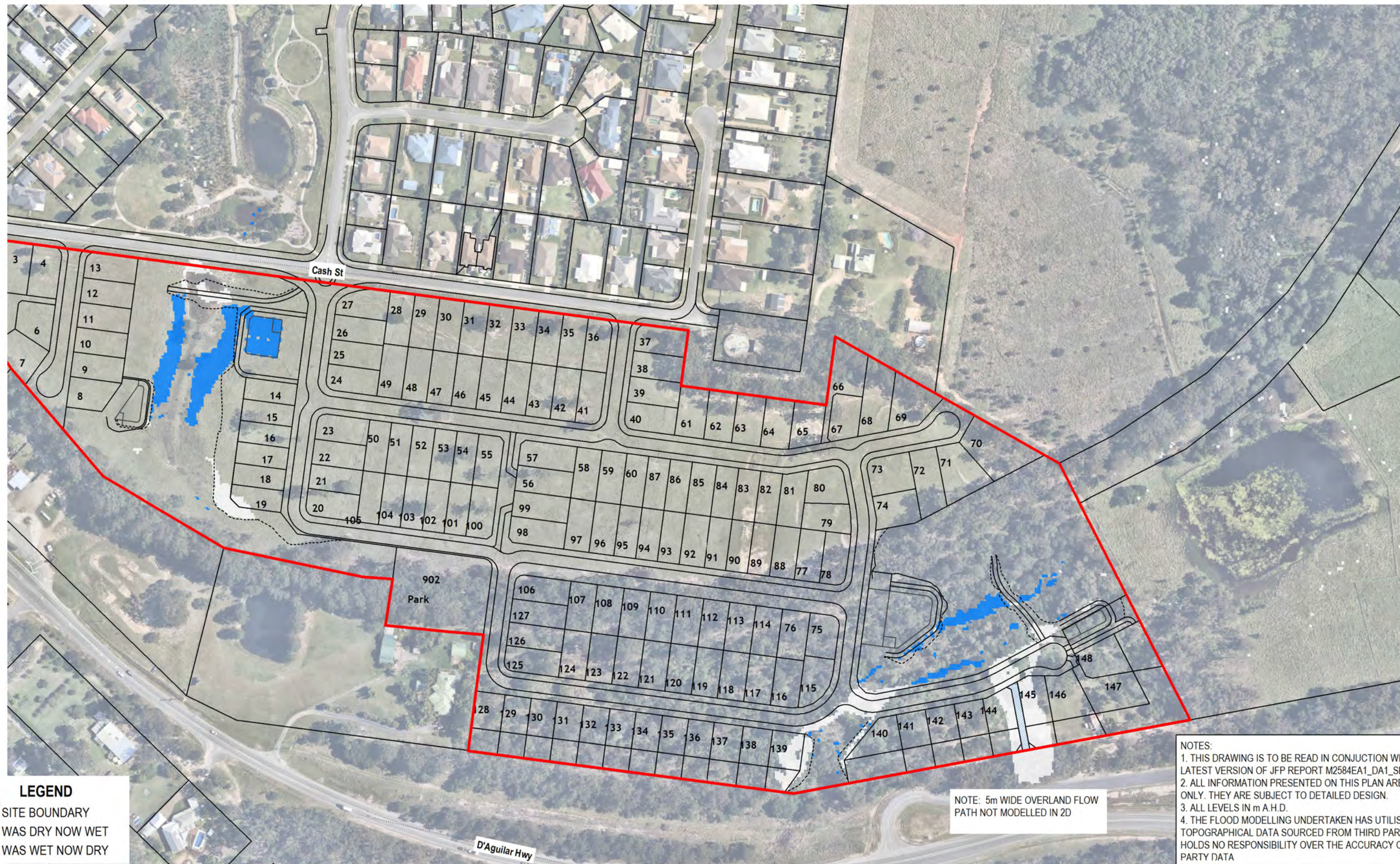
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NORTH

