PLANNING AND ENVIRONMENT COMMITTEE **10 MAY 2023**	**2**

DEVELOPMENT PERMIT FOR RECONFIGURING A LOT (2 LOTS INTO 68 LOTS, NEW ROAD AND BALANCE LAND) – 101R-103R COOPER ROAD AND 900L WILDERNESS WAY, MOUNT PETER – DIVISION 1

Ali Davey : 8/13/2504 : 7169371

PROPOSAL:	DEVELOPMENT PERMIT FOR RECONFIGURING A LOT (2 LOTS INTO 68 LOTS, NEW ROAD AND BALANCE LAND)
LANDOWNER:	A F MANASSERO
APPLICANT:	KROYMANS DEVELOPMENTS PTY LTD C/- CARDNO NOW STANTEC PO BOX 1619 CAIRNS QLD 4870
INTERESTED PARTIES:	CARDNO NOW STANTEC (QLD) PTY LTD KROYMANS DEVELOPMENTS PTY LTD ANTONIETTA FERNANDA MANASSERO ASPIRE TOWN PLANNING AND PROJECT SERVICES LANDPLAN LANDSCAPE ARCHITECTURE *Note: The identification of interested parties is provided on a best endeavours basis by Council Officers and may not be exhaustive.*
LOCATION OF SITE:	101R-103R COOPER ROAD & 900L WILDERNESS WAY, MOUNT PETER
PROPERTY:	LOT 100 ON SP322661 & LOT 900 ON SP322693
ZONE:	CONSERVATION AND LOW-MEDIUM DENSITY RESIDENTIAL
LOCAL PLAN:	MOUNT PETER LOCAL PLAN AREA
PLANNING SCHEME:	CAIRNSPLAN 2016 V3.1
REFERRAL AGENCIES:	NONE

NUMBER OF SUBMITTERS: NIL

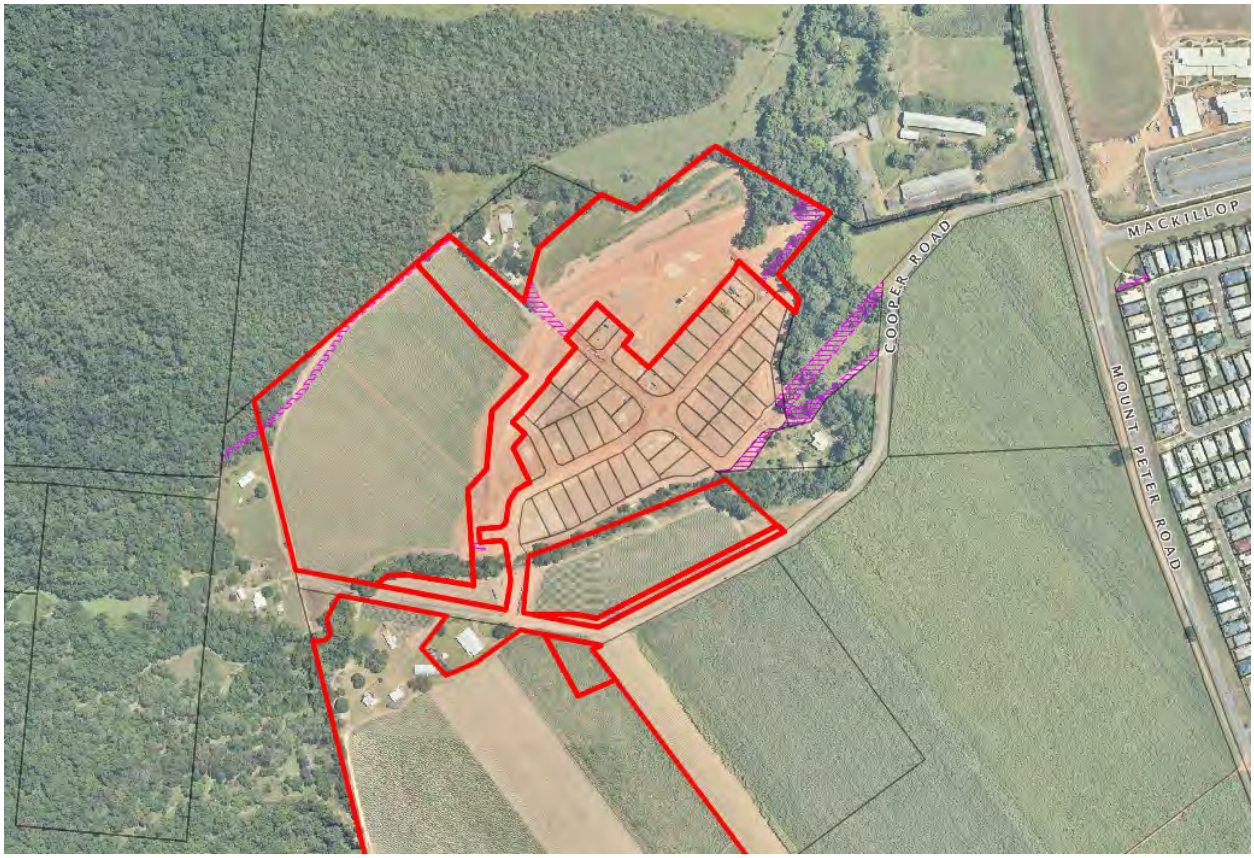
STATUTORY ASSESSMENT DEADLINE: EXPIRED

APPLICATION DATE: 19 AUGUST 2022

DIVISION: 1

ATTACHMENTS:
1. APPROVED PLAN(S) & DOCUMENT(S)
2. INFRASTRUCTURE CHARGES CALCULATIONS

LOCALITY PLAN



RECOMMENDATION

That Council approves the development application for Reconfiguring a Lot (2 Lots into 68 Lots, New Road and Balance Land) over land described as 101R – 103R Cooper Road and 900L Wilderness Way, Mount Peter, located at Lot 100 on SP322661 & Lot 900 on SP322693, subject to the following:

Approved Plans and Documents

1. **The development is to be completed and carried out generally in accordance with the following approved plans and reports submitted with the development application, except where modified by the conditions of this Development Permit at all times:**

Drawing Description	No.	Rev
Proposed Reconfiguration – Master Planned Community – Stages 1, 2, 2B, 3 & 4, Mount Peter	**Job No.: 304700741 – Q194095 Plan No.: Q194095-SP01 H**	**Dated 30th August 2022**
Road Safety Assessment – Rocky Creek Residential Subdivision Stage 1	**Q204098**	**Dated 21 April 2022**
Interim and Ultimate Works Plan	**Sheet 1 Drawing Number Q204085-07-CI-SK01**	**Revision 3 Dated 22 November 2022**
Interim and Ultimate Works Plan	**Sheet 2 Drawing Number Q204085-07-CI-SK02**	**Revision 3 Dated 22 November 2022**
Interim and Ultimate Works Plan	**Sheet 3 Drawing Number Q204085-07-CI-SK03**	**Revision 3 Dated 22 November 2022**
Interim and Ultimate Works Plan	**Sheet 4 Drawing Number Q204085-07-CI-SK04**	**Revision 3 Dated 22 November 2022**
Road Hierarchy and Key Plan	**Q204085-05-CI-SK012**	**Revision 1 Dated 23 March 2023**
Degraded Waterway Areas	**L7.01**	**Revision 01 Dated 9 February 2023**
Degraded Waterway Areas – Revegetation Management Plan	**L8.01**	**Revision 01 Dated 9 February 2023**
Degraded Waterway Areas – Landscape Specifications	**L9.01**	**Revision 01 9 February 2023**

Amended Plans and Documents

2. Amended plans and documents must be submitted generally in accordance with the following plans and documents submitted with the application, being:

Drawing Description	No.	Rev
Proposed Reconfiguration – Master Planned Community – Stages 1, 2, 2B, 3 & 4, Mount Peter	**Job No.: 304700741 – Q194095 Plan No.: Q194095-SP01 H**	**Dated 30th August 2022**
Pinecrest – Rocky Creek Stage 3 – Water Supply & Sewerage Assessment	**Q204085**	**Dated 23 February 2023**

But modified to reflect:

a. A minimum truncation of 6.4 metres for Lots 320 and 322. The amended plan must be submitted to Council in conjunction with an application for Council approval of the Plan of Subdivision.

Note: Lots 320 and 322 for Stage 3 have a truncation of 6m. The minimum requirement is 6.4m to comply with minimum verge in accordance with the Planning Scheme.

b. An updated Water Supply and Sewerage Master Plan accompanied by supporting calculations prepared/certified by a RPEQ must be provided which demonstrates how the development can be serviced and include the following:

i. The updated Water Supply and Sewerage Master Plan and network analysis must reflect the designed water network and service intent (including actual water main alignments, proposed ground levels, hydrant locations) and provide detailed model results that confirm compliance of the 'for construction' network with the *FNQROC Development Manual*. Provide all supporting hydraulic calculations;

ii. On the water reticulation plans as part of the Development Application for Operational Work, clearly identify each individual lot within the Stage 3 boundary that will require a notation to be placed on the rates file where the building envelope pressure is less than 30m in accordance Section D6.07 – 2 in the *FNQROC Development Manual*;

iii. Update the Water Supply and Sewerage Assessment to reflect the designed wastewater network and service intent (including sewer diameters and grades) and provide detailed calculations confirming compliance of the 'for construction' network with the *FNQROC Development Manual*. Provide all supporting hydraulic calculations;

iv. The 'Pinecrest – Rocky Creek Stage 3 Water Supply and Sewerage Assessment' dated 23 February 2023 is for Stage 3 only and references to other Stages or aspects of development are outside the scope of this approval; and

v. All elements of the 'Pinecrest – Rocky Creek Stage 3 Water Supply and Sewerage Assessment' dated 23 February 2023 which relate to subsequent stages of the Rocky Creek Development or the Pinecrest Development more broadly are not approved and of no effect until they are approved under the relevant development approval.

The Water Supply and Sewerage Master Plan must be provided to and endorsed by Council prior to the issue of a Development Permit for Operational Work.

Currency Period

3. This development approval, granted under the provisions of the *Planning Act 2016* (Qld), lapses six (6) years from the day the development approval takes effect, in accordance with the provisions of section 85 of the *Planning Act 2016* (Qld).

Timing of Effect

4. The conditions of the Development Permit must be satisfied prior to Council's approval of the Plan of Subdivision, except where specified otherwise in these conditions of approval.

5. Council approval of the Plan of Subdivision must occur simultaneously, or subsequent to, Council approval for the Plan of Subdivision for Development Permit 8/13/2495 (Rocky Creek Precinct – Stage 2B).

Limitation of Effect of Approval

6. This Development Permit relates to the lots contained in Stage 3 shown on the Approved Plan only.

Water Supply and Sewerage Works External

7. Undertake the following water supply and sewerage work external to the premises to connect the land to existing water supply and sewerage infrastructure prior to Council approval of the Plan of Subdivision:

a. Extend water infrastructure to connect the land to Council's existing water infrastructure at a point that has sufficient capacity to service the development.

The above work must be designed and constructed in accordance with the *FNQROC Development Manual*.

A plan of the works must be approved by Council prior to the issue of a Development Permit for Operational Work and constructed in accordance with the approved plans prior to Council approval of the Plan of Subdivision.

Water Supply and Sewerage Works Internal

8. Undertake the following water supply and sewerage works internal to premises:

a. **Provide a single internal sewer connection to each lot in accordance with the *FNQROC Development Manual*;**

b. **Extend water mains such that each allotment can be provided with a water service connection to the lot frontage; and**

c. **Any redundant sewer property connection(s) and water connection(s) must be decommissioned and removed.**

All the above works must be designed and constructed in accordance with the *FNQROC Development Manual*.

All works must be carried out in accordance with plan(s) approved under a Development Permit for Operational Work, to the requirements and satisfaction of Council prior to Council approval of the Plan of Subdivision.

Inspection of Sewers

9. **Prior to Council approval of the Plan of Subdivision, CCTV inspections of all constructed sewers must be undertaken. An assessment of the CCTV records must be undertaken by the developer's consultant and a report along with the footage submitted to Council for approval. Identified defects are to be rectified to the satisfaction of the Chief Executive Officer at no cost to Council.**

Sewer Easement

10. **Prepare for lodgement for registration at the Department of Resources (Titles Registry) a Sewer Easement in favour of Council, subject to Council's relevant standard terms document Registered Dealing Number 721329134, over Council sewers within the land that are on a non-standard alignment.**

    The easement documents required must be:

    a. **In the approved form (Form 9) for lodgement to the Titles Registry;**

    b. **Executed by each relevant landowner; and**

    c. **Endorsed by Council prior to Council approval of the Plan of Subdivision and lodgement to the Titles Registry.**

Waste Collection

11. **Sufficient area for two (2) wheelie bins each is to be available in the verge fronting lots 305, 308, 309 and 338.**

Revised Traffic Impact Assessment

12. Prior to an application for Operational Works for Stage 3, submit to Council for approval a revised RPEQ certified Traffic Impact Assessment (TIA) report for Rocky Creek Stage 3. The TIA must:

a. Be prepared by an appropriately qualified and experienced Traffic Engineer;

b. Consider and address the impacts of the proposed development on the existing transport network and Council's ultimate road network;

c. Be in accordance with Austroads *Guide to Traffic Management Part 12* and be up to date and current and not reference older partially superseded TIAs, Technical Memos or Road Safety Assessments; and

d. The TIA must include, but is not limited to, the following;

i. A road hierarchy master plan;

ii. The anticipated timing of Stage 3 of the development;

iii. The prediction of road traffic generated by the proposed development, traffic distribution and travel patterns, for Stage 3 of the development;

iv. Analysis of internal traffic circulation including provision of details of any intersections;

v. Intersection site distance assessments in accordance with relevant guidelines and identification of any augmentations to the existing road network required to provide safe and serviceable access to the proposed development. This includes any requirements for turn lanes and / or deceleration lanes;

vi. Analysis of the impact of development related traffic on Council roads and interim (Cooper / Mount Peter intersection and Mackillop / Mount Peter intersection) and ultimate (Mackillop / Mackillop West / Mount Peter intersection) intersections for Stage 3 of the development giving consideration to capacity and safety. The analysis must also consider any expected growth in the catchment external to the development. The assessment must identify the anticipated timing (number of lots) that will trigger the need for an upgrade of the road network to the ultimate form in accordance with the *FNQROC Development Manual* Design Guideline D3. SIDRA Movement Summary output tables for each intersection and SIDRA electronic files must be submitted to Council for review;

vii. **Details of turn warrant assessments and of ameliorative measures required to mitigate any identified impacts identified as a result of the analysis undertaken per Condition 12.d.vi, ensuring any proposed works are compatible with Council's ultimate road network plan;**

viii. **Provide the sugar cane rail line schedule and determine if further safety improvements, including possible extension of turning lane length are required for the Cooper Road / Mount Peter Road intersection;**

ix. **Consideration of pedestrian and cyclist connectivity requirements internally and access from external catchments; and**

x. **Details regarding access to public transport and the provision of bus stops and supporting infrastructure.**

The TIA report must include appropriate discussion and data to support the recommendations. All assumptions must be documented, and references detailed.

Note: This condition is imposed under section 145 of the Planning Act 2016 (Qld).

External Roadworks - Cooper Road (Trunk Infrastructure)

13. **Submit as part of the Operational Works application for Stage 3, detailed (for construction) design plans for the Cooper Road upgrade works under Condition 14. The detailed design plans must be:**

    a. **Certified by an RPEQ (traffic);**

    b. **In accordance Drawing Number Q204085-07-CI-SK01 to Q204085-07-CI-SK04, Revision 3, Cooper Road – Civil Works Interim and Ultimate Works Plan – Sheets 1 to 4 and dated 22/11/2022; and**

    c. **In accordance with the *FNQROC Development Manual*.**

14. **Prior to Council approval of the Plan of Subdivision for Stage 3, Cooper Road must be upgraded to the ultimate standard generally in accordance with Drawing Number Q204085-07-CI-SK01 to Q204085-07-CI-SK04, Revision 3, Cooper Road – Civil Works Interim and Ultimate Works Plan – Sheets 1 to 4 and dated 22/11/2022 and comprising the following minimum requirements:**

    a. **Two-lane median divided Sub-Arterial Trunk Road standard in accordance with the *FNQROC Development Manual*, D1;**

b. Intersection (roundabout) (LGIP Item IRF18) shown on Drawing Number Q204085-07-CI-SK03, Rev 3, Cooper Road – Civil Works Interim and Ultimate Works Plan – Sheet 3 and dated 22/11/2022;

c. 2 metre wide footpaths on both sides of the road; and

d. Category V3 major road lighting, located within the centre median, designed in accordance with the relevant current Road Lighting Standard *AS/NZS 1158* and the *FNQROC Development Manual* Sections D1 and D8.

Note: This condition is imposed under section 128(1) of the Planning Act 2016 (Qld).

External Works – Balance of Cooper Road (Non-trunk Infrastructure)

15. Prior to an application for Operational Works for Stage 3, prepare and submit to Council for approval RPEQ (traffic) certified preliminary design plans for the for the balance of Cooper Road servicing the development under Condition 17. The design must:

a. Be based on the Revised Traffic Impact Assessment required under Condition 12;

b. Incorporate, where relevant, safety recommendations listed in Road Safety Assessment – Rocky Creek Residential Subdivision Stage 1 prepared by Cardno / Stantec (21 April 2022), table 2-3; and

c. Be designed in accordance with the *FNQROC Development Manual* and the relevant Australian Standards, where applicable, unless otherwise approved by Council and endorsed by an appropriately qualified RPEQ Engineer.

16. Submit as part of the Operational Works application for Stage 3, detailed (for construction) design plans for the balance of Cooper Road servicing the development. The detailed design plans must:

a. Be certified by an RPEQ (traffic); and

b. Be in accordance with the preliminary design plans approved by Council under Condition 15.

17. Prior to Council's approval of the Plan of Subdivision for Stage 3, the balance of Cooper Road servicing the development must be upgraded to a Minor Collector in accordance with *FNQROC Development Manual* Standard Drawing S1006 and comprising the following minimum requirements:

a. A 7.5 metre wide sealed carriageway with 4.5 metre wide verges;

b. 2 metre wide footpath on one side of the road; and

c. Category PR3 minor road lighting designed in accordance with the relevant current Road Lighting Standard AS/NZS 1158 and the *FNQROC Development Manual* Sections D1 and D8.

Note: These conditions are imposed under section 145 of the Planning Act 2016 (Qld).

External Works – Cooper Road Intersection (Non-trunk Infrastructure)

18. Prior to an application for Operational Works for Stage 3, prepare and submit to Council for approval RPEQ (traffic) certified preliminary design plans for the following intersections under Condition 20:

a. Intersection (roundabout) shown on Drawing Number Q204085-07-CI-SK02, Rev 3, Cooper Road – Civil Works Interim and Ultimate Works Plan – Sheet 2 and dated 22/11/2022; and

b. Intersection (roundabout) shown on Drawing Number Q204085-07-CI-SK04, Rev 3, Cooper Road – Civil Works Interim and Ultimate Works Plan – Sheet 4 and dated 22/11/2022.

The design must be:

a. Designed in accordance with the *FNQROC Development Manual* and the Australian Standards where applicable, unless otherwise approved by Council and endorsed by an appropriately qualified RPEQ Engineer.

19. Submit as part of the Operational Works application for Stage 3, detailed (for construction) design plans for the intersections under Condition 18. The detailed design plans must:

a. Be certified by an RPEQ (traffic); and

b. Be in accordance with the preliminary design plans approved by Council under Condition 18.

20. Prior to Council's approval of the Plan of Subdivision for Stage 3, construct the following Council approved and RPEQ (traffic) certified intersections:

a. Intersection (roundabout) shown on Drawing Number Q204085-07-CI-SK02, Rev 3, Cooper Road – Civil Works Interim and Ultimate Works Plan – Sheet 2 and dated 22/11/2022; and

b. Intersection (roundabout) shown on Drawing Number Q204085-07-CI-SK04, Rev 3, Cooper Road – Civil Works Interim and Ultimate Works Plan – Sheet 4 and dated 22/11/2022.

Note: These conditions are imposed under section 145 of the Planning Act 2016 (Qld).

External Works – Cooper Road / Mount Peter Road Intersection Interim Upgrade (Non-trunk Infrastructure)

21. Prior to an application for Operational Works for Stage 3, prepare and submit to Council for approval an RPEQ (traffic) certified preliminary design for the Cooper Road / Mount Peter Road intersection interim upgrade under Condition 23. The design must be:

a. Based on the Revised Traffic Impact Assessment required under Condition 12; and

b. Designed in accordance with the *FNQROC Development Manual* and the relevant Australian Standards, where applicable, unless otherwise approved by Council and endorsed by an appropriately qualified RPEQ Engineer.

22. Submit as part of the Operational Works application for Stage 3, detailed (for construction) design plans for the Cooper Road / Mount Peter Road intersection interim upgrade. The detailed design plans must:

a. Be certified by an RPEQ (traffic); and

b. Be in accordance with the preliminary design plans approved by Council under Condition 21.

23. Prior to Council's approval of the Plan of Subdivision for Stage 3, construct the Council approved and RPEQ (traffic) certified Cooper Road / Mount Peter Road intersection interim upgrade.

Note: These conditions are imposed under section 145 of the Planning Act 2016 (Qld).

Street Layout and Design

24. The street layout and design must comply with the *FNQROC Development Manual*, to the satisfaction of the Chief Executive Officer. In particular:

a. The new internal roads as shown in the Road Hierarchy Plan (Q204085-05-CI-SK012, Rev 1, dated 23 March 2023) must be designed and constructed in accordance with Council's *FNQROC Development Manual*;

b. Provide a minimum of 0.5 spaces per lot for on-street parking;

c. Details for all internal four-way intersection treatments are required. All roundabouts must be in accordance with Council's Typical Bicycle Treatment; and

d. A temporary vehicle turn-around at the end of all partially constructed roads must be provided.

Plans incorporating the above requirements must be submitted prior to the issue of a Development Permit for Operational Work.

All works must be carried out in accordance with the plans approved as part of the Development Permit for Operational Work, to the requirements and satisfaction of Council prior to Council's approval of the Plan of Subdivision.

Footpath Master Plan

25. Prior to the issue of a Development Permit for Operational Work, the Applicant must submit a Footpath Master Plan for approval by Council. The Footpath Master Plan must include details on pedestrian and cyclist connectivity requirements internally and access from external catchments and to public transport infrastructure.

All Access Street or higher order roads must include a minimum 2.0 metre wide footpath in accordance with *FNQROC Development Manual*. The new section of footpath must match neatly to the existing footpath at both extents in relation to alignment and grade.

All footpaths must be designed and constructed in accordance with the requirements of the *FNQROC Development Manual*.

The footpath must be constructed prior to Council approval of the Plan of Subdivision.

Kerb Ramps

26. Create a safe pedestrian crossing point across the new internal road(s) by constructing kerb ramps in accordance with *FNQROC Development Manual* Standard Drawing S1016D prior to Council approval of the Plan of Subdivision.

Driveway (for Battle-Axe Lots Only – Lots 305, 308, 309 and 338)

27. Construct a concrete driveway (or other approved surface) extending from the back of the kerb for the full length of the access handle of Lots 305, 308, 309 and 338. Construction of the concrete driveway must be carried out in accordance with the *FNQROC Development Manual* Standard Drawing S1110 or as approved as part of a Development Permit for Operational Work. All works must be carried out to the requirements and satisfaction of Council prior to Council approval of the Plan of Subdivision.

Service Conduits

28. Design and construct all necessary underground service conduits, including water, electricity and telecommunications, with associated access pits, beside the driveway and finishing within the body of Lots 305, 308, 309 and 338. All works must be carried out to the requirements and satisfaction of Council prior to Council approval of the Plan of Subdivision.

Services Master Plan

29. A Services Master Plan must be submitted to Council in conjunction with the application for a Development Permit for Operational Work. The plan must include all civil infrastructure such as water, sewer, stormwater, street lighting, proposed driveway locations, street trees and any other essential infrastructure. The plan must demonstrate the placement of one (1) street tree per fifteen (15) metres spacing in accordance with Schedule 12A of the *Planning Regulation 2017*.

All elements must achieve the appropriate clearances from other infrastructure as required in the *FNQROC Development Manual* and/or relevant Australian Standards.

Traffic Management

30. Conduct a Risk Management Assessment of all safety risks likely to arise during the course of undertaking works on the road including the setting up, operating, changing and dismantling of a traffic guidance scheme. This assessment is to consider the general behaviour of road users, cyclists and pedestrians. Where the Risk Management Assessment determines works will impact the normal operations of the Local Government Managed Areas and Roads, the applicant must implement a Traffic Guidance Scheme and a copy of the plans must be submitted to Council for approval prior to implementation of the Traffic Guidance Scheme and prior to Commencement of Work.

Note: Where the Local Government Road is required to be partially or fully closed, please note that additional permits and approvals may be required. Please refer to Further Advice attached to this Permit.

Waterway Corridor

31. The boundary for all lots and roads adjacent to Stony Creek must be setback to allow for the natural function of the waterway, being the greater of either:

a. 10 metres measured perpendicular from the top of high bank; or

b. The area of land affected by the 1% AEP flood event.

A plan (or other suitable documentation) must be lodged with Council with the application for a Development Permit for Operational Work demonstrating the above requirements and prior to Council approval of the Plan of Subdivision.

Restoration of the Waterway Corridor (Stony Creek)

32. The Waterway Corridor for Stony Creek and areas adjacent to existing native vegetation to be retained must be restored and revegetated in accordance with the approved plans and documents and a Rehabilitation Plan to be submitted for assessment as part of the first Operational Work application for Stage 3, and must include the following:

a. Stage 3 Rehabilitation must be designed to accommodate the required 10 metre buffer from the top of bank. The 10 metre buffer must include restoration and revegetation of any degraded natural areas and a grassed area at a grade that can be accessed and traversed by maintenance machinery adjacent to the rear of lots; and

b. Eradication of all priority invasive and environmental weeds from the waterway and waterway buffer area.

All of the above works must be completed to the satisfaction of Council prior to Council approval of the Plan of Subdivision and maintained until the Final Works Acceptance.

Vegetation Protection and Clearing

33. Any proposed vegetation clearing from within the waterway or waterway buffer area defined as 10 metres from the top of the bank, must not commence until a Development Permit for Operational Work (Vegetation Clearing) has been obtained.

Note: A Tree Management Plan and Survey by a suitably qualified person should be submitted in conjunction with an application for Operational Work and demonstrate any proposed clearing of assessable vegetation damage.

Detailed Landscaping Plan

34. Undertake landscaping of the site and street frontages of new roads in accordance with the *FNQROC Development Manual* and in accordance with a Detailed Landscaping Plan prepared by a suitably qualified Landscape Architect or Landscape Designer. In particular, the plan must show:

a. Existing vegetation boundary extent proposed to be retained and/or removed;

b. Restoration and revegetation of degraded areas within the waterway and waterway buffer area pursuant to Condition 32 (Restoration of the Waterway Corridor (Stony Creek);

c. Treatment to barriers in accordance with the *FNQROC Development Manual* (i.e. post and rail, access gates) to restrict public access and encroachment within the area rear of the lots adjoining the Waterway Corridor and enable Council maintenance;

d. Specifications for the staging and methodology for weed management and removal on-site;

e. Location of services, driveways, street lighting and street trees in accordance with an approved Services Master Plan pursuant to Condition 29 (Services Master Plan);

f. Location of footpaths in accordance with an approved Footpath Master Plan pursuant to Condition 25 (Footpath Master Plan);

g. Planting of the road verges with trees, using native, bushfire-resistant species, having regard to any service locations and lot access crossover constraints;

h. Inclusion of all requirements as detailed in other relevant conditions included in this Approval, with a copy of this Development Approval to be given to the applicant's Landscape Architect / Designer.

Note: A list of suitable verge tree species for planting adjacent to infrastructure and services and revegetation species are attached as Appendix D & E within FNQROC Development Manual Cairns Regional Council's Specific Requirements.

A copy of the Detailed Landscaping Plan that aligns with the Rehabilitation Plan must be submitted for approval with the first Development Application for Operational Work for Stage 3.

The required landscaping, restoration and civil works must all align with the stage boundaries shown on the approved plans.

All landscaping works must be installed in accordance with the endorsed Detailed Landscaping Plan. All landscape work must be completed to the satisfaction of Council prior to Council approval of the Plan of Survey and maintained until Final Works Acceptance.

Drainage

35. The applicant is required to submit a Site Based Stormwater Management Plan (SBSMP) for the development.

This document must nominate the required soil and water management measures that are to be installed/implemented on the subject site to control the severity and extent of soil erosion, pollutant transport and any other water quality issues that may arise on the subject site (or on adjacent properties as a result of development of the subject site) during the construction phase and post-construction phase of the development.

The SBSMP must be in accordance with the requirements of the *Environmental Protection Act 1994* (Qld), the *Queensland Urban Drainage Manual*, and the *FNQROC Development Manual*; and must be submitted prior to works commencing on the subject site.

All works must be carried out in accordance with the approved plans, to the requirements and satisfaction of Council.

36. Design and construct, at no cost to Council, all necessary stormwater management and drainage works (internal and external to the site) required to satisfactorily drain the subject land.

The subject land must be drained to the satisfaction of Council, in particular:

a. Drainage infrastructure in accordance with the *FNQROC Development Manual*; and

b. Detailed design drawings are to be provided to Council for approval.

The above drainage measures must be submitted in conjunction with the Development Application for Operational Work for the development. All works must be carried out in accordance with the approved plans and to the requirements and satisfaction of Council.

Concentration of Stormwater

37. The proposed development must not create ponding nuisances and/or a concentration of stormwater flows to adjoining properties at all times.

Lawful Point of Discharge

38. All stormwater from the property must be directed to a lawful point of discharge such that it does not adversely affect surrounding properties or properties downstream, in accordance with the *Queensland Urban Drainage Manual*, Fourth Edition (2016) at all times.

Stormwater Quality Improvement Devices

39. Council must approve the location of any Stormwater Quality Improvement Devices (SQIDS) prior to installation. SQIDS (e.g. GPTs) shall include a removal basket equivalent or similar to the CleansAll product, to allow simple and economical maintenance of the device. They shall be positioned to allow for economic and efficient maintenance operations and will require a reinforced concrete hard standing area to be provided from the edge of the carriageway to the SQID location. Vehicular access shall be provided to the hard standing area in the form of a crossover or lay back kerb, constructed in accordance with the provisions of the *FNQROC Development Manual*, and access from the public road reserve to the SQID must remain unrestricted.

Sediment and Erosion Control

40. Prepare and provide to Council for approval an Erosion and Sediment Control Plan (ESCP) to be implemented on the site. The requirements of the ESCP must be adopted and implemented prior to discharge of water from the site, such that no external stormwater flow from the site adversely affects surrounding or downstream properties (in accordance with the requirements of the *Environmental Protection Act 1994* (Qld), *FNQROC Development Manual* and the *International Erosion Control Association 2008 Guidelines*).

41. During construction, the contractor must implement a suitable dust management strategy to minimise dust nuisance on adjacent properties. Details of the dust management strategy must be incorporated into the ESCP and be noted on the contractors ESCP.

42. All reasonable and practicable measures must be taken to prevent pollution entering existing creeks, waterways or drainage lines, as a result of silt run-off, oil and grease spills from any machinery. Wastewater as a result of cleaning equipment must not be discharged directly or in-directly to any watercourses, stormwater systems or private properties (in accordance with the requirements of the *Environmental Protection Act 1994* (Qld), the *FNQROC Development Manual* and *Best Practice Erosion & Sediment Control – IECA Australasia*, November 2008).

Open Channels

43. Open channels must be designed and constructed in accordance with Section D4.12 of the *FNQROC Development Manual* and must have smooth transitions with access provisions for maintenance and cleaning prior to Council approval of the Plan of Subdivision.

Allotment Drainage

44. All inter allotment drainage must be conveyed by above ground open channel catch drains as per the requirements of Section D4.13 of the *FNQROC Development Manual* at all times.

Private Drainage Assets

45. All rear allotment drainage pits and associated pipework contained within the lot boundaries of this development site shall be private infrastructure and shall not become an asset of Council, at all times.

Allotment Drainage to Drainage Reserve or Creek

46. All lots must drain towards the road reserve, drainage reserve or adjacent creek, stream or defined waterway unless otherwise approved by council. All allotments that do not drain towards a road frontage shall be provided with stormwater services in accordance with Section D4.13.2.a of the *FNQROC Development Manual,* at all times.

Electrical Design

47. Underground electricity reticulation must be designed and provided to service the development in accordance with the requirements of Section D8.06 of the *FNQROC Development Manual* prior to Council approval of the Plan of Subdivision.

Electricity Supply

48. Each lot must be connected to the electricity network in accordance with the *FNQROC Development Manual* and the relevant electricity providers standards Prior to Council approval of the Plan of Subdivision.

An underground electricity reticulation must be provided to the subdivision in accordance with the requirements of the *FNQROC Development Manual*, with the connection point being a service pillar installed by Ergon Energy at the property boundary.

Telecommunications Supply

49. Each lot must be connected to the telecommunications network in accordance with section D8.05 of the *FNQROC Development Manual* prior to Council approval of the Plan of Subdivision.

Electrical Transformer

50. Any padmount transformer must be installed on site and positioned in accordance with the following requirements prior to Council approval of the Plan of Subdivision:

a. Not located on land used for open space or sport and recreation purposes;

b. Screened from view by landscaping, sightscreens and/or fencing;

c. Accessible for maintenance in accordance with the relevant utility provider;

d. Must be located clear of footpaths;

e. Must not be located over existing infrastructure; and

f. In new residential subdivisions, located in road reserve.

Evidence of Electrical and Telecommunication Connections

51. Provide Council with evidence of the agreement to provide an electricity supply and telecommunication services for each new lot shown on the approved plan. Such evidence must be in the form of a "Certificate of Electricity Supply" or "Certificate of Electrical Acceptance".

The confirmation from the telecommunications provider must be in the form of a receipt for the full payment of the telecommunications "Development Application" or alternatively, a copy of the telecommunications provider "Council Letter".

The above evidence must be provided rior to Council approval of the Plan of Subdivision.

Electrical and Street Lighting Plans

52. Design and provide for endorsement by Council prior to Commencement of Work, layout plans for telecommunication, electrical services and road lighting generally in accordance with Section D8 of the *FNQROC Development Manual*.

The application must include evidence in the form of detailed plans which show the locations of all existing and approved civil infrastructure, including water, sewer, drainage, road, footpaths and any existing or proposed telecommunication, lighting and electrical services.

Note: Fees and charges apply as per the Council fees and charges schedule.

Offsets for Electrical and Telecommunication Services

53. All electrical and telecommunication services must be located within the road reserve at a distance of 0.3m – 1.2m from the property boundary, unless otherwise approved prior to Council approval of the Plan of Subdivision.

Street Lighting

54. Provide the following arrangements for the installation of public street lighting within the subdivision:

a. The application must include evidence in the form of detailed plans which show the locations of all existing and approved civil infrastructure, including water, sewer, drainage, road, footpaths and any existing or proposed telecommunication, lighting and electrical services.

Note: Fees and charges apply as per the Council fees and charges schedule;

b. A Rate 2 lighting scheme is to be designed in accordance with the relevant current Road Lighting Standard AS/NZS 1158 and the *FNQROC Development Manual*. The Rate 2 lighting scheme must be certified by a suitably qualified electrical/lighting Registered Professional Engineer Queensland;

c. The applicable lighting category is to be determined from the Street and Road Hierarchy Table D1.1 and the corresponding applicable Lighting Categories Table D8.1 in the *FNQROC Development Manual*. The lighting scheme must demonstrate that light pole locations align with common property boundaries, represent the permitted design spacing, and that there are no conflicts with vegetation to be retained, stormwater, driveways, kerb inlet pits and other services;

d. The design must provide the applicable illumination level specified in the current Road Lighting Standard AS/NZS 1158 at the following road elements:

i. Intersections;
ii. Pedestrian refuges;
iii. Cul-de-sacs;
iv. Bus stops;
v. Local Area Traffic Management (LATM) Devices (including roundabouts); and
vi. LATM Devices are to be shown on the civil layout design. The electrical services and street lighting design must be submitted in accordance with Ergon Energy's latest Distribution Design Drafting Standard;

e. The lighting scheme must be approved by Council prior to the issue of a Development Permit for Operational Work.

f. Where a new intersection is formed on an existing roadway for the purpose of accessing a new subdivision development or an existing intersection is to be upgraded as part of the Development Approval, the intersection and existing road approaches must be provided with street lighting for a distance equivalent to at least two (2) spans either side of the intersection to the relevant Lighting Category; and

g. All new lighting columns are to be of steel construction with LED luminaires installed at a zero-degree upcast and underground service, and all existing Ergon Energy timber street light poles are to be recovered.

The approved Street Lighting Scheme must be fully constructed and completed prior to Council approval of the Plan of Subdivision.

Damage to Infrastructure and Land

55. Where any part of Council's existing infrastructure or land is damaged as a result of construction activities occurring on the land, including but not limited to; mobilisation of heavy construction equipment, stripping, grubbing and vegetation damage, notify Council immediately of the affected infrastructure or land and have it repaired, replaced or reinstated at no cost to Council prior to Council approval of the Plan of Subdivision and at all times.

<u>FURTHER ADVICE</u>

Further Approvals Required to Carry out the Development:

1. The following further approvals are required prior to carrying out the development generally in accordance with the approved plan(s) and drawings:

- **Development Permit for Operational Work;**
- **Development Permit for Plumbing Work.**

Planning Laws

2. Information relating to the Planning Act 2016 (Qld), Planning Regulation 2017 (Qld) and Development Assessment Rules is located on the Queensland Government's planning website.

Definitions

3. All terms used in this development approval have those definitions as defined under the *Planning Act 2016* (Qld) and *Planning Regulation 2017* (Qld) (as at the date of the approval), Queensland Development Code and CairnsPlan 2016.

To the extent of any inconsistency, the order of precedence of the above instruments is as follows:

a. *Planning Act 2016* (Qld);

b. *Planning Regulation 2017* (Qld);

c. Queensland Development Code;

d. CairnsPlan 2016; and

e. *FNQROC Development Manual*.

FNQROC Development Manual

4. Access to *FNQROC Development Manual*, Local Laws, CairnsPlan 2016 and other referenced planning scheme policies are located on Council's website – www.cairns.qld.gov.au.

Infrastructure Charges Notice

5. A charge levied for the supply of trunk infrastructure is payable to Council in accordance with Council's Infrastructure Charges Resolution No. 2 of 2021 and the Infrastructure Charges Notice, a copy of which is attached for reference purposes only.

The original Infrastructure Charges Notice will be provided under cover of a separate letter.

The amount in the Infrastructure Charges Notice has been calculated according to Council's Infrastructure Charges Resolution.

Please note that this Decision Notice and the Infrastructure Charges Notice are stand-alone documents. The *Planning Act 2016* (Qld) confers rights to make representations and appeal in relation to a Decision Notice and an Infrastructure Charges Notice separately.

The amount in the Infrastructure Charges Notice is subject to index adjustments and may differ at the time of payment. Please contact Council's Development Assessment Team for review of the charge amount prior to payment.

The time when payment is due is contained within the Infrastructure Charges Notice.

Weeds, Pest Animals and Ants

6. Biosecurity Queensland of the Department of Agriculture and Fisheries leads the Queensland Government's efforts to prevent, respond to and recover from pests and diseases threatening agricultural prosperity, the environment, social amenity and human health. All landscape materials, including but not limited to, soils, mulch, grass, gravel, potted or ground plants, pavers and timber used in landscape treatments must be free from weeds, pest animals and ants.

Removal of Protected Vegetation

7. This development approval does not approve or authorise the removal of vegetation that is otherwise protected under separate State or Federal legislation, including under the following:

a. *Environmental Protection and Biodiversity Conservation Act 1999* (Cth);

b. *Nature Conservation Act 1999* (Qld); and

c. *Vegetation Management Act 1999* (Qld).

For further information see: https://www.qld.gov.au/environment/land/management/vegetation/damage.

Native Wildlife

8. Prior to any vegetation damage, an inspection to determine the possible presence of native wildlife and animal breeding places must be undertaken by a suitably qualified and experienced spotter/catcher. The assessment must include the identification of any breeding places for any Endangered/Vulnerable or Near Threatened animal species, special least concern or colonial breeding species prior to the removal of any trees and/or vegetation as per the requirements of section 332 of the *Nature Conservation (Wildlife Management) Regulation 2006* (Qld). The Department of Environment and Science must be contacted where any Endangered, Vulnerable or Near Threatened native wildlife is found to be present in any area subject to works.

Environmental Protection and Biodiversity Act (Cth)

9. The *Environmental Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) applies to an action that has, will have, or is likely to have a significant impact on matters of national environmental significance.

Further information on the EPBC Act and a copy of the *Significant Impact Guidelines 1.1 – Matters of Environmental Significance* (2013) can be obtained from the Department of Agriculture, Water and Environment at https://www.awe.gov.au/environment/epbc/publications/significant-impact-guidelines-11-matters-national-environmental-significance.

This approval does not negate the requirement for compliance with other relevant State and Federal statutory requirements, particularly with respect to the disturbance of Spectacled Flying Fox communities. For further information consult with the Queensland State Department of Environment and Science and the Federal Department of Agriculture, Water and Environment.

