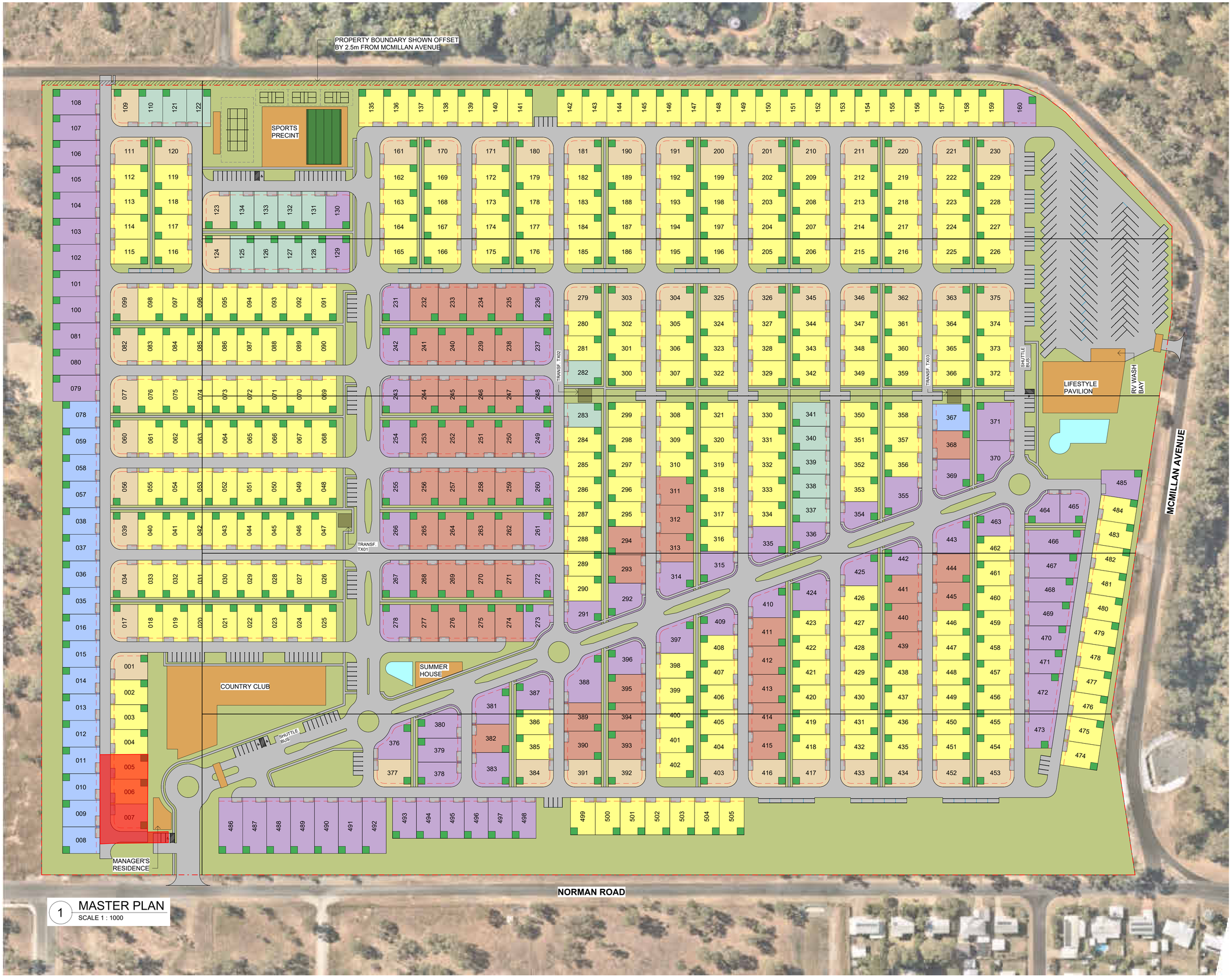

1 MASTER PLAN
SCALE 1 : 1000

Living Gems

120 SIGANTO DRIVE, HELENSVALE, QLD, 4212
INFO@GEMLIFE.COM.AU
WWW.GEMLIFE.COM.AU

REGISTERED ARCHITECT - PHILLIP NIELSEN
QLD-5331 NSW-10322 VIC-19672

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Stage 1 Construction

SITE INFO
SITE AREA: 274,644.93 m2
VISITOR PARKING: 213
PWD PARKING: 5
RV PARKING: 104
SHUTTLE BUS PARKING: 02

OPEN SPACE CALCS
LANDSCAPING:
RECREATIONAL SPACES:
PEDESTRIAN SHAREWAY:
TOTAL OPEN SPACE:

SITE COVERAGE
DESIGN AVERAGE (193m2):
CLUBHOUSE UNDER ROOF AREA:
LIFESTYLE PAVILION UNDER ROOF AREA:
TOTAL SITE COVERAGE:

LEGEND

- 13.5 x 21.0 m - TYPICAL LOT
- 14.0 x 21.0 m - TYPICAL LOT
- 15.0 x 21.0 m - TYPICAL LOT
- 15.5 x 21.0 m - TYPICAL CORNER LOT
- 16.0 x 21.0 m - TYPICAL LARGE LOT
- SPECIAL LOT - VARIOUS DIMENSIONS