SCALE: 1:2500 @ A3

DATE: 12/7/2019





LEGEND

SITE BOUNDARY
 WAS DRY NOW WET
 WAS WET NOW DRY

JFOP
 URBAN CONSULTANTS
 Moreton Bay Regional Council

POST-DEVELOPMENT 10% AEP WET & DRY CELLS

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.
M2584EA1_DA1_GIS49

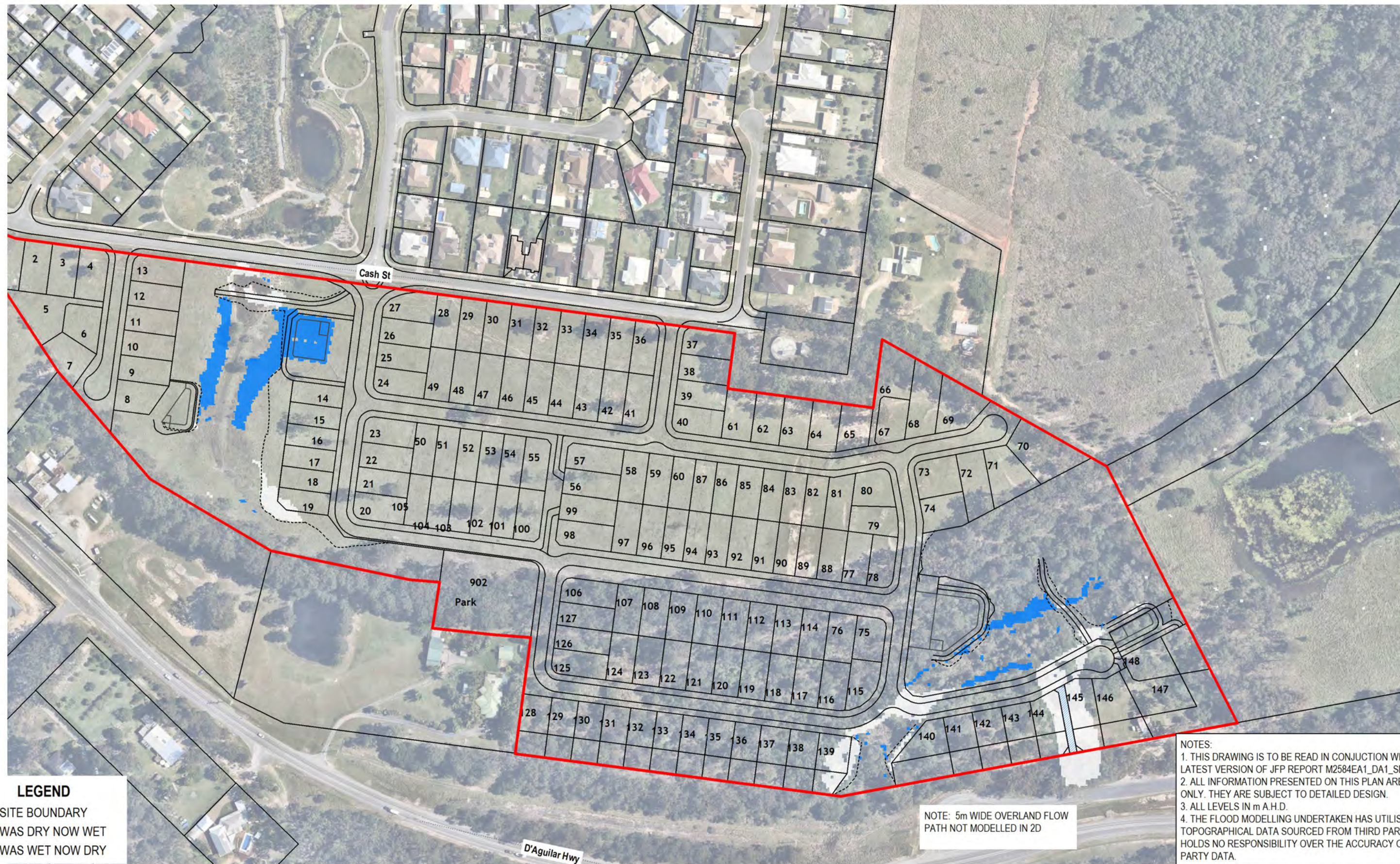
ISSUE
A

NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



LEGEND

- SITE BOUNDARY
- WAS DRY NOW WET
- WAS WET NOW DRY

- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

NOTE: 5m WIDE OVERLAND FLOW PATH NOT MODELLED IN 2D

POST-DEVELOPMENT 5% AEP WET & DRY CELLS

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS50

ISSUE

A

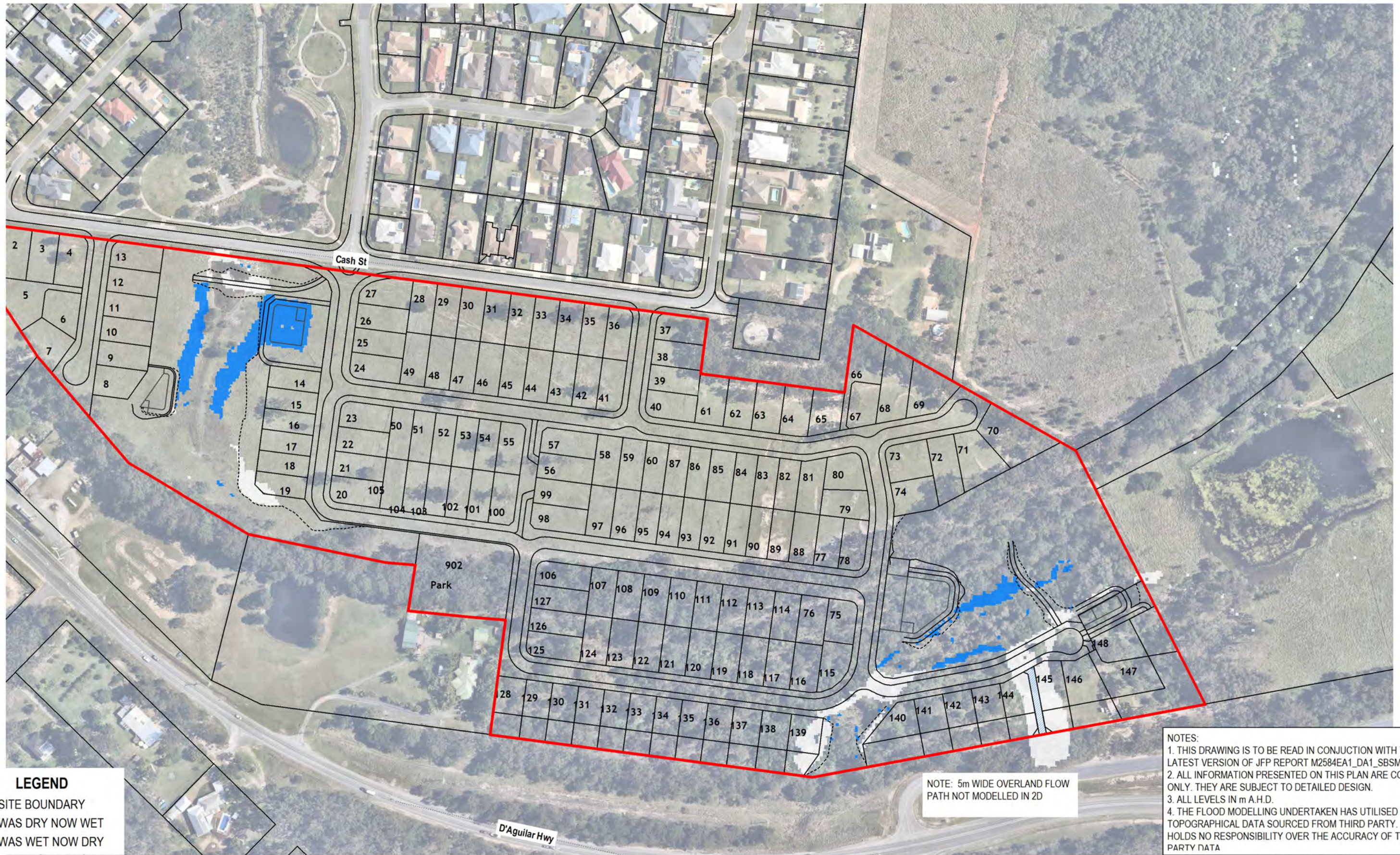
NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019





POST-DEVELOPMENT 2% AEP WET & DRY CELLS

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.
M2584EA1_DA1_GIS51

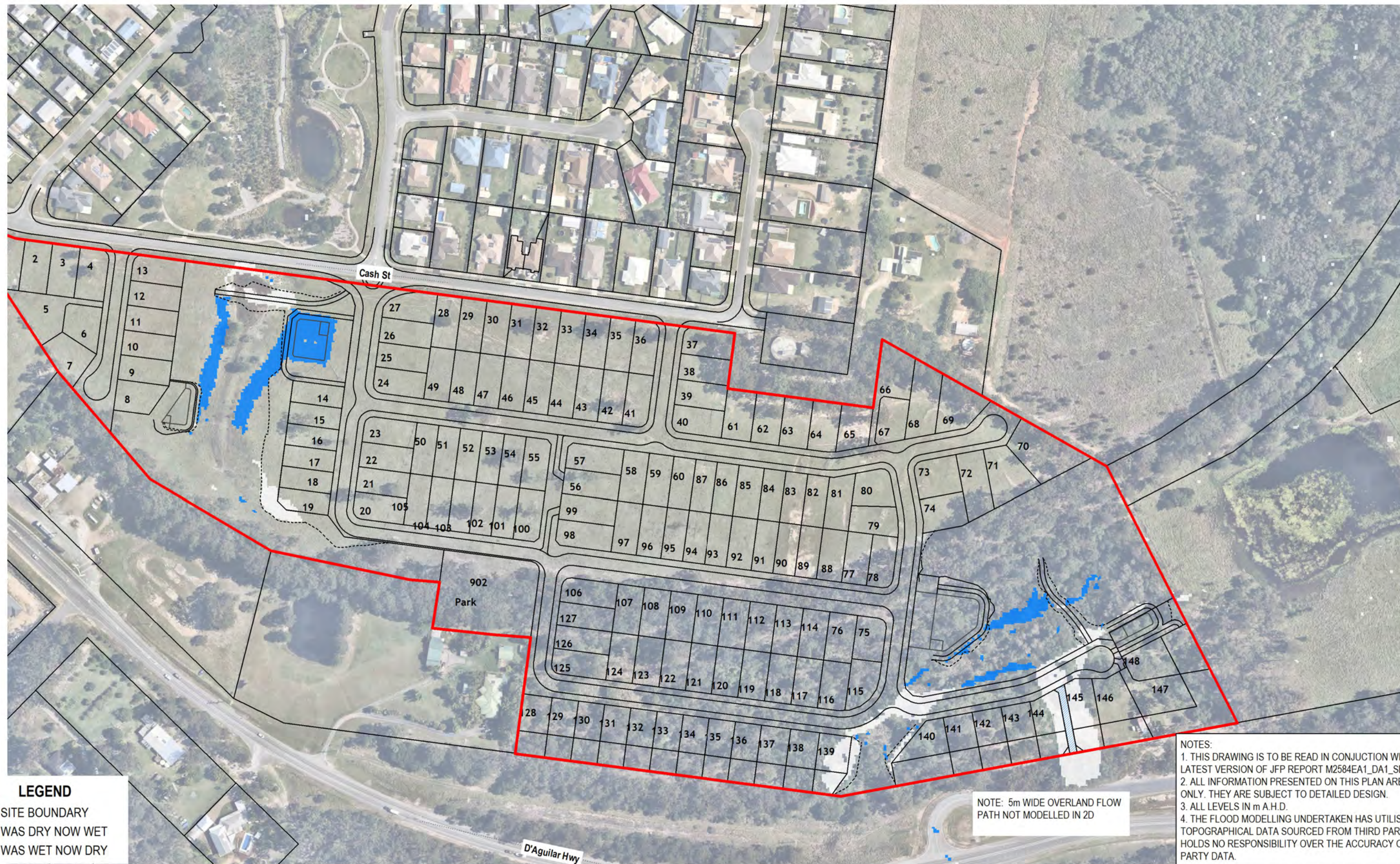
ISSUE
A

NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



LEGEND

- SITE BOUNDARY
- WAS DRY NOW WET
- WAS WET NOW DRY

- NOTES:
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 2. ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