Yellow Crazy Ants

10. **Yellow crazy ants are designated as invasive biosecurity matter under the *Biosecurity Act 2014* (Qld). All parties (whether landholders or not) are required to take all reasonable measures to prevent the movement of yellow crazy ants. This includes restrictions on the movement of any materials deemed to be infested with yellow crazy ants. For further information contact the Department of Environment and Science – https://www.daf.qld.gov.au/business-priorities/biosecurity/policy-legislation-regulation/biosecurity-act-2014/biosecurity-matter-report/restricted-matter.**

Environmental Nuisance

11. **Construction or operational activities, including but not limited to, the operation of mechanical plant and equipment, must not cause an 'environmental nuisance' within the meaning of the *Environmental Protection Act 1994* (Qld) to any sensitive receptor as stated within Schedule 1 of the *Environmental Protection (Noise) Policy 2019* (Qld).**

    Noise from air-conditioning units, swimming and spa pool filters, service equipment or other mechanical equipment must not emanate from the subject land to a degree that would in the opinion of an Authorised Person (officer) of Council, create an environmental nuisance having regard to the provisions of Chapter 8 Part 3B of the *Environmental Protection Act 1994* (Qld).

Cyclone Watch Site Management

12. **All building site managers must take all action necessary to ensure building materials and/or machinery on construction sites are secured immediately following the first cyclone watch and that relevant emergency telephone contacts are provided to Council Officers, prior to commencement of works.**

Connections to, Alteration or Realignment of Council Infrastructure

13. **Where development works require the connection to, alteration, removal or realignment of Council infrastructure or impact on other public utility infrastructure (e.g. telecommunications, electricity and gas), obtain the necessary approvals from the relevant public utility authority prior to works commencing.**

    All connections or disconnection of water infrastructure must be undertaken by Council at the Applicant's cost.

    Connection to, alteration, removal or realignment of Council infrastructure includes (but is not limited to) fire hydrants, water service meters, sewer maintenance hole covers, stormwater drainage, reinstatement of maintenance hole covers, stormwater drainage, crossovers, footpaths, road pavement, kerb and channel, kerb ramps, medians, traffic islands, road furniture, signage and line-marking.

Dial Before You Dig

14. **Undertake a 'Dial Before You Dig' search and all information is to be verified and services located on site. Council accepts no responsibility for damaged assets as a result of these works. All damaged Council infrastructure is to be returned/replaced to an as-new state before works acceptance is issued.**

Future Compliance

15. **This approval does not negate the requirement for compliance of any future use with CairnsPlan 2016 or any future in force planning schemes, all other relevant Local Laws and other statutory requirements.**

Road Closures and Works on a Local Government Road

16. **Road Closures and Works on a Local Government Road require further approvals from Cairns Regional Council that are not covered by this Permit. An Application for a Temporary Road Closure is required where an activity on Council managed road or footpath occurs and where the activity will create an interference with the normal flow of traffic or pedestrian movement. An activity pertains to construction works undertaken within the road reserve. Applicants should allow additional time before planned works commence to obtain the required approvals.**

EXECUTIVE SUMMARY

Council is in receipt of a Development Application for a Development Permit for Reconfiguring a Lot (2 Lots into 68 Lots, New Road and Balance Land) at 101R-103R Cooper Road and 900L Wilderness Way, Mount Peter, formally described as Lot 100 on SP322661 and Lot 900 on SP322693.

The development seeks to subdivide the existing balance parcel into 68 residential lots ranging in area from 500m^2 to 2,328m^2. The development is known as Stage 3 of Rocky Creek within the Pinecrest Master Planned Community Structure Plan.

The subject site is located within the Conservation Zone and Low-Medium Density Residential Zone of the CairnsPlan 2016 v3.1. The development is only occurring on the part of the site within the Low-Medium Density Residential Zone. The site is also contained within the Mount Peter Local Plan area. The site is affected by the following overlays:

- Airport Environs;
- Bushfire Hazard;
- Flood and Inundation Hazards;
- Hillslopes;
- Landscape Values;
- Natural Areas;
- Potential Landslip Hazard; and
- Transport Network.

The application is Code Assessable within the Low-Medium Density Residential Zone of the CairnsPlan 2016 v3.1.

The development application did not require any referrals to a Referral, Advice or Third-Party Advice agency.

The application has been assessed in accordance with the legislative framework for Code Assessment, including the *Planning Act 2016*, *Planning Regulation 2017*, Development Assessment Rules, the applicable benchmarks contained in CairnsPlan 2016 v3.1. The development application is recommended for approval, subject to conditions of approval.

TOWN PLANNING CONSIDERATIONS

Background

The subject land was recently used for sugar cane cultivation and is now subject to residential development under the Pinecrest Master Planned Community (PMPC) Structure Plan. More broadly, the site is located within the Mount Peter Local Plan Area, which is identified as one of the major urban growth corridors in the Cairns Region. The Purpose of the Local Plan is to facilitate a well-planned and integrated urban development for new communities in the southern growth corridor.

It is acknowledged that Mount Peter has been identified as the major growth corridor for Cairns, with extensive planning completed by Council in conjunction with the State Government. The area was previously declared a Master Planned Area by the State; however, this declaration was later rescinded, with the local plan incorporated into the current Planning Scheme adopted in 2016.

Council have issued decisions on nine (9) previous development applications over the land, which are summarised below:

Approval type	Ref.	Precinct	Stage	Date	Doc #
Preliminary Approval	8/13/2277	The Grove	1	14 August 2020	#6457448
Development Permit	8/13/2307	Rocky Creek	1	19 January 2021 (Negotiated Decision)	#6575324
Preliminary Approval	8/13/2318	PMPC Structure Plan	-	12 November 2021	#6933427
Preliminary Approval	8/13/2357	Rocky Creek	2	21 May 2021	#6662859
Development Permit				16 November 2021 (Negotiated Decision)	#6797876
				4 October 2022 (Minor Change)	#7051138
Development Permit	8/13/2384	Rocky Creek (boundary realignment)	-	25 June 2021	#6684650
Development Permit	8/13/2479		-	12 July 2022	#7002146
Development Permit	8/13/2276		-	9 April 2020	#6385693
Development Permit	8/13/2495	Rocky Creek	2B	23 December 2022 (Negotiated Decision)	#7104171

Several Development Permits for Operational Work have been granted following these applications.

Site and Surrounds

The subject site is located to the west of the Bruce Highway within Mount Peter with Stage 3 located on the western/north-western portion of the subject site.

The site generally slopes from the west where it meets the lower slopes of the Lamb Range to the south-east. Stony Creek traverses the southern part of the site from west to east. The banks of the creek are generally densely vegetated with much of the vegetation being identified as Regulated Vegetation (Category R) per the State Government Vegetation Mapping.

The portion of the site subject of this application currently appears to be used for cane farming and is accessed from Cooper Road.

Proposal

The proposal involves the subdivision of the two parent lots to create 68 residential lots, new roads and balance land. The proposed lots range in size from 500m^2 to 2,328m^2. New roads are proposed to be constructed within Stage 3 in accordance with the FNQROC Development Manual including footpaths throughout the development. The development will be connected to the external road network via upgrades to Cooper Road.

Materials Assessed in the Application

The applicant provided the following materials during the assessment process:

- Planning Assessment Report prepared by *Cardno*;
- Plans of Development prepared by *Stantec*;
- Response to Information Request prepared by *Cardno now Stantec* including the following:
  - Water Supply and Sewerage Master Plan prepared by *Cardno now Stantec*;
  - Rocky Creek Stage 3 Traffic Impact Assessment prepared by *Cardno*;
  - Traffic Technical Memo prepared by *Stantec*;
  - Preliminary Bulk Earthworks Plan prepared by *Stantec*;
  - Rocky Creek Stage 3 Rehabilitation Plan prepared by *Landplan Landscape Architecture*;
  - Electrical Padmount Advice prepared by *SPA Consulting Engineers*;
  - Tenure Master Plan prepared by *Stantec*; and
  - Public Open Space and Landscape Master Plan prepared by *Landplan Landscape Architecture*;
- Response to Further Advice prepared by *Aspire Town Planning and Project Services* and *Stantec* including the following:
  - Preliminary Drainage Study/Technical Memo prepared by *Stantec*.

These materials have been considered in the assessment of the application.

LEGISLATIVE FRAMEWORK

Statutory Planning Considerations

State Planning Policy	The State Planning Policy (SPP) contains the State Interest Policies and Assessment Benchmarks which are applicable to the development. The subject site is affected by the following State Interests:
	
	• Agriculture
	  o Agricultural Land Classification – Class A and B.
	• Biodiversity
	  o MSES – Regulated Vegetation (Category B);
	  o MSES – Regulation Vegetation (Category C);
	  o MSES – Regulated Vegetation (Category R);
	  o MSES – Regulated Vegetation (Intersecting a Watercourse).
	• Natural Hazards and Risk Resilience
	  o Flood Hazard Area – Local Government Flood Mapping Area;
	  o Bushfire Prone Area.
	
	The CairnsPlan 2016 advances the SPP except for erosion prone areas and the coastal management district. The site is not mapped within these state interests; therefore all the relevant State interests have been appropriately reflected in CairnsPlan 2016.

FNQ Regional Plan 2009-2031	The subject site is within the FNQ Regional Plan 2009-2031 designation - Urban Footprint. The Regional Plan has been appropriately integrated and reflected through the CairnsPlan 2016.

Pinecrest Master Planned Community Structure Plan	The development application represents Stage 3 of the Pinecrest Master Planned Community (PMPC) Structure Plan. The proposal is for 68 residential lots, new roads and balance land. The proposed reconfiguration plan is provided as **Figure 1** below.

Figure 1: Proposed Plan of Subdivision

The development is located within the Low Density Residential Precinct of the PMPC Structure Plan. The Low Density Residential Precinct seeks to promote a low density residential scale and character, with predominantly larger lot sizes and detached dwellings houses, that is responsive to the constraints of the land. The intended lot size within this Precinct is between 600m^2-1000m^2, however, they may be larger in response to natural characteristics and constraints on the land such as slopes, waterways, vegetation etc. The dwelling yield target for the Precinct is 133-266 dwellings based on 7-14 dwellings per hectare over the 19 hectare area.

The proposed lots range in size from 500m^2 to 2,328m^2 with the majority of the lots between 600m^2 to 799m^2 as summarised below:

<599m^2	**600m^2-699m^2**	**700m^2 - 799m^2**	**800m^2 - 899m^2**	**900m^2 - 999m^2**	**>1,000m^2**
6	32	14	2	1	13

In addition to the above, the balance land will be approximately 1.6ha in size.

The development currently meets the dwelling yield target of 133-266 dwellings as summarised below:

Stage 1 Dwelling Yield	48 Lots
Stage 2 Dwelling Yield	42 Lots (including Stage 2B)
Stage 3 Dwelling Yield	68 Lots
Total Dwelling Yield	**158 Lots**

In addition to the above, development in this Precinct is to be supported by necessary infrastructure and provided with open space and recreation opportunities. Stage 3 is to be serviced by new internal roads and is required to provide water and sewer and electricity and telecommunications connections. Stage 3 has access to the Stony Creek waterway corridor for open space and recreation opportunities.

Matters Prescribed by Regulation

Schedule 9 of the *Planning Regulation 2017*	Not Applicable.
Schedule 10 of the *Planning Regulation 2017*	Not Applicable.
Schedule 12A of the *Planning Regulation 2017*	Schedule 12A of the *Planning Regulation 2017* applies to reconfiguring a lot if: (a) The reconfiguration is the subdivision of the lot into 2 or more lots (each a created lot); and (b) The lot being reconfigured is wholly or partly in a prescribed zone under a local instrument applying to the lot; and (c) No part of the lot being reconfigured is in either of the following zones under a local instrument applying to the lot— (i) A rural residential zone stated in schedule 2; (ii) A zone, other than a zone stated in schedule 2, that is of a substantially similar type to a zone mentioned in subparagraph (i); and (d) At least 1 created lot is intended mainly for a residential purpose; and (e) The reconfiguration is associated with the construction or extension of a road. The above assessment benchmarks are applicable to the proposed reconfiguration. Accordingly, the *Regulation* introduces new benchmarks, which include a minimum of: • Grid-like street patterns connecting to surrounding and future roads and paths; • A maximum block length of 250 metres; • Street trees, with a minimum of 1 tree per 15m each side of a new road; • Footpaths, where a new footpath is required to be provided on at least 1 side of the new road where it provides direct lot access; and • Access to existing or new park/s within 400 metres of each part of a block. The regulations are intended to ensure the reconfiguration supports convenient and comfortable walking for transport, recreation, leisure, and exercise in the locality of new lots. Council, however, currently manages the design and layout of new residential subdivisions through various instruments that either reflect these benchmarks or provide alternate provisions that more appropriately consider the local context. In assessing the development, conditions have been applied regarding the provision of street trees and footpaths. On balance, the proposed subdivision is considered to be consistent with the relevant provisions of these instruments.

LOCAL CATEGORISING INSTRUMENT

CairnsPlan 2016 v3.1

Strategic Framework Assessment

The development is subject to Code Assessment and therefore assessment against the Strategic Framework of the CairnsPlan 2016 is not required, in accordance with section 45 (3) of the *Planning Act 2016*.

Relevant Assessment Benchmarks of CairnsPlan 2016

CairnsPlan 2016 Assessment Benchmarks	
Assessment Benchmark	**Assessment**
Mount Peter Local Plan Code	**Complies.** The development is considered to be consistent with the PMPC Structure Plan in terms of achieving the outcomes sought for the Low Density Residential Precinct and the intended lot sizes and dwelling yield targets.
Low-Medium Density Residential Zone Code	**Complies.** The minimum lot size within the Low-medium Density Residential Zone is 450m^2. The development proposes lots between 500m^2 to 2328m^2. The proposed lot sizes are significantly larger than the minimum lot size for the Low-Medium Density Residential Zone and the development therefore represents a lesser density than sought for the zone. However, the proposed development achieves the outcomes regarding lot size and dwelling yield targets sought for the Low Density Residential Precinct of the PMPC Structure Plan.
Conservation Zone Code	**Not Applicable.** Part of the north-western portion of the site is mapped within the Conservation Zone area. This part of the land is proposed to form part of the balance land identified as Stage 4 in the PMPC Structure Plan. As such, no further assessment has been undertaken against this code.
Airport Environs Overlay Code	**Complies.** The site is mapped within the Procedures for Air Navigation Services – Aircraft Operational (PANS-OPS) Surfaces. The development will not impact on the safety and efficiency of operations at the Cairns Airport and associated aviation facilities.
Bushfire Hazard Overlay Code	**Complies with Performance Outcomes.** So that all lots are provided with adequate road access for firefighting and emergency vehicles and safe evacuation, the proposed roads within the development have been conditioned to be constructed in accordance with the *FNQROC Development Manual.* One cul-de-sac is proposed on the northern side of Stage 3 that provides access to eight lots. The cul-de-sac is due to Lot 3 on SP126545 prohibiting Stage 3 from linking with roads to the east in other stages. The largest lots are located within the highest hazard area which will ensure there is a lesser concentration of people living in this area. As part of the landscaping conditions, the planting of bushfire resistant species is required to ensure the intensity of any bushfires is not worsened.

	The development has been designed to minimise the potential adverse impacts of bushfire on people and property.
Flood and Inundation Hazard Overlay Code	**Complies.** The footprint of Stage 3 will largely avoid all areas mapped within this overlay with the exception of the waterway (Stony Creek) and a small portion of some lots and roads in the southern portion of Stage 3. A development condition has been imposed that requires the boundary of all lots and roads adjacent to Stony Creek be setback the greater of either 10 metres from the top of bank or the area of land affected by the 1% AEP flood event. This will ensure the safety of people, property and infrastructure and allow for the natural function of the creek. It is considered that the development has been designed to ensure the safety of persons and minimise damage to future residential development, disruption to residents and exposure of people and property to unacceptable risk from flooding.
Hillslopes Overlay Code	**Not Applicable.** A small portion of the land in the north-western corner is within the Hillslopes Overlay. This portion of the land is proposed to form part of the balance land identified for Stage 4 of Rocky Creek under the PMPC Structure Plan. As such, no further assessment has been undertaken against this code.
Landscape Values Overlay Code	**Complies.** A small portion of the site along the northern boundary is identified within the High Landscape Values area of this code. The extent of Stage 3 is largely clear of this area, and it is considered that the development will not have detrimental impacts on the landscape values of the area given the small portion of the site that is identified within the overlay area. Additionally, the SARA imposed conditions relating to built infrastructure and vegetation clearing in this area in the Referral Agency Response for the Preliminary Approval (Council Reference: 8/13/2318) which will further guarantee the landscape values of the site are maintained.
Natural Areas Overlay Code	**Complies.** To ensure the development footprint avoids the Stony Creek waterway corridor and does not adversely impact areas of environmental significance, a development condition has been imposed that requires the boundary of all lots and roads adjacent to Stony Creek be setback the greater of either 10 metres from the top of bank or the area of land affected by the 1% AEP flood event. Additionally, a development condition has been included requring the retention, restoration and revegetation of the waterway corridor by way of retention or revegetation of existing native vegetation and weed eradication for a six meter wide area from the top of bank and revegetation with native endemic species to prevent future weed establishment. Vegetation within Stony Creek is also required to be protected and retained. The SARA has also imposed conditions prohibiting clearing in certain areas.
Potential Landslip Hazard Overlay Code	**Not Applicable.** A small portion of the land in the north-western corner is within the Potential Landslip Hazard Overlay. This portion of land is proposed to form part of the balance land identified for Stage 4 of Rocky Creek under the PMPC Structure Plan. As such, no further assessment has been undertaken against this code.
Transport Network Overlay Code	**Conditioned to Comply.** The new internal roads in Stage 3 have been conditioned to be constructed in accordance with the *FNQROC Development Manual*. Pedestrian footpaths are required throughout Stage 3 to ensure connectivity throughout this stage and to other stages of the development for pedestrians. A development condition has been imposed to secure this element.

	Cooper Road is identified in the Local Government Infrastructure Plan (LGIP) as a two-lane median divided road (TRF430) and will service the development and ultimately other development within the area. The Transport Network Overlay Code requires development to provide trunk infrastructure in accordance with the LGIP. Council is further entitled, under the *Planning Act 2016* (ss 65, 127 and 128), to impose a condition requiring the provision of an LGIP item. Consequently, conditions requiring the upgrade of Cooper Road to the ultimate two-lane median divided sub-arterial trunk road standard (including IRF18 – intersection) have been imposed. It is acknowledged that the Developer has proposed to defer determination of the road standard to a later stage, however, in this instance Council officers recommend provision of Cooper Road in accordance with the LGIP which specifies a delivery date of 2024. The remainder of external roads are considered to be to non-trunk roads and have been conditioned accordingly. This extends to upgrades to the existing road, intersections and streetlighting commensurate with the relevant design and safety standards. This will be informed by a revised TIA with Council also setting a minimum to ensure safety and community expectations are achieved.
Environmental Performance Code	**Conditioned to Comply.** Street lighting is required as part of Stage 3 and has been conditioned to comply with the relevant Australian Standards and the *FNQROC Development Manual*. The development of the site for residential lots will not result in noise, odour or airborne particles and emissions. Development conditions have been imposed for stormwater discharge, erosion and sediment control, the provision of a site based stormwater management plan and stormwater quality improvement devices. The above will ensure the development does not have an adverse impact on sensitive receiving environments.
Excavation and Filling Code	**Complies.** The application material has not confirmed if any retaining walls or batters are required, however, a preliminary bulk earthworks plan has been provided. The preliminary bulk earthworks plan shows there will be approximately 23,400m^2 of cut and 25,600m^2 of fill. These matters are required to be addressed as part of a future Operational Work application for Stage 3.
Infrastructure Works Code	**Conditioned to Comply.** Development conditions have been imposed with requirements for electricity and telecommunications connections, padmount infrastructure where required, stormwater discharge, erosion and sediment control, water and sewerage connections, damage to Council infrastructure and land, road infrastructure construction, street lighting, footpaths and provision of trunk infrastructure (Cooper Road Upgrades). Additionally, an updated Water Supply and Sewerage Master Plan is required to be submitted. The above conditions will ensure that infrastructure is provided in a manner and to a standard that meets the development's needs, the community's needs and is safe, efficient and maintains and enhances the environmental qualities of the Region.
Landscaping Code	**Conditioned to Comply.** Street trees are required to be installed throughout Stage 3 of Rocky Creek at a spacing of one tree per 15 metres in accordance with Schedule 12A of the *Planning Regulation 2017*. Additionally, weeds and invasive species are required to be removed and/or managed. Development conditions (Services Master Plan and Detailed Landscaping Plan) have been imposed to secure these outcomes.

	Each of the lots are of a size and shape that is able to accommodate landscaping when residential uses are established on the lots in the future.
Reconfiguring a Lot Code	**Complies with Performance Outcomes.** The proposed lots are compliant with the intended lot sizes for the Low Density Residential Precinct of the PMPC Structure Plan and are generally rectangular in shape with sufficient area to accommodate intended residential land uses. The development provides a variety of lot sizes and frontage widths which enable a mix of housing choice. All lots are provided with direct access to a gazetted road, however, some lots are battle-axe style lots and conditions have been imposed requiring the construction of driveways along the access handles to these lots. The development has allocated space for parks, including linear open space. The open space area along Stony Creek follows the shape of the creek. Within Stage 3, Lots 301, 313, 314, 320-322 and 336 all overlook Stony Creek which facilitates casual surveillance of the open space area. Stage 3 will connect to the existing roads and pathways in previous stages of Rocky Creek where possible, to ensure connectivity throughout the subdivision. One cul-de-sac is proposed on the northern side of Stage 3 that provides access to eight lots. The cul-de-sac is due to Lot 3 on SP126545 prohibiting Stage 3 from linking with roads and pathways to the east in other stages. The cul-de-sac is approximately 65 metres in length from the intersection with Greenvista Way and the end of the cul-de-sac will be visible from its entrance. The development will eventually be connected to the public transport network and bus stops/bays are to be installed. The locations of the bus stops are to be determine through future detailed design. The development will be connected to water, sewerage, electricity and telecommunications infrastructure. The plans do not show the locations of any major electricity infrastructure or substations. Development conditions have been included to address this.

Assessment against the Outcomes of the Relevant Benchmarks

Where non-compliant with an Outcome of a relevant benchmark, a performance-based assessment has been undertaken, as detailed below.

Assessment Benchmark	**Performance-based assessment**
Bushfire Hazard Overlay Code – PO1	Acceptable Outcome AO1.1 of the Bushfire Hazard Overlay Code requires that development is not located within an area of potential impact buffer or medium, high or very high potential bushfire intensity area. This is reflective of the dense vegetation on the adjoining land to the north. The proposed lots located to the north and west are located within the potential impact buffer area and small areas of very high potential bushfire intensity along the north-western boundary. The design of Stage 3 has responded to the bushfire hazard by proposing the larger lots within the hazard area. These lots are of an appropriate size and shape to allow future dwellings to be constructed away from the hazard area and allow for access to the rear of the lot for firefighting vehicles. Lots within the hazard area have direct frontage to a road, with the exception of two lots that are accessed via access handles, which ensures adequate road access for firefighting and other emergency vehicles and safe evacuation. All lots are required to be provided with a water connection which will ensure there is an adequate and accessible water supply for firefighting purposes.

Reconfiguring a Lot Code – PO1	The minimum lot size within the Low-medium Density Residential Zone is 450m^2. The development proposes lots between 500m^2 to 2328m^2. As previously mentioned, the proposed lot sizes are significantly larger than the minimum lot size for the Zone and the development therefore represents a lesser density than sought for the Zone. However, the lot sizes are consistent with the outcomes sought for the Low Density Residential Precinct of the PMPC Structure Plan.

RELEVANT MATTERS

The development is subject to Code Assessment and therefore no other relevant matters have been considered in accordance with section 45 of the *Planning Act 2016*.

PUBLIC NOTIFICATION

The development is subject to Code Assessment and therefore Public Notification was not required to be undertaken, in accordance with section 45 of the *Planning Act 2016*.

MATTERS RAISED IN SUBMISSIONS FOR IMPACT ASSESSABLE DEVELOPMENT

The development is subject to Code Assessment and therefore public notification is not required to be undertaken, in accordance with Part 4: Public Notification of the *Development Assessment Rules.*

INFRASTRUCTURE CHARGES

Council's Infrastructure Charges Resolution No. 2 of 2021 identifies that an Infrastructure Charge is levied for the development. The applicable charge has been calculated in accordance with the Resolution and section 120 of the *Planning Act 2016.*

A copy of the calculation is contained in **Attachment 2**.

LOCAL GOVERNMENT INFRASTRUCTURE PLAN (LGIP)

The proposed development is located outside of the Priority Infrastructure Area (PIA). The development requires the delivery of trunk infrastructure to facilitate the development.

The following table summarises the trunk infrastructure items:

Trunk Infrastructure	LGIP Item No.	Standard	LGIP Cost	Timing
Roundabout – 1 Lane Minor	IRF18	In accordance with Condition 13-14	$365,471.00	2031
Sub-arterial Road – 2 Lane Median Divided	TRF430	In accordance with Condition 13-14	$2,955,000.00	2024

The above requirements are included in a condition of the approval. An offset and/or repayment opportunity will be identified on the Infrastructure Charges Notice.

Further and Future Infrastructure Planning

The CairnsPlan 2016 contemplates future growth within the Southern Growth Corridor (SGC) in accordance with the Mount Peter Local Plan. The Mount Peter Local Plan indicates that Mount Peter will accommodate much of the population growth that is expected within the SGC, however, the LGIP only identifies a small portion of the SGC within the PIA with a number of residential subdivisions approved outside the PIA.

The existing infrastructure is adequate to service the approved subdivisions, however, Council's wastewater network currently has limited capacity to support further residential development outside of the land committed to under existing development permits and the Planning Scheme (i.e. land outside the PIA and south of Cooper Road (Pinecrest Master Planning Area). Council investigations into the capacity of wastewater infrastructure confirm that Stage 3 can be serviced with wastewater infrastructure. However, further stages of the development will likely trigger significant wastewater infrastructure upgrades.

REASONS FOR DECISION

The reasons for this decision are:

1. The proposed development has been assessed in accordance with the provisions of the CairnsPlan 2016 v3.1 and is considered to be compliant with the Overall Outcomes and Acceptable Outcomes of the applicable assessment benchmarks.

2. The proposed development is considered to be consistent with the Pinecrest Master Planned Community Structure Plan in that the development meets the intended lot sizes and dwelling yield targets sought for the Low Density Residential Precinct.

3. The lots have sufficient areas, dimensions and shape to be suitable for a range and mix of residential uses, taking into account vegetation and waterway buffer areas.

4. Each allotment is, or is able to be, serviced by all essential services and infrastructure.

5. Where appropriate or necessary, conditions have been imposed to secure compliance with relevant assessment benchmarks and/or the requirements of the Preliminary Approval.

RISK MANAGEMENT

Council Finance and the Local Economy

The development is to occur on privately owned land and all costs are the responsibility of the developer.

Council is imposing a necessary infrastructure condition which represents a latent financial commitment as the cost of trunk infrastructure is ultimately borne by the Council. Council's LGIP identifies the delivery of part of Cooper Road (TRF430) in 2024 and the delivery of IRF18 (intersection) in 2031. TRF430 is currently contemplated under Council's 10 year capital works program

Infrastructure Charges levied for Stage 3 and earlier stages of the development will contribute to the cost of the delivery of the conditioned LGIP items through offsets.

Community and Cultural Heritage

CairnsPlan 2016 sets out framework to ensure appropriate development occurs. The framework is reflected within the overlay, local plan, zone and development codes of which this development application has been assessed against.

Natural Environment

CairnsPlan 2016 sets out framework to ensure appropriate development occurs. The framework is reflected within the overlay, local plan, zone and development codes of which this development application has been assessed against.

ATTACHMENTS

1. APPROVED PLAN(S) AND DOCUMENT(S)
2. INFRASTRUCTURE CHARGES CALCULATIONS

Ali Davey
Senior Planning Officer
Action Officer

Claire Simmons
Executive Manager Development & Planning

Ed Johnson
Director Planning, Growth & Sustainability

ATTACHMENT 1: APPROVED PLAN(S) & DOCUMENT(S)

Road Safety Assessment

Rocky Creek Residential Subdivision Stage 1

Q204098

Prepared for
Kroymans Developments Pty Ltd

21 April 2022

Cardno

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Stantec

Contact Information

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Reviewed
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Effective Date 21/04/2022

Document History

Version	Effective Date	Description of Revision	Prepared by	Reviewed by
V1	2-Sep-21	Final	Angela Wood	John Peace
V2	8-Sep-21	Revised Final	Angela Wood	John Peace
V3	21-April -22	Revised Final	Angela Wood	John Peace

Table of Contents

Tables

Figures

1 Road Safety Assessment Overview

1.1 Project Background

Cardno has been commissioned by Kroymans Developments Pty Ltd to provide engineering input as part of the Rocky Creek residential subdivision project comprising a total of 148 residential lots over four stages. The location of the site and its environs are shown in Figure 1-1 while an extract of the proposed development layout is shown in Figure 1-2.

Figure 1-1 Subject Site

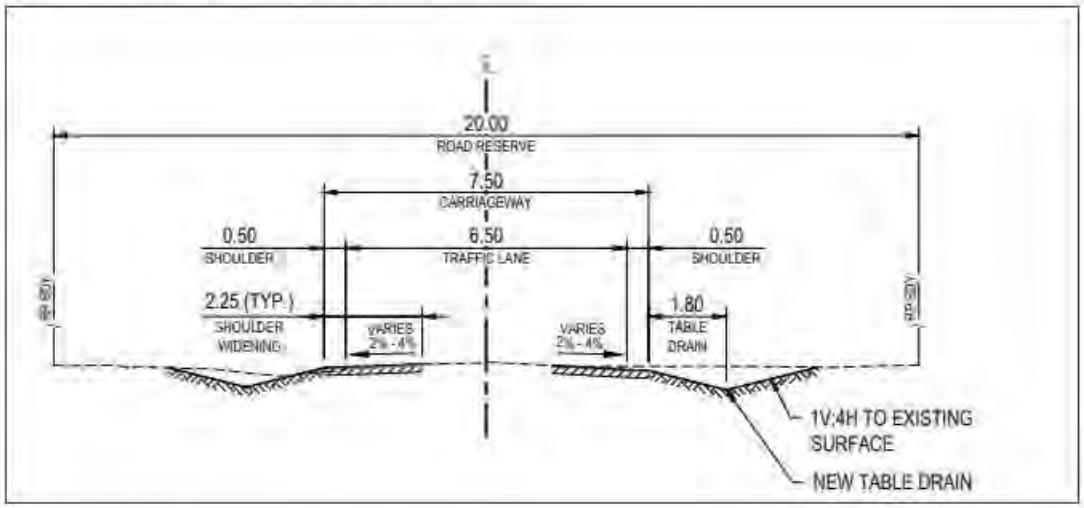
Figure 1-2 Development Configuration

The site is currently accessible via Cooper Road which incorporates a 3.5m cross-section. However, Cooper Road is proposed to be upgraded as part of the development to incorporate a Type 8 road cross-section in accordance with Far North Queensland Regional Organisation of Council's (FNQROC) development manual standard cross-sections. The proposed access road will ultimately incorporate a two-lane median divided cross-section within a 28m wide road reserve.

During the initial stages of construction, an interim upgrade option is also being considered for Cooper Road to accommodate the Stage 1 component, which will incorporate a total of 48 residential lots.

The interim Cooper Road upgrade concept initially proposed a 6.5m carriageway with 0.5m unsealed shoulders as shown in Figure 1-3. Cardno prepared a road safety risk assessment of the initial Stage 1 interim concept design (Cardno report dated 8 September 2021).

Figure 1-3 Cooper Street Cross-Section – Interim Configuration



It is understood that following their review of the interim arrangement, Cairns Regional Council issued an Information Request (Council Reference 8/10/1188). In order to respond to the items raised by Council, changes have been made to the interim upgrade design including the provision of a pedestrian connection along the corridor. The revised interim configuration is shown in Figure 1-4 to Figure 1-6.

It's understood that no road lighting is proposed as part of the current interim upgrade concept with the exception of lighting at the site entry point and the Mount Peter Road / Cooper Road intersection. As such, a Road Safety Assessment has been completed of the revised interim arrangement specifically noting that minimal lighting is proposed.

It is important to note that this Road Safety Assessment considers the suitability of the interim road cross-section to accommodate traffic likely to be generated by Stage 1 only. It is recommended that additional analysis be completed to investigate the suitability of the interim cross-section to accommodate traffic generated by future development parcels.

Figure 1-4 Cooper Street Cross-Section – Interim Configuration (Revised) Ch215-Ch315

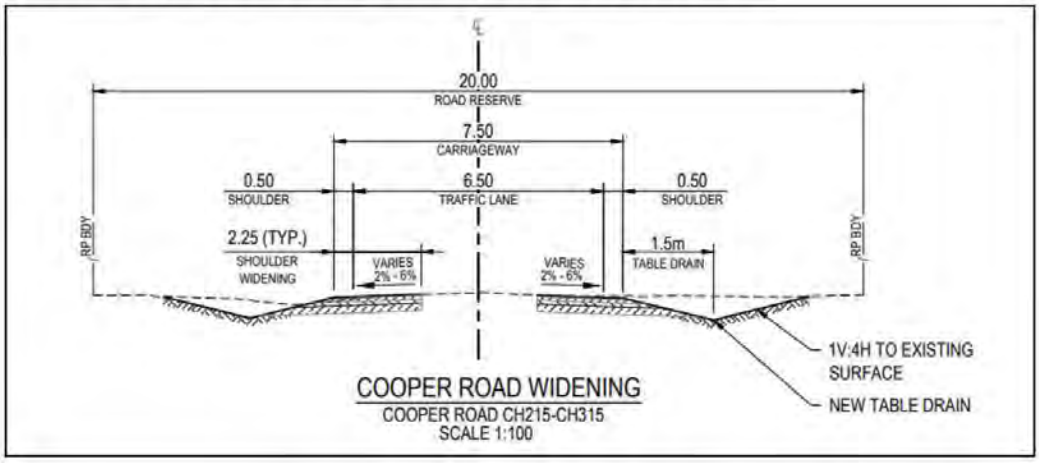


Figure 1-5 Cooper Street Cross-Section – Interim Configuration (Revised) Ch315 – Ch387

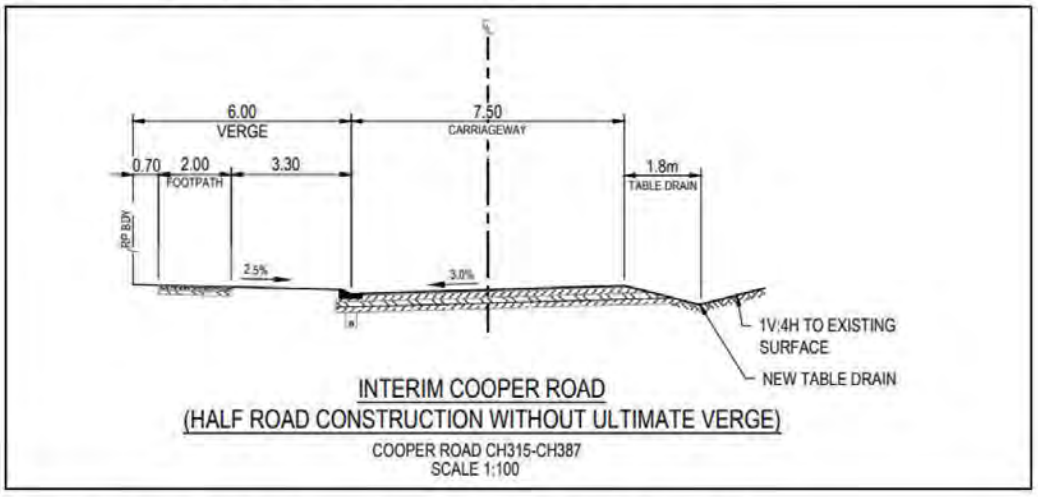
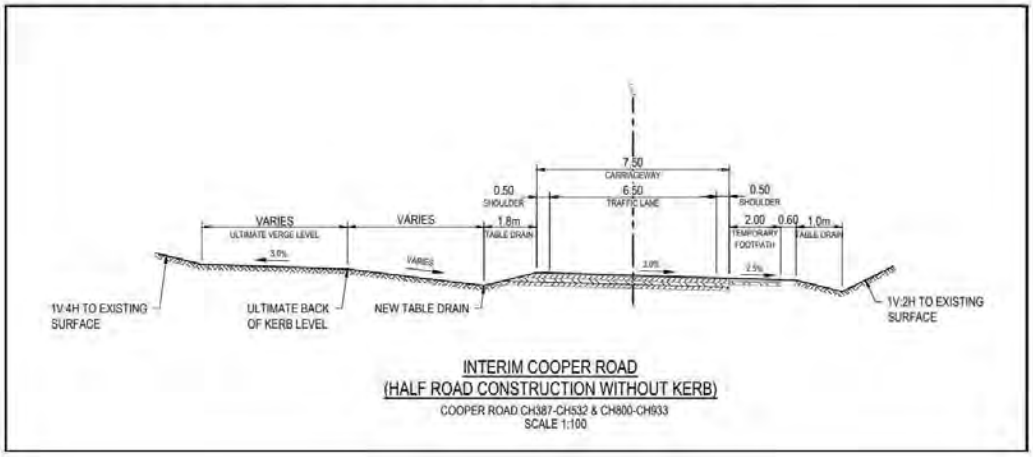


Figure 1-6 Cooper Street Cross-Section – Interim Configuration (Revised) Ch387 – Ch532



1.2 Road Safety Assessment Scope

Cardno Road Safety team has been commissioned by the Kroymans Developments Pty Ltd to undertake a Road Safety Assessment of the revised interim Cooper Road cross-sections in accordance to current guidelines to identify existing traffic safety risks, consider additional issues introduced as a result of the Rocky Creek Stage 1 development and propose mitigation measures necessary to offset development impacts.

A road safety assessment is a formal, systematic assessment of the potential road safety risks associated with, in this case, proposed development, conducted by a registered Senior Road Safety Auditor, registered RPEQ engineer.

This road safety assessment considers all road users and suggests measures to eliminate or mitigate any risks identified by the assessment.

The Road Safety Assessment has been undertaken in accordance with the guidelines provided in:

- Department of Transport and Main Roads (DTMR) *Guide to Traffic Impact Assessment* (December 2018); and
- Austroads' *Guide to Road Safety Part 6: Managing Road Safety Audits – Edition 1.2 (February 2019)* and *Guide to Road Safety Part 6A: Implementing Road Safety Audits – Edition 1.2 (February 2019)*.

The following sections identify the road safety assessment findings and recommendations.

All the findings described in Section 2.3 of this report are considered by the investigation team to require action in order to improve the safety of the proposed project and to minimise the risk of crash occurrence and reduce potential crash severity.

The assessment team has examined and reported only on the road safety implications of the project as proposed development and has not examined or verified the compliance of the design to any other criteria.

1.3 Disclaimer

This road safety assessment comprised examination of the drawings provided to us for the interim site access arrangement and a desktop investigation using maps available on Google Maps and Metro Map.

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

1.4 The Safety Assessment Team

The road safety assessment team comprises the following members:

- **Angela Wood** Senior Road Safety Auditor (Qld), RPEQ – CARDNO

This Road Safety Assessment has been carried out by the investigation team based in Brisbane. Whilst the road safety team and the detailed design team are parts of Cardno, the team members responsible for the Road Safety Assessment will not be involved with the detailed design component, therefore impartiality (integrity) of the risk assessment will be maintained.

2 The Road Safety Assessment

2.1 Previous Road Safety Assessments

A road safety assessment has been completed for the previous (superseded) Cooper Road interim concept design (Cardno report dated 8 September 2021).

2.2 Risk Assessment

Road safety assessment findings were established and comments are provided based on the information collected during the site visits and desktop investigation based on Google Map and Metro Map views. The findings focus on road safety for all road users, from a road use and network issues perspective, investigating the road safety elements as set out in *Austroads 'Guide to Road Safety Part 6A: Implementing Road Safety Audits' (AGRS06A-19 Published: 20 February 2019)* and Department of Transport and Main Roads (DTMR) *Guide to Traffic Impact Assessment* (December 2018).

While it is noted that a Austroads has released an up

The findings are presented by general location; hence the findings are not presented in order of relative safety importance or priority for treatment.

2.2.1 Risk Assessment Criteria

For each identifies issue, a risk rating has been determined. This has been based on the *Guide to Traffic Impact Assessment, Transport and Main Roads, December 2018*, as shown in Table 2-1.

Table 2-1 Safety risk score matrix

Figure 9.3.2(a) – Safety risk score matrix

		Potential consequence				
		Property only (1)	Minor injury (2)	Medical treatment (3)	Hospitalisation (4)	Fatality (5)
Potential likelihood	Almost certain (5)	M	M	H	H	H
	Likely (4)	M	M	M	H	H
	Moderate (3)	L	M	M	M	H
	Unlikely (2)	L	L	M	M	M
	Rare (1)	L	L	L	M	M

L: Low risk
M: Medium risk
H: High risk

The risk rating descriptors are and the respective treatment approaches are defined as per Table 2-2.

Table 2-2 Risk rating descriptors

Rating Measure	Descriptor
Potential Likelihood of Incident Occurring	
Almost Certain (5)	
Likely (4)	
Moderate (3)	
Unlikely (2)	
Rare (1)	
Potential Consequence of Incident Occurring	
Fatality (5)	
Hospitalisation (4)	
Medical Treatment (3)	
Minor Injury (2)	
Property only (1)	
Treatment approach	
High	Must be corrected
Medium	Should be corrected or the risk significantly reduced, if the treatment cost is moderate, but not high
Low	Should be corrected or the risk reduced, if the treatment cost is low

2.3 Specific Issues and Recommendations

The Road Safety Assessment has documented its findings by numbered issues referenced to locations within the study area. Recommendations for potential remedial treatments have been identified and each issue is allocated with a priority, as shown in Table 2-3.