YIELD

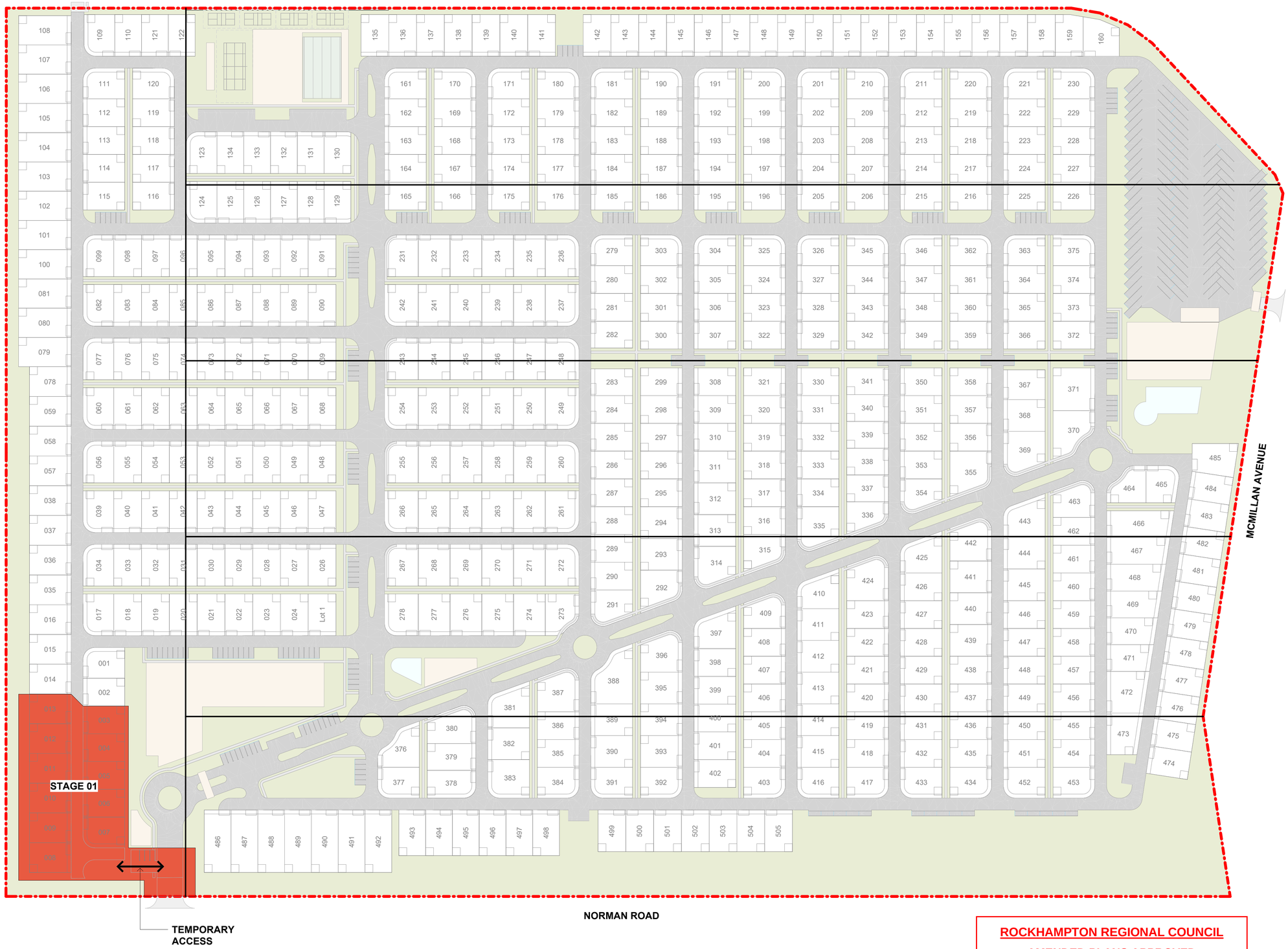
13.5 x 21.0 TYPICAL LOT	18
14.0 x 21.0 TYPICAL LOT	282
15.0 x 21.0 TYPICAL LOT	18
15.5 x 21.0 TYPICAL CORNER LOT	50
16.0 x 21.0 TYPICAL LARGE LOT	54
SPECIAL LOT - VARIOUS DIMENSIONS	83

Grand total: 505

SCALE
As indicated@A1
PRINT AT 50% @ A3

0 50m 100m

PROJECT
ROCKHAMPTON
19 McMillan Avenue, Parkhust, QLD 4702



1 STAGING DIAGRAM
SCALE 1 : 1000

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/187-2023

Dated: 18 September 2024

Living Gems

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REGISTERED ARCHITECT - PHILLIP NIELSEN
QLD-5331 NSW-10322 VIC-19672

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SCALE
1 : 1000@A1
PRINT AT 50% @ A3

0 50m 100m

PROJECT
ROCKHAMPTON
19 McMillan Avenue, Parkhust, QLD 4702, Australia

BRANCH	SITE
LG	PRH
GATE	DOC TYPE
1	DWG
BUILDING CODE	DISCIPLINE
MP	A
DRAWING No	REVISION
A050	

DRAWN	CHECKED	APPROVED
PN	PN	PN

DRAWING TITLE
STAGING DIAGRAM

FILE NAME
LG - PRH - DWG - MP - A - A050

03.03 Architectural Drawings

Footpath and Walking Network Plan

7421750N

246430E

RESIDENTS PEDESTRIAN CONNECTOIN

52 RVs

CLUBHOUSE

RESIDENTS PEDESTRIAN CONNECTOIN

TAXI AND MINI BUS (12 SEATER) PICKUP POINT

SUMMER

DOG RUN

RESIDENTS PEDESTRIAN CONNECTOIN

LOT SIZE

PROPOSED FOOTPATH NETWORK

RESIDENTS CONNECTION TO THE PUBLIC REALM

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

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Dated: 18 September 2024

JAREDPOOLEDESIGN
LEVEL 1 33 ELKHORN AVENUE
SURFERS PARADISE, QLD. 4217 AUSTRALIA
PO BOX 42. ISLE OF CAPRI, QLD. 4217
TEL 07 5527 5300
EMAIL INFO@JPD.COM.AU
WEB WWW.JPD.COM.AU

Living Gems

ISSUE	DATE	DESCRIPTION
C	11.04.24	Footpaths amended
B	16.03.24	Footpaths added
A	06.09.23	Issue for approval