POST-DEVELOPMENT 1% AEP WET & DRY CELLS

22 – 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS52

ISSUE

A

NORTH



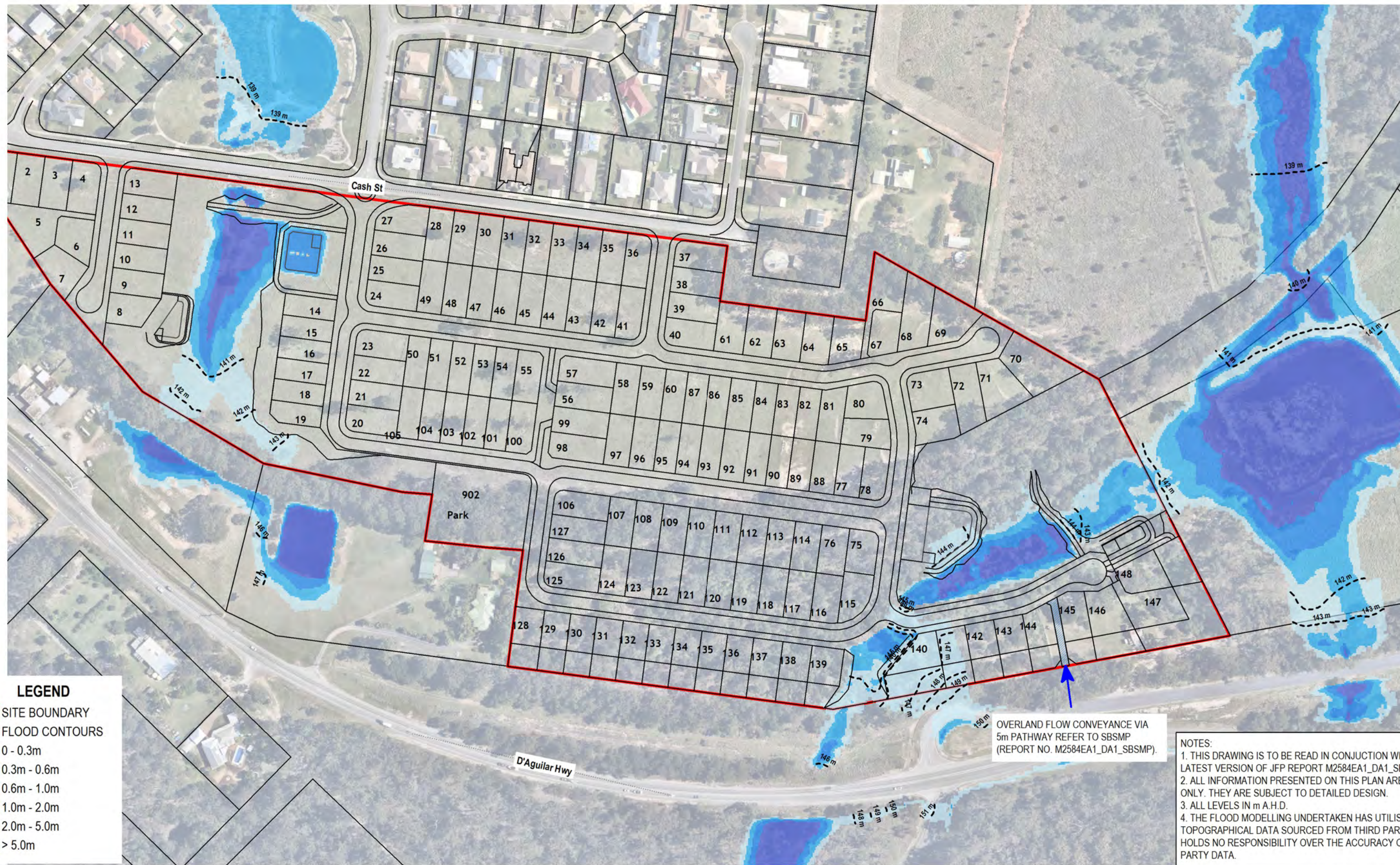
SCALE: 1:2500 @ A3

DATE: 12/7/2019





APPENDIX G – SENSITIVITY SCENARIO FLOOD PLANS



LEGEND

- SITE BOUNDARY
- - - FLOOD CONTOURS
- 0 - 0.3m
- 0.3m - 0.6m
- 0.6m - 1.0m
- 1.0m - 2.0m
- 2.0m - 5.0m
- > 5.0m

OVERLAND FLOW CONVEYANCE VIA
5m PATHWAY REFER TO SBSMP
(REPORT NO. M2584EA1_DA1_SBSMP).

- NOTES:
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 3. ALL LEVELS IN m A.H.D.
 4. THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

HIGH MANNING'S n 1% AEP MAX. FLOOD DEPTH PLAN

22 - 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS43

ISSUE

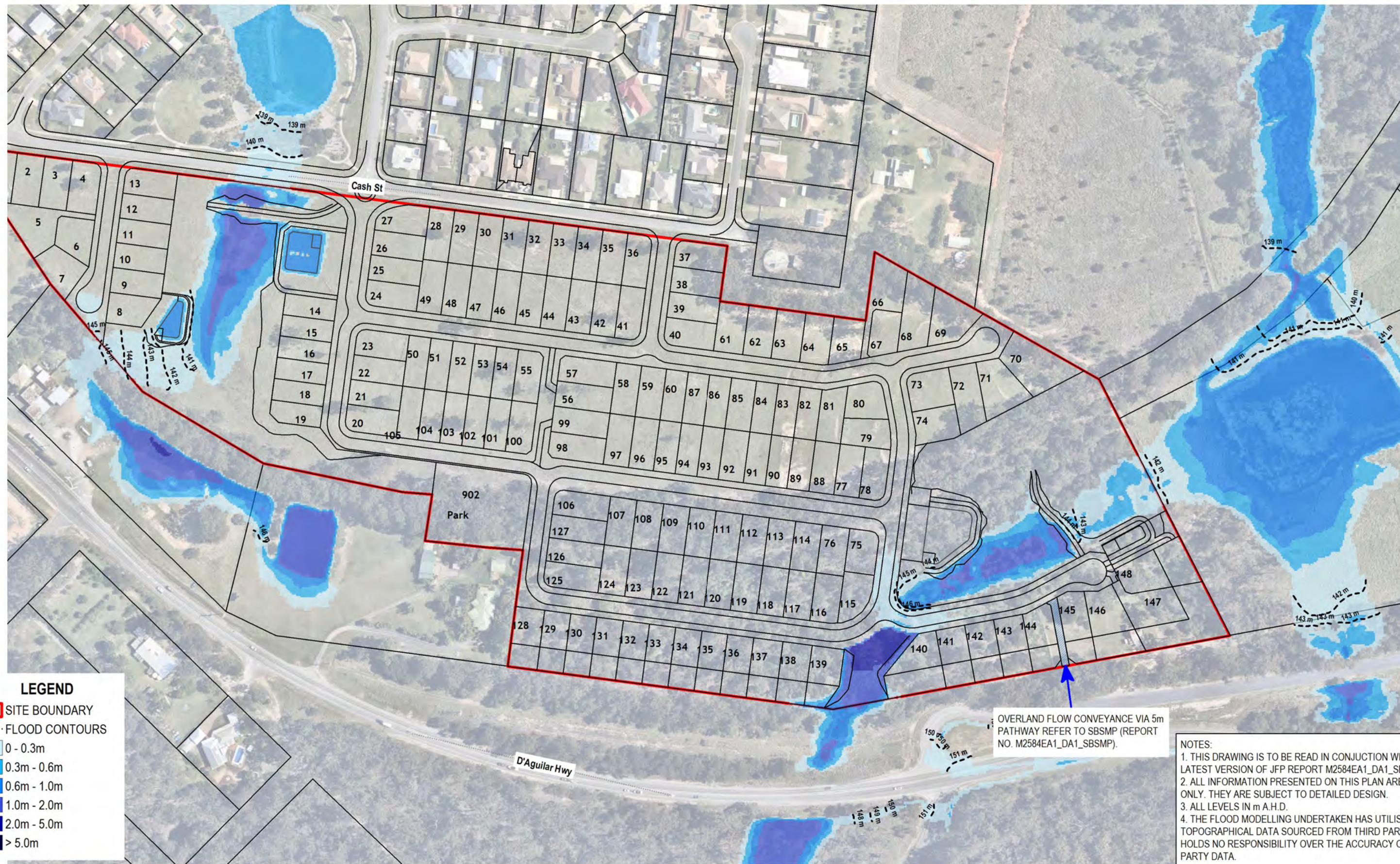
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NORTH