Table 2-3 Specific Issues and recommendations

Item	Issue Description	Without Development			With Development			Recommendation	Residual Risk		
		L	C	Risk	L	C	Risk		L	C	Risk
1	A pedestrian path/walkway along the interim access connection has been shown on the pavement plan. However, the pedestrian connection is not shown on the typical cross-section between Ch. 215-315. This risk of not providing a continuous pedestrian connection is potentially increased by the addition of dwellings, construction traffic associated with the development, the proposal to not illuminate the connection and the location of MacKillop Catholic College on Mount Peter Road.	1	4	M	4	4	H	• Clearly identify pedestrian access along the route to ensure the safe passage of pedestrians to Mount Peter Road.	2	2	L
2	The pedestrian path crosses the carriageway at CH 400. It's unclear if pedestrian crossing sight distance (CSD) and the Approach Sight Distance (ASD) will accord with *Austroads Guide to Road Design Part 4a Unsignalised and Signalised Intersections section 3.3*. In addition, the pedestrian path does not appear to align across the carriageway.	n/a	n/a	n/a	2	4	M	• Confirm the achievable sight distance for pedestrians crossing the carriageway in accordance with Austroads Guide to Road Design. • Where sight distance can't be achieved, investigate potential alternate locations for the pedestrian crossing which provide sufficient CSD and ASD to accord with Austroads requirements. • Install advanced warning to drivers advising of the potential for pedestrians to cross the road. • Install Tactile Ground Surface Indicators (TGSIs) and signage at the pedestrian crossing points. • Ensure that the pedestrian connection aligns across the Cooper Road carriageway.	1	4	M

Item	Issue Description	Without Development			With Development			Recommendation	Residual Risk		
		L	C	Risk	L	C	Risk		L	C	Risk
3	The interim typical cross-section between Ch 387 and 532 indicates that a 2m temporary path is proposed however does not include any separation between vehicles and pedestrians.	n/a	n/a	n/a	2	4	M	• Include a separation kerb within the shoulder. • Ensure that center lines and edge lines are provided along the corridor.	1	4	M
4	A number of tight curves are located in the existing Cooper Road alignment. It's understood that little super-elevation is provided to assist drivers when traversing these bends.	1	3	L	2	3	M	• Ensure that center lines and edge lines are provided along the corridor. • Implement appropriate road signage including advanced warning signage of approaching bends and Chevron Alignment Markers (CAMs) in accordance with MUTCD. • Ensure that the carriageway is clearly delineated during dark conditions with Retro Reflective Pavement Markers (RRPMs) within the center line and edge lines. • Investigate the potential to lower the posted speed limit to 50km/hr with reduced advisory speeds on bends. • Amend the line marking in the vicinity of the curves to be a solid unbroken line to prevent overtaking movements.	1	2	L
5	Site inspection photographs indicates that a non-recoverable vertical drop exists along the carriageway, adjacent to the creek. The drop is also located on a bend. It's understood that a W-beam and guide posts have been installed at the site to protect from errant vehicles. Guide posts are installed on the carriageway.	1	4	M	2	4	M	• Install advanced warning signage, CAMS and RRPMs (within the center line and edge line) in accordance with MUTCD to advise motorists of approaching bends. • Investigate the need to extend the length of the barrier to cover non-recoverable embankment. • Investigate the potential to lower the posted speed limit to 50km/hr with reduced advisory speeds on bends.	2	2	L

Item	Issue Description	Without Development			With Development			Recommendation	Residual Risk		
		L	C	Risk	L	C	Risk		L	C	Risk
6	Several property access points are located on Cooper Road. It is unclear if appropriate sight distances are provided at these access points. This issue may be worsened during dark conditions.	1	3	L	2	3	M	• Confirm that sight distances accord with Austroads Guide to Road Design and/or the Australian Standards (2890.1). • Where possible, maintain planting located within the verge to increase sight distances around bends in the Cooper Road alignment. • Where sight distances can't be achieved, provide advanced warning signage of approaching property access points. • Install flag lighting at the property access points. It is not considered necessary to install flag lighting at Lot 2 on SP282732 due to the location of lighting to be installed at the site access.	1	2	L
7	Plans indicate that a posted speed limit of 60km/hr will be installed as part of the interim access configuration. Noting that several physical hazards exist on the alignment, the posted limit may not be suitable for dark conditions.	n/a	n/a	n/a	2	3	M	• Investigate the need for advisory signage along the bends in the Copper Road alignment. • Investigate the potential to lower the posted speed limit to 50km/hr during interim conditions.	1	2	L

3 Conclusions

Cardno's road safety team has investigated the potential road safety issues associated with the proposed Rocky Creek Stage 1 Residential Development.

The identified safety risks and their respective proposed mitigation measure aimed at reducing these risks are discussed in Table 2-3.

While the assessment indicates that alternate measures can generally be installed to negate the installation of formal road lighting, it is recommended that temporary road or flag lighting be installed at property access points along Cooper Road to reduce the potential for conflict between development generated traffic and vehicles travelling to and from existing properties. Further recommendations are also outlined within Table 2-3 along the Cooper Road corridor.

4 Safety Assessment Team Statement

I hereby certify that the road safety assessment team have examined the documents provided to us by Kroymans Developments Pty Ltd (the Client). I also confirm that the investigation has been carried out independently of the design team following the general principles detailed in *Austroads 'Guide to Road Safety Part 6A: Implementing Road Safety Audits' (AGRS06A-19 Published: 20 February 2019)* and Department of Transport and Main Roads (DTMR) *Guide to Traffic Impact Assessment* (December 2018).

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

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Mobile +61 403 474 024

Signature/Date

Disclaimer

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

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

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

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

About Cardno

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

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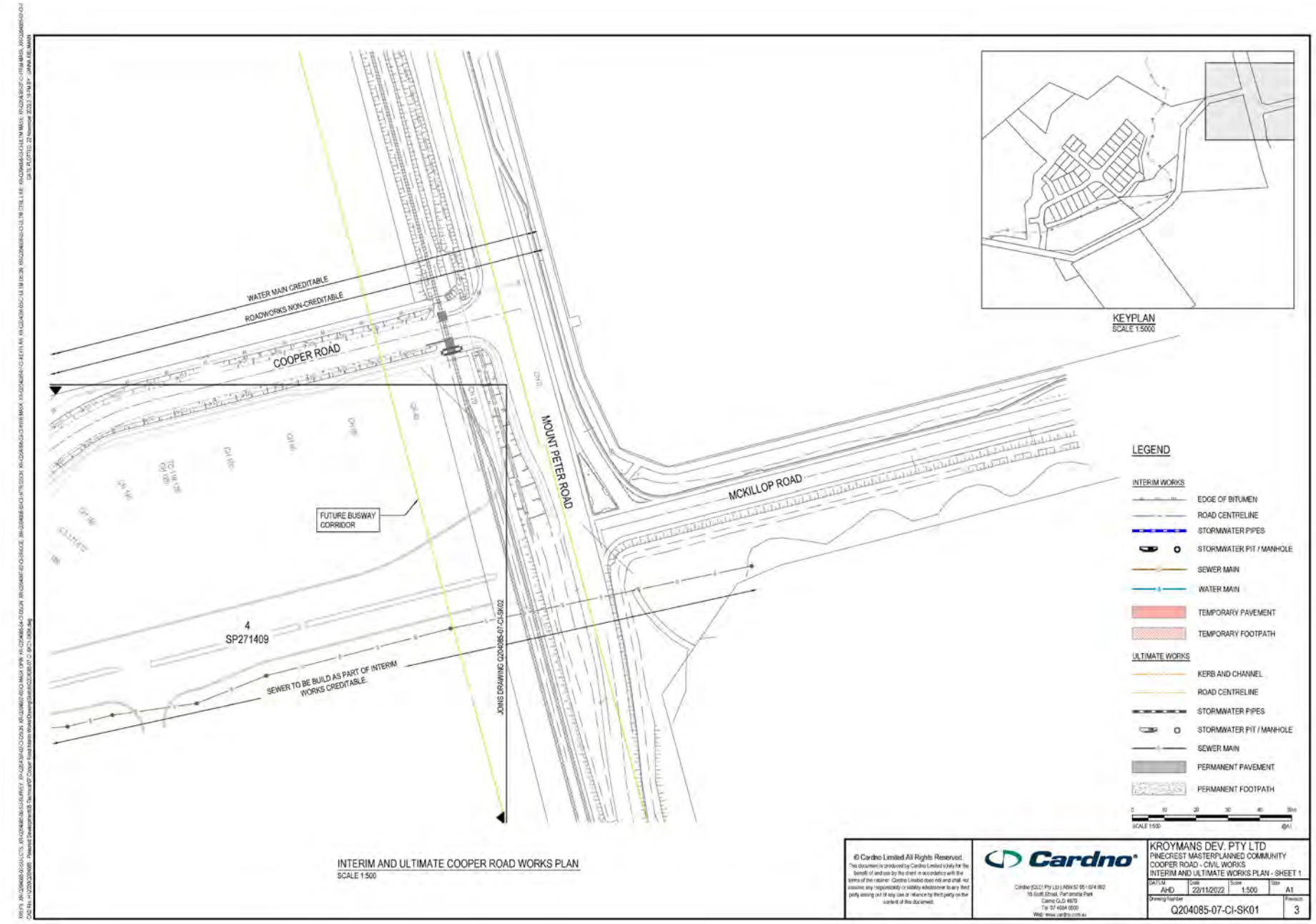
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COOPER ROAD
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MCKILLOP ROAD
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STORMWATER PIT / MANHOLE
SEWER MAIN
WATER MAIN
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TEMPORARY FOOTPATH
ULTIMATE WORKS
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PERMANENT FOOTPATH
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INTERIM AND ULTIMATE COOPER ROAD WORKS PLAN
SCALE 1:500
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PINECREST MASTERPLANNED COMMUNITY
COOPER ROAD - CIVIL WORKS
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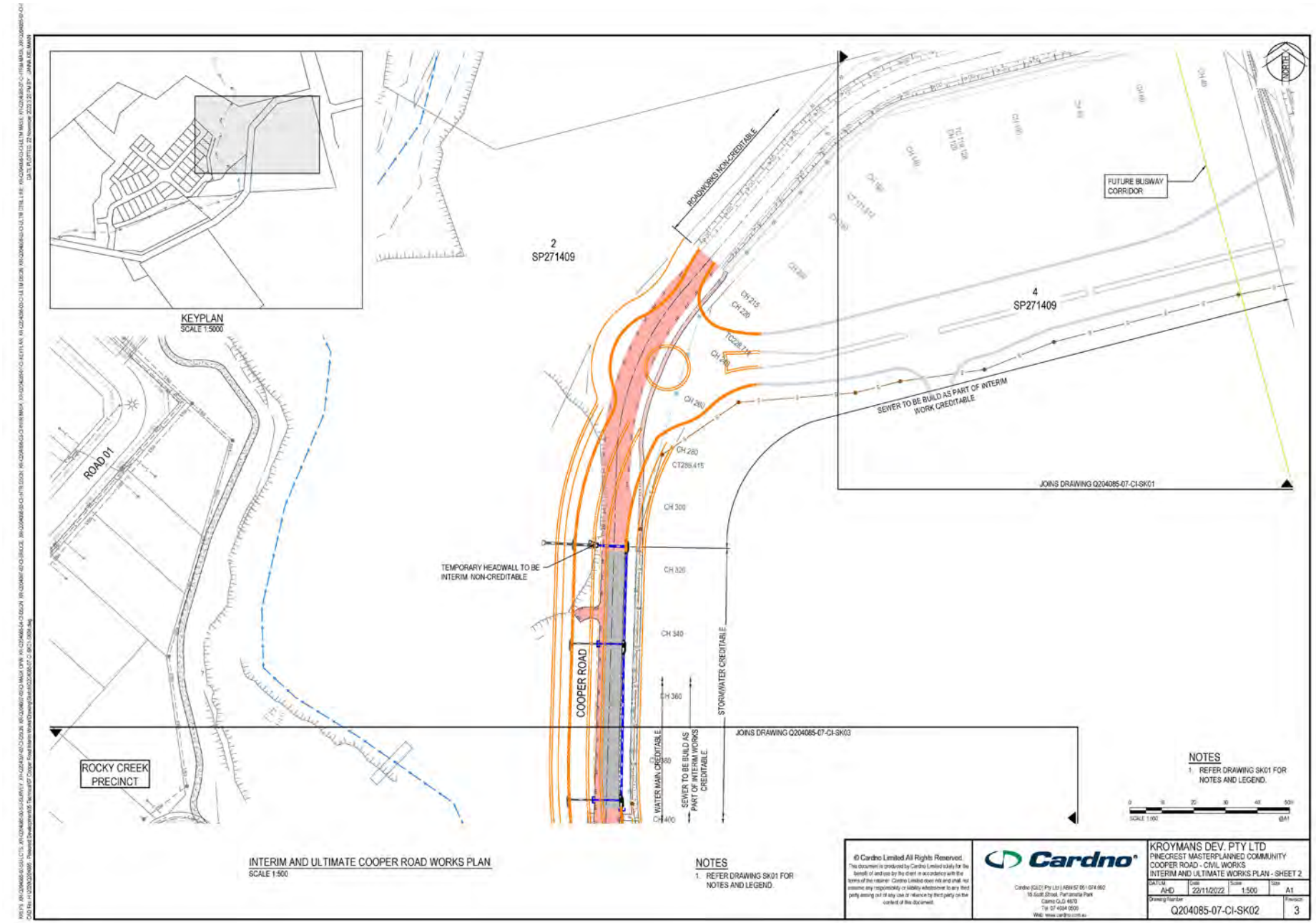
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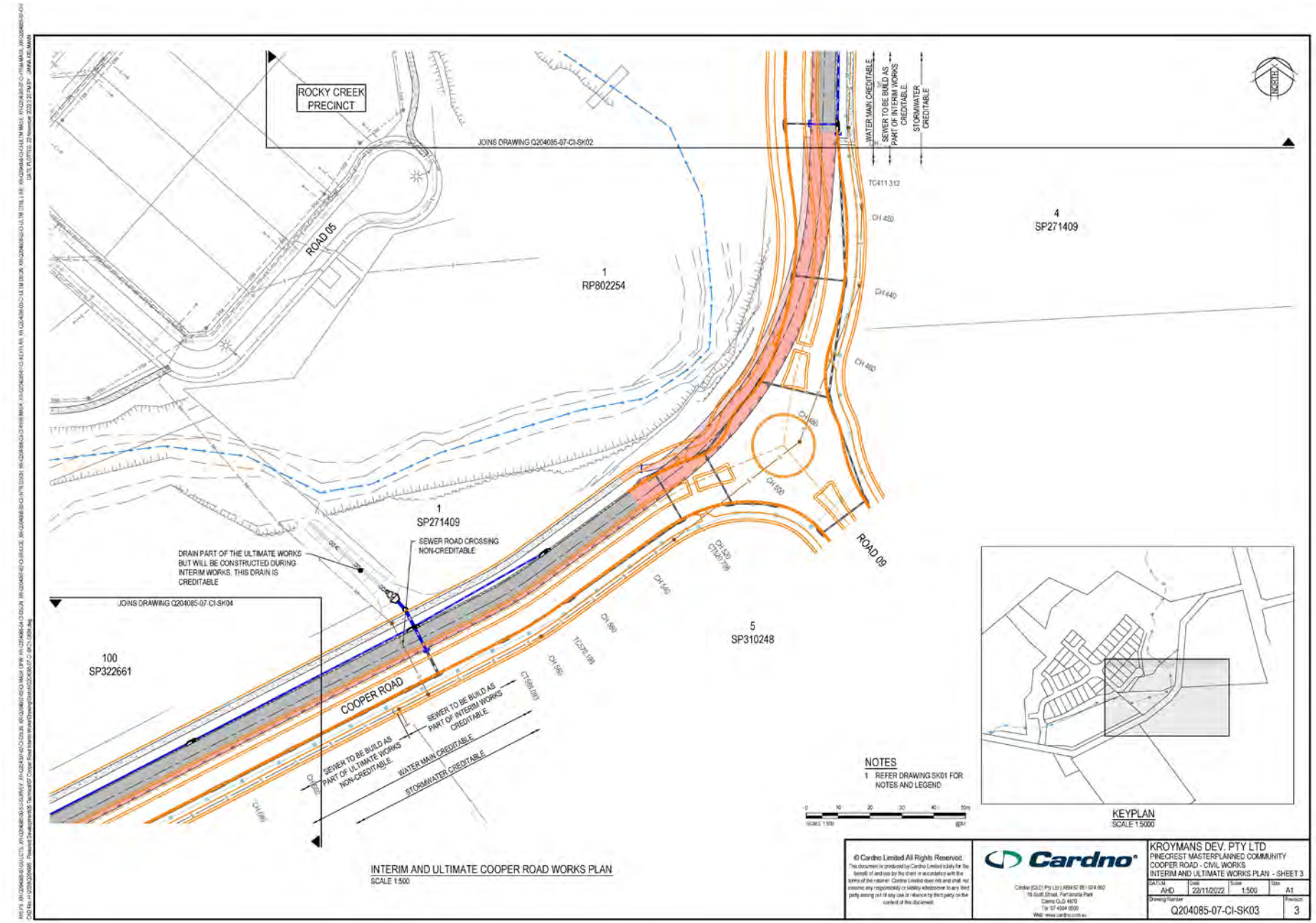
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SP271409
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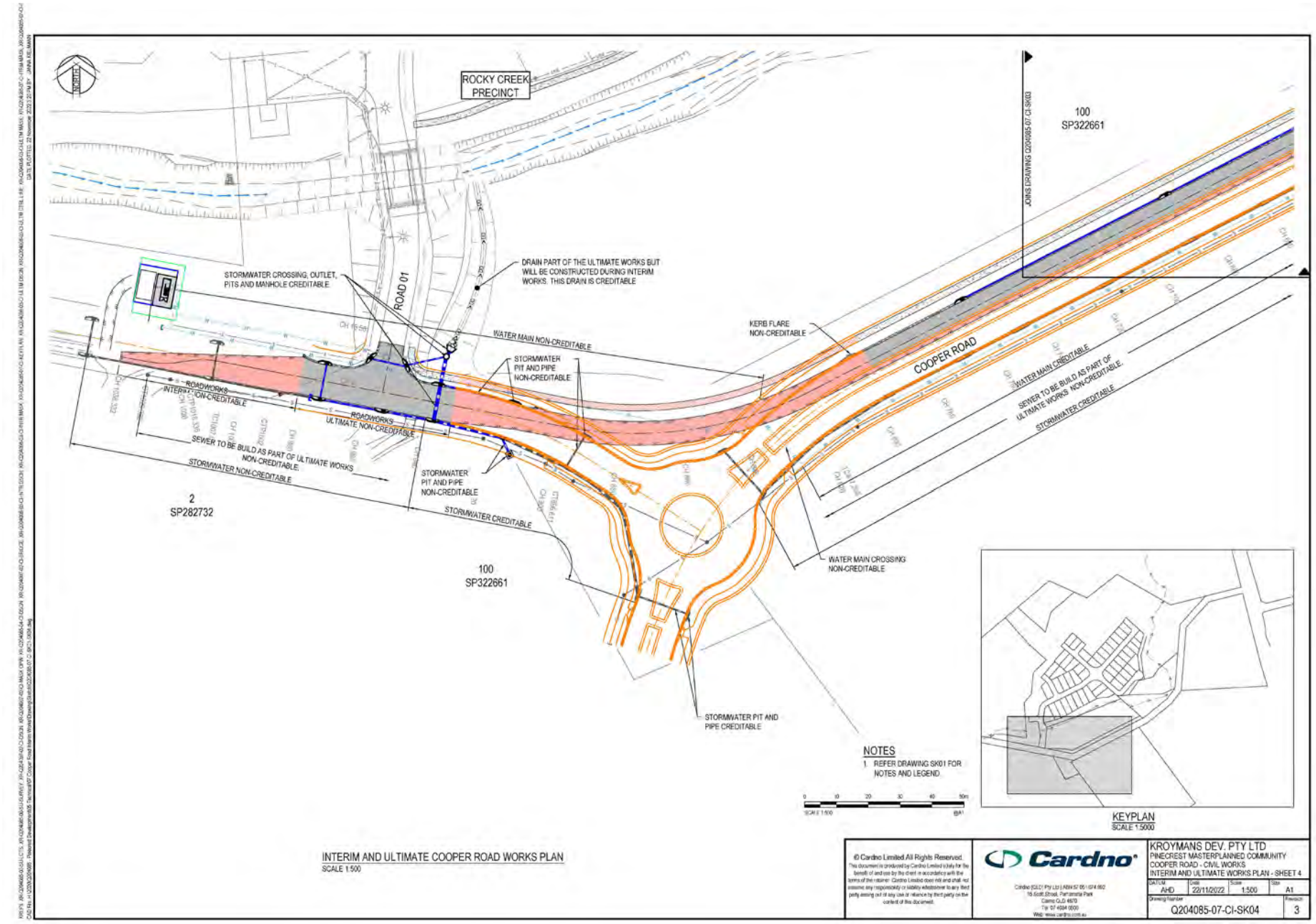
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DRAIN PART OF THE ULTIMATE WORKS BUT WILL BE CONSTRUCTED DURING INTERIM WORKS. THIS DRAIN IS CREDITABLE
WATER MAIN NON-CREDITABLE
STORMWATER PIT AND PIPE NON-CREDITABLE
KERB FLARE NON-CREDITABLE
COOPER ROAD
WATER MAIN CREDITABLE
SEWER TO BE BUILD AS PART OF ULTIMATE WORKS NON-CREDITABLE
STORMWATER CREDITABLE
ROADWORKS INTERIM NON-CREDITABLE
ROADWORKS ULTIMATE NON-CREDITABLE
SEWER TO BE BUILD AS PART OF ULTIMATE WORKS NON-CREDITABLE
STORMWATER NON-CREDITABLE
STORMWATER CREDITABLE
STORMWATER PIT AND PIPE NON-CREDITABLE
WATER MAIN CROSSING NON-CREDITABLE
STORMWATER PIT AND PIPE CREDITABLE
100 SP322661
2 SP282732
100 SP322661
JOINS DRAWING Q204085-07-CI-SK03
NOTES
1. REFER DRAWING SK01 FOR NOTES AND LEGEND.
KEYPLAN
SCALE 1:5000
INTERIM AND ULTIMATE COOPER ROAD WORKS PLAN
SCALE 1:500
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Cardno
KROYMANS DEV. PTY LTD
PINECREST MASTERPLANNED COMMUNITY
COOPER ROAD - CIVIL WORKS
INTERIM AND ULTIMATE WORKS PLAN - SHEET 4
DATUM AHD
Date 22/11/2022
Scale 1:500
Size A1
Drawing Number Q204085-07-CI-SK04
Revision 3

Pinecrest – Rocky Creek Stage 3

Water Supply & Sewerage Assessment

Q204085

Prepared for
Kroymans Developments Pty Ltd

23 February 2023

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04	23/02/23	Updated Report	BD/JCas/JCal	MA

Table of Contents

Appendices

Tables

Figures

1 Introduction

This Water Supply and Sewerage Assessment has been prepared by Cardno, now Stantec on behalf of the Pinecrest Development located in Mount Peter in the Cairns Regional Council (CRC) on the following lots:

- Lots 3, 4, & 7 on RP704171;
- Lot 3 on RP846863;
- Lot 2 on SP201240;
- Lot 300 on SP315904; and,
- Lot 100 on SP315904.

Figure 1-1 shows the original ultimate layout of the Pinecrest development with the Pinecrest Phase 1 (2021) scenario consisting of Rocky Creek, and the northern portions of Bellavista and Mountain View stages. The original proposed lot layout for these Pinecrest precincts is currently under development. An updated Structure Plan has since been developed and is shown in Figure 1-2.

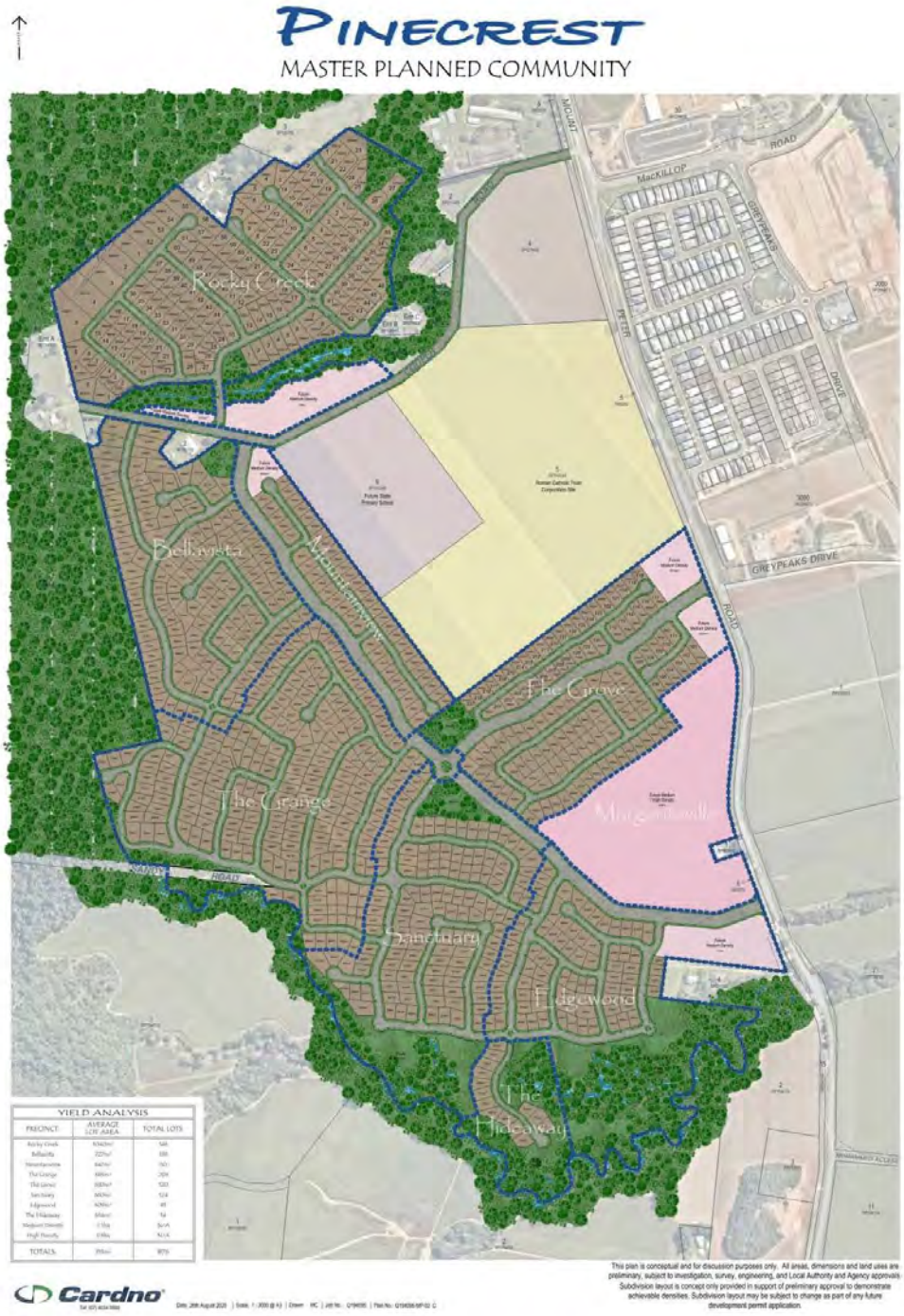

Figure 1-1 Original Pinecrest Master Plan (2020)

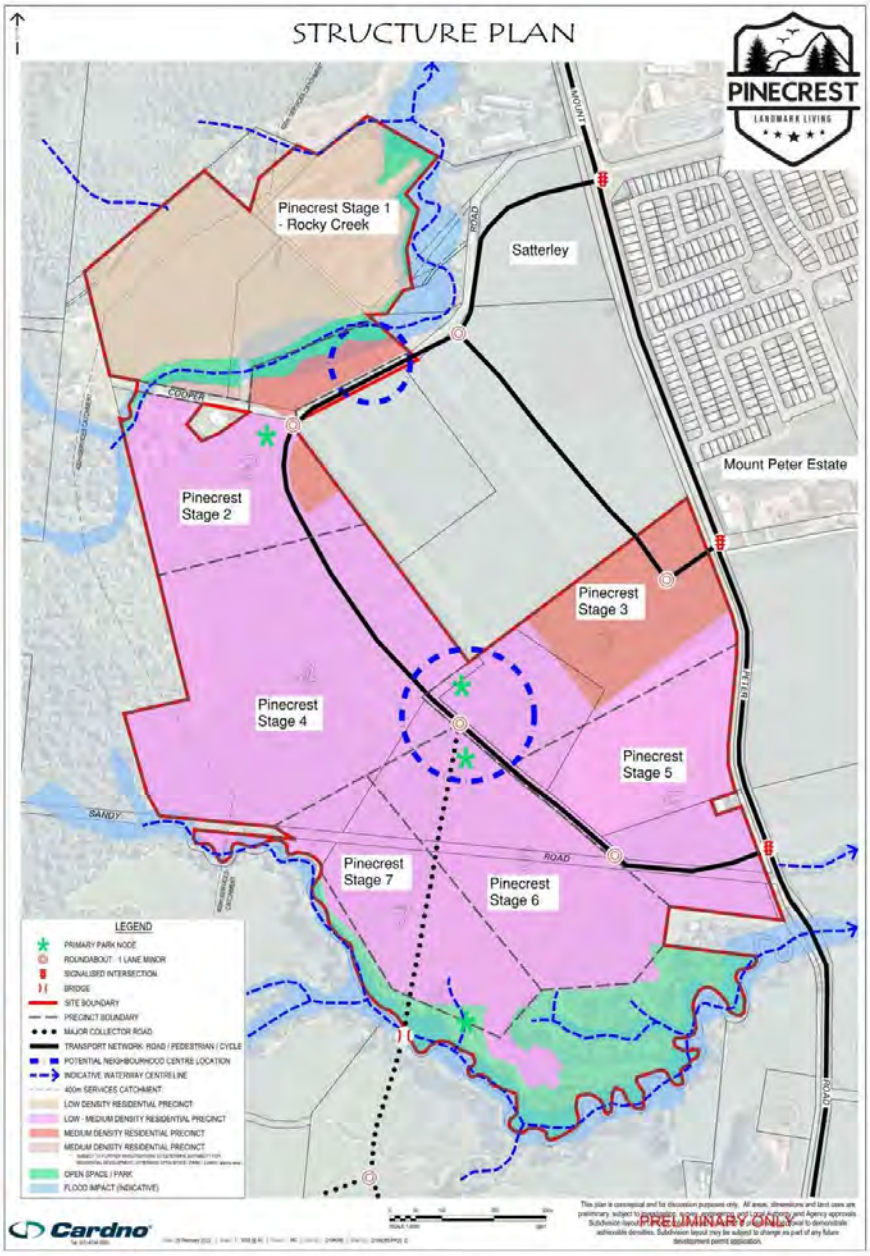

Figure 1-2 Updated Pinecrest Structure Plan

Figure 1-2 shows the updated Pinecrest Structure Plan, which indicatively shows the precincts, staging, major road network layouts and potential location of neighbourhood centres within the Pinecrest development.

Stage 1 of the development is comprised of brown shaded area, consisting of Rocky Creek. The Staged areas of the Rocky Creek Development is shown in the Figure 1-3.

Figure 1-3 Rocky Creek Stage 1, 2, 2B, 3 & 4

This report assesses the water supply and sewer infrastructure requirements to service the proposed development whilst maintaining service standards in surrounding CRC infrastructure.

2 Design Criteria

The following water supply design criteria was applied to the proposed development: *FNQROC[1] Design Guidelines – D6 Water Reticulation v03/17.*

2.1 Water Supply

Critical water supply design parameters are shown below

2.1.1 Water Supply Demand and Peaking Factors

Average Day Consumption (AD)	= 400 L/EP/D
Peaking Factors	
Peak Day (PD) – Low and Medium Density	= 2.25 x AD
Peak Hour (PH) – Low and Medium Density	= 1/12 x PD

2.1.2 Fire Fighting

Residential Fire Flow Demand	= 15 L/s for 2 hours
Multi-story Residential/Commercial/Industrial Fire Flow Demand	= 30 L/s for 4 hours
Minimum System Pressure	= 12 m at property boundary
Background demand	= Minimum System Pressure @ 2/3 Peak Hour Positive System Pressure @ Peak Hour

2.1.3 Residual Pressures

Minimum operating pressure at PH	= 22 m @ building pad
Maximum operating pressure	= 60 m

2.1.4 Pipeline Design

Maximum velocity	= 2.5 m/s Velocities up to 4.0 m/s may be acceptable during fire flows

2.1.5 Roughness Coefficients

The below roughness coefficients are to be used in accordance with the Darcy-Weisbach equation when calculating headloss within the model:

Table 2-1 Roughness Coefficients

Darcy-Weisbach Roughness Coefficients	
Mean Velocity (m/s)	Adopted Hazen Williams Friction Coefficient "C"
1.0	0.6
1.5	0.3
2.0	0.15

[1] Far North Queensland Regional Organisation of Councils

2.2 Sewerage Supply

Critical deign parameters are shown below.

- Peak Dry Weather Flow (PDWF) scour review;
- Peak Wet Weather Flow (PWWF) pipe percent full review, surcharge review; and
- Pump Station (PS) for the proposed development flow rate and high level energy requirements.

The model is developed with the following flow parameters:

- Average Dry Weather Flow (ADWF) of 174 L/EP/d;
- PDWF factor of 2.3 as per FNQROC Design Manual; and
- PWWF of 1350 L/EP/d as per CRC direction. This provides a PWWF factor of approximately 8 as per the existing model.
- Depth of flow at PWWF in proposed sewers - ≤ 75% of diameter
- Depth of Flow at PWWF in existing sewers – Depth of flow/surcharge minimum 1.0m below surface level. (Adopted by CRC)

2.3 Development Population

CRC adopts an EP in accordance with FNQROC as the basis for sewerage infrastructure planning which represents the sewerage load associated with the proposed development. The developmental EP was calculated by converting the corresponding number of dwellings with the recommended loading rate specified in the FNQROC Design Manual. The estimated load in EPs for the precincts of the development is detailed in Section 3.3.

3 Load Allocation

3.1 Proposed Development Load

Cardno was provided with a development plan for the Pinecrest development; and translated these in accordance with the *FNQROC Design Guidelines – D6 Water Reticulation v03/17* to develop water loading for the subject development. Equivalent Persons (EP) have been estimated for each stage and outlined in Table 3-2.

Commercial loads were not in the provided schedules and a gross floor area estimate of 0.5 x lot area was assumed to derive the commercial loads.

3.2 Previous Load Allocations

The previous load allocations within the CRC's model were removed from the development area and replaced with those identified in Table 3-2. The CRC Demand Model provided in GIS format was compared to the H20 Map model demands to determine the appropriate loadings to be removed. Removed hydraulic loads have been summarised in Table 3-1 as well as the CRC demand model for comparison.

Table 3-1 Previous Loads Removed from Models

Planning Horizon	CRC Demand Model	Hydraulic Model Loadings (EP)		
	(EP)	SFR (EP) Single Family Residential	LDR (EP) Rural Residential	NRW (EP) Non Revenue Water
2016	20	0	0	0
2021	21	0	0	0
2026	22	3.1	1.8	0.7
2031	22	20.4	2.3	3.4
Ultimate	3,250	1,694.6	0.0	254.2

The Existing Model Loadings in Table 3-1 are based on the below Nodes being deactivated within the model:

- FJ_256263
- FJ_MPPWM36
- FJ_MPPWM38
- FJ_MPPWM916
- FJ_MPPWM917
- FJ_MPPWM918

These nodes are shown in Figure 3.1 which details the Ultimate (2041) Local Government Infrastructure Plan (LGIP) Water Retic Trunk layout within the proposed development.

Table 3-2 Loads from Mount Peter Rd Trunk Junctions

Planning Horizon	Existing Model Loadings (EP)		
	SFR (EP) Single Family Residential	LDR (EP) Rural Residential	NRW (EP) Non Revenue Water
2016	0	0	0
2021	0	0	0
2026	9.0	1.8	2.0
2031	190.7	1.7	33.3
Ultimate	2,025.8	0.0	303.83

Table 3-3 details the Loads placed on the below Nodes:

- FJ_MPPWM002_1 – Loads have been removed from original model on this node. It is assumed that these accounted for the Satterley Estate development, which is included in the model, as are the developments in the north.
- FJ_MPPWM009_1 – It has been assumed that the loads on this node account for the loads from the external catchment Lot 5 SP310248.
- FJ_MPPWM025_1 – This has been retained in the model. It is just to the South of the Pinecrest development.

These Nodes are not deactivated within the model and are used to tie-in the Pinecrest development. It is possible that some of the development site is attributed to these nodes, however they were kept in the model to provide a conservative assessment.

3.3 Pinecrest Load Allocations

Table 3-3 shows the load allocations for each stage within the Pinecrest development, which have been calculated based on an assumption of the number of dwellings/hectare for the development type indicated on the structure plan. It must be noted that an updated lot layout for the later stages of the Pinecrest development has not been produced (refer to the updated Pinecrest Structure Plan in Figure 1-2). Lot sizes are based on "Table 1.1.4 – Ultimate Residential Density Assumptions" of Cairns Regional Council's *Extrinsic Material to the Local Government Infrastructure Plan. (Rev 2.2)*.

The total EP calculated using the new structure plan was found to be considerably lower when compared to the total EP previously calculated based on a master plan with lot configurations. As such, the previous lot count for each of these areas has been adopted in the model for conservatism. The adopted load allocations for the Pinecrest area are shown in Table 3-4.

Table 3-3 Pinecrest EP – Based on New Structure Plan

Pinecrest Stage	Area	Dwellings / Ha (Density)	Dwellings	EP/Dwelling	EP
Pinecrest - Stage 1	21.4	14	299.6	2.8	838.9
Pinecrest - Stage 1 Medium Density	0.2	25	5	2.8	14
Pinecrest - Stage 2	9.8	14	137.2	2.8	384.2
Pinecrest - Stage 2 Medium Density	2.7	25	67.5	2.8	189
Pinecrest - Stage 3	6.2	14	86.6	2.8	242.4
Pinecrest - Stage 3 Medium Density	7.7	25	191.3	2.8	535.5
Pinecrest - Stage 4	25.5	14	356.5	2.8	998.3
Pinecrest - Stage 5, 6, + 7	38.7	14	541.8	2.8	1,517

Table 3-4 Pinecrest EP – Based on Previous Masterplan (Used in Modelling)

Stage	Lot / Land use	Units	Development Density (EP/Unit)	Demand (EP)
Rocky Creek (Stages 1-3)	Lot 401 m^2 to 900 m^2	97	2.8 EP/Lot	271.6
	Lot 901 m^2 to 1100 m^2	30	3.1 EP/Lot	93
	Lot 1101 m2 to 1500 m^2	11	3.4 EP/Lot	37.4
	Lot > 1500 m^2	4	3.7 EP/Lot	14.8
	Sub-Total	142		**416.8**
Rocky Creek (Stages 4A, 4B)	Lot 401 m^2 to 900 m^2	1	2.8 EP/Lot	2.8
	Lot 901 m^2 to 1100 m^2	1	3.1 EP/Lot	3.1
	Lot 1101 m2 to 1500 m^2	3	3.4 EP/Lot	10.2
	Lot > 1500 m^2	2	3.7 EP/Lot	7.4
	Sub-Total	**7**		**23.5**
Pinecrest Stage 1 Medium-Density Residential and Pinecrest Stage 2 Medium-Density Residential (Adjacent to Rocky Creek Precinct)	Area: 2.22 Ha Dwellings / Ha (Density): 25	55	2.8 EP/Lot	**155**
Pinecrest Stage 2 Low to Medium Density	Lot 401 m^2 to 900 m^2	137	2.8 EP/Lot	**384.2**
Pinecrest Stages 3 and 4	Lot 401 m^2 to 900 m^2	443	2.8 EP/Lot	1,240.7
	Medium Density	191	2.8 EP/Lot	535.5
	Sub Total	634		**1,776.2**
Pinecrest Stages 5, 6 and 7	Lot 401 m^2 to 900 m^2	542	2.8 EP/Lot	**1,517**
Total				**4,273**

3.4 External Load Allocations

Further to Section 3.2 Cardno included the following Developments within the assessment.

- 79 lots over Lot 4 on SP271409 (Satterley) (401m2 to 900m2) under Development Permit 8/13/2020; and,
- A total of 490 lots (375 lots were already accounted for) for "Mount Peter Estate" (generally 401m2 to 900m) over the eastern portion of Mount Peter Road between Development Permits 8/13/1816 (approved) and 8/13/2287 (under consideration).

Table 3-5 details the external loads which were added to the model and are depicted in Appendix A Figure A.18. These were taken from the provided CRC demand model.

Table 3-5 External Loads

Lot	EP
3SP126545	19.1
Satterley	221.1
1SP271409	19.9
1RP802254	0.2
2SP271409	68.3
3SP282732	6.3
2SP282732	12.6
6SP310248	231.4
3SP134760	115
4SP134760	10.4
5SP310248	648.6[Note1]
Mt Peter Estate (Existing)	1,340
Mt Peter Estate (2023-Ultimate)	1,610
Total	**3,654**

Note 1: Loading for Lot 5SP310248 has not been added to the water model, it is assumed that this loading has already been accounted for on previous loading for node FJ_MPPWM009_1 (1,854 EP under the Single-Family Residential demand pattern, and 278 EP under Non-Revenue Water demand pattern).

3.5 Loading Scenarios

3.5.1 Existing Development Horizon (2021) (Pre-development)

This scenario accounts for the existing network prior to any development.

3.5.2 Rocky Creek Stages 1-3 (2023)

This scenario accounts for the development of Rocky Creek Stages 1-3 (416.8 EP) plus the external developments at Satterley (221 EP) and Mt Peter's Estate (1,340 EP).

3.5.3 Rocky Creek Stages 1-4 and Pinecrest Stage 2 (2026), with 2023 Infrastructure (Water Only)

This scenario accounts for the development with 2026 loading (Pinecrest Stage 2 development (384 EP) and Rocky Creek Stages 1-4 (451 EP)) with Satterley (221 EP) and Mt Peter's Estate (1,340 EP), with 2023 infrastructure being constructed.