PROJECT Proposed New Development
Norman Road, Parkhurst (Rockhampton) Qld

CLIENT LivingGems

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DRAWING TITLE BP1426/03.03

NORTH

15m 75m 150m

SCALE 1:3000 @ A3

Footpath and Walking Network Plan

POOLE

05.01

Dwelling Type A

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

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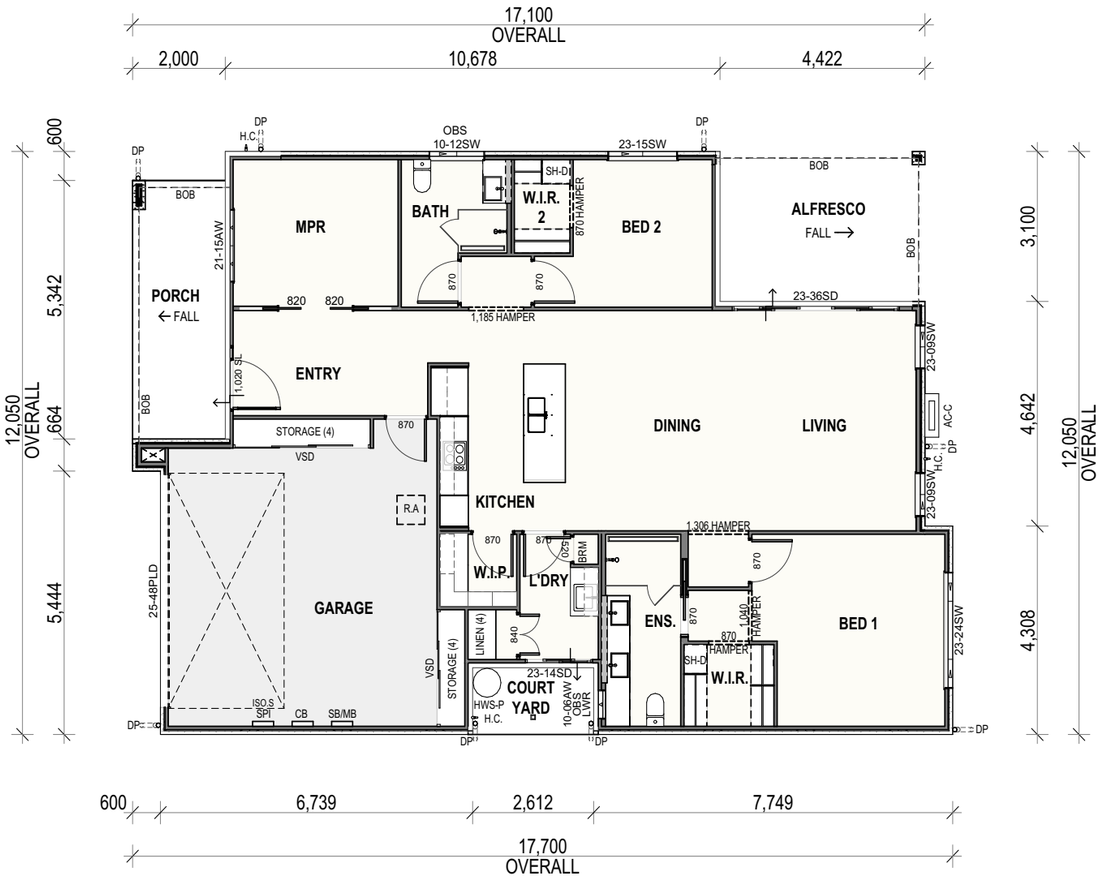
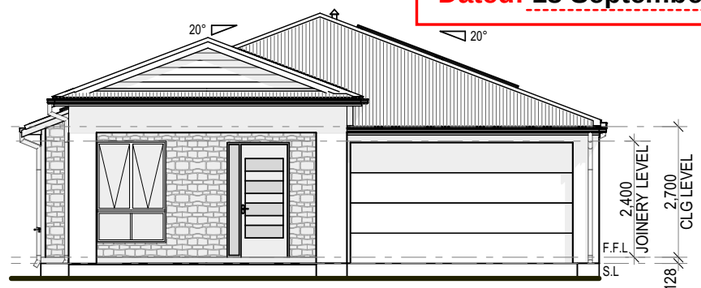
Dated: 18 September 2024



FLOOR PLAN



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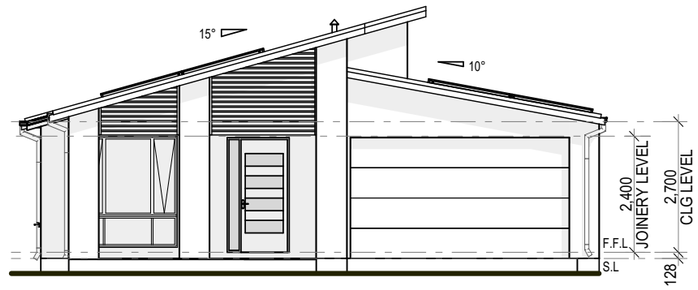

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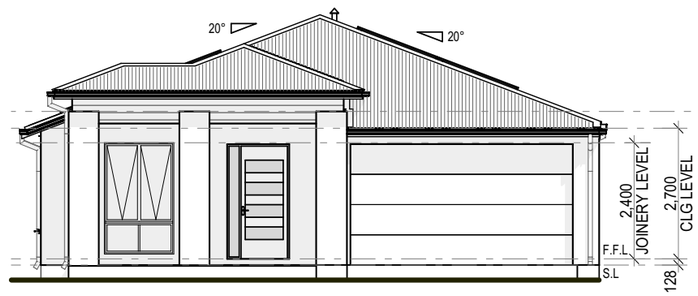