SCALE: 1:2500 @ A3

DATE: 12/7/2019





SEVERE BLOCKAGE 1% AEP MAX. FLOOD DEPTH PLAN

22 - 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS44

ISSUE

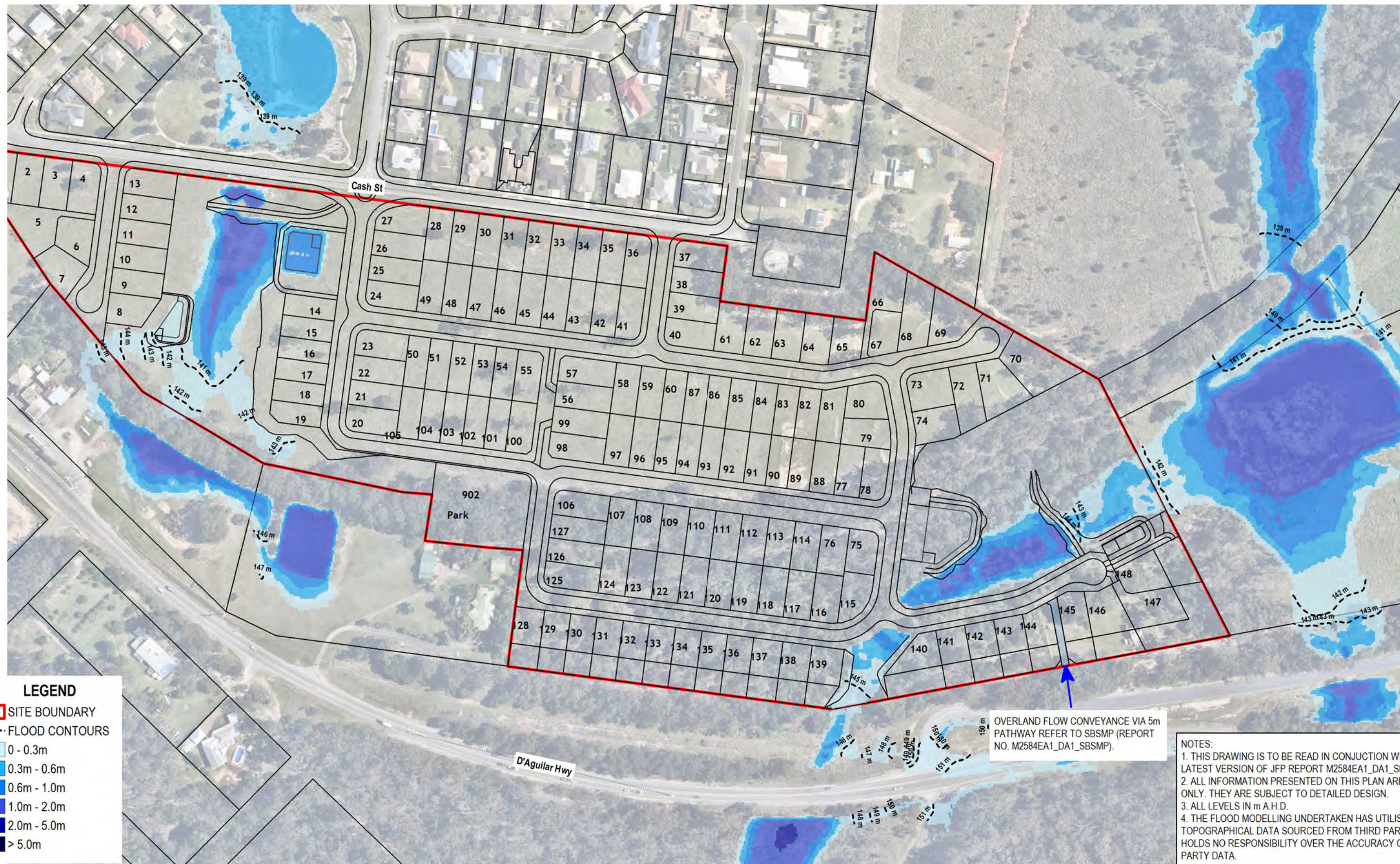
C

NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



LEGEND

- SITE BOUNDARY
- FLOOD CONTOURS
- 0 - 0.3m
- 0.3m - 0.6m
- 0.6m - 1.0m
- 1.0m - 2.0m
- 2.0m - 5.0m
- > 5.0m

- NOTES:
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE LATEST VERSION OF JFP REPORT M2584EA1_DA1_SBSMP.
 - ALL INFORMATION PRESENTED ON THIS PLAN ARE CONCEPT ONLY. THEY ARE SUBJECT TO DETAILED DESIGN.
 - ALL LEVELS IN m A.H.D.
 - THE FLOOD MODELLING UNDERTAKEN HAS UTILISED LIDAR TOPOGRAPHICAL DATA SOURCED FROM THIRD PARTY. JFP HOLDS NO RESPONSIBILITY OVER THE ACCURACY OF THIRD PARTY DATA.

CLIMATE CHANGE SCENARIO 1% AEP MAX. FLOOD DEPTH PLAN

22 - 80 CASH ST & 1901 D'AGUILAR HWY, D'AGUILAR

DFC (PROJECT MANAGEMENT) PTY LTD

DRAWING NO.