3.5.4 Ultimate (2041)

This Scenario accounts for the full development of Pinecrest, (including Rocky Creek Stages 1-4) (4,273 EP) as per Table 3-2, and all external load allocations (3,654 EP).

4 Water Supply Infrastructure Assessment

CRC issued Cardno with the water network planning model to undertake this assessment. The water supply analysis was undertaken in H2OMAP Water software using the "Mount_Peter_Model_Extract.H2O" model. In the existing model, an allowance had been made for growth west of Mount Peter Rd with trunk infrastructure and pressure zone boundaries planned through the Pinecrest development. This model was adopted and updated with the proposed internal reticulation of the Pinecrest development incorporating the existing proposed trunk infrastructure and pressure zones within the model.

4.1 Data Provisions from Cairns Regional Council

The following information was provided by the Cairns Regional Council for the purpose of this assessment:

> Hydraulic Model: H2OMAP Water model, *"Mount_Peter_Model_Extract.H2O"*

> Integrated Demand Model

4.2 Water Network and Planning

The proposed Pinecrest development area is supplied from Robert Road Reservoir and Draper Road Reservoir. These storages are currently interconnected on the reticulation side via the Behana main (located at the Bruce Highway), and flow balanced to meet demand. Nominally however, most of the supply typically comes from Robert Road Reservoir.

The hydraulic analysis was undertaken for the Existing (2021) (Pre-development), Rocky Creek Stages 1-3 and Pinecrest Stage 2 (2023 with proposed augmentation), Pinecrest 2026 (2026 loading with 2023 infrastructure) and Ultimate (2041) scenarios for both Peak Day and Fire Flow simulations. These scenarios are as follows:

> Existing (2021) 2021_PD_AUGS_CAIRNS_SOUTH, System Aug Scenario

> Rocky Creek Stage 1 (2023) PC_RC_STAGE 1-3

> Pinecrest (2026) PC_RC_2026LOADS

> Ultimate (2041) 2041_PINECREST_AUG

The scenarios assume that all augmentations from previous planning horizons have been implemented.

4.3 Hydraulic Modelling

In the ultimate (2041) planning horizon, the development consists of two new pressure zones serviced by the Mount Peter Low (83.6 m) and Mount Peter High (116.5 m) reservoirs. These new pressure zones will eliminate the developments impact on the Robert Rd Water Supply Zone.

The new pressure zones extend south through the development which will require a creek crossing. Cardno has proximally located both crossing of the high and low supply zones for construction purposes.

Hydraulic simulations were run for Peak Day and Fire Flow scenarios for the Existing (2021) (Pre-development), Interim (2021 and 2026 with proposed augmentation) and Ultimate (2041) planning horizons.

4.3.1 Existing Development Horizon (2021) (Pre-development)

Previous analysis found that the planned 2021 system has insufficient capacity prior to the proposed Pinecrest development. This is due to several consumers north of the development currently with service below the desired service standard (DSS), requiring private booster pumps to achieve an acceptable water pressure. In the south there is also a property (Lot 1 RP850100) that is unable to meet the Peak Day pressure requirements as per the DSS.

In the south there are also three localities that do not meet DSS firefighting requirements (Lot 55 SP296749; Lot 2 RP704176; and, Lot 2 RP735739).

There is also a lot (30 Cooper Road, 1RP802254) that is not previously modelled. Survey found that this property is connected to the CRC water network via a small main (assumed DN50) connecting to Mount Peter Road. Figure A1, Appendix A shows the Min. Residual Pressure at the property to be 19.2 m.

4.3.2 Rocky Creek Stage 1-3 (2023)

The Interim Development Horizon assesses Rocky Creek Stages 1-3.

A booster pump is required under this scenario in order to service allotments located above 43 m AHD within this development. Cardno has proposed the below pump and modelled this scenario with this pump providing pressure to this Phase of the development.

> Grundfos Hydro MPC E 3 CRNE 32-2

This pump's pump curve and specifications are found in Appendix B. The pump duty points are as follows:

- MDPH Duty Point (1 pump): 9.4 L/s @ 36.2 m operating at 3257 rpm.
  - > Required NPSH is 3.4 m and available NPSH is 15.7 m
- Firefighting 2/3 PH 12 m min. Residual Pressure (2 pumps): 21 L/s @ 34m operating at 3231 rpm.
  - > Required NPSH is 4.4 m and available NPSH is 12.1 m
- Firefighting PH Positive Residual Pressure (2 pumps): 24.2 L/s @ 20.7 m operating at 3055 rpm.
  - > Required NPSH is 6.6 m and available NPSH is 10.7 m

4.3.2.1 Peak Hour Results

The hydraulic analysis indicates that the additional demand from Rocky Creek Stage 1-3 and Pinecrest Phase 2 do not impact on the standards of service requirements for the surrounding existing development. Minimum pressures for the initial stages of the Pinecrest development average over 50 m, well above the minimum requirement of 22 m as shown on Figure A.2, Appendix A. The pressure at 30 Cooper Road remains at 19.2 m, however, it is proposed to service this property via the Rocky Creek Booster Pump. When serviced via the Rocky Creek booster pump, the pressure is above the 22 m requirement shown in Figure A.3, Appendix A and Appendix E in tabular format.

Within the Rocky Creek development any building pad with an elevation of 80 m or higher, will have a minimum 30 m of residual pressure or less. A building pad greater than 88 m will result in a residual pressure of less than 22 m.

4.3.2.2 Fire Flow Results

The residential fire flow of 15 L/s was applied to the low-density residential nodes, there are no other land use types proposed within this stage. The development and surrounding network model nodes were assessed in hydraulic simulations and the minimum residual pressure requirement of 12m is not met for the 2021 planning horizons as shown in Figure A.8, Appendix A. The property not meeting the requirement is 1RP802254, which can be resolved by connecting it to the Rocky Creek booster pump zone via a DN50 connection. This results in a residual pressure of 49.4 m as shown in Figure A.9, Appendix A and Appendix E in tabular format.

4.3.3 Rocky Creek Stage 1-4 (2026 Loads) & Pinecrest Phase 2 (2026 Loads)

4.3.3.1 Peak Hour Results

The hydraulic analysis indicates that the additional demand from Rocky Creek Stage 1-4 and Pinecrest Phase 2 using 2026 loads do impact on the standards of service requirements for the surrounding existing development. Minimum pressures for the initial stages of the Pinecrest development average over 50 m, well above the minimum requirement of 22 m as shown on Figure A.4, Appendix A and Appendix E in tabular format. The pressure in the Mt Peter Estate to the East is impacted pressures dropping to 20.43 m which is under the 22 m requirement. This will be resolved once the Mt Peter High Level Reservoir is commissioned and can be mitigated in the interim with a private booster pump.

4.3.3.2 *Fire Flow Results*

The residential fire flow of 15 L/s was applied to the low-density residential nodes, there are no other land use types proposed within this stage. The development and surrounding network model nodes were assessed in hydraulic simulations and the minimum residual pressure requirement of 12 m is met for the 2021 planning horizons. Results for the hydrants across the development and the within the surrounding network are represented on Figure A.10, Appendix A and Appendix E in tabular format.

4.3.4 Ultimate Development Horizon (2041)

The ultimate system modelled as per the CRC' LGIP consists of two pressure zones running through the development:

- 2026 WRF002 - Mount Peter High Level Reservoir and Pump Station – The high-level reservoir is planned for 116.5 m elevation and budgeted at $4,977,598 in 2016
- 2036 WRF004 – Mount Peter Low Level Reservoir – The low-level reservoir is planned for 83.58 m elevation and budgeted at $5,663,708 in 2016

Each pressure zone feeds into the development from the east and continues further south via a creek crossing. All proposed augmentations beyond the development's boundaries were implemented as planned.

4.3.4.1 *Peak Hour Results*

The hydraulic analysis indicates that the north-western area of the Rocky Creek development falls the DSS under the ultimate demand scenario. This is only seen at the high point of the development with a minimum pressure of approximately 17 m at peak hour which is primarily caused by the high headlosses through the high-level reservoir trunk main as shown in Figure A.5 in Appendix A.

Pressure issues within the Rocky Creek development are resolved by upgrading the trunk main from the high-level reservoir to Mt Peter Rd, raising the minimum pressures to approximately 26 m as seen in Figure A.6 in Appendix A as well in tabular format in Appendix E.

It is not within the scope of this assessment to alter LGIP, and as such this study has simply provided an augmentation strategy of the proposed transfer mains servicing the high-level reservoir (shown in Figure A.5 and Table 4-1) in order to provide adequate pressure. However, through further study a provision for connection to the low-level reservoir to the majority of the low elevation estate may be made at the detailed design phase, reducing the need for augmentations of the high-level reservoir's transfer mains.

The Rocky Creek, The Grove and Sanctuary developments all have maximum pressures exceeding the 60 m limit. This max pressure be reduced by implementing a pressure reducing valve off the WMF200 future trunk upgrade connection.

4.3.4.2 *Fire Flow Results*

The residential fire flow of 15 L/s was applied to the low-density residential nodes with 30 L/s applied to nodes servicing commercial & med-high density residential allotments. The development and surrounding network model nodes were assessed in hydraulic simulations and the minimum residual pressure requirement of 12 m is met for the ultimate planning horizons. Results are shown in Figures A.11 and A12, Appendix A and Appendix E in tabular format.

In the north of The Grove there is a med-density residential property that is unable to provide 30 L/s of firefighting flow. Whilst this has been modelled, it has not been taken into consideration in this study as it expected that the commercial property will source an alternative connection on its Cooper Road frontage to achieve compliance.

Figure 4-1 Augmentations

Model year	Upgrade Description	Current Master Plan Size	Proposed Master Plan Size	Proposed Length	Model Reference
Ultimate	Model ID: FPI_MPPWM059_1 Master Plan ID: WMF215, WMF040 Installation of DN525 main from Mt Peter High Level Reservoir to Mt Peter Estate.	DN300, DN450	DN525	940 m	Ultimate
Ultimate	Model ID: FPI_MPPWM059_3 Master Plan ID: WMF045, WMF041 Installation of DN525 main from Mt Peter High Level Reservoir to Mt Peter Estate.	DN450, DN375	DN525	1,055 m	Ultimate

5 Sewerage Infrastructure Assessment

This section details the existing and proposed sewerage infrastructure required to discharge the wastewater flow from the Pinecrest development to the existing CRC downstream network while maintaining FNQROC's Design Criteria.

Cardno previously prepared the "*Edmonton, Mount Peter and Gordonvale Sewerage Planning Study Final Report*" (April 2017) and the associated sewerage model. The model in H20 SWMM has been utilised for this analysis to ensure the impact to the downstream network is assessed. The model is named:

> EWWTP-Stage_4_v014

Refer to Section 4.4 for the descriptions of scenarios that have been created and analysed for this report.

5.1 Existing Infrastructure

The Pinecrest development site is within the catchment of the Edmonton Wastewater Treatment Plant (WWTP) located about 7km from the development site. There is existing sewerage network near the development area, with a 300mm diameter PVC sewer main on MacKillop Road constructed as part of the Mount Peter Estate development. This then discharges downstream into the recently constructed "Mt Peter Transfer Stage 1" augmentation consisting of a 375mm diameter main through to Petersen Road.

The nearest sewage pump station is PS ED6 (refer to Appendix A) which is much further downstream near Fuller Park which discharges to the gravity network. The existing sewerage network adjacent to the development and the existing catchments are shown in Figure 5-1. The proposed manhole N10 on Mackillop Road is the nominated discharge point and provided As-built information has included in the hydraulic model. The noted 2016 capacity of Edmonton WWTP is 26,277EP from the "*Edmonton, Mount Peter and Gordonvale Sewerage Planning Study Final Report*" Cardno (April 2017).

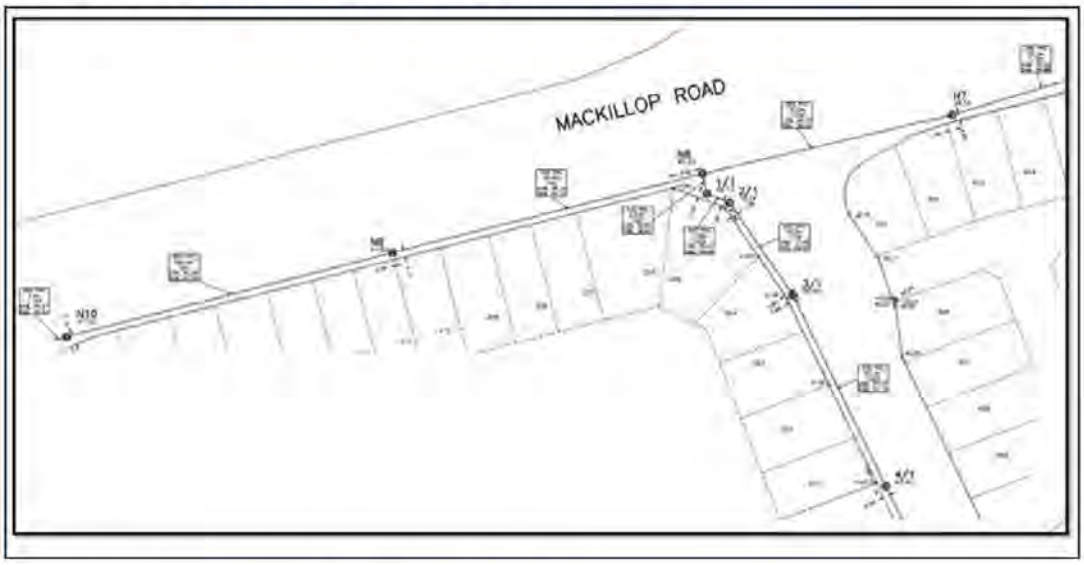

Figure 5-1 Hydraulic model discharge location N10

5.2 Wastewater Model Build

The wastewater loads from the development catchment were incorporated into the model. Hydraulic analysis was undertaken for the initial and ultimate planning horizons. The hydraulic model analysed the infrastructure required to discharge the flow from the development area to the existing CRC sewerage networks and the impacts of this additional load on the existing network. It does not include analysis of the internal reticulation in the proposed development which will be undertaken during detailed design.

All internal gravity wastewater reticulation pipework for the Pinecrest development will be DN150 PVC or D225 PVC mains and will operate within FNQROC design criteria. This will be further assessed during detailed design.

The Cooper Road DN225 uPVC Sewer Main for Rocky Creek Stages 1-3 (and ultimate stages) has been loaded into the model based on detailed design drawings.

The sewer loading points for the Pinecrest development, and the surrounding external lots are shown in Figure A.18 in Appendix A.

5.3 Wastewater Network and Planning

The proposed Pinecrest development is to discharge to the existing Edmonton WWTP catchment. The analysis was undertaken for the Existing (2021 Pre-development), Interim (2023 – Rocky Creek Stages 1-3, and Mt Peter's Estate and Satterley, with proposed augmentation) and Ultimate (beyond 2031, with proposed augmentation) scenarios for ADWF and PWWF simulations.

The modelled scenarios assume that all augmentations from noted planning horizons within the "Edmonton, Mount Peter and Gordonvale Sewerage Planning Study Final Report" (April 2017) have been implemented.

The topography of the development area varies, the northern section (Rocky Creek Precinct) generally falls from the northwest to the southeast.

The Mountainview, Bellavista, The Grange and a portion of The Grove precincts generally fall from the northwest to the east, and to Mount Peter Road. These precincts will connect to the proposed 300mm diameter gravity sewer main on Mount Peter Road which will convey the developed wastewater flow to the existing network at manhole N10 on Mackillop Road, the recently constructed 300mm diameter PVC main. This is part of the Edmonton WWTP catchment, ultimate capacity 41,323 EP from the "*Edmonton, Mount Peter and Gordonvale Sewerage Planning Study Final Report*" Cardno (April 2017).

The other portion of The Grove will grade from the northeast to the southwest, while Sanctuary and Edgewood fall from west to the east. The Hideaway falls to the south.

5.4 Wastewater Model Results and Augmentations Required

Refer to Appendix A for figures detailing the model results.

5.4.1 Existing Development Horizon (2021)

The Existing Development Horizon (2021) has been established to provide a baseline case for the water network with the Pinecrest Development loads removed from CRC's previous model. Lot 4 on SP271409 (Satterley) has not been considered in this scenario.

The model includes the "Mt Peter Transfer Stage 1" augmentation which has already been constructed. This includes a 375mm diameter gravity main through to Petersen Road, a 300mm rising main from PS ED1 and upgraded pumps at PS ED6.

Analysis has found that there were downstream pipe flow depth failures in this scenario, on a section of DN300 main upstream of PS ED6. However, it was found that none of the manholes along this section of main surcharged under this loading, with the water level maintaining a level >1m below surface level. The HGL of this section is shown in Figure 5-1 below.

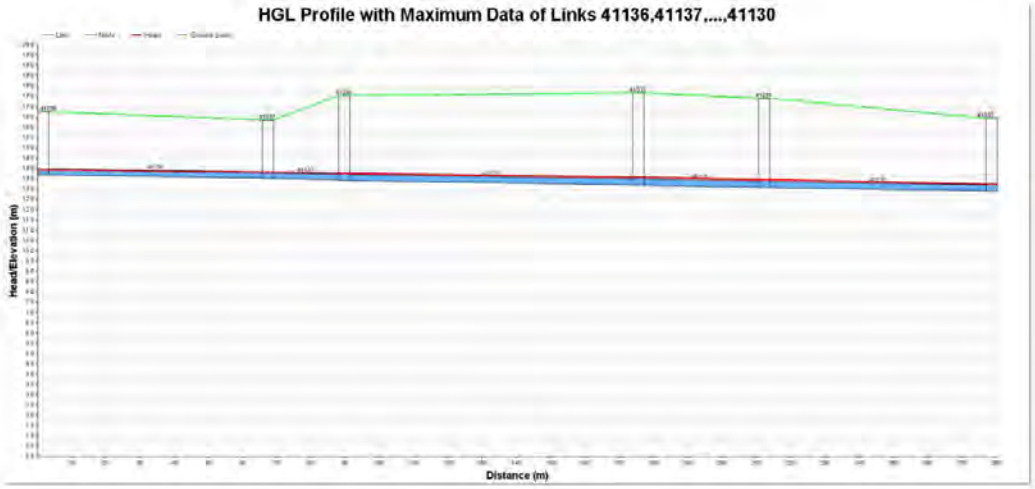

Figure 5-2 HGL of overflowing DN300 pipe section upstream of PS ED6 – Existing Scenario

5.4.2 Interim Development Horizon (2023)

Augmentations are required to provide a connection point for the flows from the Pinecrest development to enter the existing sewerage network. The proposed augmentations, internal to the Pinecrest development, are as follows:

- To service the Rocky Creek precinct in the north of the Pinecrest development, a gravity sewer network including a 225mm diameter main along Cooper Road will be constructed to connect to the existing 300mm diameter main at Mount Peter Road/Mackillop Road. This will initially allow for the Rocky Creek Stages 1-3 in the Interim scenario, with the balance lots to follow in the Ultimate scenario.
- Within the Rocky Creek precinct, a small PS has been designed to discharge wastewater from the precinct through a 160mm diameter HDPE main into the external gravity network along Cooper Road. The details of this pump station are outlined in Section 5.4.2.1.

Analysis has found that there were downstream pipe flow depth failures in this scenario, on a section of DN300 main upstream of PS ED6. However, it was found that none of the manholes along this section of main surcharged under this loading, with the water level maintaining a level >1m below surface level. The HGL of this section is shown in Figure 5-2 below.

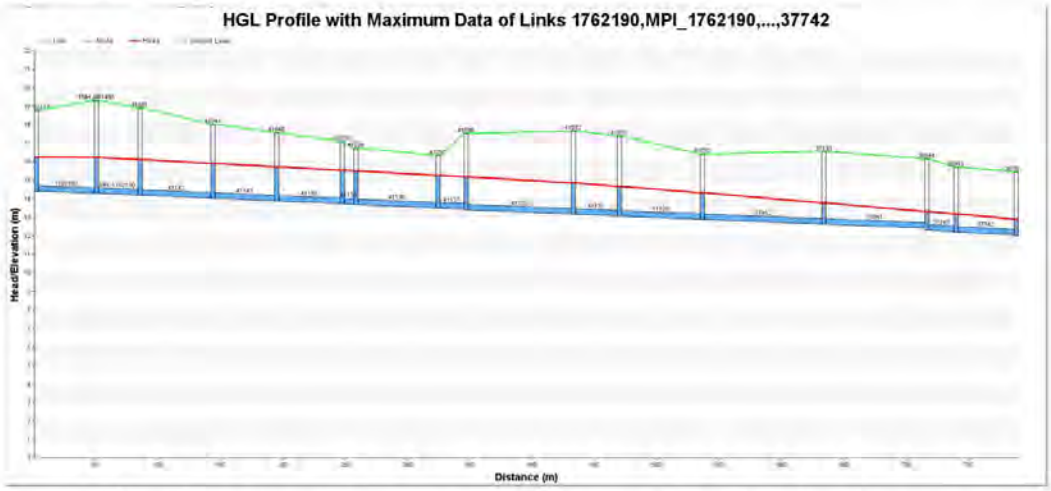

Figure 5-3 HGL of overflowing DN300 pipe section upstream of PS ED6 – Interim Scenario

Analysis using the updated Rocky Creek development loads has indicated that an additional 40 EP (on top of Rocky Creek Stages 1-3, Satterley & Mt Peter Estate) can be added to the Pinecrest precinct before the Mt Peter Transfer Stage 3 diversion is required. This is based on maintaining a depth of at least 1m below the surface at the critical manhole along 41037 on the DN300 gravity line which conveys flow to PS ED6.

Based on the above augmentations being carried out, and Mount Peter Estate and Lot 4 on SP271409 (Satterley) developments going ahead (as per Table 4-2), it is confirmed that the sewerage network will have sufficient capacity to provide for the Pinecrest Development at the interim development horizon.

5.4.2.1 Rocky Creek Sewer Pump Station

The Rocky Creek Precinct will require the construction of sewer pump station to convey flows to the proposed DN225 trunk sewer main along Cooper Rd.

The design of the Rocky Creek Sewer Pump Station was previously undertaken by Tansley Consulting on 11/06/21, whereby 2x Flygt NP 3102 SH 3~ Adaptive 255 4.2 kW pumps were proposed, along with the construction of an OD160 PN16 PE rising main. The previous pump station design report and pump selection is shown in Appendix C.

An updated system curve has been produced, based on the updated loading data for the Rocky Creek Stages 1-4 development, as well as external developments. Two duty points were calculated as per FNQROC D7.19, Table 7.14, Item 10. The calculated duty points, along with the previously calculated duty point, are shown in Table 5-1 below.

Table 4-1 Calculated Duty Points

	Duty Point
Tansley Consulting	14.07 L/s @ 16.15m head Velocity in OD160 PE rising main: 1.06 m/s
Cardno - Duty Point 1 (Single Pump Operation – C1 x ADWF)	9.37 L/s @ 12.82m head Velocity in OD160 PE rising main: 0.71 m/s
Cardno - Duty Point 2 (Duty Pump Operating in parallel with Standby Pump - 5 x ADWF)	8.5 L/s @ 12.00m head Velocity in OD160 PE rising main: 0.64 m/s

At the time of writing this report, the sewer pump station has been constructed, and is in the process of being commissioned. As such, the curve for the previously selected pump was superimposed onto the updated system curve. The updated system curve is shown in Figure 5-4.

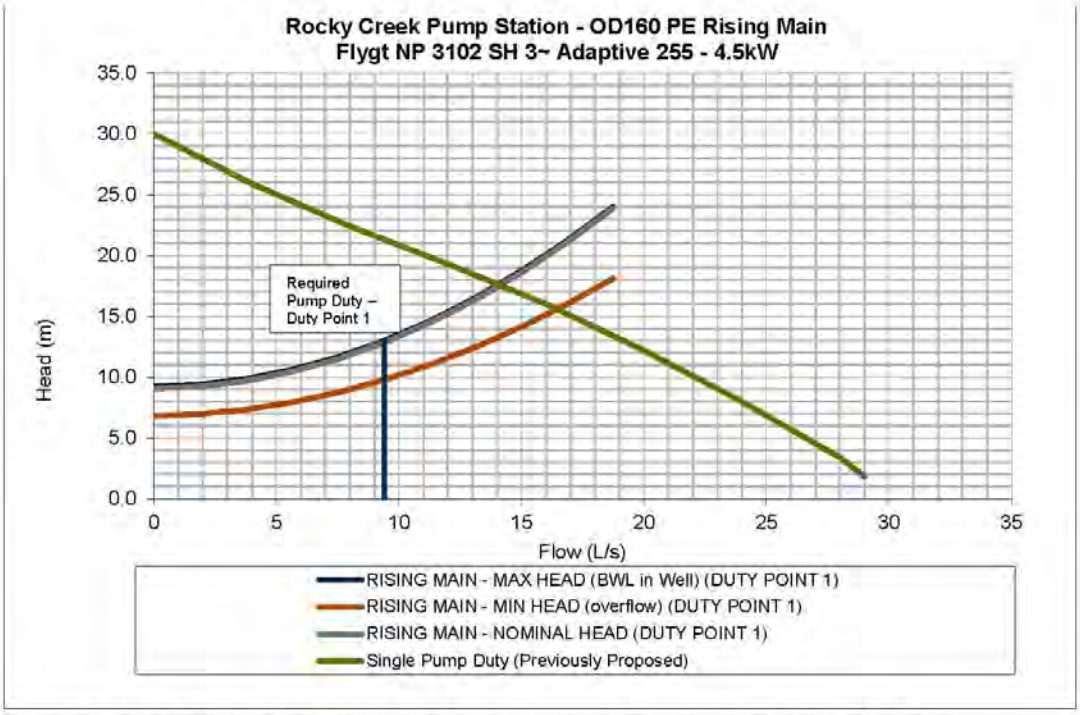

Figure 5-4 Rocky Creek Pump Station – System Curve with Previously Selected Flygt Pump

Looking at Figure 5-4, it can be seen that the previously selected pumps are adequate.

The selected pumps will pump at a flow rate of 14 L/s; it is proposed that pump start/stop levels in the wet well be configured such that the appropriate number of pump starts per hour can be achieved. Also, the pumps will achieve an adequate self-cleansing velocity in the OD160 PE rising main at this flow rate.

The updated hydraulic calculations for the rising main are shown in Appendix D.

5.4.2.1.1 Detailed Modelling Assessment of the Downstream Sewerage Network

The below shows that the downstream sewerage network is compliant with Satterley (221.2 EP) Mt Peter's Estate Ultimate (1,610 EP) and both Rocky Creek Stages 1-2 and Rocky Creek Stages 1-4.

With Stage 2 loadings the model shows that the Rocky Creek Pump starts 6.5 times per hour during PWWF (See Figure 5-5)

The critical maintenance hole in the downstream sewerage network is 41037. It is 2.842 m deep and with the Stage 2 loadings the model results show a maximum surcharge of 1.484 m (See Figure 5-6) resulting in 1.358 m freeboard.

The long section from the Rocky Creek Pump Station to PS ED6 has been provided in Figure 5-7 detailing that 41037 is the critical maintenance hole.

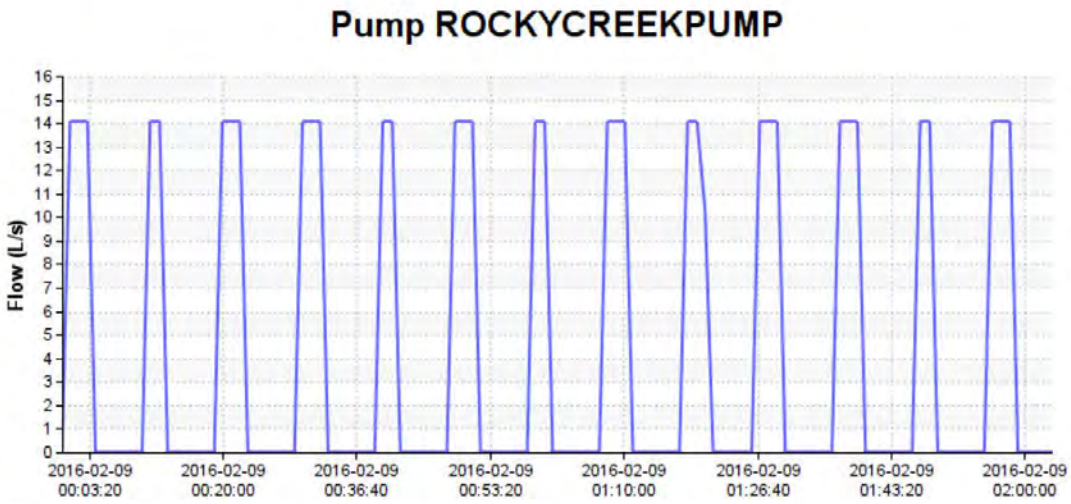

Figure 5-5 – Stage 2 - Rocky Creek Pumpstation – Modelled Flow Rate Results

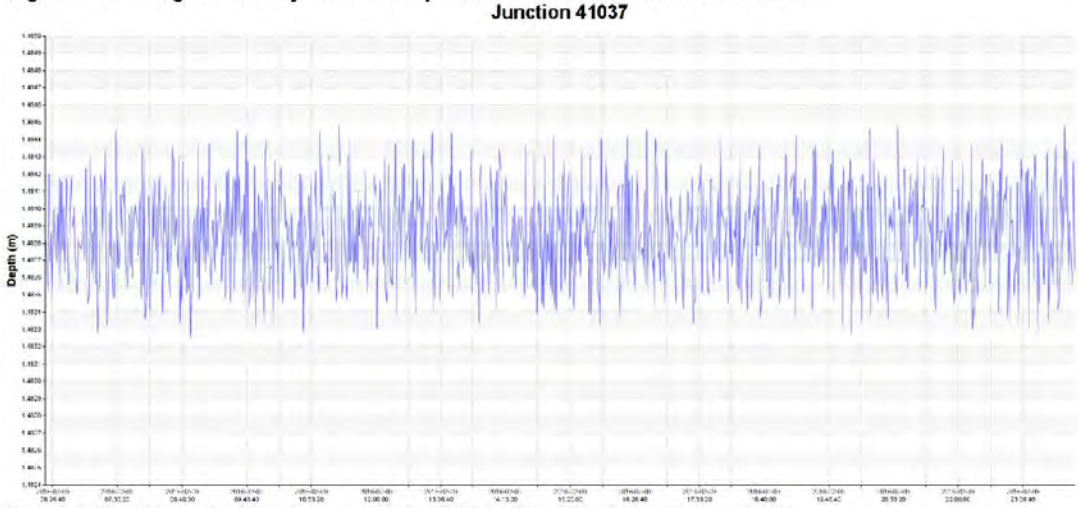

Figure 5-6 – Stage 2 - Maintenance Hole 41037 – Modelled Surcharge Depth

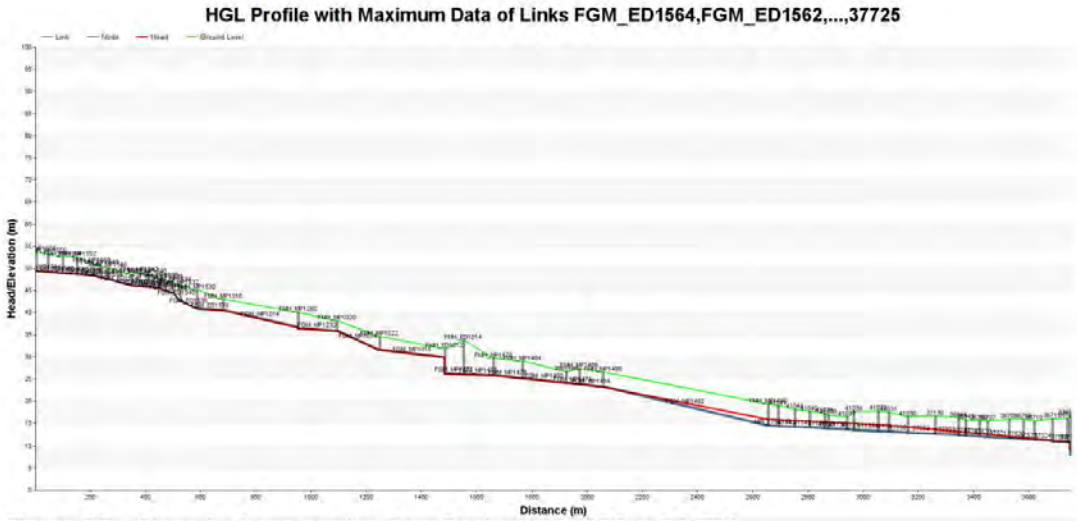

Figure 5-7 – Stage 2 – Long-section from Rocky Creek SPS to PS ED6

With Stage 4 loadings the model shows that the Rocky Creek Pump starts 8 times per hour during PWWF (See Figure 5-8)

The critical maintenance hole in the downstream sewerage network is 41037. It is 2.842 m deep and with the Stage 2 loadings the model results show a maximum surcharge of 1.834 m (See Figure 5-9) resulting in 1.008 m freeboard.

The long section from the Rocky Creek Pump Station to PS ED6 has been provided in Figure 5-10 detailing that 41037 is the critical maintenance hole.

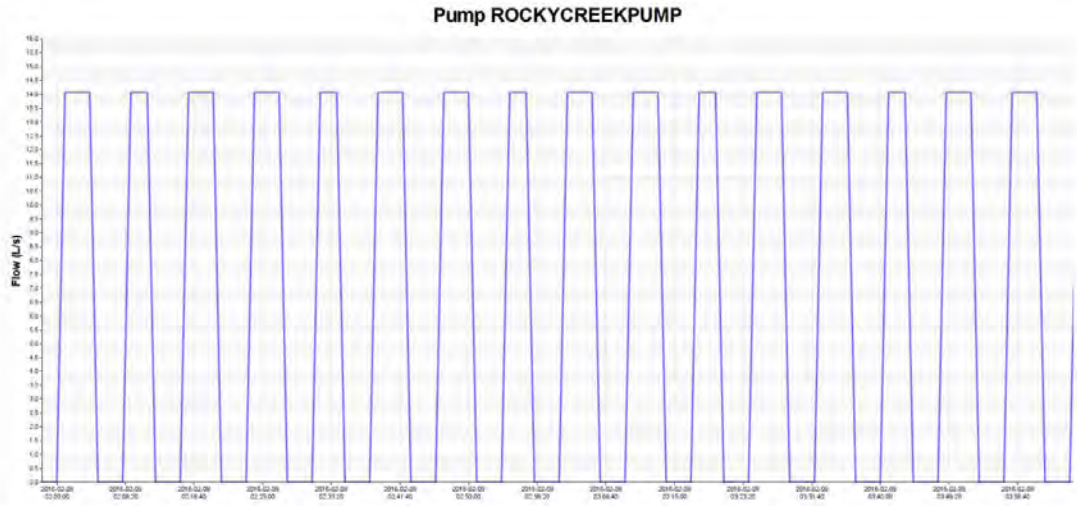

Figure 5-8 - Stage 4 - Rocky Creek Pumpstation – Modelled Flow Rate Results

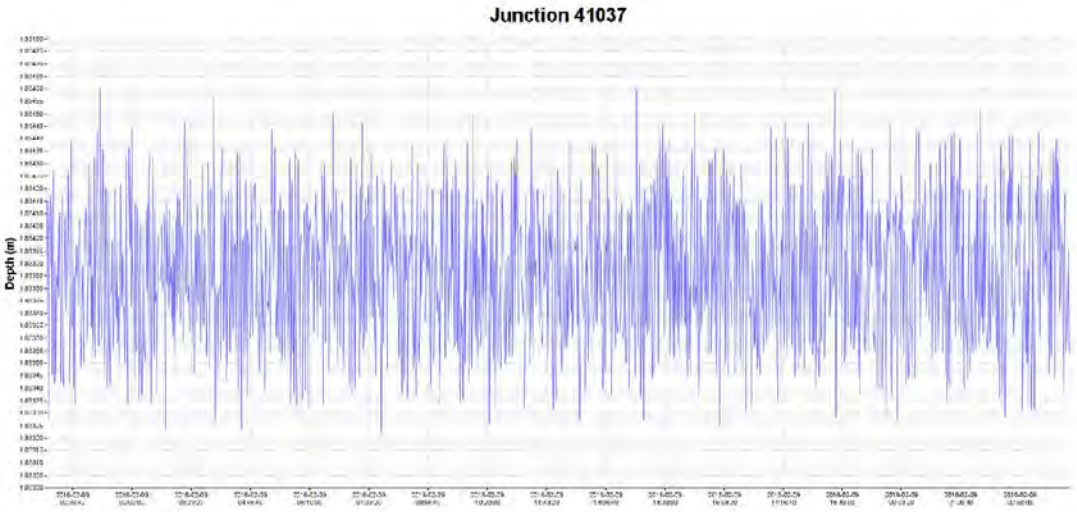

Figure 5-9 – Stage 4 - Maintenance Hole 41037 – Modelled Surcharge Depth

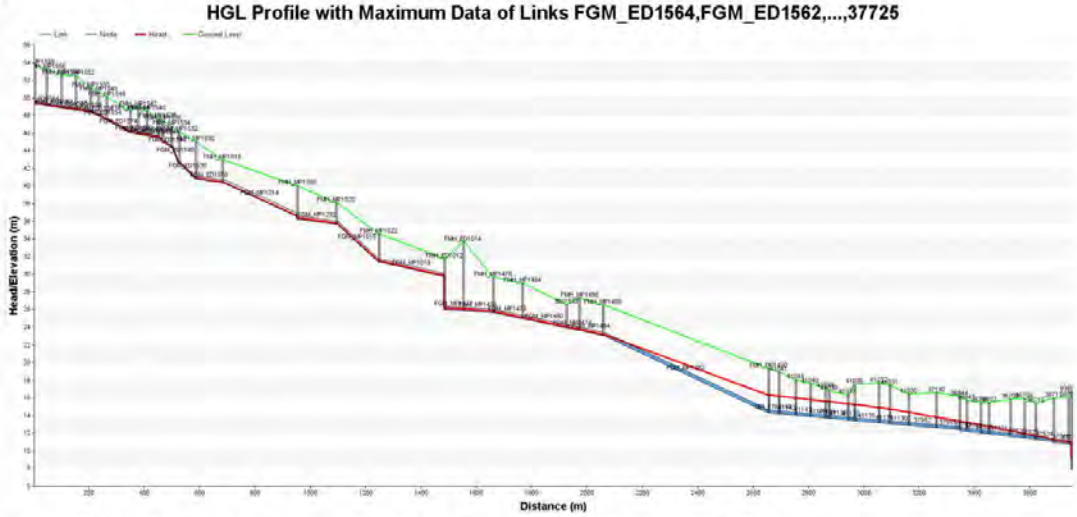

Figure 5-10 – Stage 4 – Long-section from Rocky Creek SPS to PS ED6

5.4.3 Beyond 2023 Development Horizon

As noted in the previous section, analysis has indicated that the current network downstream of the Rocky Creek development can accommodate an additional 40 EP on top of Rocky Creek Stage 1-3 loading, as well as the Satterley and Mt Peter's Estate developments, before the Mt Peter Transfer Stage 3 diversion is required. The nature of this augmentation is as follows:

- Mt Peter Transfer Stage 3 – new 450mm and 675mm diameter gravity mains from Petersen Road to the new Sewage Pump Station (SPS) F_ED11, and a new 450mm diameter rising main to Edmonton WWTP. Previous Cardno modelling had this being required from 2022-2026. However, as noted in the interim development horizon section

  Analysis found that there is a section of the proposed 600mm gravity main which exceeds 75% full at PWWF but is less than 100% full. The failing section is the last section of 600mm diameter gravity main before it increases to 675mm diameter. The sizing of this augmentation should be reconsidered as it is future works – 1,710m of the 600mm main proposed should be sized up to 675mm.

Note that this augmentation is shown on the Ultimate Development Horizon Figure in Appendix A.

5.4.4 Ultimate Development Horizon

The ultimate system has been modelled with the proposed loading in Section 3. External development loads have also been added, and consideration has been given to the infrastructure required to service the development. Refer to the Figures provided in Appendix A.

The following augmentations were proposed aligning with the previous Cardno 2017 report, and are applicable to later Pinecrest development stages:

- Mt Peter MPU2 – 300mm diameter gravity main along Mount Peter Road to the existing network 300mm diameter main at Mackillop Road (required with the construction of The Grove precinct, as noted previously the discharge manhole is N10 on Mackillop Road). Consideration has been given to minimum grade of the proposed 300mm main, the invert level at the discharge manhole and the main depth along with PWWF capacity. The sizing of the main will be confirmed during the detailed design phase.

  It is noted that this augmentation is not required for the Rocky Creek Stage 1-3, and that only the 300mm diameter road crossing will be required to connect manhole N10 to the Rocky Creek network along Cooper Road.

  This proposed augmentation and connection to the existing network provides for Pinecrest Stages 3-4 (namely, the precincts previously noted as The Grove and The Grange). It has been assumed that the remainder of Pinecrest Stages 5-7 (namely Sanctuary, Edgewood, The Hideaway and the Medium/High Density area) is loaded onto the node on the south which transfers flows to F_MP7.

- Mt Peter Transfer Stage 2 – new pump station F_MP7, gravity main and rising main required for later Pinecrest development (at this stage, assumed to be Pinecrest Stages 5-7). Approximately 1.2km of 250mm diameter rising main will be required to the east of Mount Peter Road, which will discharge into the new DN300 gravity main constructed under MPU 2. This pump station may be located closer to Mount Peter Road and the Pinecrest development, dependent on the development staging in the catchment area. DN450 gravity main from the southern end of the Pinecrest Development to the east will also be required. This proposed augmentation will provide connection to the proposed future pump station. Previous modelling had the first section of gravity main to F_MP7 (approximately 512m long) sized as a DN300. It was found that the DN300 was of insufficient capacity to convey PWWF, and as such, has been upsized to a DN450.