DWELLINGS - TYPE - A

FLOOR AREAS	
AREA	SQ METERS
ALFRESCO	20.83
COURT YARD	3.60
GARAGE	40.52
LIVING	135.66
PORCH	10.68
	211.29 m²

Living Gems

LEVEL 2, 120 SIGANTO DRIVE
HELENSVALE QLD 4212
livinggems.com.au

PROJECT: Parkhurst

AT: 19 McMillan Avenue
Parkhurst QLD 4702

05.02

Dwelling Type B

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

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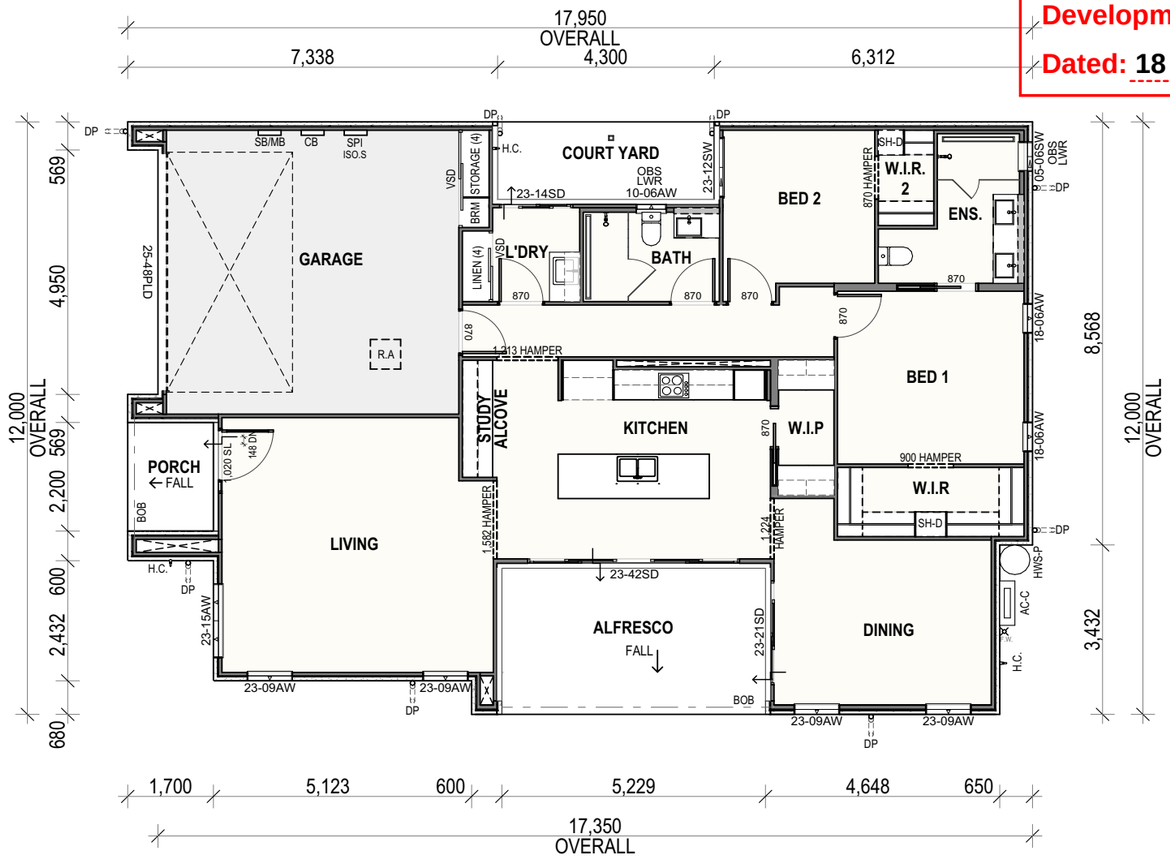
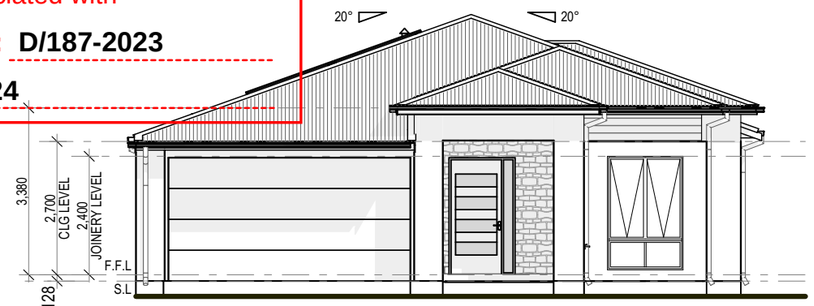
Development Permit No.: D/187-2023

Dated: 18 September 2024



FLOOR PLAN



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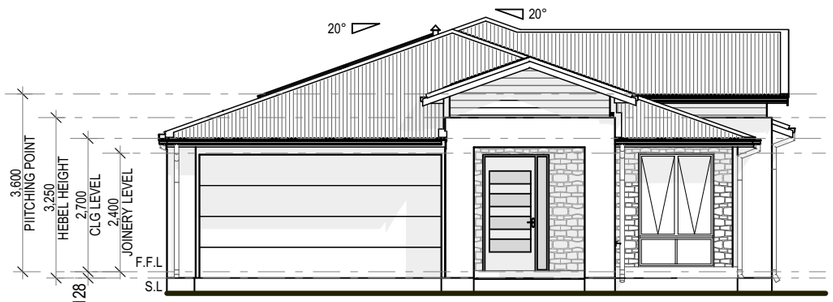


FACADE OPTION 2



FACADE OPTION 3

DWELLINGS - TYPE - B

FLOOR AREAS	
AREA	SQ METERS
ALFRESCO	15.48
COURT YARD	6.75
GARAGE	37.75
LIVING	137.70
PORCH	3.74
	201.42 m²

Living Gems

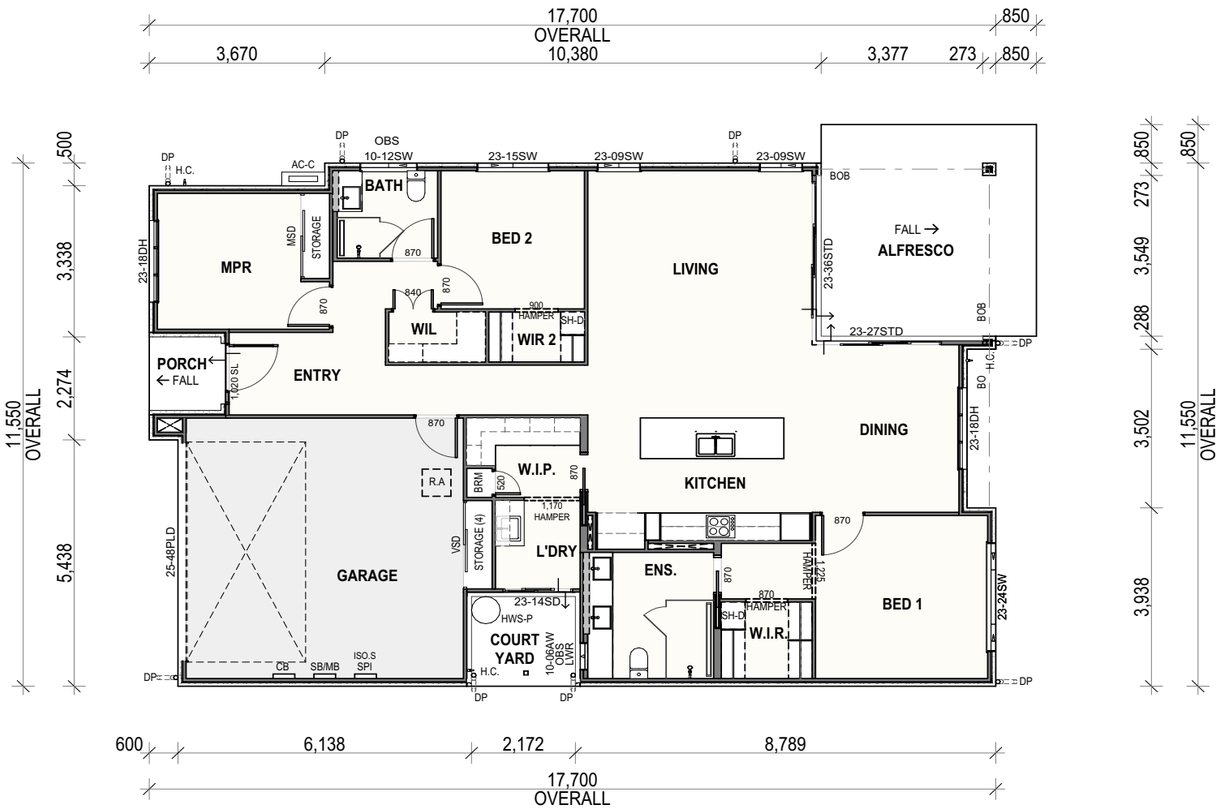
LEVEL 2, 120 SIGANTO DRIVE
HELENSVALE QLD 4212
livinggems.com.au