M2584EA1_DA1_GIS45

ISSUE

C

NORTH



SCALE: 1:2500 @ A3

DATE: 12/7/2019



PROPERTY DESCRIPTION
LOT 1 ON RP230991 &
LOT 2 ON RP80309
PARISH OF DURUNDUR
COUNTY OF CANNING
TOTAL AREA 17.756ha

Plans approved for purposes
relating to the conditions of
1903-10276 SRA only.

| STATISTICS | STAGE 1 | STAGE 2 | STAGE 3 | STAGE 4 | STAGE 5 | TOTAL |
|---------------------------------|---------|---------|---------|---------|---------|--------|
| NO. OF LOTS | 27 | 33 | 27 | 27 | 34 | 148 |
| LENGTH OF NEW 13.5m ROAD (m) | 30 | 0 | 105 | 0 | 0 | 135 |
| 16.5m ROAD (m) | 230 | 265 | 30 | 345 | 475 | 1345 |
| 19m ROAD (m) | 80 | 0 | 0 | 0 | 0 | 80 |
| 21m ROAD (m) | 0 | 0 | 195 | 45 | 0 | 240 |
| DRAINAGE RESERVE AREA (ha) | 2.07 | 0 | 0.35 | 0 | 1.93 | 4.350 |
| STAGE AREA (ha) | 4.470 | 2.464 | 2.529 | 2.570 | 5.723 | 17.756 |
| DEVELOPABLE AREA (ha) | | | | | | 13.406 |
| DENSITY | | | | | | 11.0 |

NOTES

(1) This plan was prepared for the purpose and exclusive use of DFC (PROJECT MANAGEMENT) PTY LTD to accompany an application to MORETON BAY REGIONAL COUNCIL to Reconfigure the land described in the plan and is not to be used for any other purpose or by any other person or corporation. JFP URBAN CONSULTANTS PTY LTD accepts no responsibility for any loss or damage suffered howsoever arising to any person or corporation who may use or rely on this plan in contravention to the terms of this clause or clauses 2, 3, 4, 5 or 6 hereof.

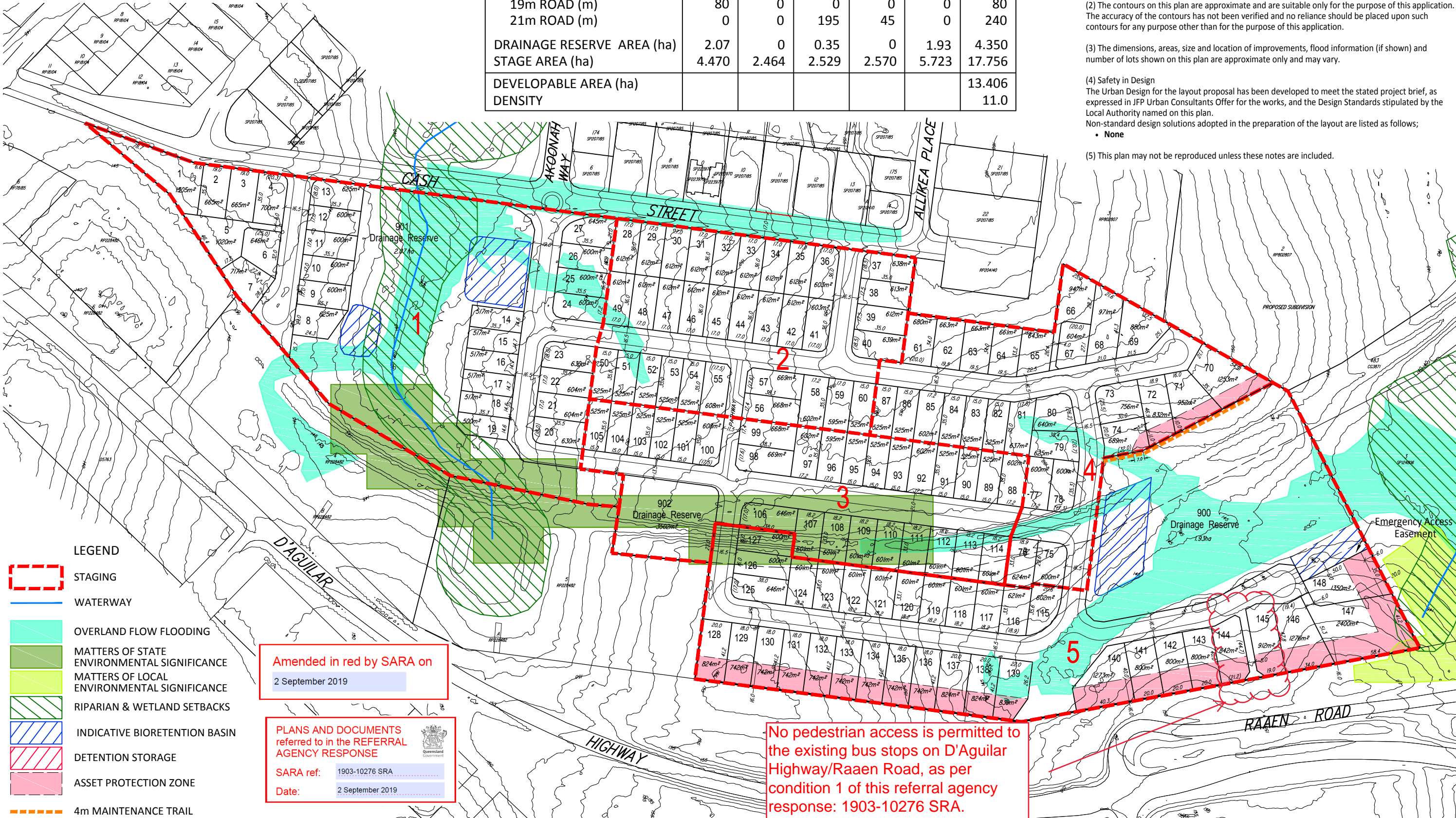
(2) The contours on this plan are approximate and are suitable only for the purpose of this application. The accuracy of the contours has not been verified and no reliance should be placed upon such contours for any purpose other than for the purpose of this application.

(3) The dimensions, areas, size and location of improvements, flood information (if shown) and number of lots shown on this plan are approximate only and may vary.

(4) Safety in Design
The Urban Design for the layout proposal has been developed to meet the stated project brief, as expressed in JFP Urban Consultants Offer for the works, and the Design Standards stipulated by the Local Authority named on this plan.

Non-standard design solutions adopted in the preparation of the layout are listed as follows;
• None

(5) This plan may not be reproduced unless these notes are included.



LEGEND

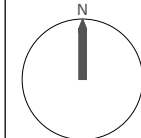
- STAGING
- WATERWAY
- OVERLAND FLOW FLOODING
- MATTERS OF STATE ENVIRONMENTAL SIGNIFICANCE
- MATTERS OF LOCAL ENVIRONMENTAL SIGNIFICANCE
- RIPARIAN & WETLAND SETBACKS
- INDICATIVE BIORETENTION BASIN
- DETENTION STORAGE
- ASSET PROTECTION ZONE
- 4m MAINTENANCE TRAIL

Amended in red by SARA on
2 September 2019

PLANS AND DOCUMENTS
referred to in the REFERRAL
AGENCY RESPONSE

SARA ref: 1903-10276 SRA
Date: 2 September 2019

NORTH:



SCALE:

SCALE: @ A3 1:2500

0 25 50 75 100 125 150 175

THIS SCALE SHOWN IS ORIGINAL DRAWING SCALE - (A3 SIZE)

DO NOT SCALE FROM THIS DRAWING - USE ONLY DIMENSIONS PROVIDED - IF IN DOUBT PLEASE ENQUIRE

| | | | | |
|----------|-----|----------|----|-----------------------------------|
| DESIGNED | TJM | CHECKED | GB | L.A. MORETON BAY REGIONAL COUNCIL |
| DRAWN | TJM | APPROVED | GB | COUNCIL REF |

ISSUES:

| | | | |
|--------|--|----------|-------|
| F | NEW APZ, EMT & MAINT TRAIL ADDED | 25-07-19 | SCP |
| E | LOTS 14 - 19 AMENDED | 08-07-19 | DWW |
| D | LOTS 14-19, 27 & ROUNDABOUT AMENDED | 28-06-19 | SCP |
| C | LAYOUT AMENDED | 30-05-19 | DWW |
| B | APZ, BIO BASINS & LOTS 148-149 AMENDED | 25-02-19 | SCP |
| A | ORIGINAL | 10-01-19 | TJM |
| ISSUE: | DETAILS: | DATE: | INIT: |

TITLE:

RECONFIGURATION PLAN
DFC (PROJECT MANAGEMENT) PTY LTD
CASH STREET, D'AGUILAR

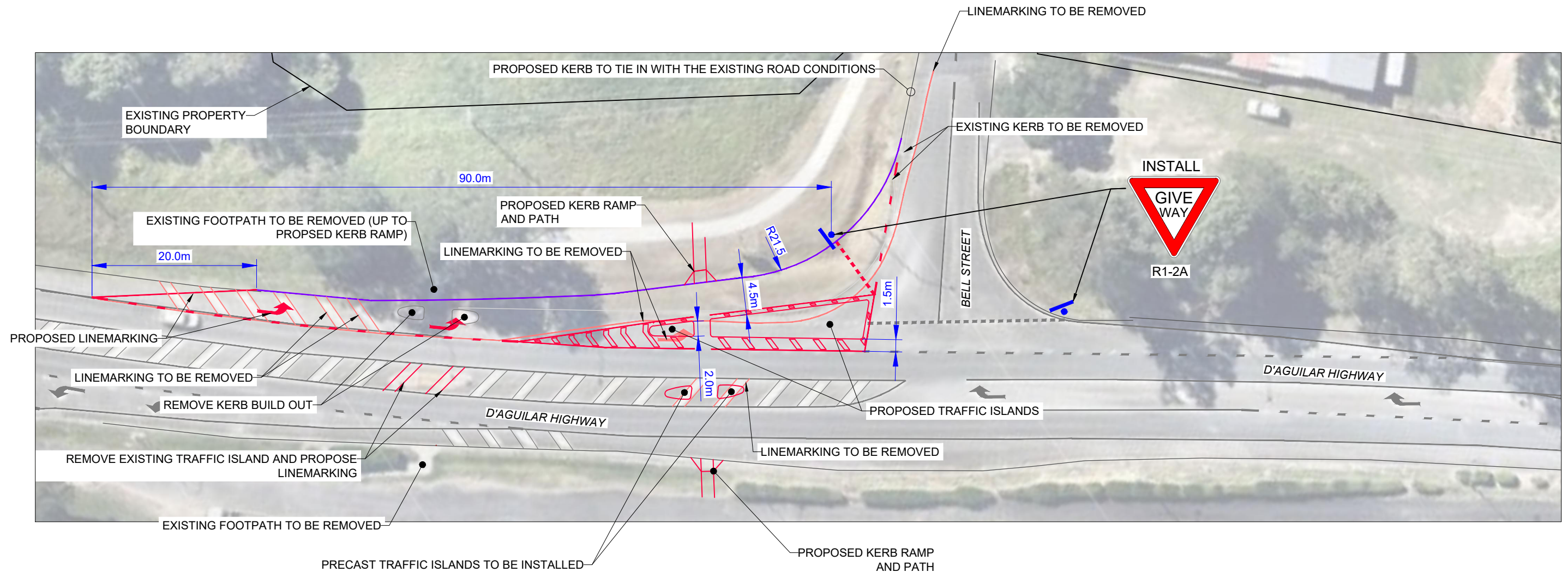
DETAILS:

JOB NUMBER: M2584P_DA1 R1 F

PLAN: ISSUE:

SHEET: 1 OF 1

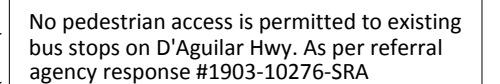
DATE: 25th July 2019

[illegible]

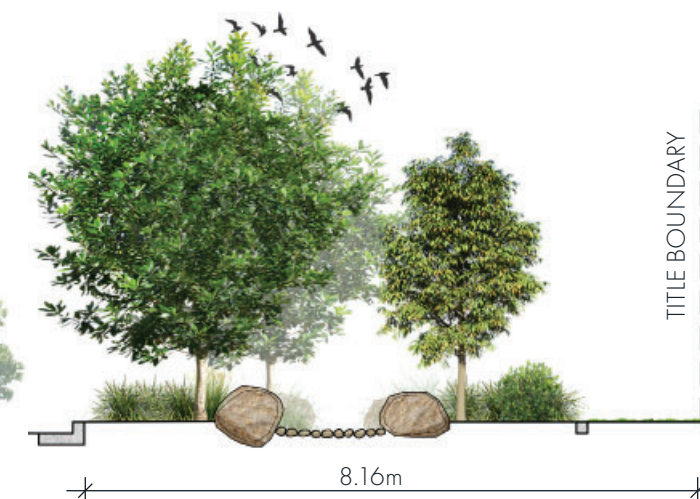
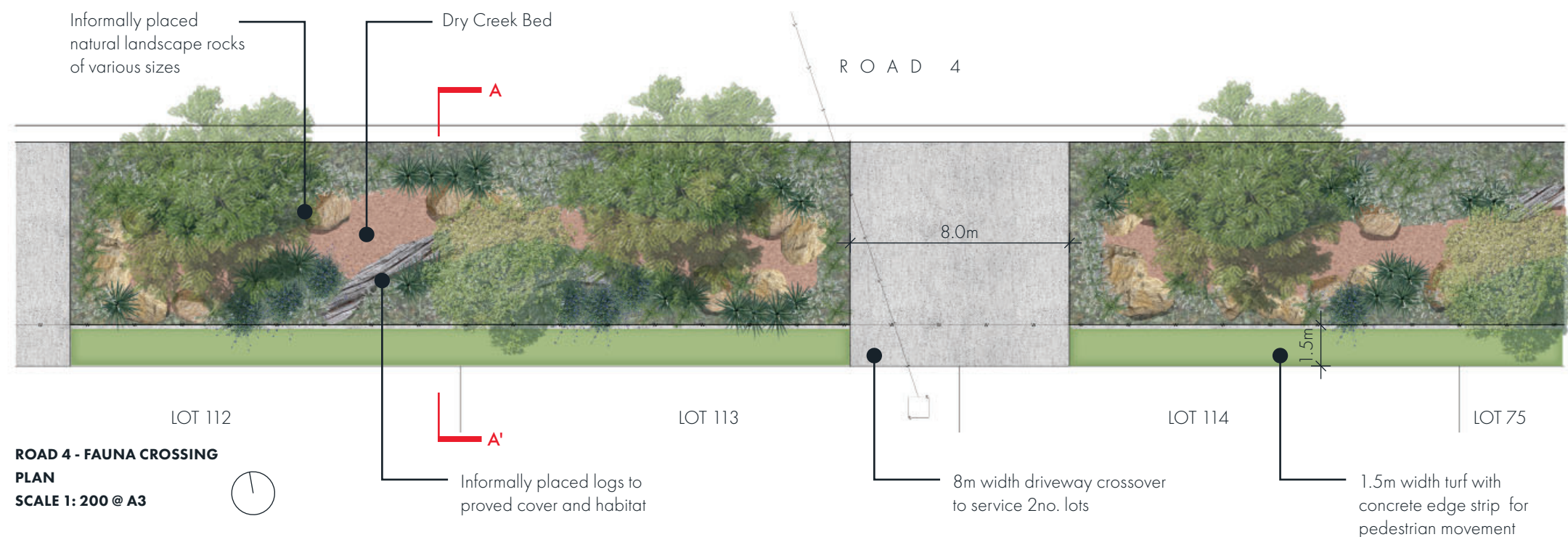
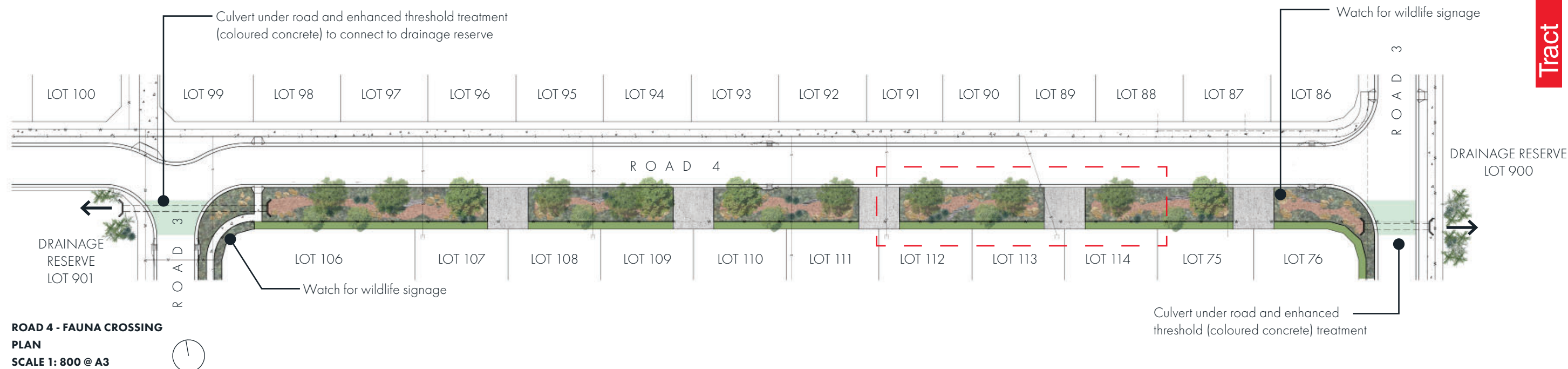
LOT 1 ON RP230991 &
LOT 2 ON RP80309
PARISH OF DURUNDUR
COUNTY OF CANNING
TOTAL AREA 17.756ha