  This augmentation is required to service a portion of Pinecrest Stages 3-7 to the south (namely the (namely Sanctuary, Edgewood, The Hideaway and the Medium/High Density area).

  Previous planning has detailed the rising main running along Mount Peter Road to Mackillop Road. The length of the rising main can be reduced if the new rising main discharges to the Mt Peter MPU2 300mm diameter gravity main instead of running along Mount Peter Road.

  The upgrades of the noted future PS (PS augmentation F_MP7 (from 2026 to 2031) and associated rising main for Pinecrest Development will be staged into three parts with separate trigger points:

  - DN250 rising main to discharge into the new 300mm gravity main on Mount Peter Road. The capacity limit in the DN300 pipe is approximately 1,200 EP before one of the following augmentations is required:
    - Extend the rising main to the existing infrastructure downstream at the intersection of Mount Peter Road and Mackillop Road where the additional flow can be accommodated.
    - If PS augmentation F_MP4 (further to the east, Mt Peter Transfer Stage 4) has been constructed the PS augmentation F_MP7 can be made redundant and the existing and additional flow can be diverted via gravity to PS F_MP4.

It is noted that the proposed augmentations within the 2017 Cardno report (with pipe sizing amended as above) shall provide sufficient network capacity to accommodate the completion of the proposed Pinecrest development while ensuring no adverse impacts on the downstream existing network. A summary is provided in Table 5-4.

Table 5-4 Augmentations

Model year	Upgrade Description	Current Master Plan Size	Proposed Master Plan Size	Proposed Length	Load Trigger Point	Model Reference
Beyond 2023	F_ED11: Mt Peter Transfer Stage 3 Installation of 450-675mm gravity main from Petersen Road to new SPS, 450mm rising main to Edmonton WWTP	DN450-DN600	DN450-DN675	3.9km	40 additional EP in Rocky Creek area (in addition to Rocky Creek Stages 1-3)	2023/Ultimate
Ultimate	MPU 2 Installation of 300mm gravity main along Mount Peters Road	DN300	DN300	614m	Required for the development of Pinecrest Stage 3-4 (namely, the precincts previously noted as The Grove and The Grange)	Ultimate
Ultimate	F_MP7_GM: Mt Peter Transfer Stage 2 Installation of 450mm gravity main from Pinecrest Development to the East (to future SPS F_MP7)	DN300	DN450	512m	Required for the development of Pinecrest Stages 5-7 (namely, the precincts previously noted as Sanctuary, Edgewood, The Hideaway and the Medium/High Density area)	Ultimate
Ultimate	F_MP7: Mt Peter Transfer Stage 2 Installation of 68kW PS and	DN200/DN250, PS size not specified	DN250, 68 kW pump (to discharge to DN300 gravity main	1.2km (to discharge to DN300 gravity main)	Required for the development of Pinecrest Stages 5-7 (namely, the	Ultimate

	DN250 rising main to the south of Pinecrest and discharge into 300mm gravity main along Mount Peter Road. Once the DN300 gravity main under MPU 2 is at capacity, 94 kW pump station and longer DN250 rising main – 1.8km long – may be required to discharge downstream of new gravity main if F_MP4 is not constructed.		under MPU 2). DN250, 94 kW pump (to discharge downstream of DN300 gravity main).	1.8km (to discharge downstream of DN300 gravity main)	precincts previously noted as Sanctuary, Edgewood, The Hideaway and the Medium/High Density area)	

6 Summary and Conclusions

6.1 Water

In the existing (2021) scenario, this development is unplanned for. Further to this, parts of the network were found to not meet the DSS. Thus, no further loads could be placed on the network without the augmentation. Cardno assessed the 2021 planning horizon and recommended augmentation to ensure a "no worsening" of properties within the water supply zone.

Rocky Creek Stage 1-3 (2023) & Pinecrest Phase 2 scenarios were developed consisting of the initial stages of the Pinecrest development (Rocky Creek, and northern portions of Bellavista & Mountain View). It was found that these stages could be serviced with the additional proposed infrastructure:

> Booster Pump Station Grundfos Hydro MPC E 3 CRNE 32-2.

In the ultimate (2041) scenario, all planned augmentations including Mt Peter low- and high-level reservoirs are assumed to be implemented. In this scenario the development can adequately be serviced, however, there are pressure balance issues which will require future detailed planning closer to the planning horizon.

6.2 Sewer

At the existing development horizon, analysis has found that there were downstream pipe flow depth failures in this scenario, on a section of DN300 main upstream of PS ED6. However, it was found that none of the manholes along this section of main surcharged under this loading, with the water level maintaining a level >1m below surface level.

At the interim development horizon (2023), the existing network downstream of Rocky Creek was found to be of sufficient capacity to service the Rocky Creek Stages 1-3 development. One section of gravity main (the DN300 main, just upstream of PS ED6) was found to exceed a depth of 75% full at PWWF. However, it was found that none of the manholes along this section of main surcharged under this loading, with the water level maintaining a level >1m below surface level. The critical manhole along this section of main does not reach a level <1m below surface level until 40 EP is loaded on top of the Rocky Creek Stage 1-3 loading. This is the trigger point for the Mt Peter Transfer Stage 3 diversion to Edmonton WWTP. The nature of the Mt Peter Transfer Stage 3 augmentation is as follows:

- Mt Peter Transfer Stage 3 – new 450mm and 675mm diameter gravity mains from Petersen Road to the new Sewage Pump Station F_ED11, and a new 450mm diameter rising main to Edmonton WWTP. Analysis found that there was a minor failure downstream due to pipe flow depth in a section of the proposed 600mm gravity main. The failing section is the last section of 600mm diameter gravity main before it increases to 675mm diameter. The sizing of this augmentation should be reconsidered as it is future works – 1,710m of the 600mm main proposed should be sized up to 675mm.

At the ultimate development horizon, all augmentations previously listed were found to be necessary with some slight modifications to the previously proposed pipe sizes, as follows:

- MPU 2 – Installation of DN300mm gravity main along Mt Peter Road
- Mt Peter Transfer Stage 2 – new Pump Station F_MP7, rising main, and gravity main from Pinecrest Development to the east (to Future SPS F_MP7), to service later Pinecrest Development Stages 5-7. The first section of this gravity line (approximately 500m in length) was previously sized as a DN300, this was found to be of insufficient capacity, and as such has been upsized to a DN450.

The upgrades of the noted future PS (PS augmentation F_MP7 (from 2026 to 2031) and associated rising main for Pinecrest Development will be staged into three parts with separate trigger points:

- DN250 rising main to discharge into the new 300mm gravity main on Mount Peter Road. The capacity limit in the DN300 pipe is approximately 1,200 EP before one of the following augmentations is required:
  - > Extend the rising main to the existing infrastructure downstream at the intersection of Mount Peter Road and Mackillop Road where the additional flow can be accommodated.
  - > If PS F_MP4 (further to the east, Mt Peter Transfer Stage 4) has been constructed the PS augmentation F_MP7 can be made redundant and the flow can be diverted via gravity to PS F_MP4.

Water Supply & Sewerage Assessment

APPENDIX A

FIGURES

Cardno

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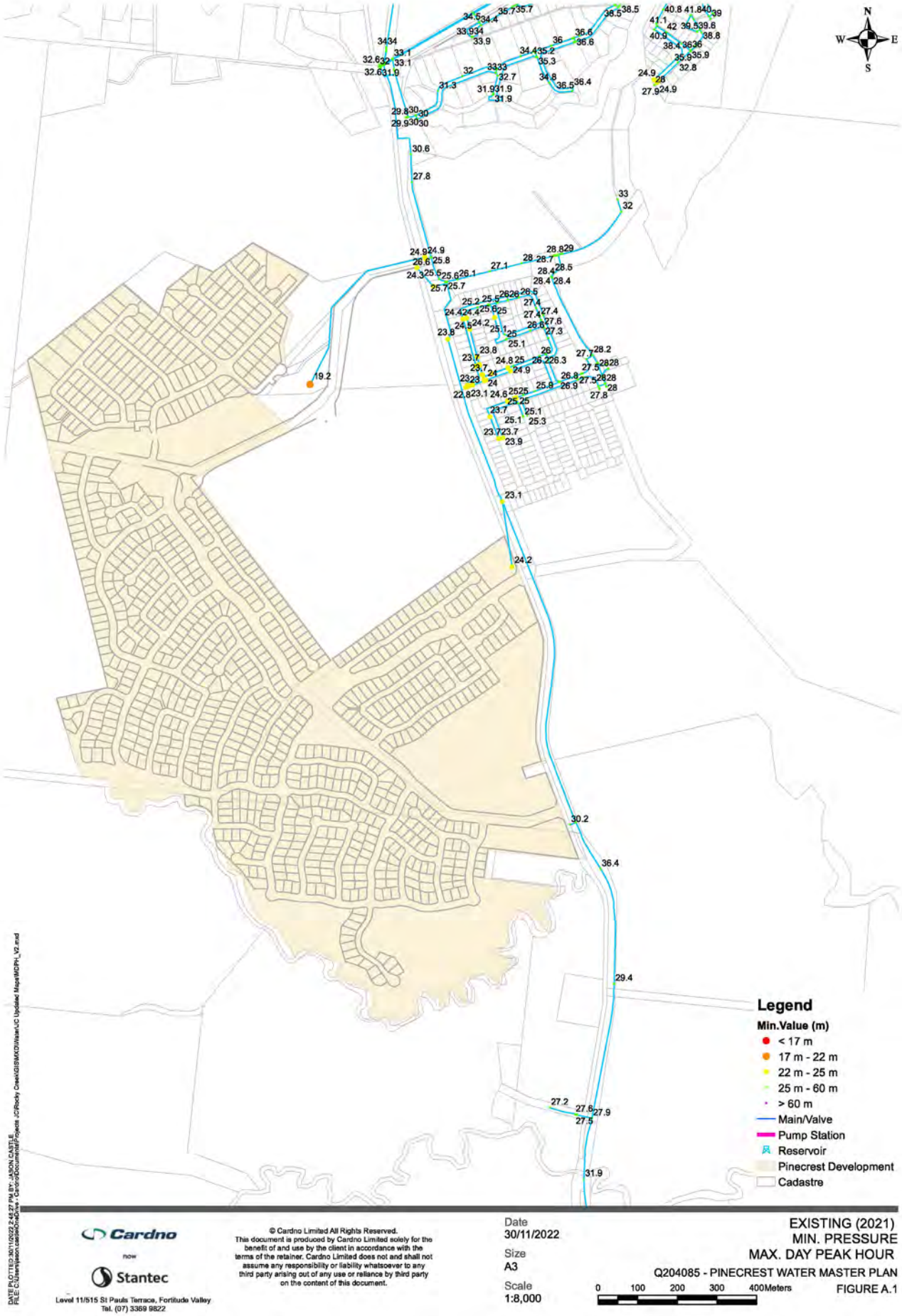
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Min.Value (m)
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25 m - 60 m
> 60 m
Main/Valve
Pump Station
Reservoir
Pinecrest Development
Cadastre
0 100 200 300 400Meters
Cardno
now
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Date
30/11/2022
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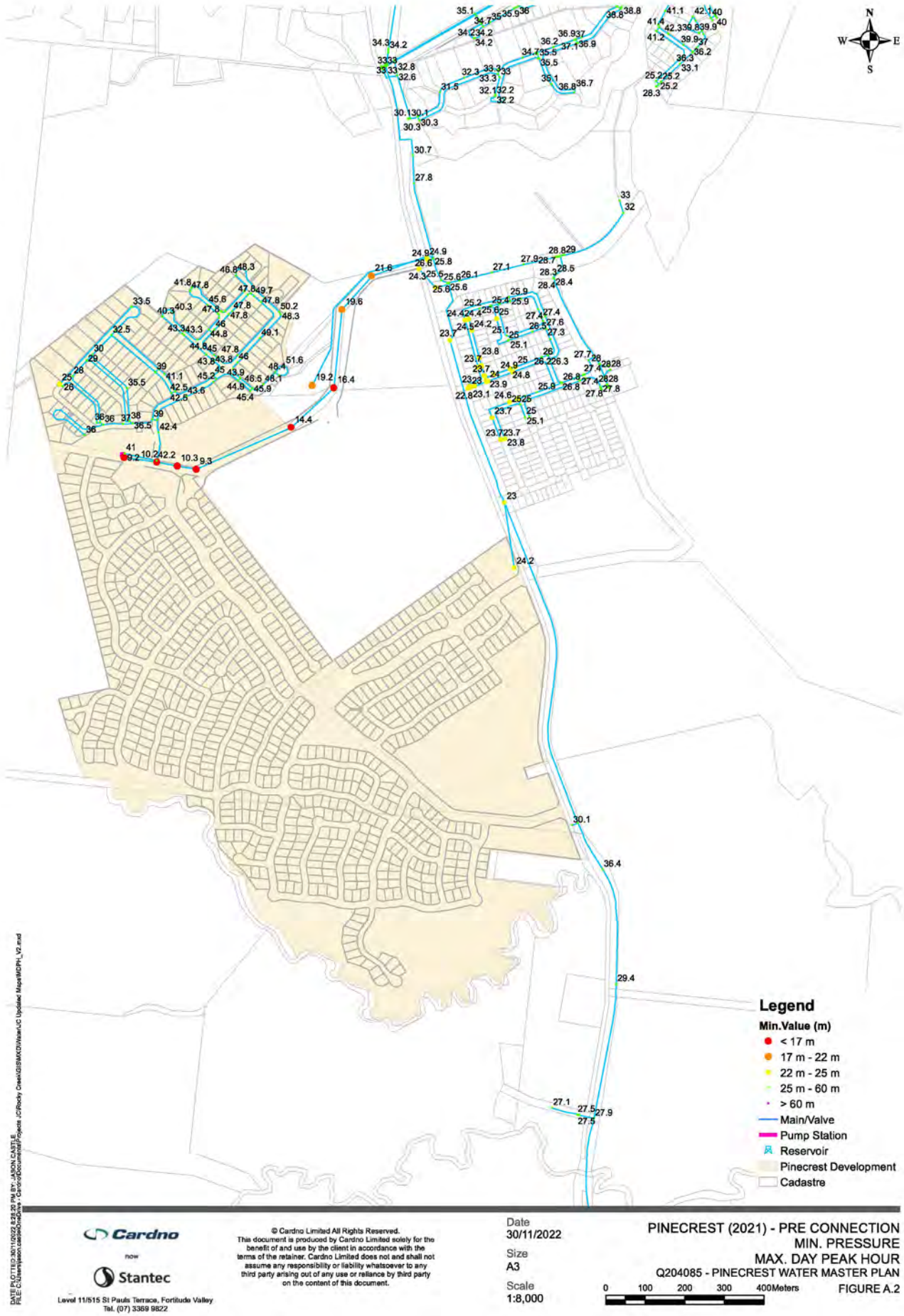
EXISTING (2021)
MIN. PRESSURE
MAX. DAY PEAK HOUR
Q204085 - PINECREST WATER MASTER PLAN
FIGURE A.1



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PINECREST (2021) - PRE CONNECTION
MIN. PRESSURE
MAX. DAY PEAK HOUR
Q204085 - PINECREST WATER MASTER PLAN
FIGURE A.2

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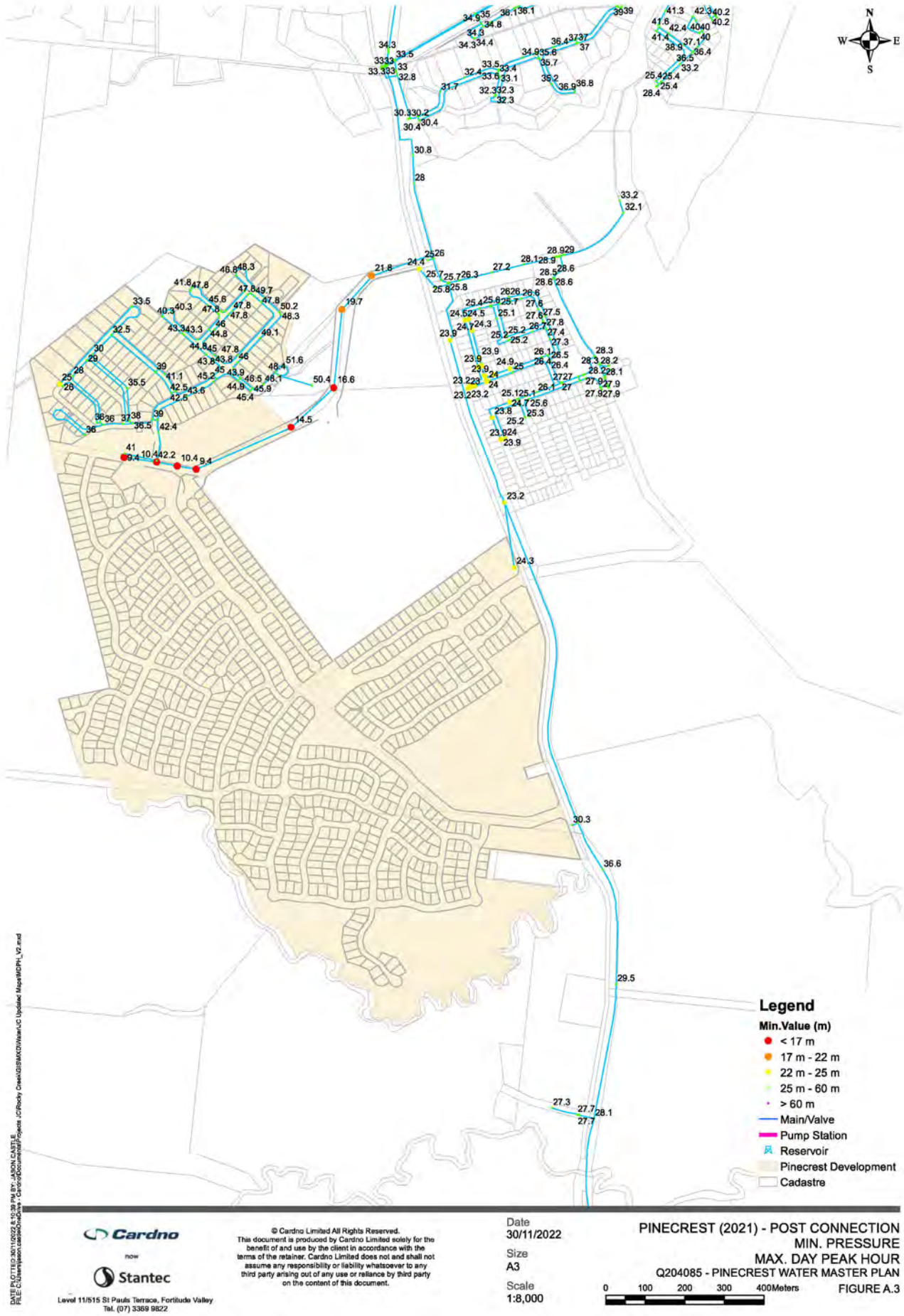

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Size A3
Scale 1:8,000

PINECREST (2021) - POST CONNECTION
MIN. PRESSURE
MAX. DAY PEAK HOUR
Q204085 - PINECREST WATER MASTER PLAN
FIGURE A.3

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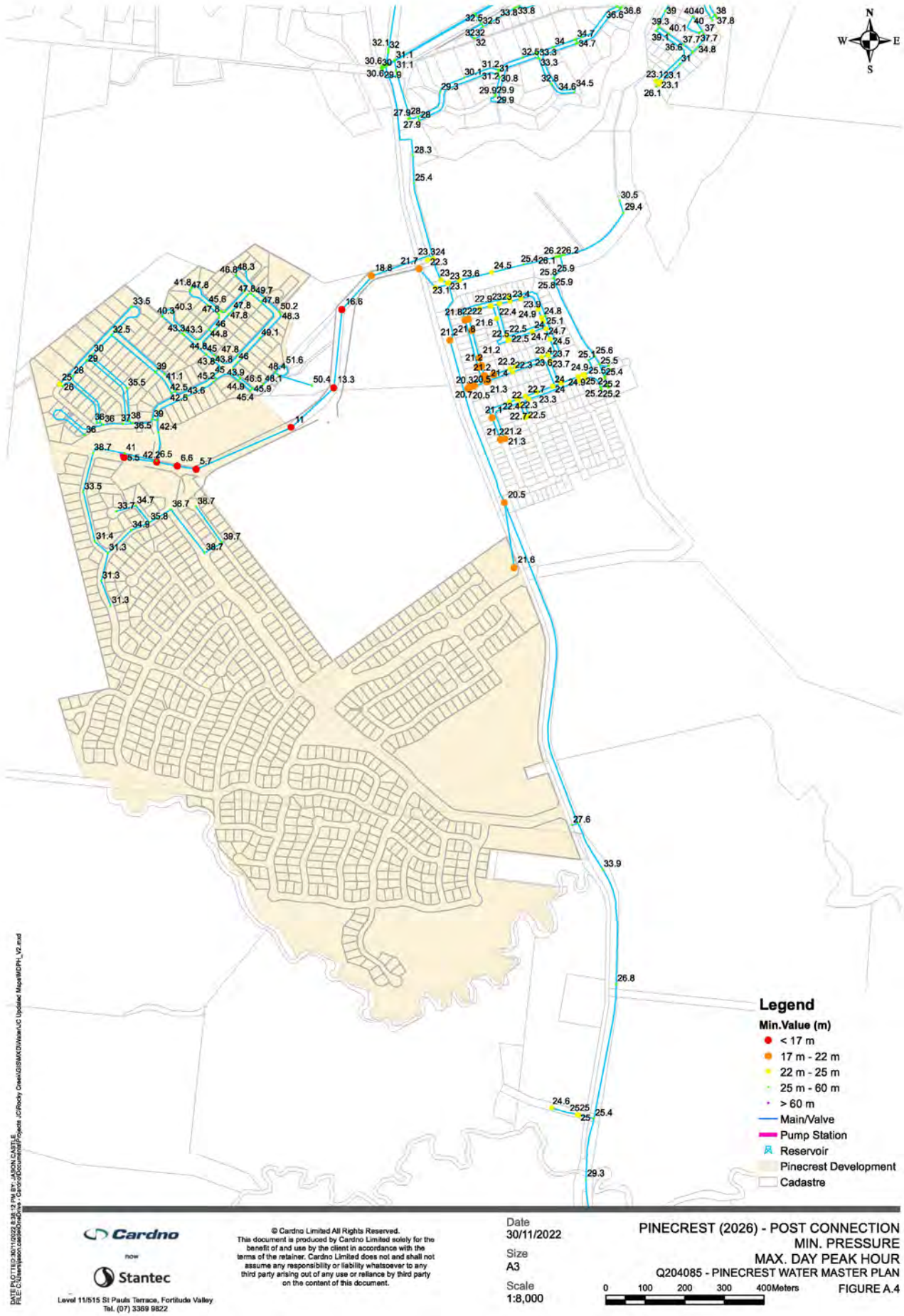

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Date 30/11/2022
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PINECREST (2026) - POST CONNECTION
MIN. PRESSURE
MAX. DAY PEAK HOUR
Q204085 - PINECREST WATER MASTER PLAN
FIGURE A.4

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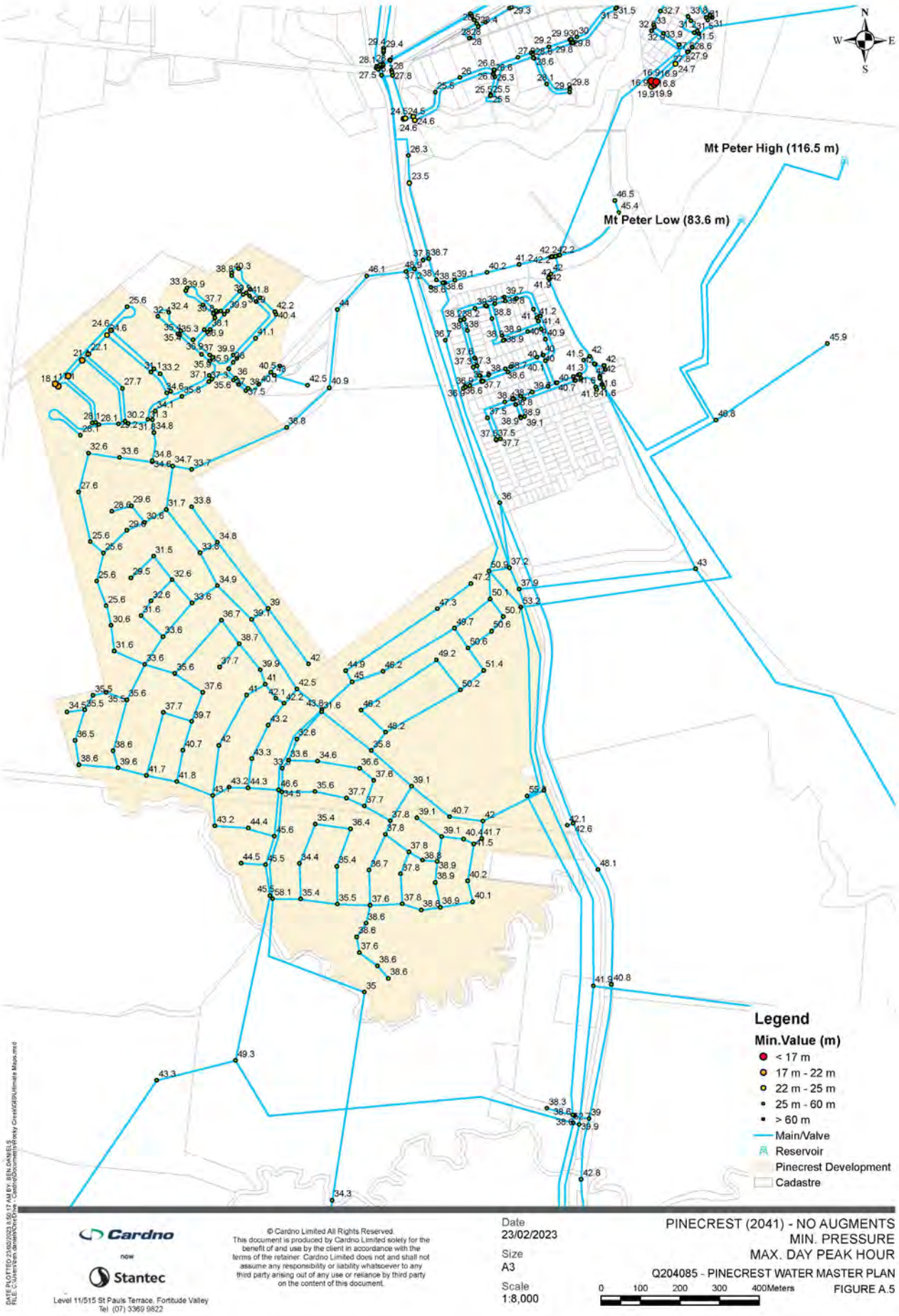
Mt Peter High (116.5 m)
Mt Peter Low (83.6 m)
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Min.Value (m)
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17 m - 22 m
22 m - 25 m
25 m - 60 m
> 60 m
Main/Valve
Reservoir
Pinecrest Development
Cadastre
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23/02/2023
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Scale
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PINECREST (2041) - NO AUGMENTS
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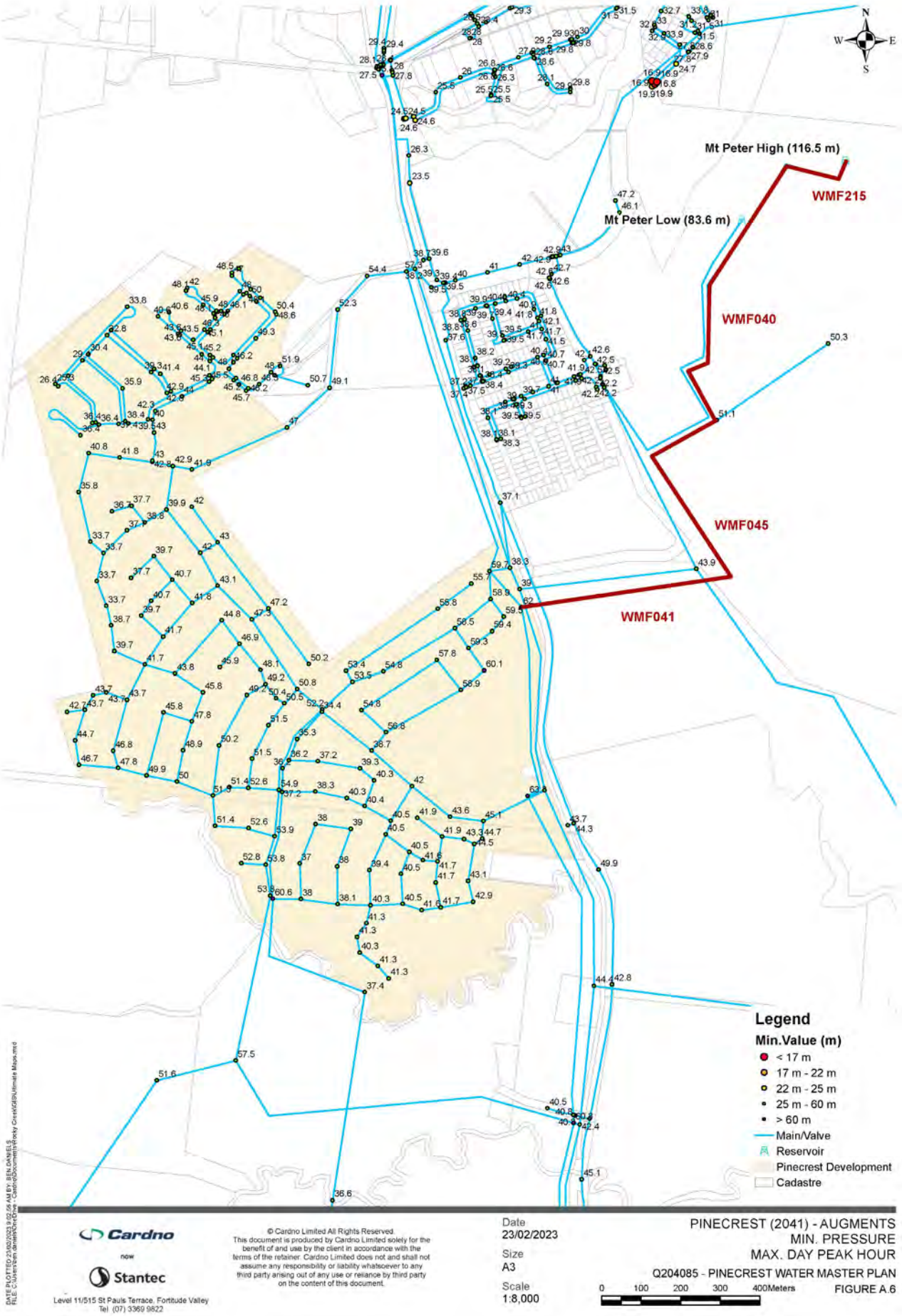
MAX. DAY PEAK HOUR
Q204085 - PINECREST WATER MASTER PLAN
0 100 200 300 400Meters
FIGURE A.5


Mt Peter High (116.5 m)
Mt Peter Low (83.6 m)
WMF215
WMF040
WMF045
WMF041
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Min.Value (m)
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22 m - 25 m
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Main/Valve
Reservoir
Pinecrest Development
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23/02/2023
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PINECREST (2041) - AUGMENTS
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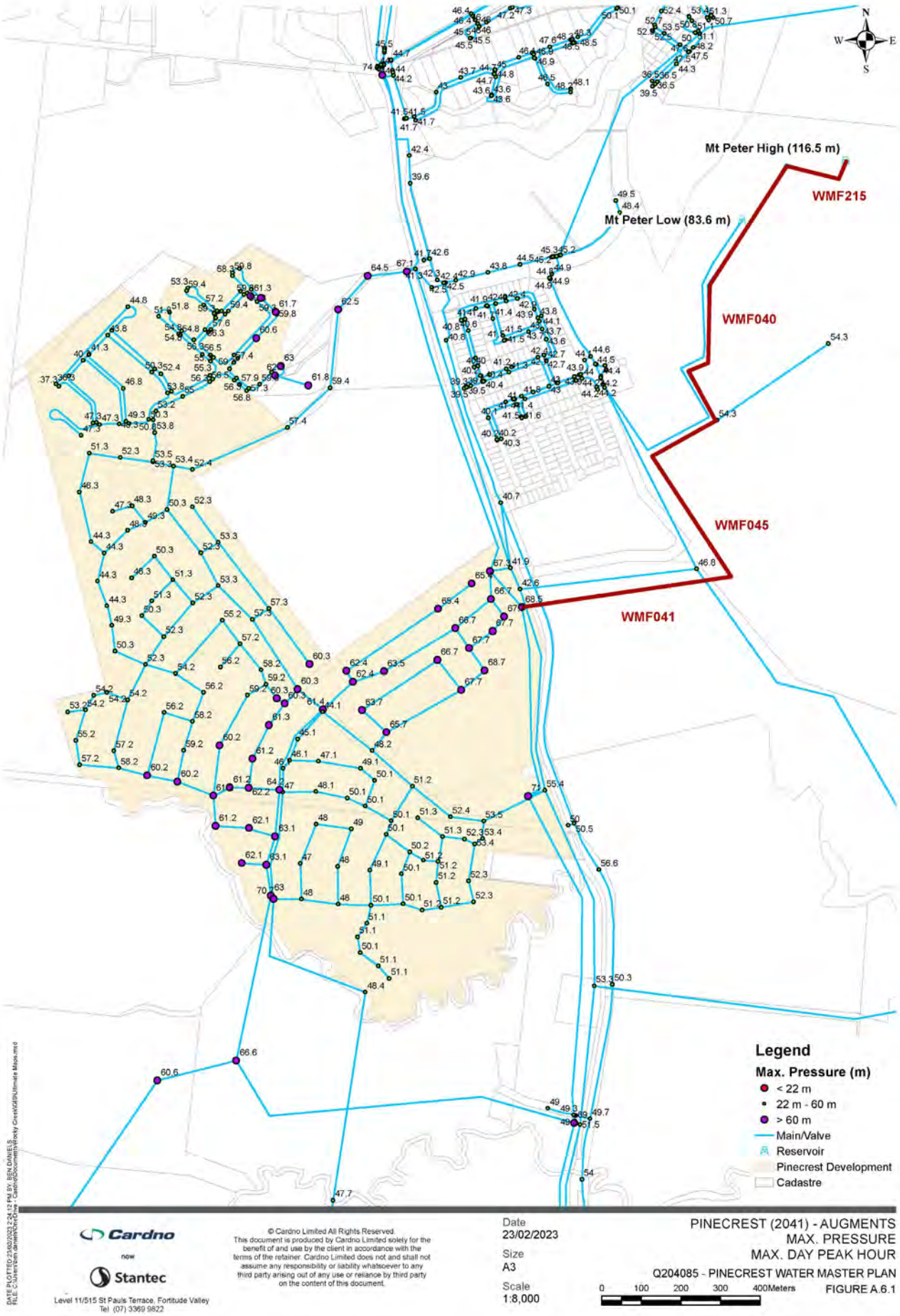
MAX. DAY PEAK HOUR
Q204085 - PINECREST WATER MASTER PLAN
FIGURE A.6
0 100 200 300 400Meters


Mt Peter High (116.5 m)
Mt Peter Low (83.6 m)
WMF215
WMF040
WMF045
WMF041
N
S
E
W
Legend
Max. Pressure (m)
< 22 m
22 m - 60 m
> 60 m
Main/Valve
Reservoir
Pinecrest Development
Cadastre
Cardno
now
Stantec
Level 11/515 St Pauls Terrace, Fortitude Valley
Tel (07) 3369 9822
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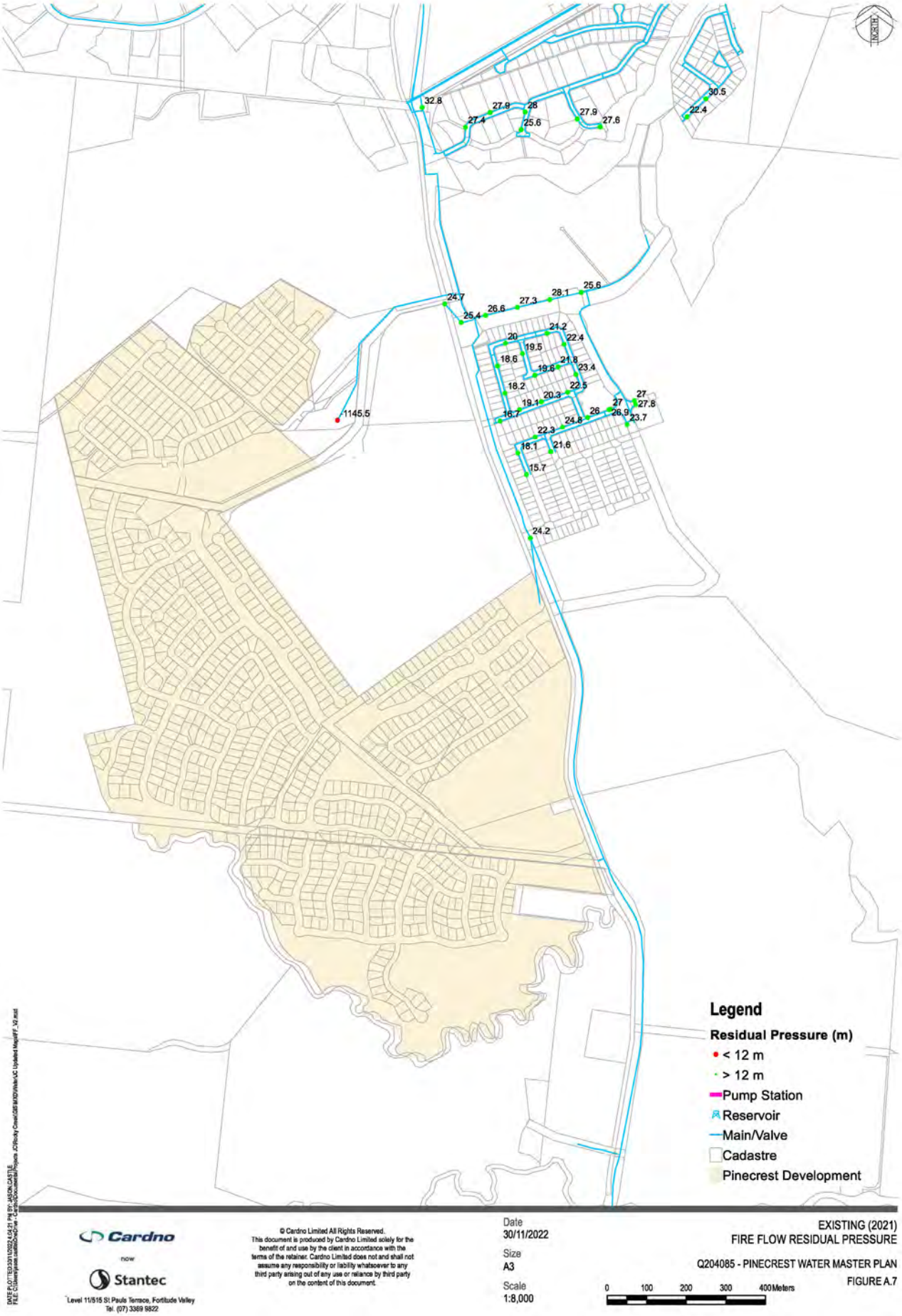
Date
23/02/2023
Size
A3
Scale
1:8,000
PINECREST (2041) - AUGMENTS
MAX. PRESSURE
MAX. DAY PEAK HOUR
Q204085 - PINECREST WATER MASTER PLAN
FIGURE A.6.1
0 100 200 300 400Meters