PROJECT: Willowbend

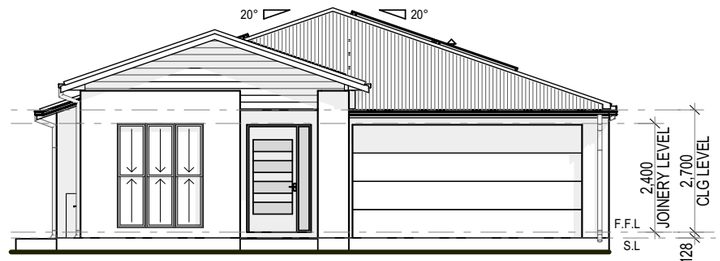
AT: 19 McMillan Avenue
Parkhurst QLD 4702

05.03

Dwelling Type C



FLOOR PLAN



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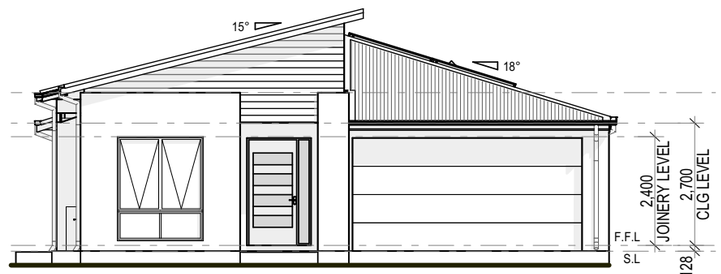

FACADE OPTION 2



FACADE OPTION 3

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

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Dated: 18 September 2024

DWELLINGS - TYPE - C

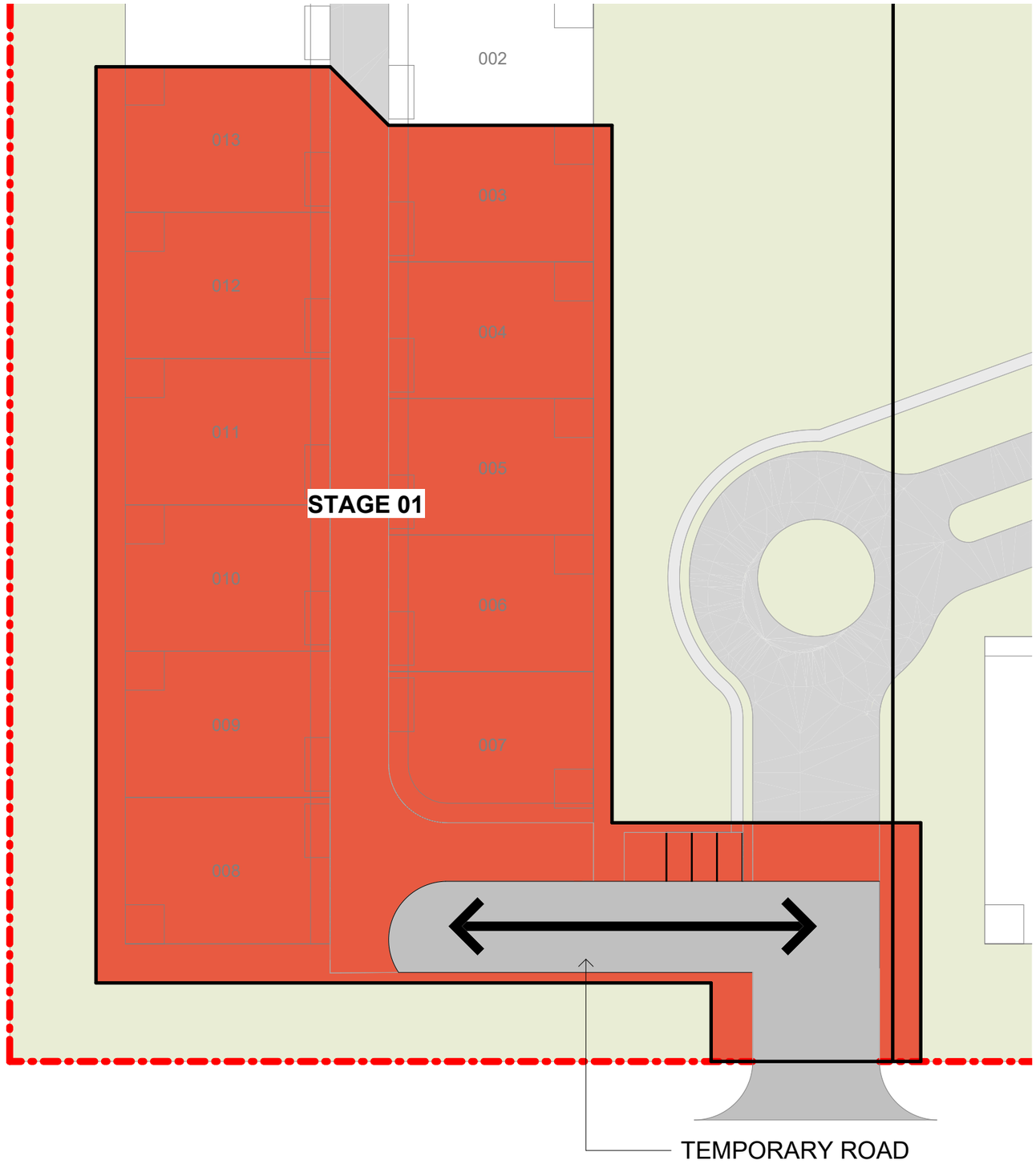
FLOOR AREAS	
AREA	SQ METERS
ALFRESCO	21.02
COURT YARD	4.30
GARAGE	37.48
LIVING	139.07
PORCH	2.44
	204.31 m²

Living Gems

LEVEL 2, 120 SIGANTO DRIVE
HELENSVALE QLD 4212
livinggems.com.au

PROJECT: Parkhurst

AT: 19 McMillan Avenue
Parkhurst QLD 4702



1 TEMPORARY ACCESS

SCALE 1 : 500

Living Gems

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WWW.GEMLIFE.COM.AU

REGISTERED ARCHITECT - PHILLIP NIELSEN
QLD-5331 NSW-10322 VIC-19672

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DATE

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Development Permit No.: D/187-2023