NOTES

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| DETAILS: | | |
|-------------------|-------|--------|
| JOB NUMBER: | PLAN: | ISSUE: |
| M2584P_DA1 R1 I | | |
| SHEET: | | |
| 1 OF 1 | | |
| DATE: | | |
| 6th November 2019 | | |



SUGGESTED PLANT SCHEDULE

| Trees | | Shrubs | | Grasses & Groundcovers | |
|--------------------------------|---------------------|---------------------------------------|------------------------------|----------------------------|----------------------|
| <i>Elaeocarpus reticulatus</i> | Blueberry Ash | <i>Callistemon 'Little John'</i> | Little John Bottlebrush | <i>Dianella carulea</i> | Blue Flax Lily |
| <i>Lophostemon confertus</i> | Brush Box | <i>Callistemon 'Wilderness White'</i> | Wilderness White Callistemon | <i>Ficinia nodosa</i> | Knobby Club Rush |
| <i>Melaleuca leucadendra</i> | Weeping Paperbark | <i>Grevillea 'Robyn Gordon'</i> | Robyn Gordon Grevillea | <i>Lomandra hystrix</i> | Green Mat Rush |
| <i>Waterhousia floribunda</i> | Weeping Lilly Pilly | <i>Leptospermum polygalifolium</i> | Tantoon | <i>Lomandra longifolia</i> | Spiney Head Mat Rush |
| | | <i>Melaleuca thymifolia</i> | Honey myrtle | <i>Myoporum parvifolia</i> | Creeping Boobialla |
| | | <i>Westringia fruticosa</i> | Native rosemary | <i>Poa labillardierei</i> | Common Tussock Grass |
| | | | | <i>Themeda triandra</i> | Kangaroo Grass |

ROAD 4 - Fauna crossing with dry creek bed, informal landscape rockwork, logs and mass planting native species.

Landscape works are to provide cover and protection, habitat and a corridor for native fauna to travel between drainage reserves and landscape beyond.

Drawing Title

Project Name

Drawing No.

Revision

Date

Drawn




Checked

Project Principal

PROPERTY DESCRIPTION

LOT 1 ON RP230991 &
LOT 2 ON RP80309
PARISH OF DURUNDUR
COUNTY OF CANNING
TOTAL AREA 17.756ha

DEVELOPMENT SUMMARY: RESIDENTIAL LOTS

| COLOUR | MBRC LOT TYPE | FRONTAGE | NO. OF LOTS | % |
|---|---------------|--------------|-------------|------|
|  | D | >12.5m - 18m | 90 | 60% |
|  | E | >18m - 32m | 53 | 36% |
|  | F | >32m + | 5 | 4% |
| TOTAL | | | 148 | 100% |

NOTES

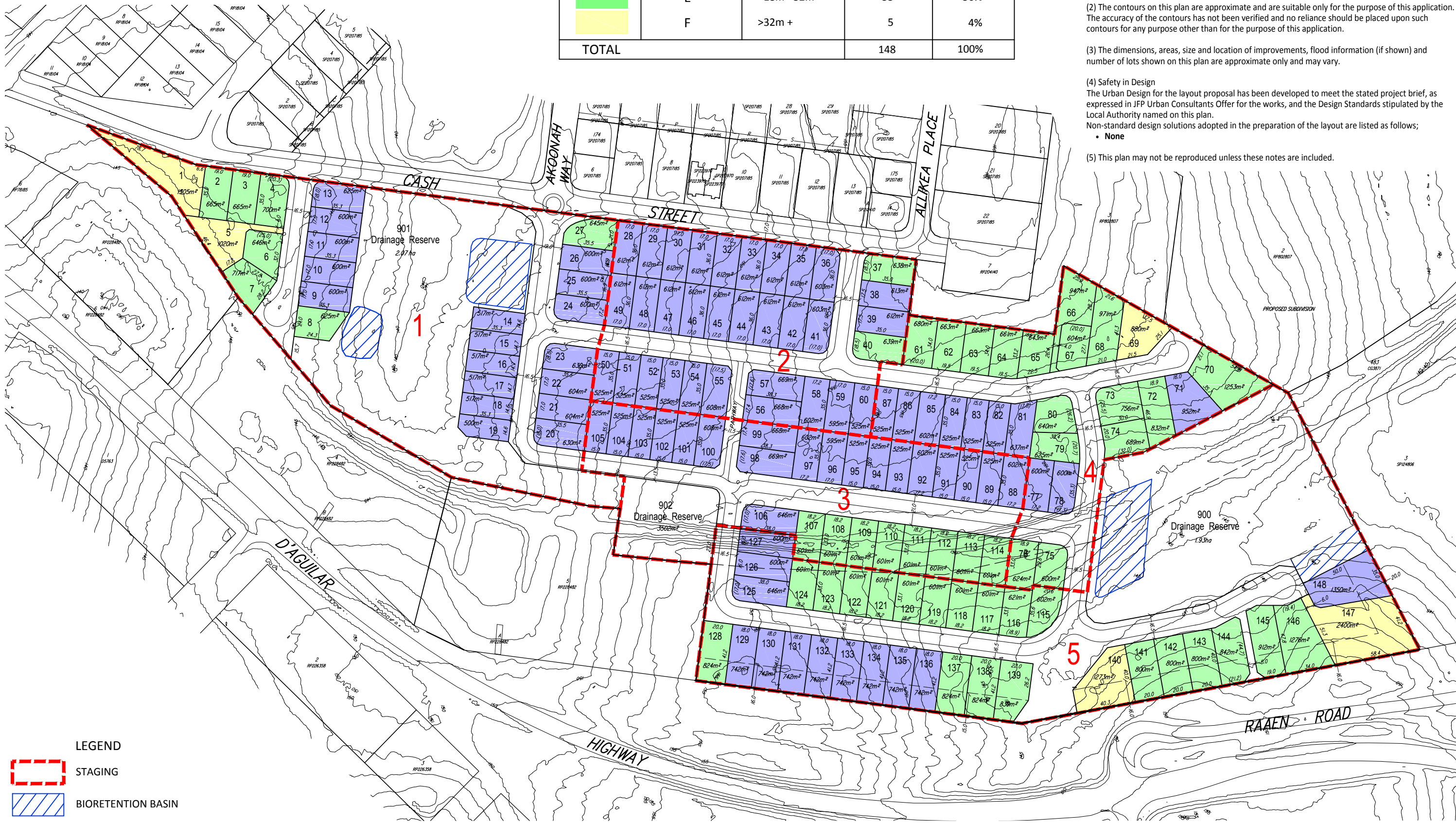
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LEGEND