32.8
27.9
28
27.4
25.6
27.9
27.6
30.5
22.4
24.7
25.4
26.6
27.3
28.1
25.6
21.2
20
22.4
19.5
18.6
21.8
19.6
23.4
18.2
22.5
19.1
20.3
27
27.8
16.7
26
26.9
23.7
24.8
22.3
18.1
21.6
15.7
24.2
1145.5
Legend
Residual Pressure (m)
< 12 m
> 12 m
Pump Station
Reservoir
Main/Valve
Cadastre
Pinecrest Development
Cardno
now
Stantec
Level 11/515 St Paula Terrace, Fortitude Valley
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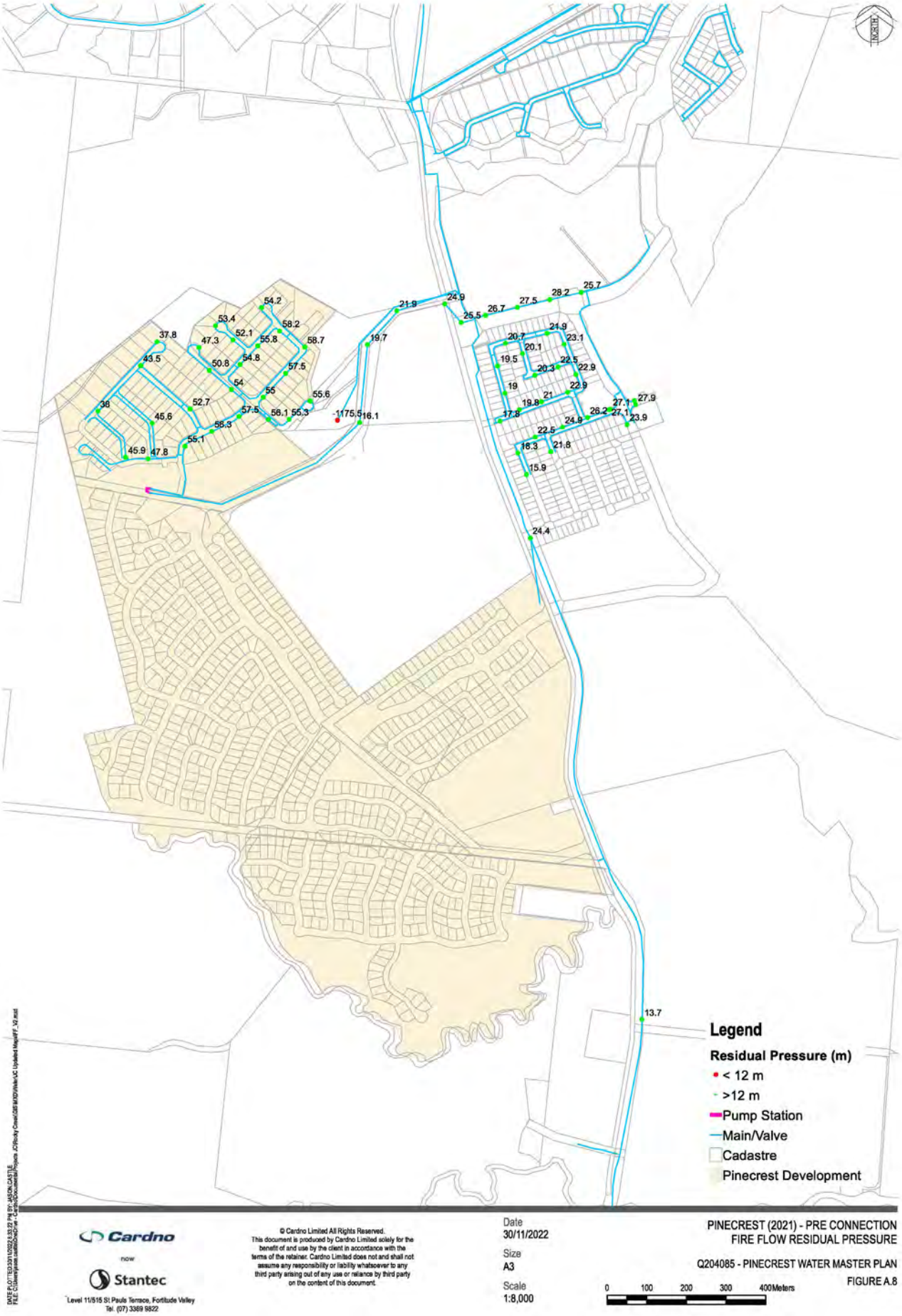
Date
30/11/2022
Size
A3
Scale
1:8,000
0
100
200
300
400 Meters
EXISTING (2021)
FIRE FLOW RESIDUAL PRESSURE
Q204085 - PINECREST WATER MASTER PLAN
FIGURE A.7


54.2
53.4
58.2
37.8
52.1
55.8
58.7
47.3
43.5
54.8
50.8
57.5
54
55
55.6
38
52.7
57.5
56.1
55.3
45.6
56.3
55.1
45.9
47.8
21.9
24.9
19.7
25.5
26.7
27.5
28.2
25.7
20.7
21.9
23.1
20.1
19.5
22.5
20.3
22.9
19
22.9
19.8
21
27.1
27.9
17.8
26.2
27.1
23.9
24.9
22.5
18.3
21.8
15.9
24.4
175.5
16.1
13.7
Legend
Residual Pressure (m)
< 12 m
>12 m
Pump Station
Main/Valve
Cadastre
Pinecrest Development
Cardno
now
Stantec
Level 11/515 St Paula Terrace, Fortitude Valley
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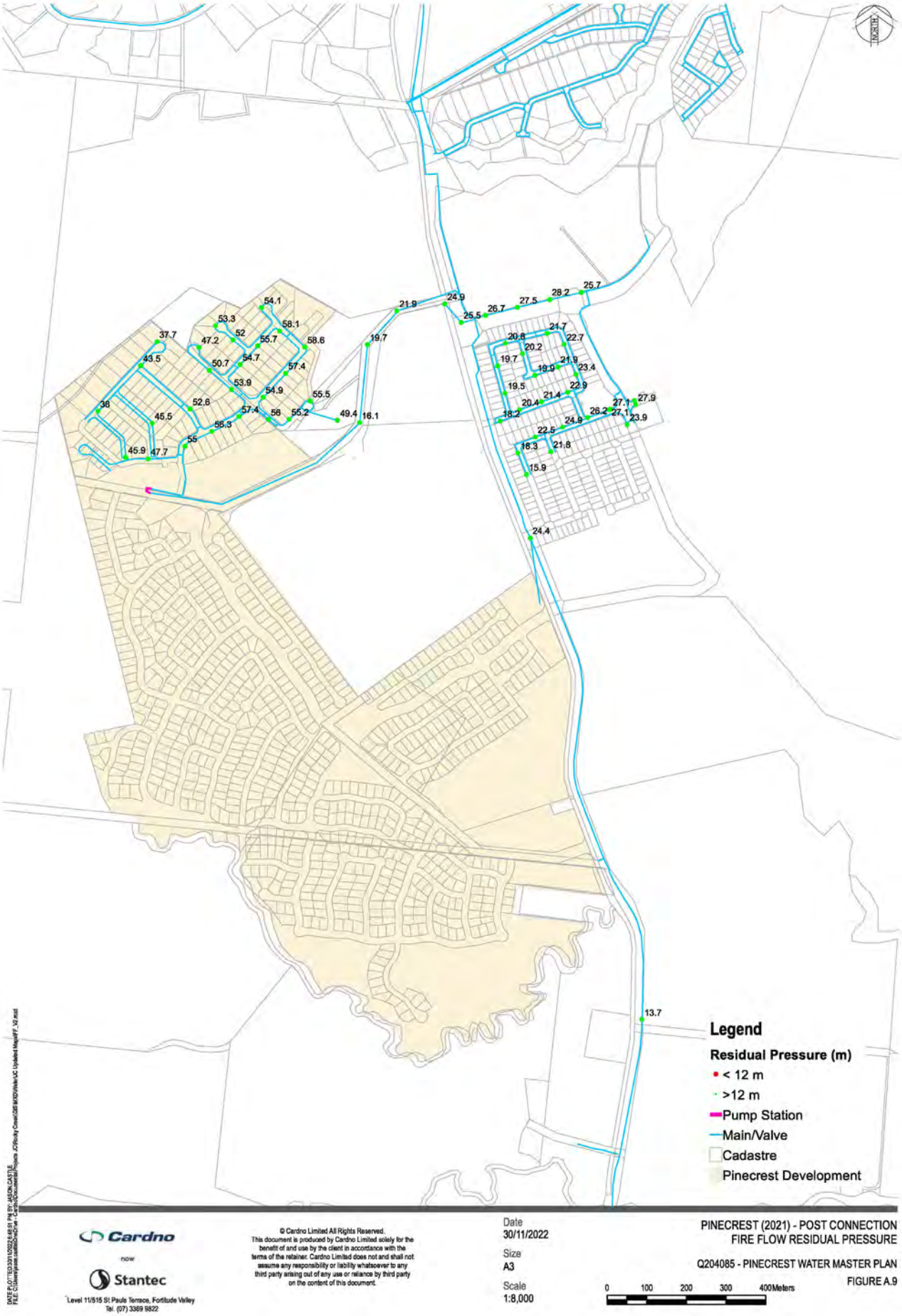
Date
30/11/2022
Size
A3
Scale
1:8,000
0
100
200
300
400Meters
PINECREST (2021) - PRE CONNECTION
FIRE FLOW RESIDUAL PRESSURE
Q204085 - PINECREST WATER MASTER PLAN
FIGURE A.8


54.1
53.3
58.1
37.7
47.2
52
55.7
58.6
43.5
50.7
54.7
57.4
53.9
54.9
55.5
38
52.6
45.5
57.4
56
55.2
49.4
16.1
55.3
55
45.9
47.7
19.7
21.9
24.9
25.5
26.7
27.5
28.2
25.7
20.8
24.7
22.7
20.2
19.7
21.9
19.9
23.4
19.5
22.9
20.4
21.4
27.1
27.9
18.2
26.2
27.1
23.9
24.9
22.5
18.3
21.8
15.9
24.4
13.7
Legend
Residual Pressure (m)
< 12 m
>12 m
Pump Station
Main/Valve
Cadastre
Pinecrest Development
Cardno
now
Stantec
Level 11/515 St Paula Terrace, Fortitude Valley
Tel. (07) 3369 9822
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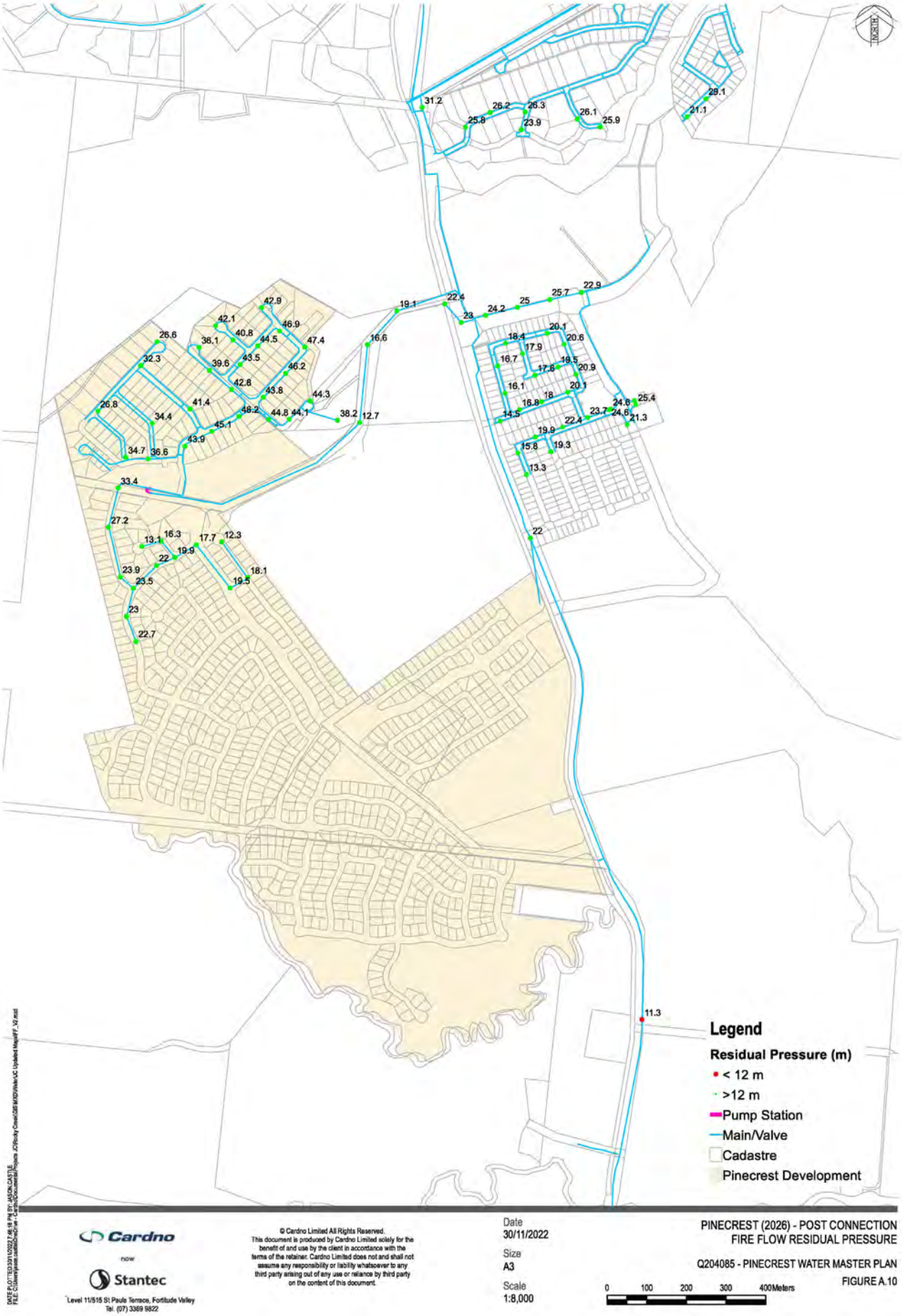
Date
30/11/2022
Size
A3
Scale
1:8,000
0
100
200
300
400Meters
PINECREST (2021) - POST CONNECTION
FIRE FLOW RESIDUAL PRESSURE
Q204085 - PINECREST WATER MASTER PLAN
FIGURE A.9


Legend
Residual Pressure (m)
< 12 m
>12 m
Pump Station
Main/Valve
Cadastre
Pinecrest Development
Cardno
now
Stantec
Level 11/515 St Paula Terrace, Fortitude Valley
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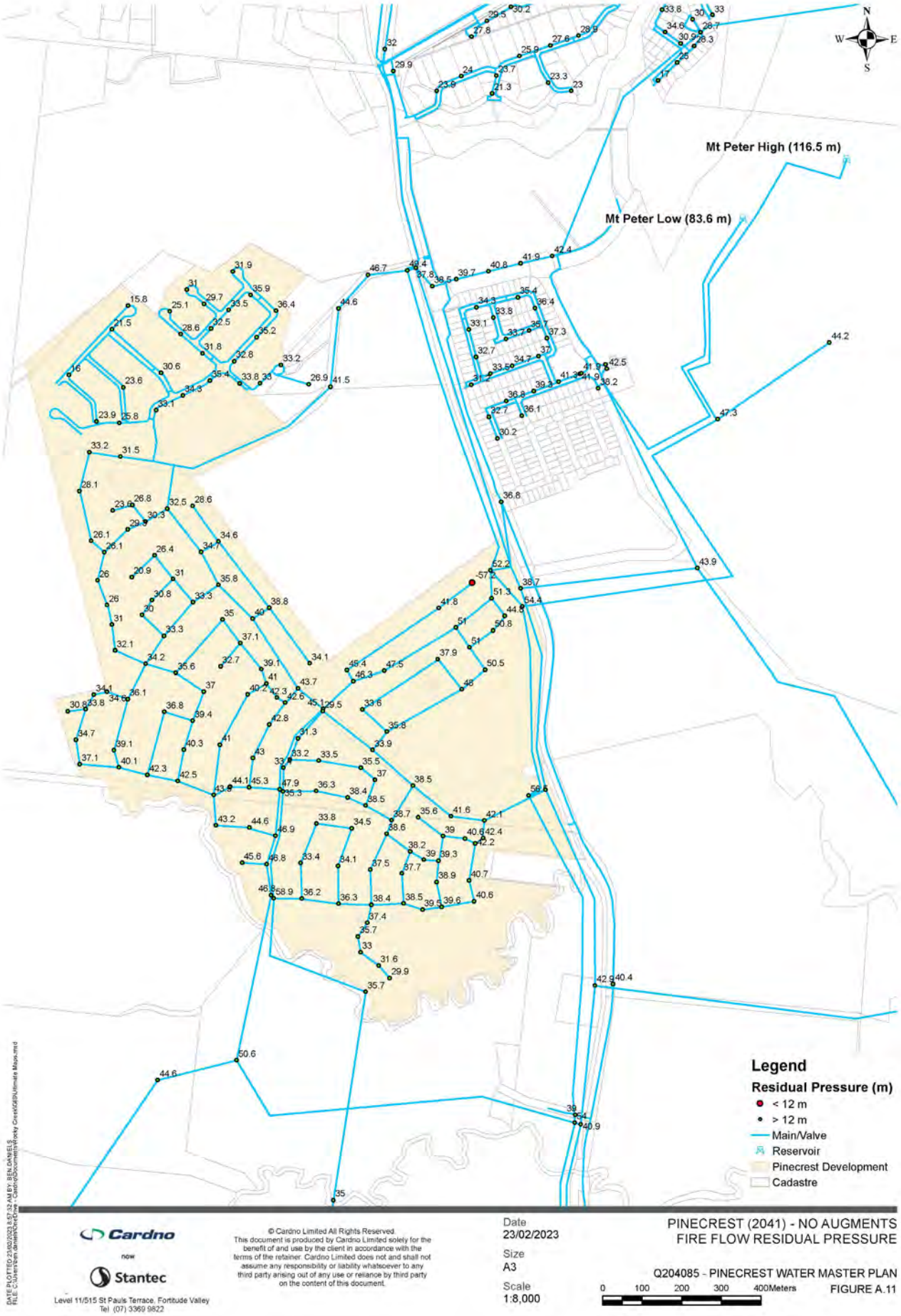
Date
30/11/2022
Size
A3
Scale
1:8,000
0 100 200 300 400Meters
PINECREST (2026) - POST CONNECTION
FIRE FLOW RESIDUAL PRESSURE
Q204085 - PINECREST WATER MASTER PLAN
FIGURE A.10


Mt Peter High (116.5 m)
Mt Peter Low (83.6 m)
N
S
E
W
Legend
Residual Pressure (m)
< 12 m
> 12 m
Main/Valve
Reservoir
Pinecrest Development
Cadastre
Cardno
now
Stantec
Level 11/515 St Pauls Terrace, Fortitude Valley
Tel (07) 3369 9822
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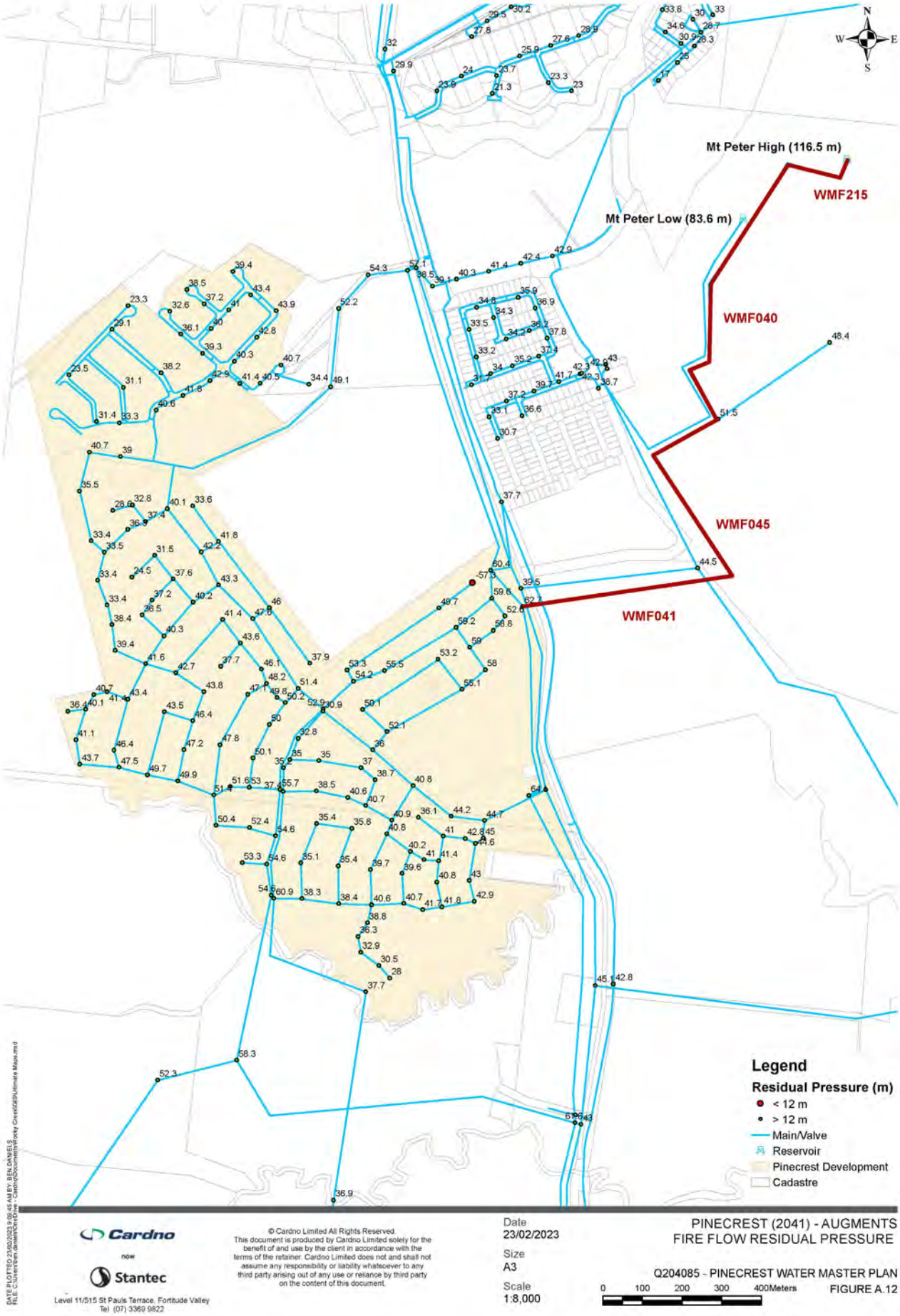
Date
23/02/2023
Size
A3
Scale
1:8,000
PINECREST (2041) - NO AUGMENTS
FIRE FLOW RESIDUAL PRESSURE
Q204085 - PINECREST WATER MASTER PLAN
FIGURE A.11
0 100 200 300 400Meters


Mt Peter High (116.5 m)
Mt Peter Low (83.6 m)
WMF215
WMF040
WMF045
WMF041
N
S
E
W
Legend
Residual Pressure (m)
< 12 m
> 12 m
Main/Valve
Reservoir
Pinecrest Development
Cadastre
Cardno
now
Stantec
Level 11/515 St Pauls Terrace, Fortitude Valley
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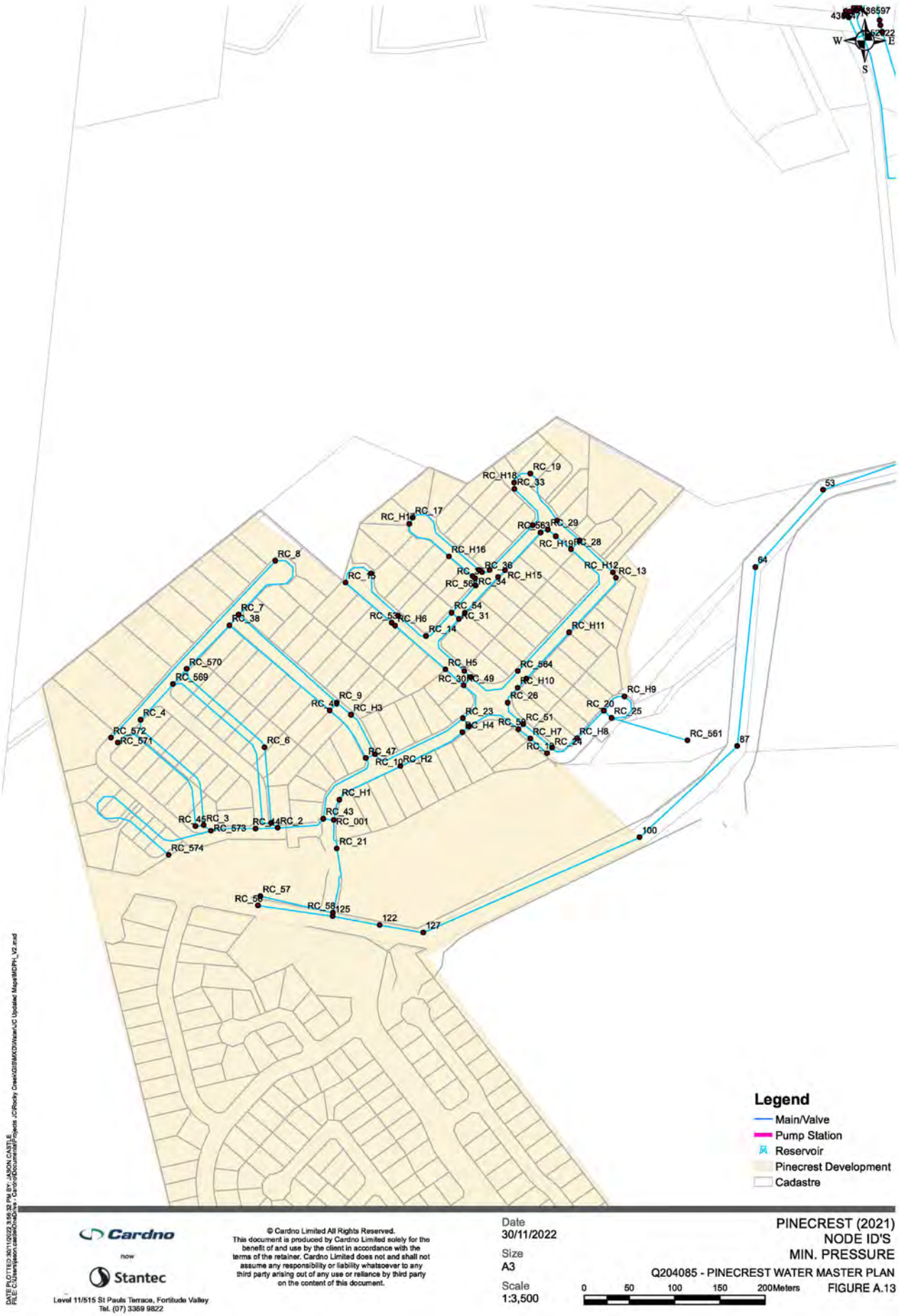
Date
23/02/2023
Size
A3
Scale
1:8,000
PINECREST (2041) - AUGMENTS
FIRE FLOW RESIDUAL PRESSURE
Q204085 - PINECREST WATER MASTER PLAN
FIGURE A.12
0 100 200 300 400Meters


RC_H18
RC_19
RC_33
RC_H17
RC_17
RC_29
RC_28
RC_H16
RC_H12
RC_13
RC_8
RC_36
RC_34
RC_H15
RC_7
RC_38
RC_54
RC_31
RC_H6
RC_14
RC_H11
RC_570
RC_569
RC_H5
RC_564
RC_30
RC_49
RC_H10
RC_H9
RC_9
RC_40
RC_H3
RC_26
RC_20
RC_25
RC_4
RC_572
RC_571
RC_6
RC_23
RC_H4
RC_51
RC_H7
RC_H8
RC_561
RC_47
RC_10
RC_H2
RC_H1
RC_45
RC_3
RC_573
RC_44
RC_2
RC_43
RC_001
RC_574
RC_21
RC_57
RC_58
125
122
127
53
64
87
100
Legend
Main/Valve
Pump Station
Reservoir
Pinecrest Development
Cadastre
Cardno
now
Stantec
Level 11/515 St Pauls Terrace, Fortitude Valley
Tel. (07) 3369 9822
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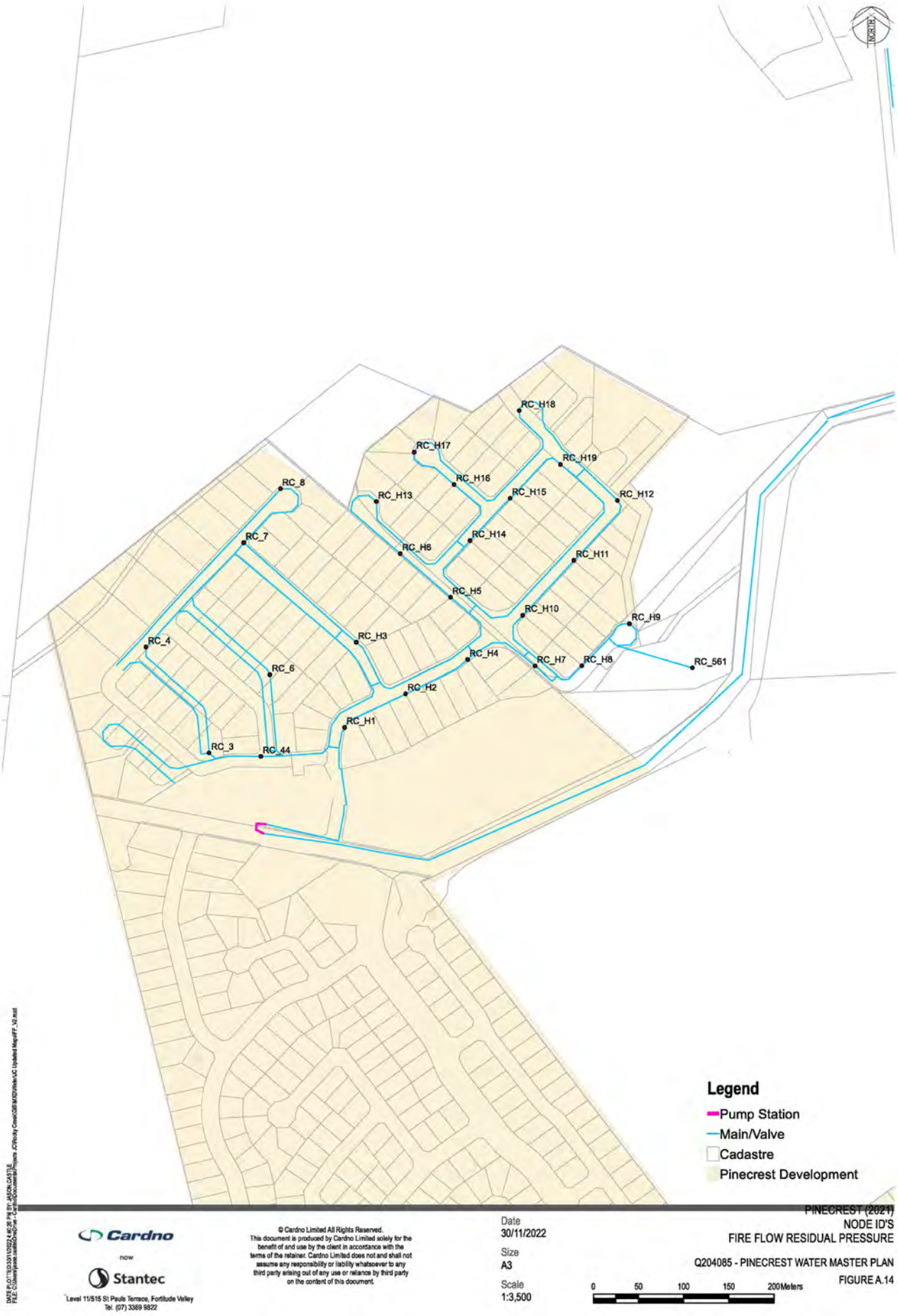
Date
30/11/2022
Size
A3
Scale
1:3,500
0 50 100 150 200Meters
PINECREST (2021)
NODE ID'S
MIN. PRESSURE
Q204085 - PINECREST WATER MASTER PLAN
FIGURE A.13


RC_H18
RC_H17
RC_H19
RC_H16
RC_8
RC_H13
RC_H15
RC_H12
RC_7
RC_H14
RC_H6
RC_H11
RC_H5
RC_H10
RC_H9
RC_4
RC_H3
RC_H4
RC_H7
RC_H8
RC_561
RC_6
RC_H2
RC_H1
RC_3
RC_44
Legend
Pump Station
Main/Valve
Cadastre
Pinecrest Development
Cardno
now
Stantec
Level 11/515 St Paula Terrace, Fortitude Valley
Tel. (07) 3369 9822
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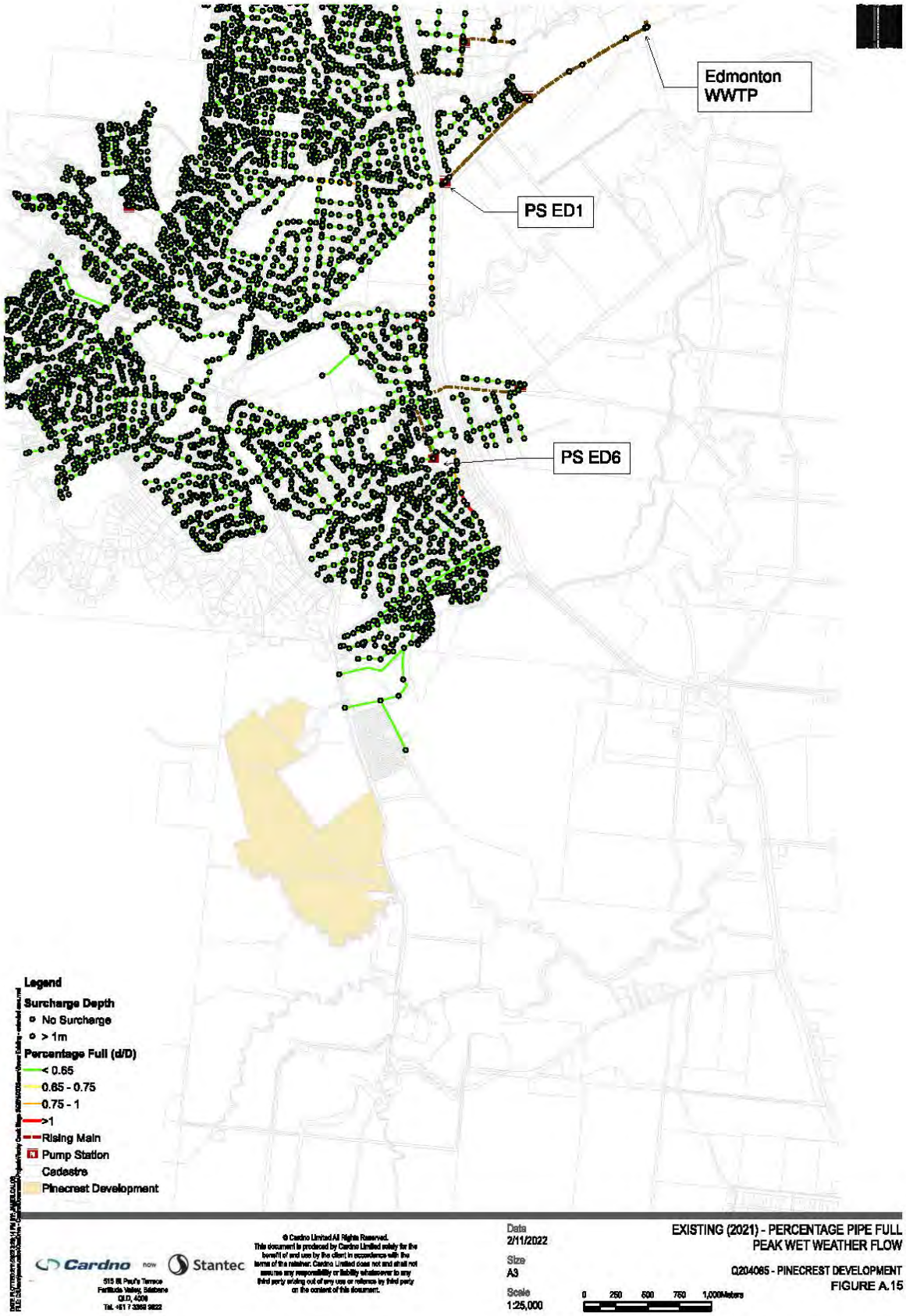
Date
30/11/2022
Size
A3
Scale
1:3,500
0 50 100 150 200 Meters
PINECREST (2021)
NODE ID'S
FIRE FLOW RESIDUAL PRESSURE
Q204085 - PINECREST WATER MASTER PLAN
FIGURE A.14


Edmonton WWTP
PS ED1
PS ED6
Legend
Surcharge Depth
No Surcharge
> 1m
Percentage Full (d/D)
< 0.65
0.65 - 0.75
0.75 - 1
>1
Rising Main
Pump Station
Cadastre
Pinecrest Development
Cardno now Stantec
515 St Paul's Terrace
Fortitude Valley, Brisbane
QLD, 4006
Tel. +61 7 3369 9822
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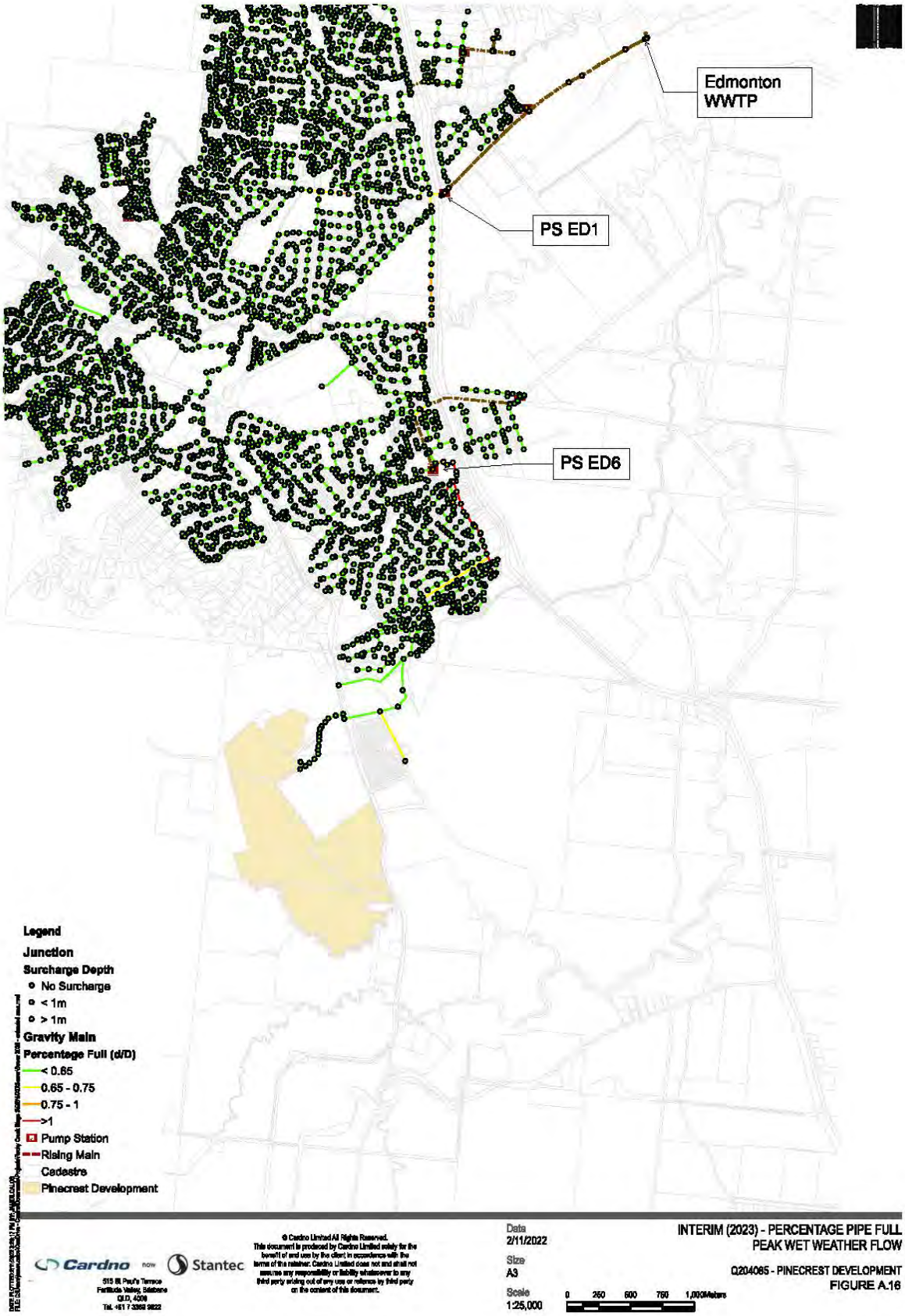
Date
2/11/2022
Size
A3
Scale
1:25,000
0 250 500 750 1,000Meters
EXISTING (2021) - PERCENTAGE PIPE FULL
PEAK WET WEATHER FLOW
Q204065 - PINECREST DEVELOPMENT
FIGURE A.15


Edmonton WWTP
PS ED1
PS ED6
Legend
Junction
Surcharge Depth
No Surcharge
< 1m
> 1m
Gravity Main
Percentage Full (d/D)
< 0.65
0.65 - 0.75
0.75 - 1
>1
Pump Station
Rising Main
Cadastre
Pinecrest Development
Cardno now Stantec
515 St Paul's Terrace
Fortitude Valley, Brisbane
QLD, 4006
Tel. +61 7 3369 9822
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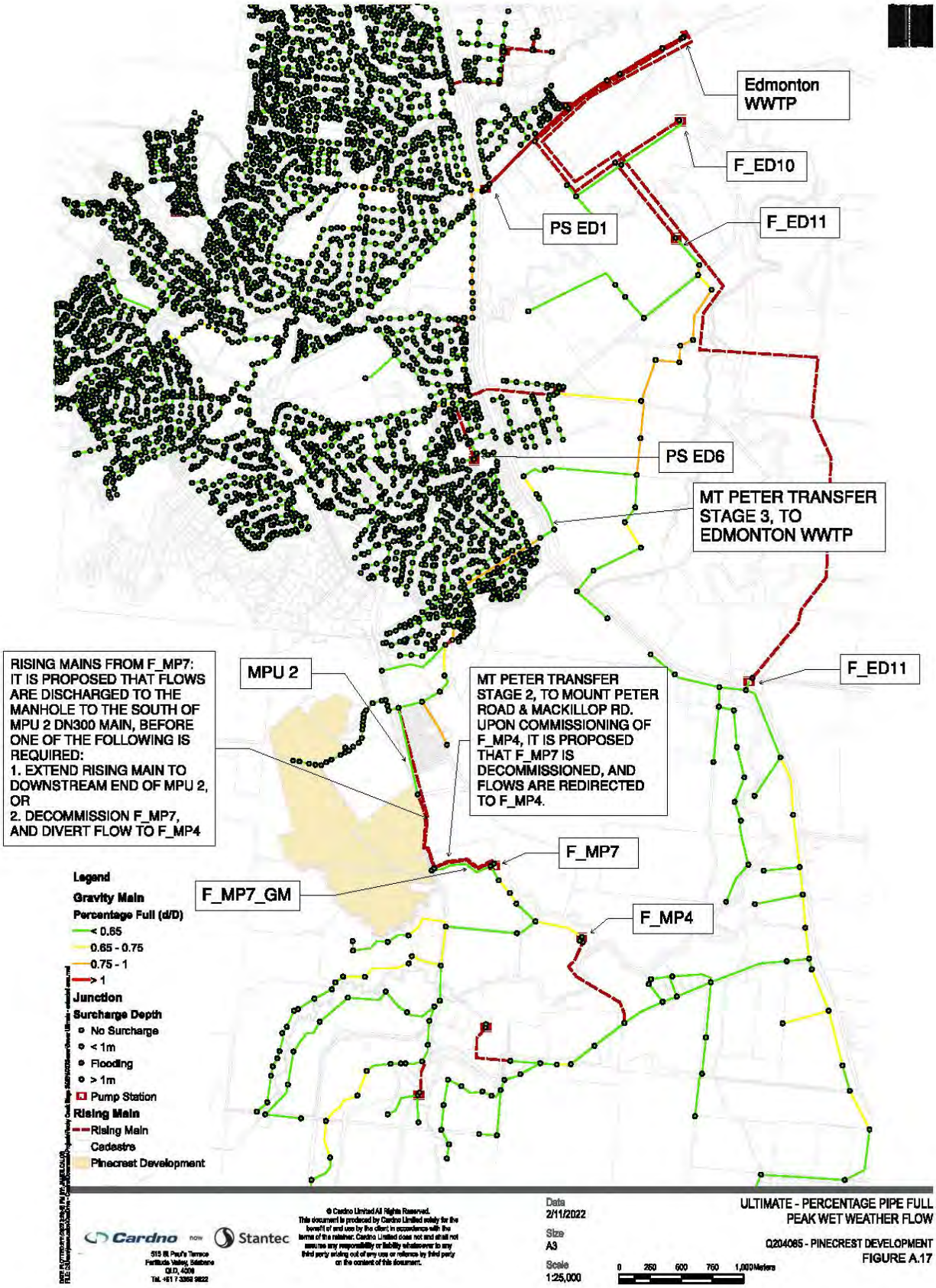
Date
2/11/2022
Size
A3
Scale
1:25,000
0 250 500 750 1,000Meters
INTERIM (2023) - PERCENTAGE PIPE FULL
PEAK WET WEATHER FLOW
Q204085 - PINECREST DEVELOPMENT
FIGURE A.16