Dated: 18 September 2024

N

SCALE
1 : 500@ A3
PRINT AT 200% @ A1

0 5 m

PROJECT
ROCKHAMPTON
19 McMillan Avenue, Parkhust, QLD 4702

BRANCH	SITE
LG	PRH
GATE	DOC TYPE
1	DWG
BUILDING CODE	DISCIPLINE
MP	A
DRAWING No	REVISION
A051	

DRAWN	CHECKED	APPROVED
PN	PN	PN

DRAWING TITLE
TEMPORARY ACCESS

FILE NAME
LG - PRH - DWG - MP - A - A051

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/187-2023

Dated: 18 September 2024

Living Gems

930-960 Norman Road & 19 McMillan Avenue, Parkhurst

Statement of Landscape Intent

PREPARED BY ZONE LANDSCAPE ARCHITECTURE

Project Reference: L23171

Designed: BA

Revision: D | 03.06.2025

Document Revisions

Rev.	Comments	Date	Initial
1	Review 1	11.12.2023	JB/HL
2	Review 1	13.12.2023	JB
A	Issue A For Approval	15.12.2023	JB
B	Issue B For Approval	29.11.2023	SS
C	Issue C For Approval	02.06.2025	BA
D	Issue C For Approval	03.06.2025	SS

Document Sources

Rev.	Base Information	Issued By	Issued
D	Architectural Plans	JPD	11.12.2023
DA	Architectural Plans	JPD	DEC 2023
DA	Civil Engineering	Westera	14.12.2023
AE	Architectural Plans	Living Gems	27.11.2024
DA	Civil Engineering	Westera	06.11.2024
AP	Architectural Plans	Living Gems	14.05.2025

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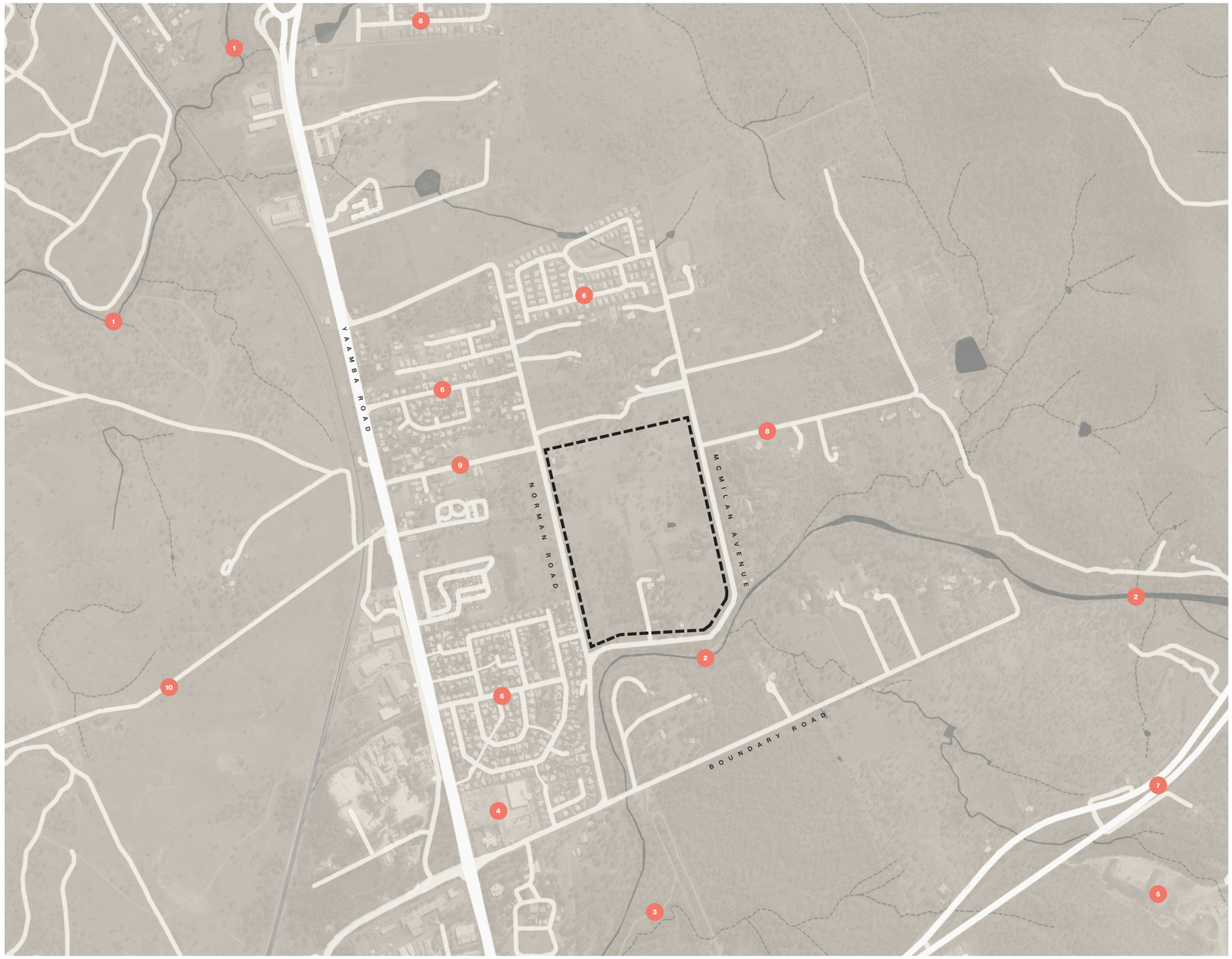
Living Gems*

1.0

Site Context.



Subject Site
930-960 Norman Road & 19 McMillan Avenue, Parkhurst

1. Ramsay Creek
2. Limestone Creek
3. Limestone Creek Conservation Park
4. Parkhurst Shopping Centre (Woolworths)
5. Peak Hill Quarry
6. Residential Area
7. Yeppoon Road
8. Alfred Road
9. Mason Avenue
10. William Palfrey Road