-  STAGING
-  BIORETENTION BASIN

NORTH:

SCALE:

SCALE: @ A3 1:2500

0 25 50 75 100 125 150 175

THIS SCALE SHOWN IS ORIGINAL DRAWING SCALE - (A3 SIZE)
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|----------|-----|----------|----|-----------------------------------|
| DESIGNED | TJM | CHECKED | GB | L.A. MORETON BAY REGIONAL COUNCIL |
| DRAWN | TJM | APPROVED | GB | COUNCIL REF |

ISSUES:

| | | | |
|--------|----------------------------|----------|-------|
| C | LOT LAYOUT & TABLE AMENDED | 19-07-19 | DWW |
| B | LOT LAYOUT AMENDED | 28-06-19 | SCP |
| A | ORIGINAL | 25-02-19 | SCP |
| ISSUE: | DETAILS: | DATE: | INIT: |

TITLE:

PLAN OF DEVELOPMENT
DFC (PROJECT MANAGEMENT) PTY LTD
CASH STREET, D'AGUILAR

DETAILS:

JOB NUMBER: M2584P_DA1 02 C
SHEET: 1 OF 1
DATE: 19th July 2019

BRISBANE - SUNSHINE COAST - CENTRAL QLD
BRISBANE - JFP House
76 Ernest Street,
South Brisbane Qld 4101
P 07 3012 0100 W www.jfp.com.au

JFP
URBAN CONSULTANTS PTY LTD A.C.N. 050 414 045

PLANNERS
URBAN DESIGNERS
SURVEYORS
ENGINEERS
LANDSCAPE ARCHITECTS

ATTACHMENT 4

Infrastructure Charges Notice

ATTACHMENT 5

Appeal Rights

- (2) The person is taken to have engaged in the representative's conduct, unless the person proves the person could not have prevented the conduct by exercising reasonable diligence.
- (3) In this section—
 - conduct* means an act or omission.
 - representative* means—
 - (a) of a corporation—an executive officer, employee or agent of the corporation; or
 - (b) of an individual—an employee or agent of the individual.
 - state of mind*, of a person, includes the person's—
 - (a) knowledge, intention, opinion, belief or purpose; and
 - (b) reasons for the intention, opinion, belief or purpose.

Chapter 6 Dispute resolution

Part 1 Appeal rights

229 Appeals to tribunal or P&E Court

- (1) Schedule 1 states—
 - (a) matters that may be appealed to—
 - (i) either a tribunal or the P&E Court; or
 - (ii) only a tribunal; or
 - (iii) only the P&E Court; and
 - (b) the person—
 - (i) who may appeal a matter (the *appellant*); and
 - (ii) who is a respondent in an appeal of the matter; and

-
- (iii) who is a co-respondent in an appeal of the matter; and
 - (iv) who may elect to be a co-respondent in an appeal of the matter.
- (2) An appellant may start an appeal within the appeal period.
- (3) The *appeal period* is—
- (a) for an appeal by a building advisory agency—10 business days after a decision notice for the decision is given to the agency; or
 - (b) for an appeal against a deemed refusal—at any time after the deemed refusal happens; or
 - (c) for an appeal against a decision of the Minister, under chapter 7, part 4, to register premises or to renew the registration of premises—20 business days after a notice is published under section 269(3)(a) or (4); or
 - (d) for an appeal against an infrastructure charges notice—20 business days after the infrastructure charges notice is given to the person; or
 - (e) for an appeal about a deemed approval of a development application for which a decision notice has not been given—30 business days after the applicant gives the deemed approval notice to the assessment manager; or
 - (f) for an appeal relating to the *Plumbing and Drainage Act 2018*—
 - (i) for an appeal against an enforcement notice given because of a belief mentioned in the *Plumbing and Drainage Act 2018*, section 143(2)(a)(i), (b) or (c)—5 business days after the day the notice is given; or
 - (ii) for an appeal against a decision of a local government or an inspector to give an action notice under the *Plumbing and Drainage Act 2018*—5 business days after the notice is given; or

- (iii) otherwise—20 business days after the day the notice is given; or
- (g) for any other appeal—20 business days after a notice of the decision for the matter, including an enforcement notice, is given to the person.

Note—

See the P&E Court Act for the court's power to extend the appeal period.

- (4) Each respondent and co-respondent for an appeal may be heard in the appeal.
- (5) If an appeal is only about a referral agency's response, the assessment manager may apply to the tribunal or P&E Court to withdraw from the appeal.
- (6) To remove any doubt, it is declared that an appeal against an infrastructure charges notice must not be about—
 - (a) the adopted charge itself; or
 - (b) for a decision about an offset or refund—
 - (i) the establishment cost of trunk infrastructure identified in a LGIP; or
 - (ii) the cost of infrastructure decided using the method included in the local government's charges resolution.

230 Notice of appeal

- (1) An appellant starts an appeal by lodging, with the registrar of the tribunal or P&E Court, a notice of appeal that—
 - (a) is in the approved form; and
 - (b) succinctly states the grounds of the appeal.
- (2) The notice of appeal must be accompanied by the required fee.
- (3) The appellant or, for an appeal to a tribunal, the registrar, must, within the service period, give a copy of the notice of appeal to—

-
- (a) the respondent for the appeal; and
 - (b) each co-respondent for the appeal; and
 - (c) for an appeal about a development application under schedule 1, section 1, table 1, item 1—each principal submitter for the application whose submission has not been withdrawn; and
 - (d) for an appeal about a change application under schedule 1, section 1, table 1, item 2—each principal submitter for the application whose submission has not been withdrawn; and
 - (e) each person who may elect to be a co-respondent for the appeal other than an eligible submitter for a development application or change application the subject of the appeal; and
 - (f) for an appeal to the P&E Court—the chief executive; and
 - (g) for an appeal to a tribunal under another Act—any other person who the registrar considers appropriate.
- (4) The *service period* is—
- (a) if a submitter or advice agency started the appeal in the P&E Court—2 business days after the appeal is started; or
 - (b) otherwise—10 business days after the appeal is started.
- (5) A notice of appeal given to a person who may elect to be a co-respondent must state the effect of subsection (6).
- (6) A person elects to be a co-respondent to an appeal by filing a notice of election in the approved form—
- (a) if a copy of the notice of appeal is given to the person—within 10 business days after the copy is given to the person; or
 - (b) otherwise—within 15 business days after the notice of appeal is lodged with the registrar of the tribunal or the P&E Court.

- (7) Despite any other Act or rules of court to the contrary, a copy of a notice of appeal may be given to the chief executive by emailing the copy to the chief executive at the email address stated on the department's website for this purpose.

231 Non-appealable decisions and matters

- (1) Subject to this chapter, schedule 1 and the P&E Court Act, unless the Supreme Court decides a decision or other matter under this Act is affected by jurisdictional error, the decision or matter is non-appealable.
- (2) The *Judicial Review Act 1991*, part 5 applies to the decision or matter to the extent it is affected by jurisdictional error.
- (3) A person who, but for subsection (1) could have made an application under the *Judicial Review Act 1991* in relation to the decision or matter, may apply under part 4 of that Act for a statement of reasons in relation to the decision or matter.

- (4) In this section—

decision includes—

- (a) conduct engaged in for the purpose of making a decision; and
- (b) other conduct that relates to the making of a decision; and
- (c) the making of a decision or the failure to make a decision; and
- (d) a purported decision; and
- (e) a deemed refusal.

non-appealable, for a decision or matter, means the decision or matter—

- (a) is final and conclusive; and
- (b) may not be challenged, appealed against, reviewed, quashed, set aside or called into question in any other way under the *Judicial Review Act 1991* or otherwise,