Edmonton WWTP
F_ED10
F_ED11
PS ED1
PS ED6
MT PETER TRANSFER STAGE 3, TO EDMONTON WWTP
F_ED11
MPU 2
RISING MAINS FROM F_MP7: IT IS PROPOSED THAT FLOWS ARE DISCHARGED TO THE MANHOLE TO THE SOUTH OF MPU 2 DN300 MAIN, BEFORE ONE OF THE FOLLOWING IS REQUIRED:
1. EXTEND RISING MAIN TO DOWNSTREAM END OF MPU 2, OR
2. DECOMMISSION F_MP7, AND DIVERT FLOW TO F_MP4
MT PETER TRANSFER STAGE 2, TO MOUNT PETER ROAD & MACKILLOP RD. UPON COMMISSIONING OF F_MP4, IT IS PROPOSED THAT F_MP7 IS DECOMMISSIONED, AND FLOWS ARE REDIRECTED TO F_MP4.
F_MP7
F_MP7_GM
F_MP4
Legend
Gravity Main
Percentage Full (d/D)
< 0.65
0.65 - 0.75
0.75 - 1
> 1
Junction
Surcharge Depth
No Surcharge
< 1m
Flooding
> 1m
Pump Station
Rising Main
Rising Main
Cadastre
Pinecrest Development
Cardno now Stantec
515 St Paul's Terrace
Fortitude Valley, Brisbane
QLD, 4006
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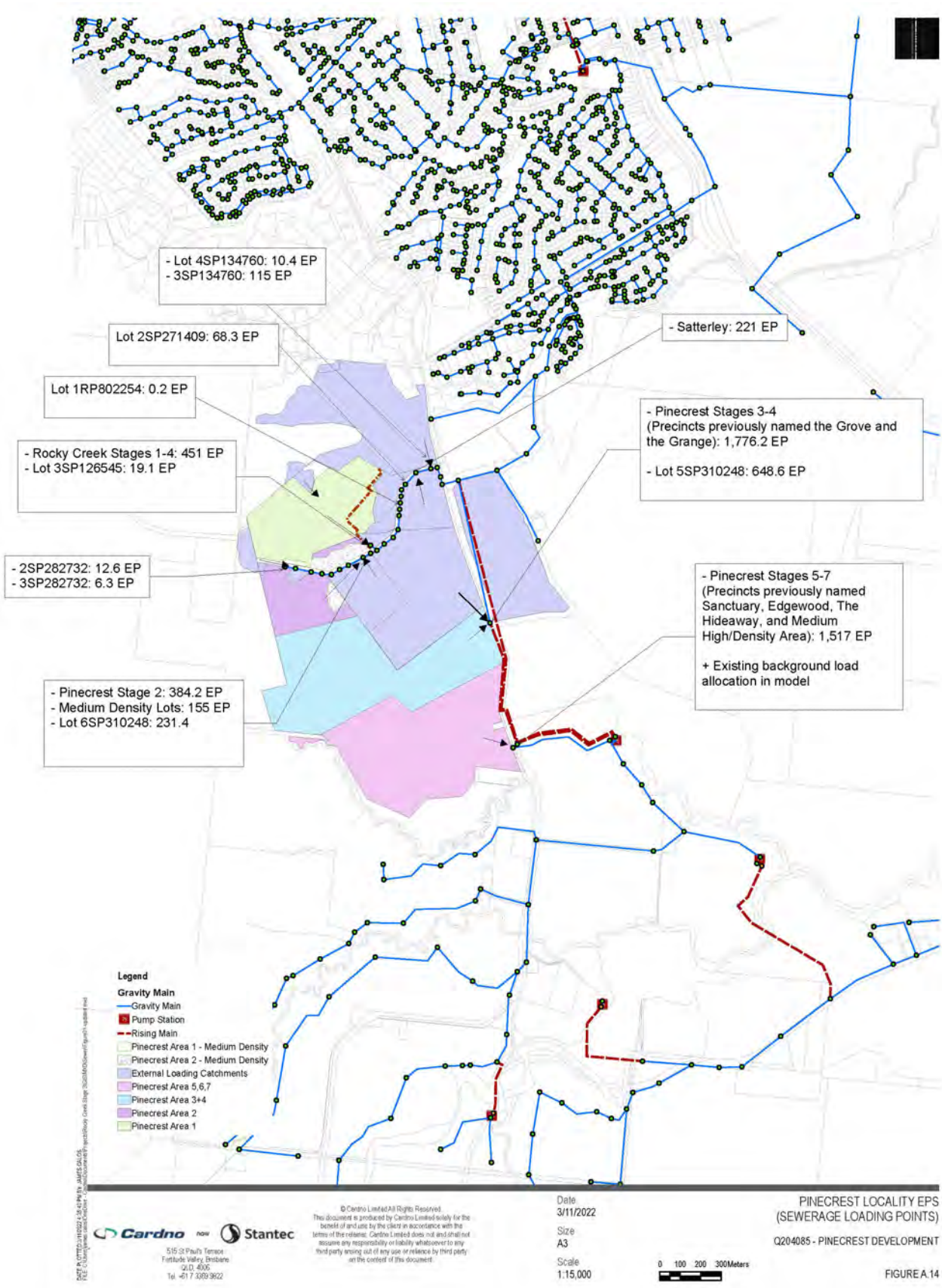
Date
2/11/2022
Size
A3
Scale
1:25,000
0 250 500 750 1,000 Meters
ULTIMATE - PERCENTAGE PIPE FULL
PEAK WET WEATHER FLOW
Q204085 - PINECREST DEVELOPMENT
FIGURE A.17


- Lot 4SP134760: 10.4 EP
- 3SP134760: 115 EP
Lot 2SP271409: 68.3 EP
Lot 1RP802254: 0.2 EP
- Rocky Creek Stages 1-4: 451 EP
- Lot 3SP126545: 19.1 EP
- 2SP282732: 12.6 EP
- 3SP282732: 6.3 EP
- Pinecrest Stage 2: 384.2 EP
- Medium Density Lots: 155 EP
- Lot 6SP310248: 231.4
- Satterley: 221 EP
- Pinecrest Stages 3-4
(Precincts previously named the Grove and the Grange): 1,776.2 EP
- Lot 5SP310248: 648.6 EP
- Pinecrest Stages 5-7
(Precincts previously named Sanctuary, Edgewood, The Hideaway, and Medium High/Density Area): 1,517 EP
+ Existing background load allocation in model
Legend
Gravity Main
Gravity Main
Pump Station
Rising Main
Pinecrest Area 1 - Medium Density
Pinecrest Area 2 - Medium Density
External Loading Catchments
Pinecrest Area 5,6,7
Pinecrest Area 3+4
Pinecrest Area 2
Pinecrest Area 1
Cardno now Stantec
515 St Paul's Terrace
Fortitude Valley, Brisbane
QLD, 4006
Tel +61 7 3369 9822
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Date
3/11/2022
Size
A3
Scale
1:15,000
0 100 200 300Meters
PINECREST LOCALITY EPS
(SEWERAGE LOADING POINTS)
Q204085 - PINECREST DEVELOPMENT
FIGURE A.14

Water Supply & Sewerage Assessment

APPENDIX B

ROCKY CREEK WATER PUMP DATA SHEET

Cardno

now

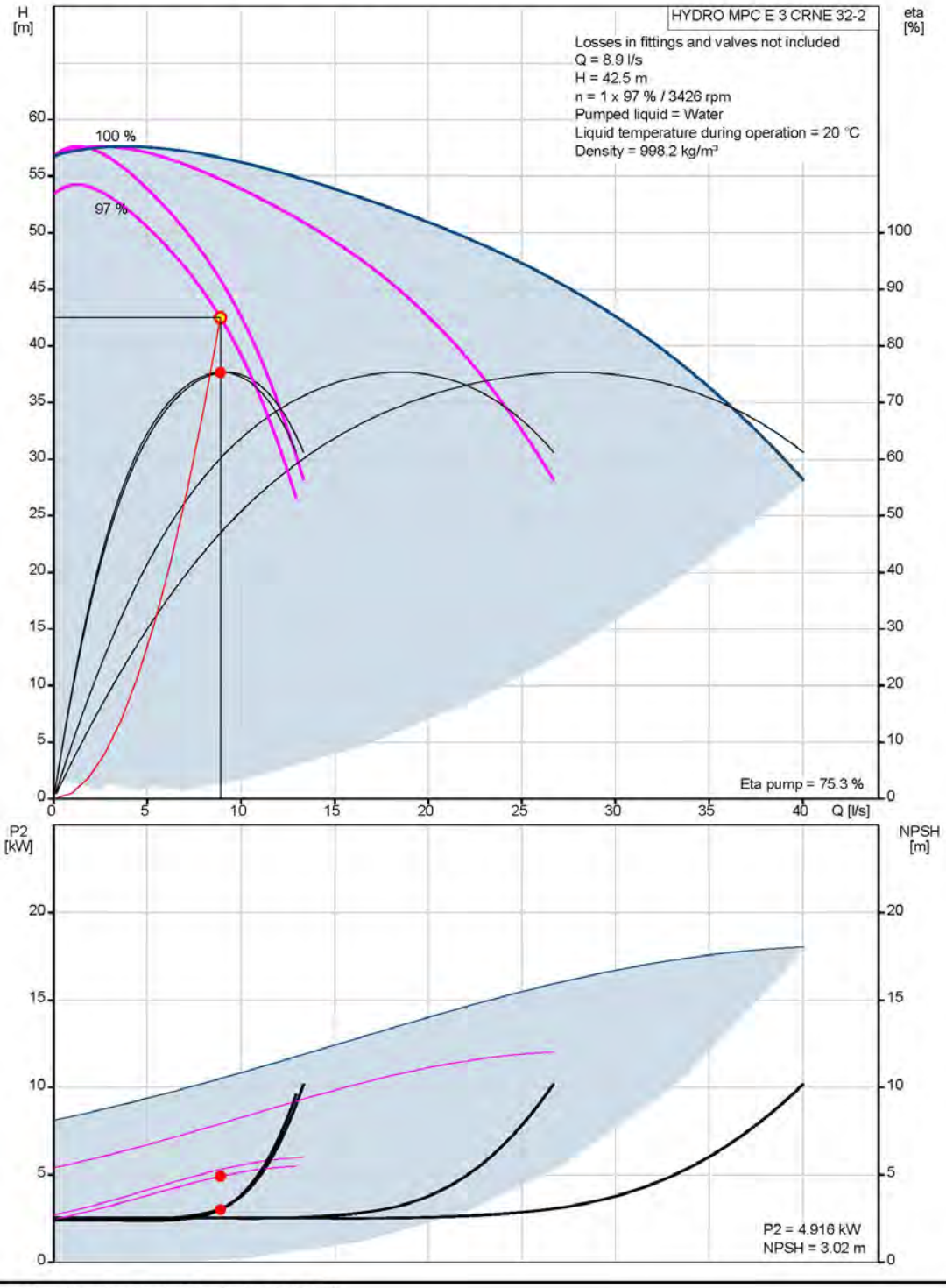
Stantec

GRUNDFOS

Company name:
Created by:
Phone:

Date: 16/03/2021

99732975 HYDRO MPC E 3 CRNE 32-2

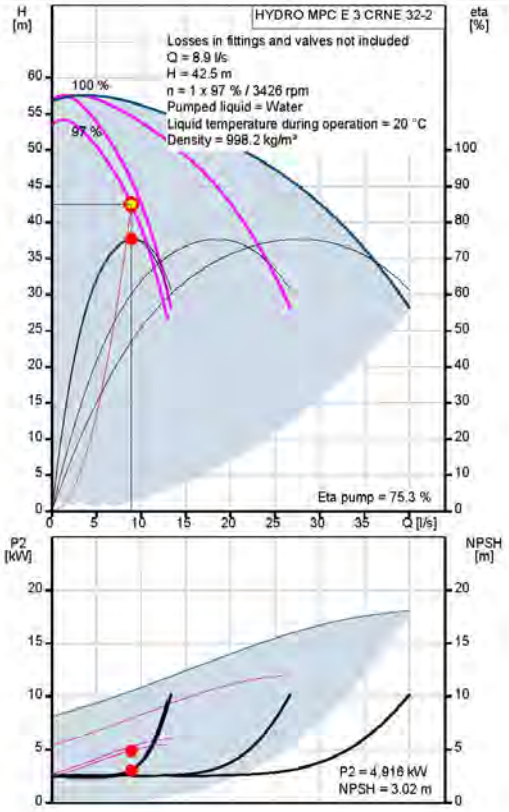


GRUNDFOS

Company name:
Created by:
Phone:

Date: 16/03/2021

Description	Value
General information:	
Product name:	HYDRO MPC E 3 CRNE 32-2
Product No:	99732975
EAN number:	5713833524487
Price:	
Technical:	
Actual calculated flow:	8.9 l/s
Maximum flow:	40 l/s
Max flow:	40 l/s
Resulting head of the pump:	42.5 m
Head max:	57 m
Main pump name:	CRNE 32-2
Main pump No:	99379857
Number of pumps:	3
Materials:	
Manifolds:	EN/DIN 1.4571/ AISI 316 Ti
Installation:	
Range of ambient temperature:	5 .. 40 °C
Maximum operating pressure:	16 bar
Manifold inlet:	DN150
Manifold outlet:	DN150
Pressure rating:	PN 16
Earth connection:	N, PE
System design:	A
Liquid:	
Pumped liquid:	Water
Liquid temperature range:	5 .. 60 °C
Selected liquid temperature:	20 °C
Density:	998.2 kg/m³
Electrical data:	
Power (P2) main pump:	7.5 kW
Mains frequency:	50 / 60 Hz
Rated voltage:	3 x 380-415 V
Rated current of system:	45.6 A
Start. method:	Variable frequency drives
Enclosure class (IEC 34-5):	IP54
Radio interference supression:	EMC DIRECTIVE(2014/30/EU)
Number of phases of main pump:	3
Controls:	
Control type:	E
Dry running protection, mechanical:	NONE
Tank:	
Volume of pressure tank:	18 l
Diaphragm tank:	YES
Others:	
Net weight:	799 kg
Gross weight:	899 kg
Product range:	Australia
Config. file no:	99059280
Config.file Control MPC:	98271947
Config.file Hydro MPC:	98272012
Country of origin:	AU
Custom tariff no.:	8413709062

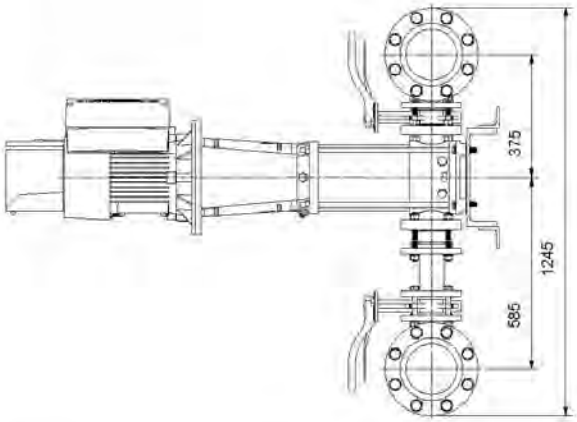


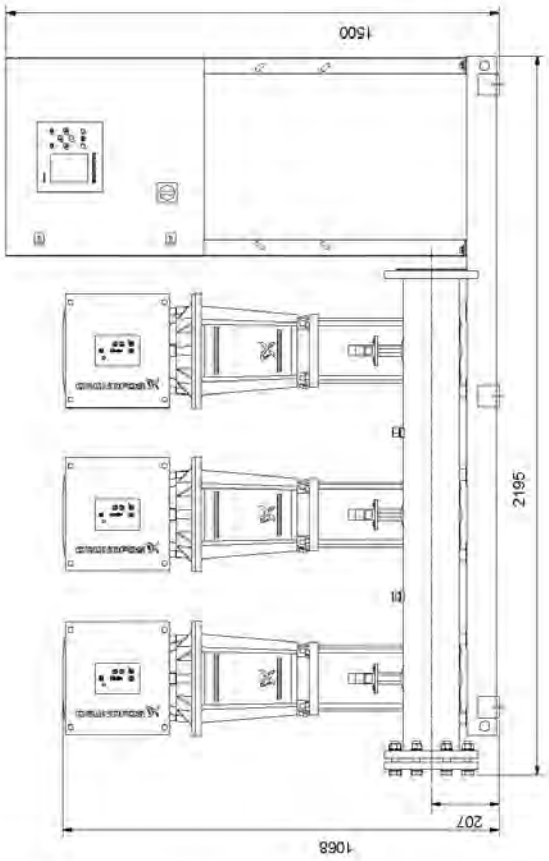
GRUNDFOS

Company name:
Created by:
Phone:

Date: 16/03/2021

99732975 HYDRO MPC E 3 CRNE 32-2





Note! All units are in [mm] unless others are stated.
Disclaimer: This simplified dimensional drawing does not show all details.

Water Supply & Sewerage Assessment

APPENDIX C

PREVIOUS SEWER PUMP STATION DESIGN AND PUMP SELECT

Cardno

now

Stantec

TANSLEY CONSULTING
ABN: 34 165 638 460

DESIGN OF ROCKY CREEK SEWAGE PUMP STATION (SPS)

DESIGN FLOWS

Based on Section 2.1 of the Wastewater Modelling Report prepared by Cardno in August 2020, the following loadings have been adopted:

Average Dry weather Flow (ADWF)	=	270 L/EP/day
Peak Wet Weather Flow (PWWF)	=	2,095 L/EP/day
PWWF from Rocky Creek Development	=	10.67 L/sec
PWWF from Mountain View Development	=	3.40 L/sec

The design flow for the Rocky Creek SPS is therefore the sum of the Rocky Creek and Mountain View Developments ie 14.07 L/sec

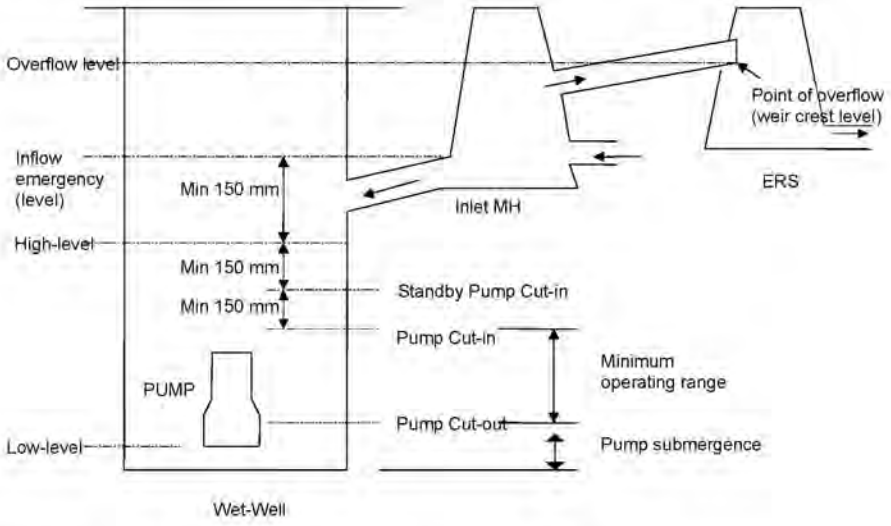
The storage volume of the pump station in kL is calculated as V = 0.9Q/N where N = number of allowable starts per hour (generally taken by FNQROC/WSAA as 8) and Q = design flow in L/sec

In this case V = 0.9 x 14.07/8 = 1.58 kL

For a 2.1 m diameter pump station this is equivalent to a storage depth of 0.456 m say 0.46m

For a 2.0 m diameter FRP prefabricated pump station the storage depth increases to 0.502m say 0.5 m.

Based on Figure 4.1 of the WSA-04 Sewage Pumping Station Code and accepted by FNQROC reproduced below the following levels are produced:



Invert level (IL) of the incoming sewer	=	RL 43.415
High Level (HL) alarm	=	RL 43.265
Standby pump cut-in	=	RL 43.115
Duty Pump start	=	RL 42.965
Pump cut-out level	=	RL 42.505

Pump submergence is usually equivalent to the distance between the top of the pump's volute and the floor of the wet well typically say 350mm producing a wet well base level of RL 42.155.

RISING MAIN DESIGN

Ideally it is preferred to maintain a flow velocity in a main under normal conditions to around 1m/sec to reduce the friction losses while ensuring velocities are sufficient to prevent deposition of suspended solids and ensuring re-suspension during pumped flows.

For a flow of 14.07 L/sec a pipe diameter of not less than 100mm is considered suitable.

The highest point of the rising main is around chainage 326 with an invert level of 53.404, the Duty Pump Cut out level of RL 42.505 produces a static head of 10.9 metres say 11 metres .

Three options were considered:

- DN125 PE, SDR 11, internal diameter of 102 mm.
- DN140 PE, SDR 11, internal diameter of 114 mm.
- DN160 PE, SDR 11, internal diameter of 130 mm.

Analysis of the three options using Hazen-Williams with a static head of 11 metres the following duty point for the pumps are:

- DN125, Head = 26.03 metres, flow velocity 1.756 m/sec
- DN140, Head = 19.82 metres, flow velocity 1.378 m/sec
- DN160, Head = 16.15 metres, flow velocity 1.060 m/sec

Reviewing the characteristic curves of suitable Flygt 'N' type submersible pumps produces the following three alternatives:

- DN125, Flygt N3127 SH3 (246), 7.4 kW motor, 64% efficiency
- DN140, Flygt N3127 SH3 (248), 7.4 kW motor, 61% efficiency
- DN160, Flygt N3102 SH3 (258), 4.5 kW motor, 60% efficiency

Based on the above the preferred option which results in a higher capital cost but lower operational cost is the Flygt N3102 with a DN160 PE rising main.

The highest point of the rising main is around chainage 326 with an invert level of 53.404, another high point is located closer to the creek crossing but this can be overcome by deepening the rising main for a short distance and removing the need for an air valve or vent in this location.

The topography is such that the high point is located before the creek crossing and is in fact higher than the discharge manhole (IL 52.943) this will result in self draining of this section of main and the necessity of providing a means of allowing air into the main to prevent the possibility of low pressures being generated within the main. Manual air valves are Council's preferred means of allowing removal of any accumulation of air and gases at the high points of rising mains and a manual air release has been provided for in the design. It is recommended however that either an automatic air release valve be provided or a vent provided at the high point to allow for ingress and egress of air and gases at this point. A six metre high vent pole should provide sufficient ventilation and dispersion of any odorous gases generated within the rising main. A suitable arrangement for a vent pole is shown in the attached FNQROC/WSAA drawing SEW 1407, the typical vent shown in the detail could be replaced with a vent pole similar to that on drawing SEW 1408.

Hydraulic calculations

Pipeline	LENGTH L	FLOW L/s Q	VELOCITY m/s V	Friction Losses Hf	Inlet/Outlet Losses Hi	TOTAL LOSSES H	
						11.000	Static Head
Pump discharge	0.2	14.07	1.722	0.005	0.181	0.186	
Pump station pipework	2.5	14.07	1.722	0.059	0.710	0.769	
Rising Main to RM 7	316.0	14.07	1.060	2.288	0.126	2.414	
RM 7 to RM 13	101.0	14.07	1.060	0.731	0.120	0.851	
RM 13 to RM 14 (Ck Xing)	72.0	14.07	1.060	0.521	0.057	0.579	
RM 14 to RM 15	40.0	14.07	1.060	0.290	0.057	0.347	
					TOTAL:	16.146	

The crossing beneath Rocky Creek itself will require concrete encasement or some other form of scour protection.

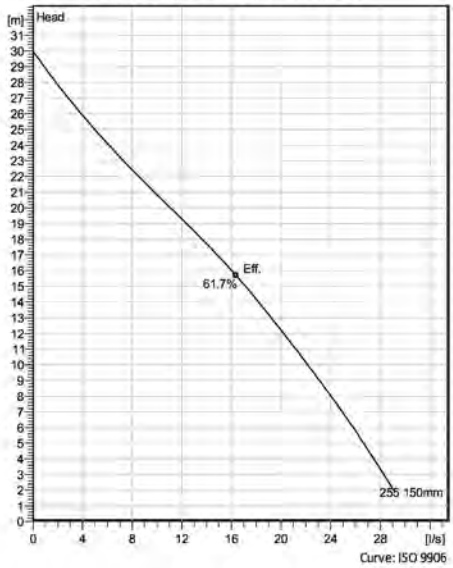
NP 3102 SH 3~ Adaptive 255

Patented self cleaning semi-open channel impeller, ideal for pumping in most waste water applications. Modular based design with high adaptation grade.

FLYGT
a xylem brand

Technical specification

Curves according to: Water, pure ,4 °C,1 kg/dm³,1.569 mm²/s



Configuration

Motor number
N3102.160 18-10-2AL-W 4.2KW

Installation type
P - Semi permanent, Wet

Impeller diameter
150 mm

Discharge diameter
80 mm

Pump information

Impeller diameter
150 mm

Discharge diameter
80 mm

Inlet diameter
100 mm

Maximum operating speed
2890 1/min

Number of blades
2

Max. fluid temperature
40 °C

Materials

Impeller
Grey cast iron

Stator housing material
Grey cast iron

Project	ROCKY CREEK PRECINCT - STAGE 1	**Created by**	
Block	0	**Created on**	7/1/2021 **Last update** 7/1/2021

Program version
09.0 - 21/06/2021 (Build 118)

Data version
16/06/2021 15:42

User group(s)
Xylem Australia - EXT, Products - Grinder

NP 3102 SH 3~ Adaptive 255

Technical specification

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Motor - General

Motor number N3102.160 18-10-2AL-W 4.2KW	**Phases** 3~	**Rated speed** 2890 1/min	**Rated power** 4.2 kW
Approval No	**Number of poles** 2	**Rated current** 7.4 A	**Stator variant** 67
Frequency 50 Hz	**Rated voltage** 415 V	**Insulation class** H	**Type of Duty** S1
Version code 160			

Motor - Technical

Power factor - 1/1 Load 0.92	**Motor efficiency - 1/1 Load** 85.1 %	**Total moment of inertia** 0.0142 kg m²	**Starts per hour max.** 30
Power factor - 3/4 Load 0.90	**Motor efficiency - 3/4 Load** 86.5 %	**Starting current, direct starting** 56 A	
Power factor - 1/2 Load 0.84	**Motor efficiency - 1/2 Load** 86.4 %	**Starting current, star-delta** 18.7 A	

Project	ROCKY CREEK PRECINCT - STAGE 1	**Created by**			
Block	0	**Created on**	7/1/2021	**Last update**	7/1/2021

Program version
9.0 - 21/06/2021 (Build 118)

Data version
10/06/2021 15:42

User group(s)
Xylem Australia - EXT, Products - Grinder

NP 3102 SH 3~ Adaptive 255

Performance curve

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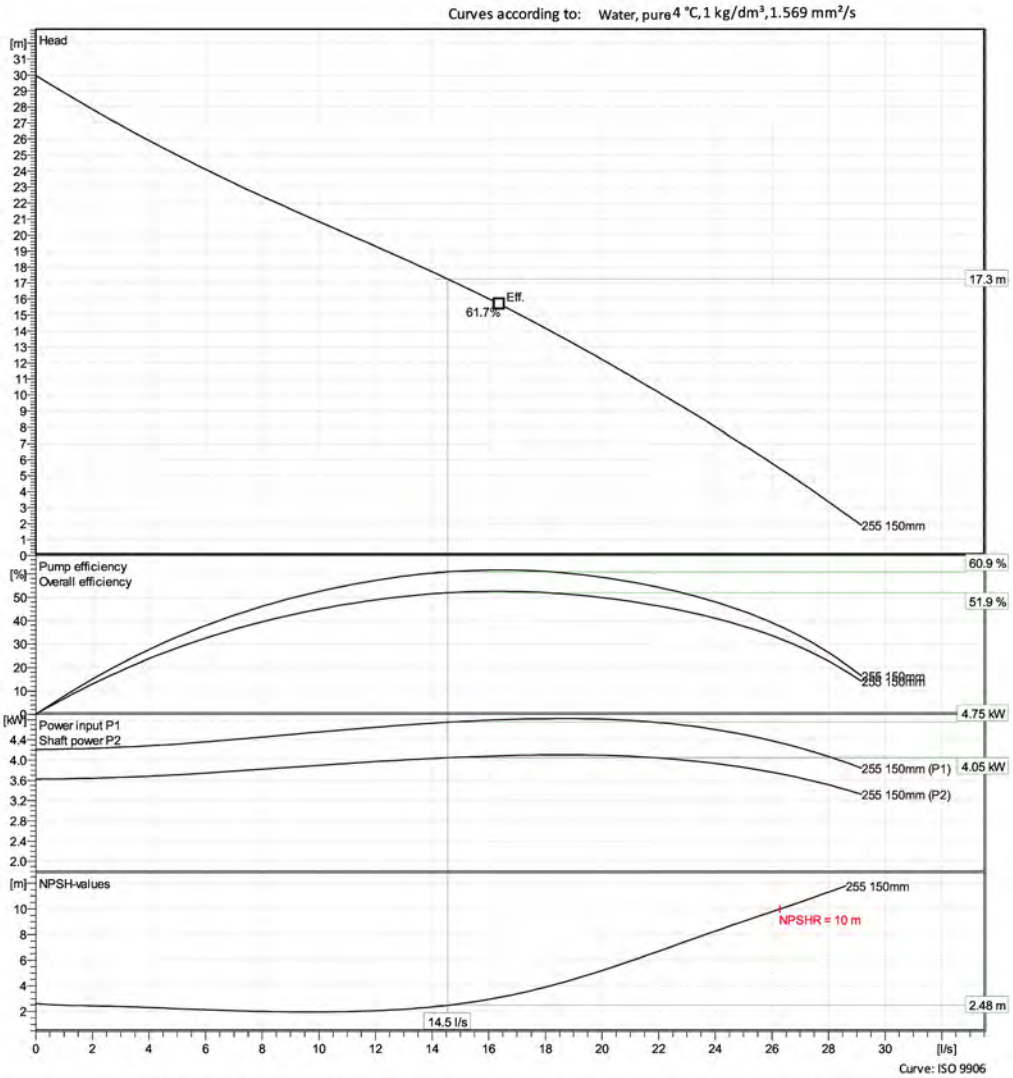
Duty point

Flow	Head
14.5 l/s	17.3 m



Project	ROCKY CREEK PRECINCT - STAGE 1	**Created by**			
Block	0	**Created on**	7/1/2021	**Last update**	7/1/2021

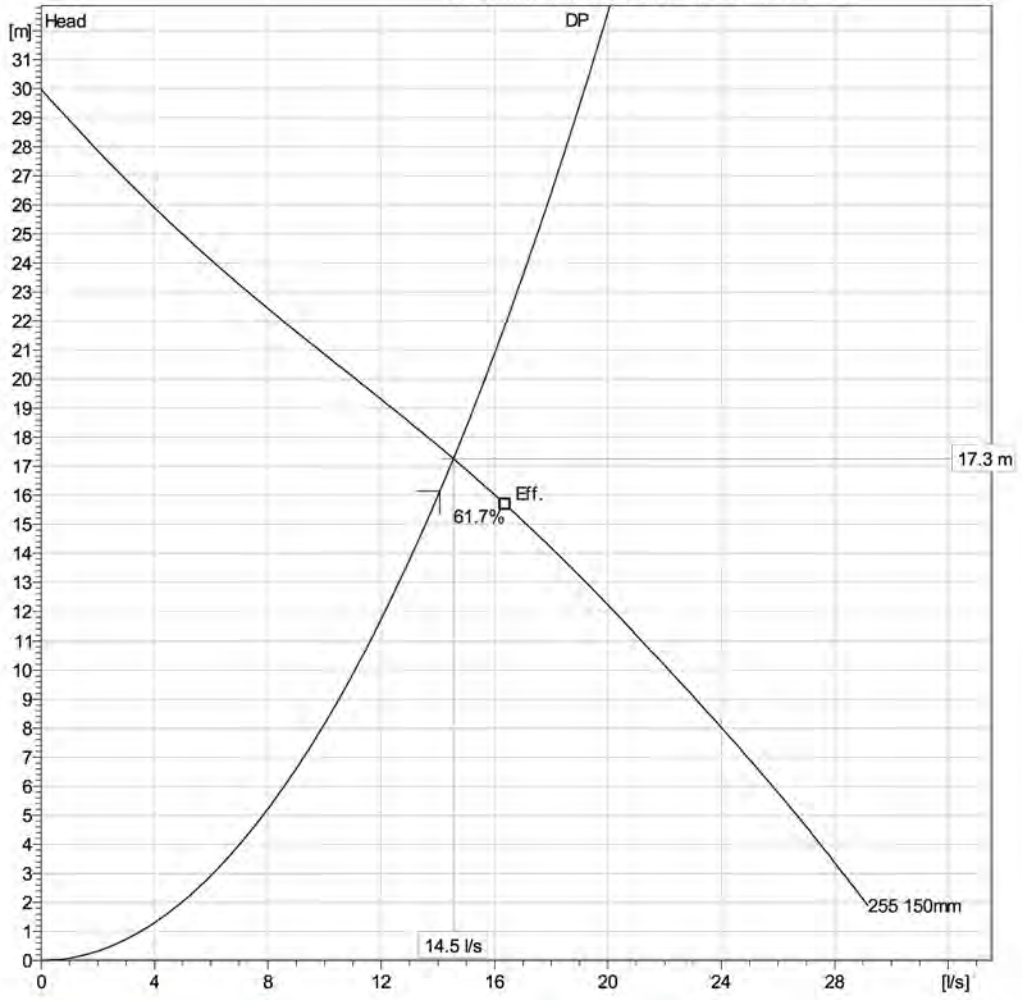
Program version	Data version	User group(s)
59.0 - 21/06/2021 (Build 118)	16/06/2021 15:42	Xylem Australia - EXT, Products - Grindex

NP 3102 SH 3~ Adaptive 255

Duty Analysis

FLYGT a xylem brand

Curves according to: Water, pure ,4 °C,1 kg/dm³,1.569 mm²/s



Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific Energy	NPSHre
DP	14.5 l/s	17.3 m	4.05 kW	14.5 l/s	17.3 m	4.05 kW	60.9 %	9.06E-5 kWh/l	2.48 m

Project	ROCKY CREEK PRECINCT - STAGE 1	**Created by**			
Block	0	**Created on**	7/1/2021	**Last update**	7/1/2021

Program version 09.0 - 21/06/2021 (Build 118) | Data version 16/06/2021 15:42 | User group(s) Xylem Australia - EXT, Products - Grinder

NP 3102 SH 3~ Adaptive 255

Dimensional drawing

FLYGT
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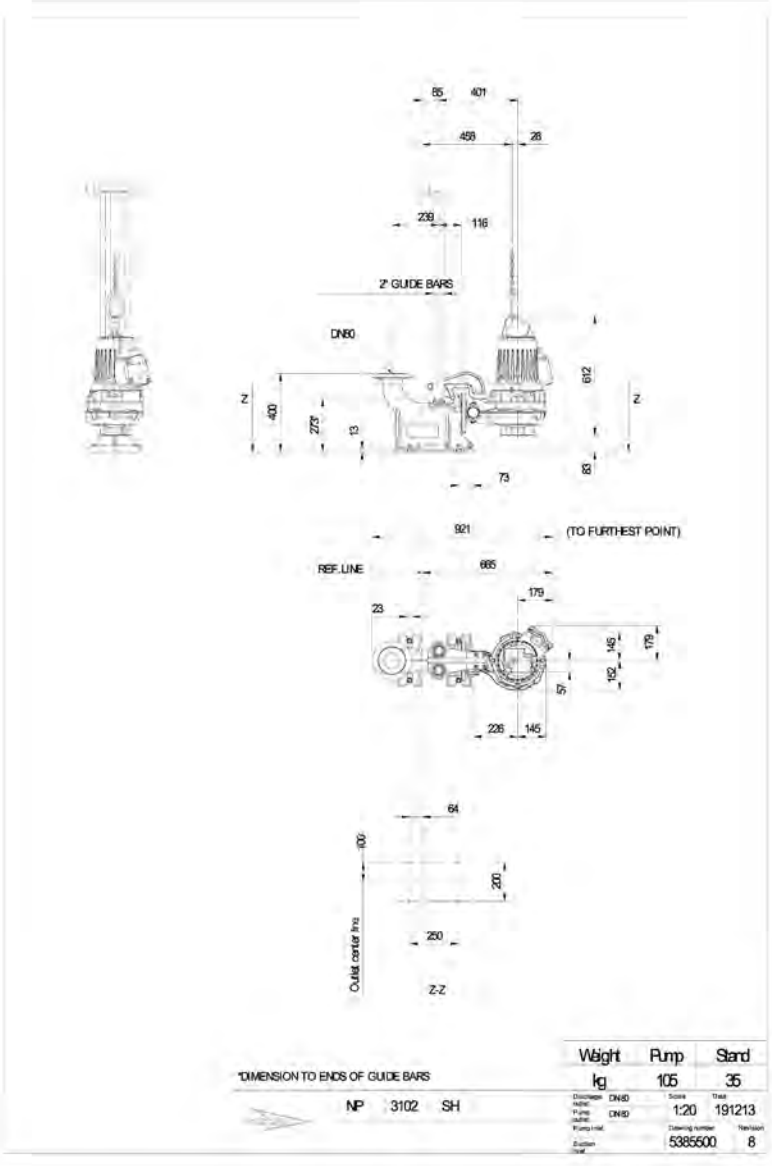

*DIMENSION TO ENDS OF GUIDE BARS

NP 3102 SH

Weight	Pump	Stand
kg	105	35
Discharge nozzle: DN80	Scale 1:20	Size 191213
Pump outlet: DN80		
Pump inlet:	Drawing number 5385500	Revision 8
Suction inlet:		

Project	ROCKY CREEK PRECINCT - STAGE 1	**Created by**		
Block	0	**Created on**	7/1/2021	**Last update** 7/1/2021

Program version	Data version	User group(s)
59.0 - 21/06/2021 (Build 116)	10/06/2021 15:42	Xylem Australia - EXT, Products - Grinder