Site Analysis

1.1 Site Locality

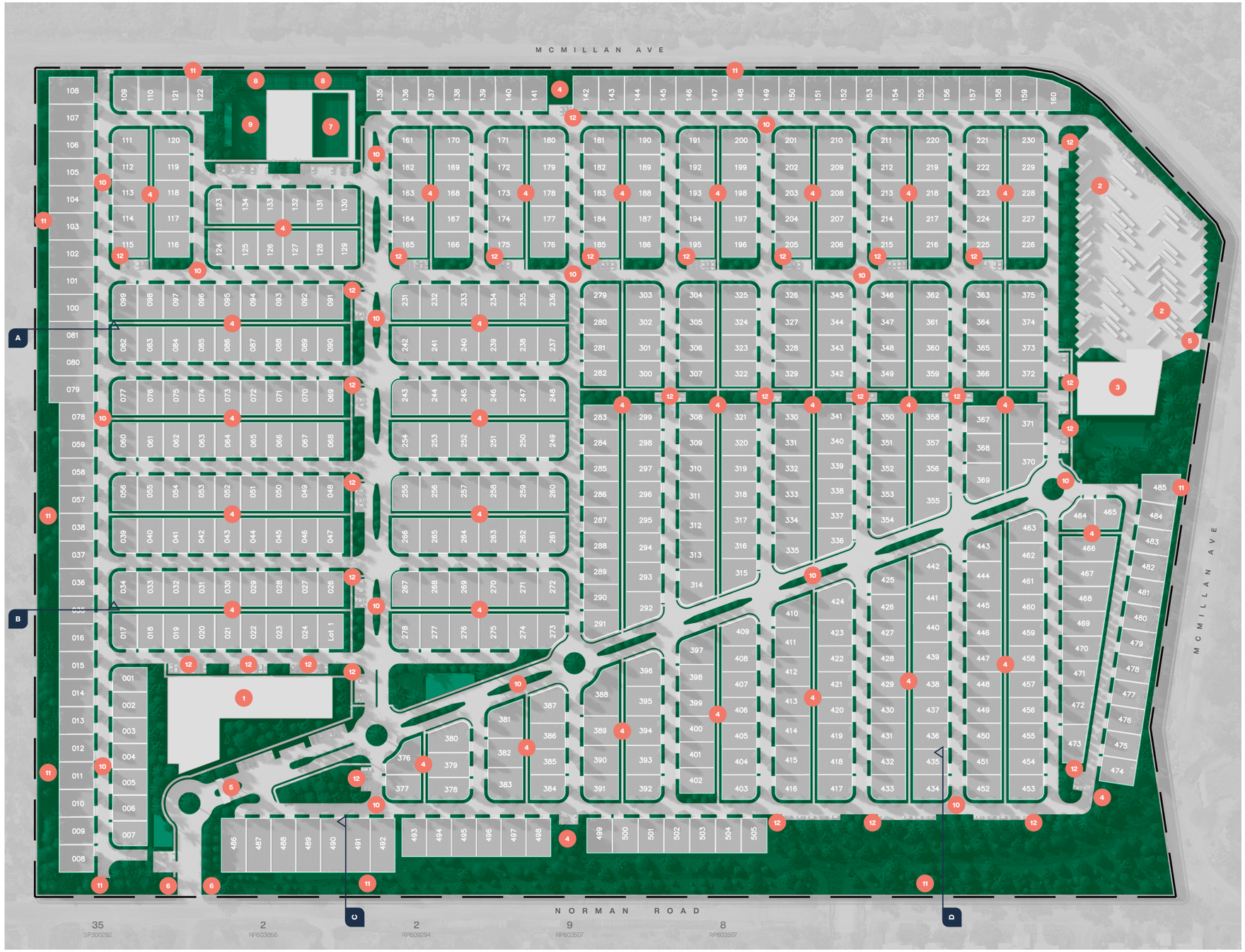
0m 500m 1000m N

June 2025

Living Gems*

2.0

Landscape Design.



Open Space Areas

The Open Space Areas plan illustrates all areas of open space within the Subject Site. These areas encompass both soft and hard landscaping zones, incorporating communal spaces, streetscape features, landscape buffers, setbacks, as well as recreational amenities such as tennis courts and bowling greens. For a more detailed breakdown of landscape treatments, please consult **Plan 2.2 Landscape Treatment Areas**.

Subject Site
930-960 Norman Road & 19 McMillan Avenue, Parkhurst

1. Club House
2. RV Parking
3. Lifestyle Pavilion
4. Linkage & Secondary Open Space
5. Gate House
6. Entry Statement
7. Lawn Bowls
8. Tennis Court
9. Pickleball Court
10. Streetscape
11. Setback
12. Visitor Parking

Landscape Design

2.1 Landscape Design Open Space Areas

0m 20 40 60 80 100 200

N

June 2025



Subject Site
930-960 Norman Road & 19 McMillan Avenue, Parkhurst

1 **Streetscape Primary Boulevard**
Estate entry central medians (primary medians 4.0m width). Primary medians to feature tall signature palm trees with copses of mid sized support palms (or shade trees eg Elaeocarpus, Waterhousia or Tristaniopsis species). Understorey plantings of formal layered shrub species and prostrate groundcovers with placement and maximum heights cognisant of maintaining vehicular sightlines where required. RAB of 12.0m diameter to feature large feature palm or shade tree. Understorey plantings of formal layered shrub species to centre and mass planted prostrate groundcovers to outer 3.0m cognisant of maintaining vehicular sightlines.

2 **Streetscape Plantings General**
Primary streetscape landscape zone located to dwelling frontages (refer to **3.0 Dwelling Streetscape** for details.). Planting area to feature small to medium feature tree set within layered plantings. Street trees will the planted at an average spacing of 14m based on lot width (average of one tree per lot). Tree species planted at minimum 600mm to rear of internal road edge with root guards incorporated as required. Refer to **Section 6.0 Planting Palettes** for street tree species types. Low shrub species to rear with accent species and low mass planted groundcovers, refer to **3.0 Dwelling Streetscape** for planting setout details.

3 **General Planting**
Layered planting scheme to general planting areas as illustrated this sheet. Planting area to feature small to medium feature trees set within layered plantings, hedge species incorporated to rear of planting beds (typically along fencelines). Signature character species to be incorporated within all areas to ensure a coherent design outcome is achieved. Mass planted ground cover species to front of planting beds. Groundcover plantings to average height 300-400mm. Accent species planted in copses to frame feature trees and palm species.

4.0m Water Easement
Existing water main and assoc easement along northern boundary to be retained.

4 **6.0m - 12.0m Setbacks (Vegetated)**
Vegetated Cut Off Drain to development perimeter varies from 6m to 12m in width (refer notations this plan). Planting incorporated to outer edges of concrete / rock low-flow. Planting to reflect General Planting (3) with screening hedges incorporated to fencelines. Central concrete channel drain provides informal maintenance access. Small-medium screening trees to be incorporated where offsets from retaining structures and civil infrastructure permits. Refer to Landscape Master Plan and Cross Sections for further detail. Refer to **Cross Section B, C, E & F** for additional information.

5 **7.0m Setback (Non-Vegetated)**
Rock-lined Cut Off Drain to development perimeter 3m wide (refer notations this plan). 4.0m wide existing water easement to balance 7m setback. Refer to **Cross Section A** for additional information.