Water Supply & Sewerage Assessment

APPENDIX D

REVISED SYSTEM CURVE FOR ROCKY CREEK SEWER PUMP STATION

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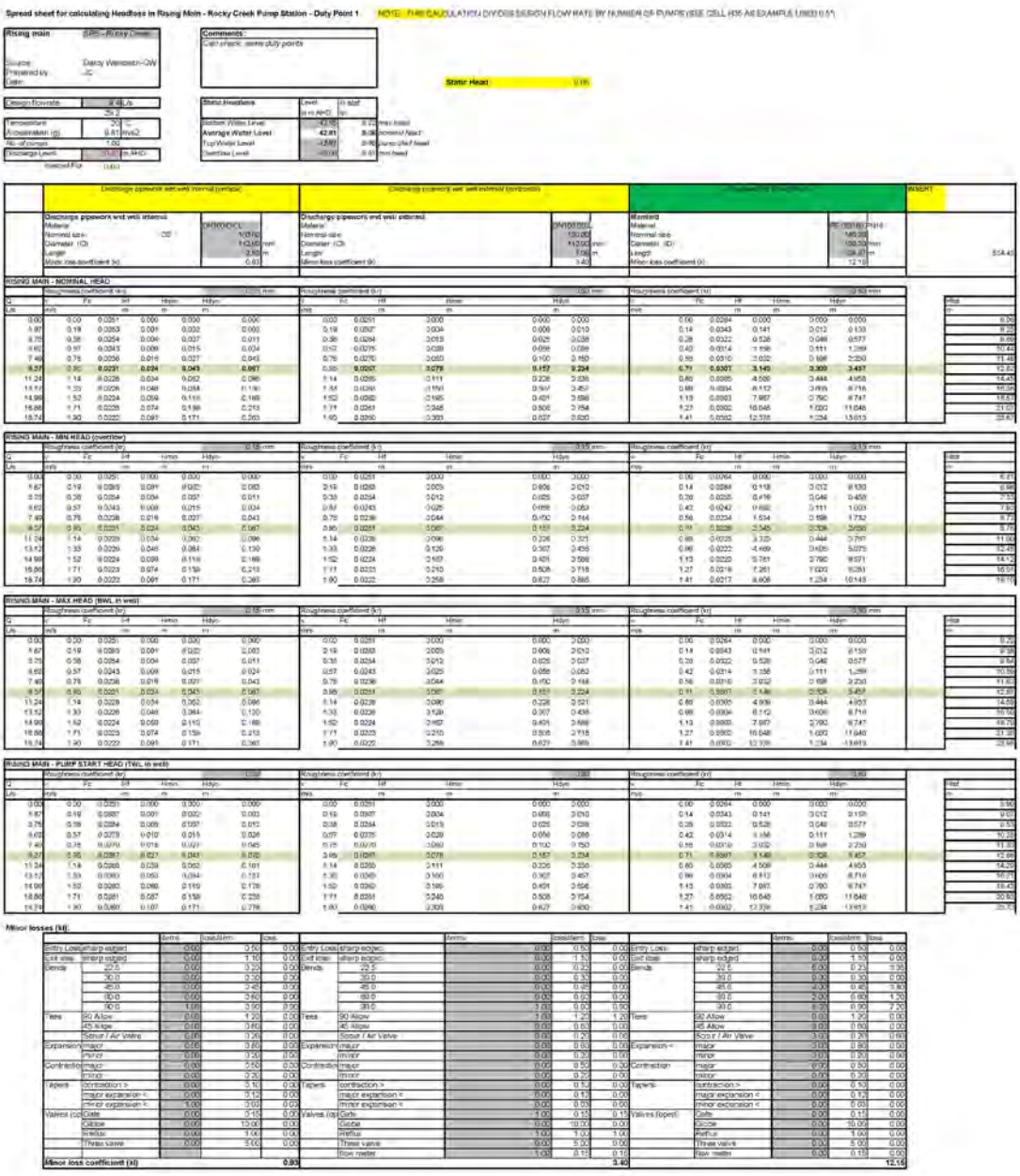

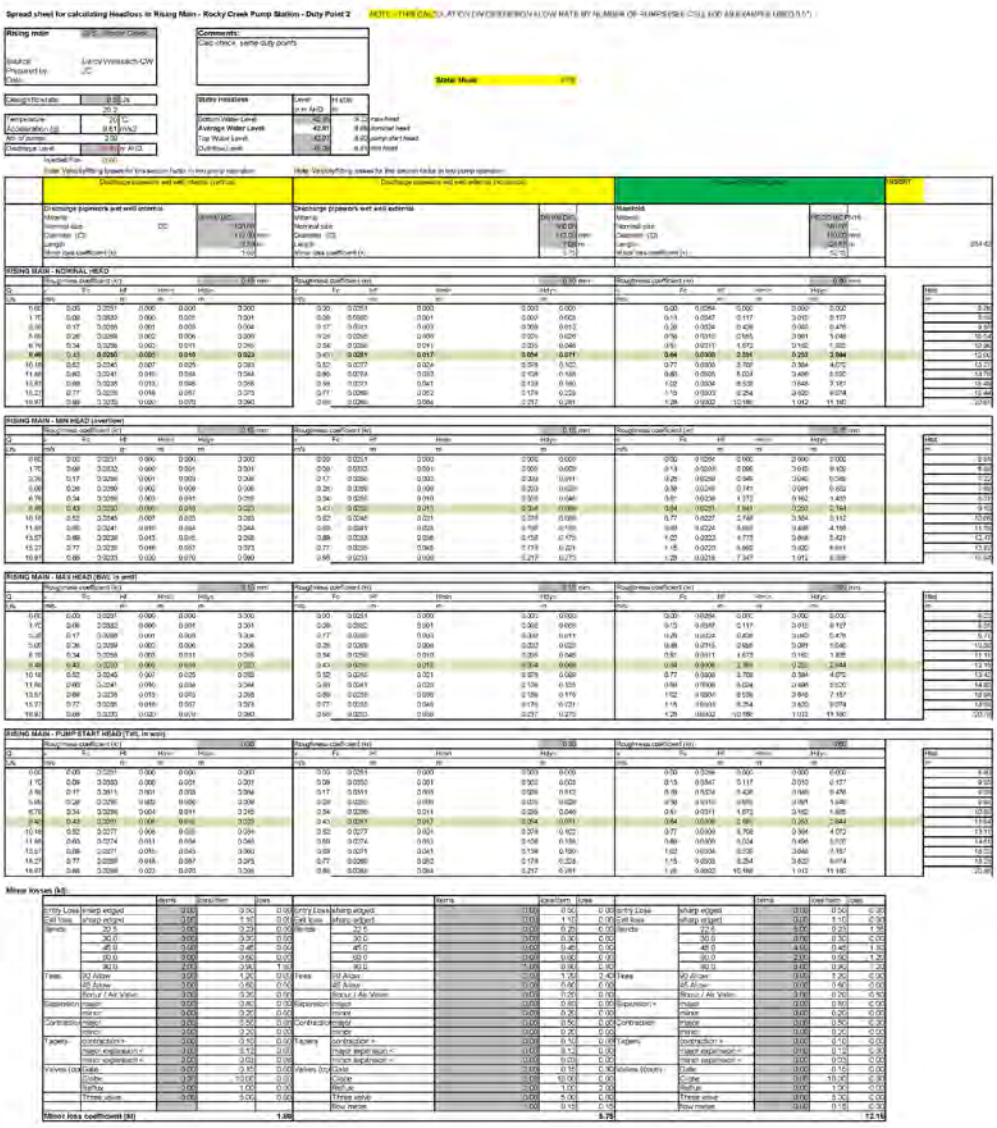

Water Supply & Sewerage Assessment

APPENDIX E

WATER SUPPLY PRESSURE TABLES

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Table 1-1 Fire Flow Residual Pressure

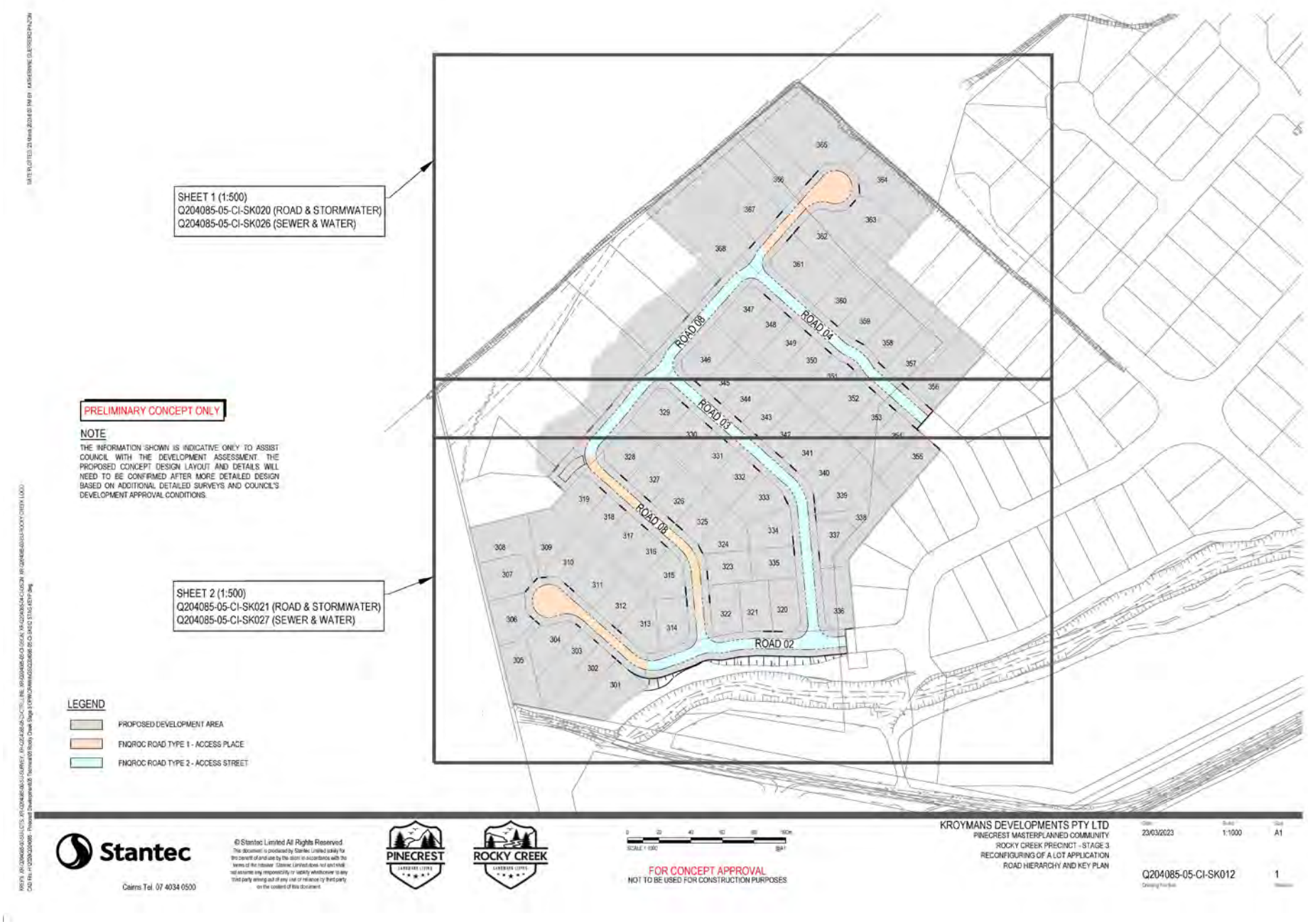
Node ID	Demand (L/s)	Elevation (m)	2021 (Stage 1-3)	2026 (Stage 1-4 & Phase 2)	2041 (Ultimate Augmented)
RC_H9	15	48.31	55.48	44.32	40.74
RC_H8	15	51.82	55.22	44.05	40.52
RC_H7	15	53.39	56.01	44.85	41.39
RC_H6	15	56.55	50.72	39.55	36.11
RC_H5	15	54.88	53.91	42.75	39.32
RC_H4	15	54.80	57.40	46.23	42.94
RC_H3	15	58.93	52.58	41.42	38.18
RC_H2	15	56.37	56.25	45.09	41.83
RC_H19	15	50.07	58.08	46.92	43.39
RC_H18	15	51.53	54.11	42.94	39.36
RC_H17	15	51.97	53.31	42.15	38.51
RC_H16	15	54.18	51.98	40.82	37.22
RC_H15	15	51.97	55.68	44.52	40.99
RC_H14	15	53.77	54.67	43.51	40.00
RC_H13	15	59.49	47.24	36.08	32.59
RC_H12	15	49.64	58.56	47.40	43.92
RC_H11	15	50.77	57.38	46.21	42.75
RC_H10	15	53.91	54.94	43.77	40.32
RC_H1	15	58.16	55.01	43.85	40.64
RC_8	15	66.50	37.74	26.58	23.32
RC_7	15	67.50	43.47	32.30	29.06
RC_6	15	64.50	45.52	34.36	31.11
RC_561	15	49.50	49.41	38.25	34.43
RC_44	15	63.00	47.73	36.57	33.32
RC_4	15	72.00	37.96	26.80	23.53
RC_3	15	64.00	45.85	34.68	31.44

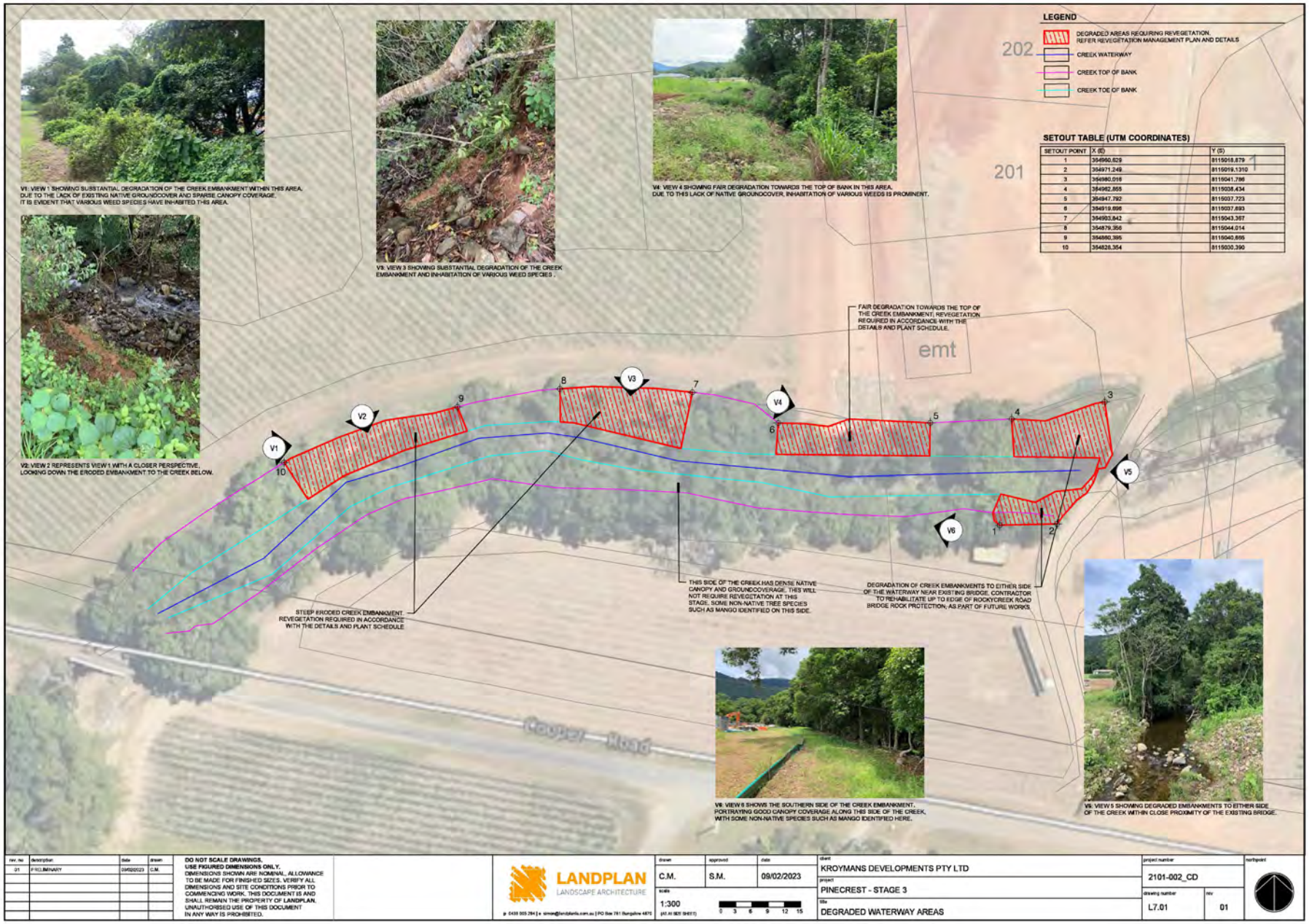
Table 1-2 Max. Day Peak Hour

Node ID	Elevation (m)	2021 (Stage 1-3)	2026 (Phase 2)	2041 (Augmented)
RC_H9	48.31	76.05	68.21	51.85
RC_H8	51.82	72.54	64.71	48.35
RC_H7	53.39	70.98	63.14	46.79
RC_H6	56.55	67.75	59.91	43.55
RC_H5	54.88	69.44	61.60	45.24
RC_H4	54.80	69.66	61.83	45.52
RC_H3	58.93	65.56	57.72	41.42
RC_H2	56.37	68.15	60.31	44.02
RC_H19	50.07	74.21	66.37	50.00
RC_H18	51.53	72.73	64.90	48.52
RC_H17	51.97	72.29	64.46	48.07
RC_H16	54.18	70.09	62.25	45.87
RC_H15	51.97	72.31	64.47	48.10
RC_H14	53.77	70.52	62.68	46.31
RC_H13	59.49	64.80	56.96	40.59
RC_H12	49.64	74.66	66.82	50.45
RC_H11	50.77	73.55	65.71	49.35
RC_H10	53.91	70.44	62.60	46.24
RC_H1	58.16	66.41	58.57	42.29
RC_9	61.00	63.48	55.65	39.35
RC_8	66.50	57.98	50.14	33.84
RC_7	67.50	56.98	49.15	32.85
RC_6	64.50	59.99	52.16	35.86
RC_58	57.80	67.05	59.21	43.02
RC_574	64.00	60.49	52.65	36.36
RC_573	64.00	60.49	52.65	36.36
RC_572	75.00	49.48	41.64	25.34
RC_571	74.00	50.49	42.65	26.36

Node ID	Elevation (m)	2021 (Stage 1-3)	2026 (Phase 2)	2041 (Augmented)
RC_570	70.00	54.49	46.65	30.36
RC_569	71.00	53.49	45.65	29.36
RC_568	62.00	62.50	54.67	38.37
RC_567	52.00	72.26	64.42	48.04
RC_566	52.00	72.27	64.43	48.05
RC_565	52.00	72.34	64.50	48.14
RC_564	52.00	72.30	64.46	48.10
RC_563	52.00	72.28	64.44	48.07
RC_562	52.00	72.26	64.42	48.04
RC_561	49.50	74.86	67.03	50.66
RC_56	59.00	9.37	5.62	41.83
RC_54	55.00	69.28	61.44	45.07
RC_53	56.50	67.80	59.96	43.60
RC_52	56.50	67.78	59.94	43.57
RC_51	56.00	68.37	60.53	44.18
RC_50	55.00	69.37	61.53	45.18
RC_49	56.00	68.32	60.49	44.13
RC_48	56.00	68.31	60.47	44.11
RC_47	57.50	66.99	59.15	42.86
RC_46	61.00	63.48	55.65	39.35
RC_45	64.00	60.49	52.65	36.36
RC_44	63.00	61.50	53.66	37.37
RC_43	61.00	63.58	55.74	39.47
RC_4	72.00	52.49	44.65	28.36
RC_38	67.50	56.98	49.15	32.85
RC_36	54.00	70.26	62.42	46.04
RC_35	54.00	70.27	62.43	46.05
RC_34	54.00	70.27	62.43	46.05
RC_33	53.00	71.26	63.43	47.05

Node ID	Elevation (m)	2021 (Stage 1-3)	2026 (Phase 2)	2041 (Augmented)
RC_32	52.00	72.28	64.44	48.07
RC_31	55.00	69.28	61.44	45.07
RC_30	56.00	68.31	60.47	44.11
RC_3	64.00	60.49	52.65	36.36
RC_29	52.00	72.28	64.44	48.07
RC_28	52.00	72.28	64.44	48.07
RC_27	50.00	74.28	66.44	50.07
RC_26	56.00	68.35	60.51	44.16
RC_25	49.00	75.36	67.53	51.16
RC_24	54.00	70.37	62.53	46.17
RC_23	55.00	69.45	61.61	45.29
RC_21	57.58	67.09	59.25	43.00
RC_20	51.50	72.86	65.03	48.66
RC_2	63.50	61.01	53.17	36.88
RC_19	53.00	71.27	63.43	47.05
RC_18	52.00	72.28	64.44	48.06
RC_17	58.00	66.26	58.43	42.04
RC_16	53.50	70.76	62.92	46.54
RC_15	59.50	64.79	56.95	40.59
RC_14	55.00	69.28	61.44	45.07
RC_13	51.50	72.79	64.96	48.59
RC_12	54.50	69.87	62.03	45.68
RC_11	56.50	67.96	60.12	43.81
RC_10	57.50	66.98	59.15	42.85
RC_001	60.50	64.08	56.25	39.98
127	59.00	9.43	5.84	41.88
125	58.00	10.40	6.71	42.83
122	58.00	10.41	6.78	42.87


SHEET 1 (1:500)
Q204085-05-CI-SK020 (ROAD & STORMWATER)
Q204085-05-CI-SK026 (SEWER & WATER)
SHEET 2 (1:500)
Q204085-05-CI-SK021 (ROAD & STORMWATER)
Q204085-05-CI-SK027 (SEWER & WATER)
ROAD 08
ROAD 04
ROAD 03
ROAD 02
PRELIMINARY CONCEPT ONLY
NOTE
THE INFORMATION SHOWN IS INDICATIVE ONLY TO ASSIST COUNCIL WITH THE DEVELOPMENT ASSESSMENT. THE PROPOSED CONCEPT DESIGN LAYOUT AND DETAILS WILL NEED TO BE CONFIRMED AFTER MORE DETAILED DESIGN BASED ON ADDITIONAL DETAILED SURVEYS AND COUNCIL'S DEVELOPMENT APPROVAL CONDITIONS.
LEGEND
PROPOSED DEVELOPMENT AREA
FNQROC ROAD TYPE 1 - ACCESS PLACE
FNQROC ROAD TYPE 2 - ACCESS STREET
Stantec
Cairns Tel. 07 4034 0500
© Stantec Limited All Rights Reserved
PINECREST
ROCKY CREEK
FOR CONCEPT APPROVAL
NOT TO BE USED FOR CONSTRUCTION PURPOSES
KROYMANS DEVELOPMENTS PTY LTD
PINECREST MASTERPLANNED COMMUNITY
ROCKY CREEK PRECINCT - STAGE 3
RECONFIGURING OF A LOT APPLICATION
ROAD HIERARCHY AND KEY PLAN
23/03/2023
1:1000
A1
Q204085-05-CI-SK012
1


LEGEND
DEGRADED AREAS REQUIRING REVEGETATION. REFER REVEGETATION MANAGEMENT PLAN AND DETAILS
CREEK WATERWAY
CREEK TOP OF BANK
CREEK TOE OF BANK
SETOUT TABLE (UTM COORDINATES)
SETOUT POINT | X (E) | Y (S)
1 | 354990.629 | 8115018.879
2 | 354971.249 | 8115019.1310
3 | 354980.016 | 8115041.786
4 | 354962.855 | 8115038.434
5 | 354947.782 | 8115037.723
6 | 354919.696 | 8115037.693
7 | 354903.842 | 8115043.357
8 | 354879.356 | 8115044.014
9 | 354860.395 | 8115040.895
10 | 354828.354 | 8115030.390
V1: VIEW 1 SHOWING SUBSTANTIAL DEGRADATION OF THE CREEK EMBANKMENT WITHIN THIS AREA, DUE TO THE LACK OF EXISTING NATIVE GROUNDCOVER AND SPARSE CANOPY COVERAGE. IT IS EVIDENT THAT VARIOUS WEED SPECIES HAVE INHABITED THIS AREA.
V2: VIEW 2 REPRESENTS VIEW 1 WITH A CLOSER PERSPECTIVE, LOOKING DOWN THE ERODED EMBANKMENT TO THE CREEK BELOW.
V3: VIEW 3 SHOWING SUBSTANTIAL DEGRADATION OF THE CREEK EMBANKMENT AND INHABITATION OF VARIOUS WEED SPECIES .
V4: VIEW 4 SHOWING FAIR DEGRADATION TOWARDS THE TOP OF BANK IN THIS AREA, DUE TO THIS LACK OF NATIVE GROUNDCOVER, INHABITATION OF VARIOUS WEEDS IS PROMINENT.
V5: VIEW 5 SHOWING DEGRADED EMBANKMENTS TO EITHER SIDE OF THE CREEK WITHIN CLOSE PROXIMITY OF THE EXISTING BRIDGE.
V6: VIEW 6 SHOWS THE SOUTHERN SIDE OF THE CREEK EMBANKMENT, PORTRAYING GOOD CANOPY COVERAGE ALONG THIS SIDE OF THE CREEK, WITH SOME NON-NATIVE SPECIES SUCH AS MANGO IDENTIFIED HERE.
FAIR DEGRADATION TOWARDS THE TOP OF THE CREEK EMBANKMENT, REVEGETATION REQUIRED IN ACCORDANCE WITH THE DETAILS AND PLANT SCHEDULE.
STEEP ERODED CREEK EMBANKMENT REVEGETATION REQUIRED IN ACCORDANCE WITH THE DETAILS AND PLANT SCHEDULE
THIS SIDE OF THE CREEK HAS DENSE NATIVE CANOPY AND GROUNDCOVERAGE. THIS WILL NOT REQUIRE REVEGETATION AT THIS STAGE. SOME NON-NATIVE TREE SPECIES SUCH AS MANGO IDENTIFIED ON THIS SIDE.
DEGRADATION OF CREEK EMBANKMENTS TO EITHER SIDE OF THE WATERWAY NEAR EXISTING BRIDGE. CONTRACTOR TO REHABILITATE UP TO EDGE OF ROCKYCREEK ROAD BRIDGE ROCK PROTECTION, AS PART OF FUTURE WORKS.
emt
Cooper Road
DO NOT SCALE DRAWINGS. USE FIGURED DIMENSIONS ONLY. DIMENSIONS SHOWN ARE NOMINAL. ALLOWANCE TO BE MADE FOR FINISHED SIZES. VERIFY ALL DIMENSIONS AND SITE CONDITIONS PRIOR TO COMMENCING WORK. THIS DOCUMENT IS AND SHALL REMAIN THE PROPERTY OF LANDPLAN. UNAUTHORISED USE OF THIS DOCUMENT IN ANY WAY IS PROHIBITED.
LANDPLAN LANDSCAPE ARCHITECTURE
drawn C.M. | approved S.M. | date 09/02/2023
scale 1:300 (AT A1 SIZE SHEET)
client KROYMANS DEVELOPMENTS PTY LTD
project PINECREST - STAGE 3
title DEGRADED WATERWAY AREAS
project number 2101-002_CD
drawing number L7.01
rev 01

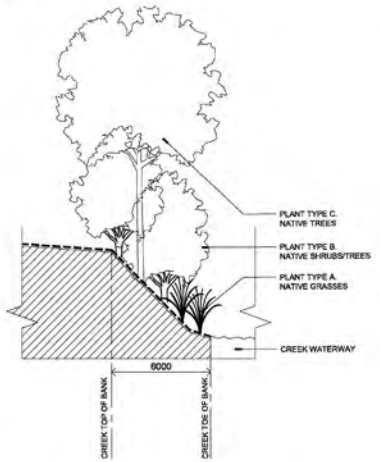
PLANT SCHEDULE

REVEGETATION AREAS (PA1)				
	TYPE A			
LOM HYS	LOMANDRA hystrix	Creek Matrush	tube	90
LOM LON	LOMANDRA longifolia	Matrush	tube	90
	TYPE B			
CUP ANA	CUPANIOPSIS anacardioides	Tuckeroo	tube	6
SYZ ANG	SYZYGIUM angophoroides	Yarrabah satinash	tube	6
SYZ HEM	SYZYGIUM hemilamprа	Broad leaf lilypilly	tube	6
MIL PIN	MILLETTIA pinnata	Pongamia	tube	6
XAN CHR	XANTHOSTEMON chrysanthа	Golden penda	tube	6
CAR BRA	CARALLIA brachiata	Yarrabah satinash	tube	6
CAS ALP	CASTANOSPORA alphandii	Weeping cleistanthus	tube	6
CRY TRI	CRYPTOCARYA triplinervis	Blush satinash	tube	6
ACM HEM	ACMENA hemilamprа ssp. Hemilamprа	Blush satinash	tube	6
LEE IND	LEEA indica	Bandicoot berry	tube	6
LIT LEE	LITSEA leefeana	Brown bollywood	tube	6
CLE APO	CLEISTANTHUS apodus	Weeping cleistanthus	tube	6
BRE CER	BREYNIA cernua	Coffee bush	tube	6
SYZ FIB	SYZYGIUM fibrosum	Fibrous satinash	tube	6
ATR FIT	ATRACTOCARPUS fitzalanii ssp. Fitzalanii	Brown gardenia	tube	6
SYZ LUE	SYZYGIUM luehmannii	Cherry satinash	tube	5
RHU TAI	RHUS taitensis	Sumac	tube	5
	TYPE C			
BAR CAL	BARRINGTONIA calyptrata	Mango pine	tube	8
SYZ TIE	SYZYGIUM tierneyanum	River cherry	tube	7
SYZ FIB	SYZYGIUM fibrosum	Fibrous satinash	tube	7
MEL ELL	MELICOPE elleryana	Corkwood	tube	7
MIL PIN	MILLETTA pinnata	Pongamia	tube	7
TER SER	TERMINALIA sericocarpa	Damson plum	tube	7
CAR BRA	CARALLIA brachiata	Corky bark	tube	7

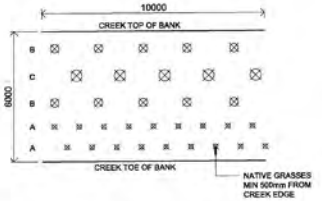
PA1 BASED ON 10 MODULES (REFER DETAILS FOR PLANTING MODULE LAYOUT). PLANT SPECIES TO BE PLACED RANDOMLY IN ACCORDANCE WITH PLANTING MODULE LAYOUT.

The contractor shall review the plant schedule to ensure that drawings and schedules concur. Where insufficient detail or discrepancies may exist on either the plans or the schedule, it is the contractors responsibility to resolve immediately with the Landscape Architect and prior to providing tender pricing, signing work contracts or commencement of works.

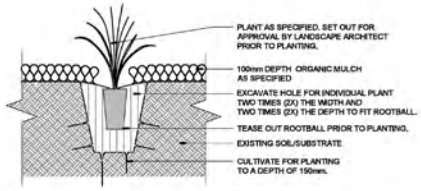
DETAILS



01 PA1 - CREEK BANK REVEGETATION SECTION
SCALE 1:100



02 PA1 - PLANTING MODULE LAYOUT
SCALE 1:100



03 PA1 REVEGETATION PLANTING
SCALE 1:10

LEGEND

- REVEGETATION PLANTING TYPE 1 (PA1). REFER PLANT SCHEDULE AND DETAILS
- APPROX. LINE OF EXISTING RIVERINE VEGETATION
- CREEK WATERWAY
- CREEK TOP OF BANK
- CREEK TOE OF BANK

rev. no	description	date	drawn
01	PRELIMINARY	09/02/2023	C.M.

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LANDSCAPE ARCHITECTURE
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drawn	approved	date
C.M.	S.M.	09/02/2023

scale: AS SHOWN (A1 at size SHEET)

client: KROYMANS DEVELOPMENTS PTY LTD
project: PINECREST - STAGE 3
title: DEGRADED WATERWAY AREAS - REVEGETATION MANAGEMENT PLAN

project number: 2101-002_CD
drawing number: L8.01
rev: 01

northpoint

SPECIFICATIONS

SCOPE OF WORK

The work includes the organisation for and supply of all relevant labour, materials, plant and equipment as required to execute the works.

The scope of work includes but is not limited to the following:

- Removal of deleterious material;
- Cultivation;
- Supply and spreading of additives;
- Supply and installation of imported topsoil;
- Supply and installation of mulch;
- Supply and installation of temporary irrigation;
- Planting; and
- Maintenance.

EARTHWORKS

Earthworks shall involve the removal of existing compacted material, the cultivation of subsoil, the supply and mixing in of additives, the supply and spreading of topsoil and the fine grading of such soil and existing soil profiles to all landscaped areas to form the finished levels and profiles.

Finished surfaces shall finish flush with adjacent surfaces.

Preparation

Eradicate all weeds using environmentally acceptable methods, such as non-residual (Bioactive near waterways) glyphosate herbicide at the recommended maximum rate.

Maintain all areas in a weed free state for the duration of the contract and Plant Establishment periods.

Where abundant biomass is present from sprayed grasses and weeds such as within natural areas, the sprayed vegetation may be considered a suitable mulch by Council, without the requirement for additional commercial mulch.

Cultivation

Excavate and remove from site compacted fill resulting from the building works. Cultivate all planting and turf areas to a depth of 150mm and place 100g/m2 of Blood and Bone and 100g/m2 of Gypsum.

IMPORTED TOPSOIL (FOR PLANTING)

Import and spread premium topsoil mix . Soil shall be free of weeds, sticks, rocks and other deleterious matter. Imported topsoil is to comply with AS4419.

MULCH

25mm Hoop Pine Bark.

Mulch to be spread evenly across all planting areas. Mulch to planting areas shall be approved rainforest mulch free of soil, stones, weeds, rubbish or any other deleterious materials. Spread mulch to garden bed areas to a depth of 100mm, to finish 20mm below adjacent surfaces. Keep mulch clear of plant stems. Spread mulch following planting and watering in. Avoid mixing of soil and mulch materials. Do not use recycled garden mulch. Mulch to comply with AS4454.

PLANTING AREAS

Finished soil depth to all garden areas shall be 300mm crowned towards centre of beds ensuring positive falls to drainage structures. Use 'Agriform' 10g fertilizer tablets (or approved equivalent) to base of all plant root balls at manufacturer's recommended rate.

PLANTS

Provide plants with the following characteristics:

- Large healthy root systems, with no evidence of root curl, restriction or damage;
- Vigorous well-established stock free from pests and diseases, of good form consistent with the pot size, species or variety;
- Hardened off, not soft or forced, and suitable for planting in the natural climatic conditions prevailing at the site.

Label at least one plant from each species in a batch with a durable, readable tag. Plant stock immediately after it is delivered to site. For all plant stock excavate a hole twice the diameter of the rootball and at least 200mm deeper than the rootball. Loosen compacted sides and base of holes to prevent confinement of root growth. Fill all holes to half deep with water in advance of planting, allowing time for water to soak away. After planting, fill hole with amended/imported soils.

IRRIGATION

The design, supply, and installation of a fully automatic tapestry irrigation system to provide coverage to all PA1 planting areas specified. The system shall be capable of delivering an application rate of 32mm per week.

To avoid water wastage, ensure that the correct sprinkler nozzle is used for the particular application required, and also adjust sprinklers and solenoid valves as required to avoid overspray onto paths and roadways.

STANDARDS OF WORKMANSHIP

All installation works should be carried out by competent tradespersons experienced in commercial installations of this magnitude and holders of current BSA licensing for irrigation installation.

Ensure that all workmanship adheres to, but is not limited to the industry specific Australian Standards.

WORKS CARRIED OUT BY ASSOCIATED TRADES

The following associated works will need to be co-ordinated in conjunction with the installation of the automatic irrigation system:

Supply and installation of power supply to controllers, pumps, and other associated electrical equipment by licensed electrical contractors;

Supply, installation, and testing of backflow prevention devices with associated valves, filters, and copper pipework by licensed plumbers;

Supply and installation of conduits and penetrations, and associated draw wires, etc., as required under roadways, pathways, and other hard surfaces.

PLANTING ESTABLISHMENT

Establish and maintain the works for a period of twelve (12) months from the Date of Practical Completion.

Establishment shall include the care of the contract areas by accepted horticultural practices, as well as rectifying any defects that become apparent in the works under normal 'use'. This shall include, but not be limited to, the following works:

- Repair and/or replace any defects due to failure and/or inferior quality materials and/or workmanship;
- Replace plants that have failed and/or have been damaged or died;
- Weed and pest control;
- Maintain all landscape areas in a neat and tidy condition at all times;
- Maintain fertilising and pruning as required;
- Check and adjust levels to attain those specified by addition or removal of mulch and/or topsoil.

All planted beds are to be weeded to maintain same in a grass and weed free environment. Carry out any other work that is specified or is necessary to establish the landscape works in a first class condition.

PLANT MAINTENANCE STRATEGY

Pruning

Prior to pruning works, the Contractor, after consultation with the Superintendent, shall determine the finished design character of the planting areas.

In general, tip prune all shrubs and trees to ensure a dense and bushy appearance. Remove any overhanging branches or foliage that prevents proper function of a space, eg pathways, seating areas, etc. Thin out and remove from site those plants that may inhibit or injure the growth of surrounding plants.

Fertilising

Soil testing is to be done twice a year and should include taking samples from planting beds. The fertilising programme shall be based on the soil testing results.

Fertilising should be designed to maintain a healthy growth pattern. To obtain this, a balance of both natural and synthetic fertiliser should be used.

Weed Control

Remove all weeds from all planting areas as often as necessary to maintain a continuous weed-free environment. All removed weed debris shall be removed from the site.

Where weeds are growing close to ornamental plants care should be taken when applying herbicides. The best method may be hand removal.

Persistent weeds such as nutgrass or couch may require herbicides. Paint the weeds with undiluted herbicide containing bioactive glyphosphate ("Zero" or "Roundup"). These products work by being absorbed through the leaves, stems, etc. of the plant, and killing the root system. They should be applied to 'healthy' green parts of the plant (leaves, not dry woody stems) to allow maximum absorption into the system.

Note, however that "Zero" and "Roundup" are non-selective, meaning that they will kill most plants they come in contact with. Care must be taken not to let the herbicides contact ornamental plants. If this occurs the affected area of the plant should be thoroughly rinsed with water.

Herbicides should not be applied within 12 hours of impending rain.

When spraying herbicides, these should be diluted with clean water to the manufacturer's directions. A hood or cone should be fitted over the nozzle of the spray wand in order to prevent drifting onto ornamental plants. Spraying should not be carried out on windy days. Should herbicide accidentally drift onto the green tissue (leaves, green stems etc) of non-target, ornamental species, the affected area should be immediately and thoroughly rinsed with water.

"Turf weedem" are only mildly selective in that they will not kill grass, but will kill broad leafed and ornamental plants.

The "Cut-Stump" Method

Large woody weeds such as Groundsel and persistent climbing weeds, such as Cat's Claw and Morning Glory, should be cut off at approximately 30mm above ground level. Undiluted bioactive "Roundup" should then be immediately applied to the remaining stump. A smaller dropper bottle, clearly labelled :Poison - Roundup" is ideal for this purpose. This is known as the "Cut-Stump" method. Any suckering from treated plants should be sprayed with bioactive "Roundup", as for other weeds.

Pest and Disease Control

Any spraying should only be undertaken when the insect, mite and scale has been positively identified and when their populations have increased to a point that will become detrimental to plant growth or is considered necessary by the Superintendent. Notify the Superintendent of any infestations for damage.

Litter Removal

The Contractor during the maintenance process shall remove any litter or rubbish from the gardens or turf areas. It is important that the site is kept clear of litter so that it will not detract from the appearance of the landscape.

Mulched Surfaces

In accordance with Cairns Regional Council Specific Requirements D9.26 Mulching: Natural well composted Forest mulch shall be used in "natural" planting areas only, such as buffer planting or parkland planting. It should be installed to a minimum 100mm compacted depth, free from rocks, nut grass, and any other invasive weeds.

Mulched Areas should be inspected monthly to determine mulch requirements. Generally a minimum depth of 100mm cover should be maintained. However, mulch should be kept 30mm from the stems of shrubs or trees to prevent the possibility of collar rot. Special care when re-mulching should be given to maintain original ground levels around the base of plants.

Workplan

Revegetation activity	Responsible party	Estimate time required	Timeframe	Frequency
Site Preparation Example: Herbicide application	Contractor	As required	During stage 3 construction	Once
Planting Example: Plant 200 plants	Contractor	As required	During stage 3 construction	Once
Maintenance Example: Herbicide application	Contractor	Weekly, Nov-April Monthly, May-Oct	12 months post planting	Approx. 30h per year
Monitoring Example: Photopoints	Contractor	As required	During establishment period	Monthly

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LANDPLAN

drawn	approved	date
C.M.	S.M.	09/02/2023

scale: AS SHOWN (at A1 size only)

client: KROYMANS DEVELOPMENTS PTY LTD
project: PINECREST - STAGE 3
title: DEGRADED WATERWAY AREAS - LANDSCAPE SPECIFICATIONS

project number: 2101-002_CD
drawing number: L9.01
rev: 01

ATTACHMENT 2: Infrastructure Charges Calculations

Attachment to Infrastructure Charges Notice

Cairns REGIONAL COUNCIL

Applicant Name:	Kroymans Developments Pty Ltd	**DA/ICN Number:** 8/13/2504	**DM5 Ref:** 7170442
Development Address:	900L Wilderness Way and 101R-103R Cooper Road, Mount Peter	**Preparing Officer:**	Ali Davey
		Relevant Charges Policy:	Cairns Regional Council Charges Resolution No. 2 of 2021
Property Description:	Lot 900 on SP322693 and Lot 100 on SP322661	**Date Levied:**	17-Apr-23
		Index:	124.93

Levied Charge Calculation

AC - (BASE CHARGE)

Category	Use					Quantity	Sub Total	Indexed Sub Total
Residential uses	Dwelling house	Use component	$	30,677.65	for each dwelling with 3 or more bedrooms	69	$2,116,757.85	$2,201,906.00
		Impervious area component	$	-			$0.00	$0.00
						PROPOSED CHARGE	$2,116,757.85	$2,201,906.00

C - (CREDIT)

Category	Use					Quantity	Sub Total	Indexed Sub Total
Residential uses	Dwelling house	Use component	$	30,677.65	for each dwelling with 3 or more bedrooms	2	$61,355.30	$63,823.36
		Impervious area component	$	-			$0.00	$0.00
						EXISTING CHARGE	$61,355.30	$63,823.36
						LC (LEVIED CHARGE)	$2,055,402.55	$2,138,082.64

EC - (ESTABLISHMENT COST)

Category	Description	Sub Total	Indexed Sub Total
Manual Entry	TRF430	$2,560,812.12	$2,560,812.12
Manual Entry	IRF18	$408,676.80	$408,676.80
	ESTABLISHMENT COST	$2,969,488.92	$2,969,488.92
	VALUE OF OFFSET	$2,055,402.55	$2,138,082.64
	VALUE OF REFUND	$914,086.37	$831,406.28
	VALUE OF LEVIED CHARGES FOLLOWING OFFSET	$0.00	$0.00

Note: this amount excludes any roadworks constructed under the Stage 1 Operational Works Permit.

REVIEWED Ian Elliott-Smith

OFFICE USE ONLY:	
DATE PAYABLE	ROL - Before the Local Government approves t
DATE PAID	
Account:	T648 GL 05446
RECEIPT NUMBER	