6 **Existing Drainage Easement**
Existing earth drainage channel within Easement AS P307472. Width ranges from 20m to 40m with existing connection to the west under Norman Street and to the south under McMillan Avenue to Limestone Creek. Along the fencelines a 'structured' landscape treatment will be implemented. This treatment will adhere to General Planting (3) guidelines, featuring screening hedges, small to medium-sized shade trees, and layered landscaping to base. This structured landscape treatment will gradually transition into a more informal riparian palette. Any existing vegetation to be retained and supplemented as required with suitable riparian species. Low groundcover planting to batters to facilitate filtered views across the corridor. Accent species such as Doryanthes, Crinum, and Dietes to the outer edge of the low-flow. The low-flow area will mimic a naturalistic watercourse with copses of Water Sensitive Urban Design (WSUD) species eg Melaleuca, Livistonia, and Casuarina. Sedges to be incorporated to watercourse outer-edge and to proposed stormwater outlets (scour protection also incorporated) to assist with erosion control and bank stability. Refer to **Cross Section D** for additional information.

Norman Rd Frontage
Fenceline to Norman Road frontage to tie into Primary Entry Road and associated Entry Statement. Refer to **2.4 Landscape Plan** Primary Walls & Fences for fencing type and alignment. A 'structured' landscape located to rear of Norman Rd frontage fence. This treatment will adhere to General Planting (3) guidelines, featuring screening hedges, small to medium-sized shade trees, and layered landscaping to base. This structured landscape treatment will gradually transition into a more informal riparian palette associated with the existing and proposed drainage channels.

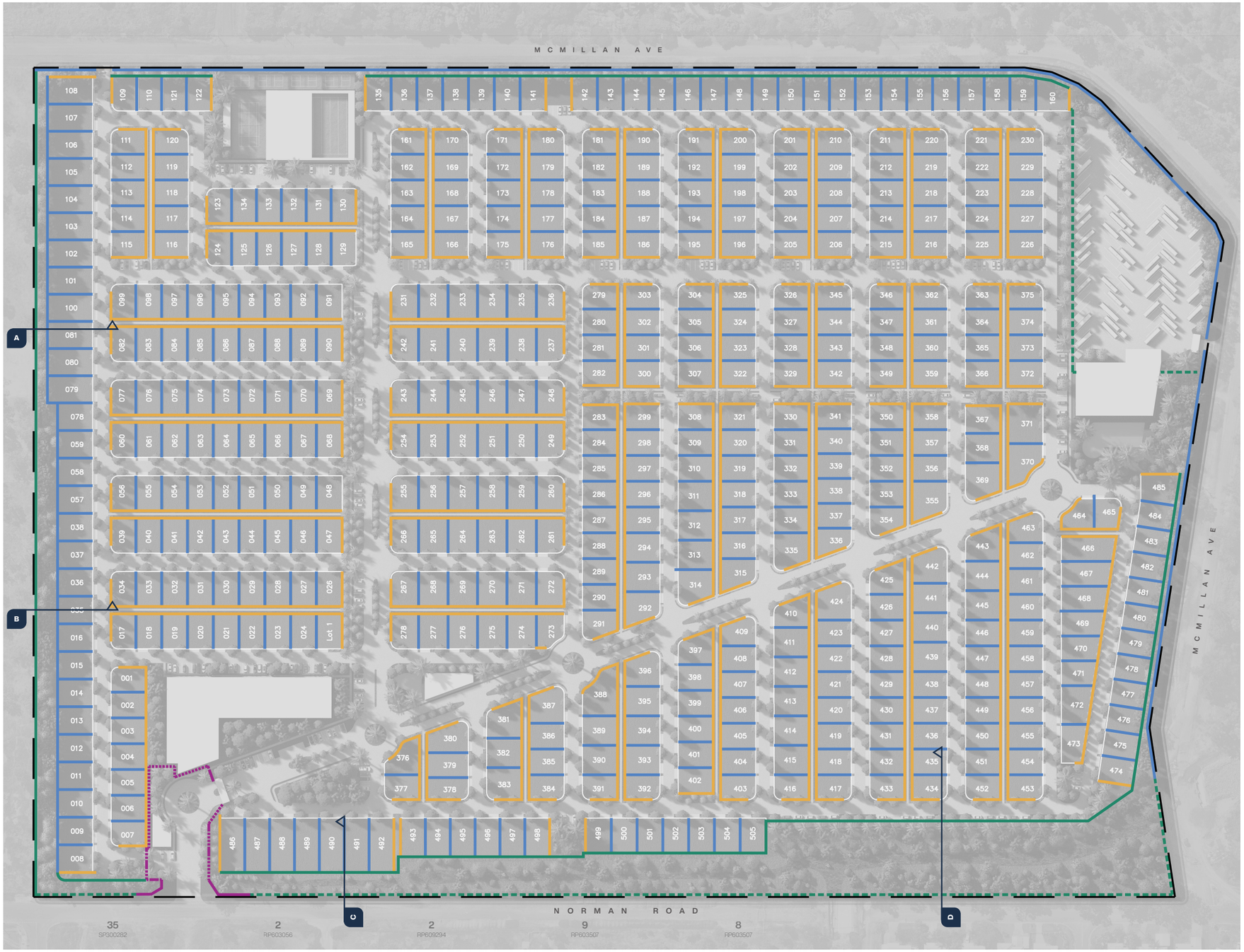
7 **Southern Boundary**
3.0m wide setback to southern perimeter. Planting to reflect General Planting (3) with screening hedges incorporated to fencelines. Street trees to council standards to McMillan Avenue if deemed required.

8 **Streetscape Upgrade**
Street trees to council standards to Norman Road and McMillan Avenue if deemed required.

Landscape Design
2.2 Landscape Design Treatment Plan

0m 20 40 60 80 100 200

N



Subject Site
930-960 Norman Road & 19 McMillan Avenue, Parkhurst

Fence Type A
Privacy screening fence (Slatted 50% solid). Horizontal slat fencing with 75mm aluminium blades with 10-15mm spacings to allow filtered views. Typical height 1800mm, this can be extended to 2100mm if required.

Fence Type B
Privacy screening fence (100% solid). Colourbond Trimdek, Timber Good-Neighbor / Lapped and Capped or approved equivalent to meet Australian Standard AS 1397, colour to match architectural finishes palette. This fence is typically used to provide privacy between residences or to the boundary of the development where screening is required. Typical height 1800mm, increased to 2100mm if deemed required. If fencing above typical heights are proposed this will be noted on the fencing plan contained within this design package. Refer Section 5.0 Fences & Walls.

Fence Type C
Aluminium spear top pool fence, colour to match architectural finishes palette. This fence is typically used to the perimeter of the development where views are to be promoted. This fence is also used extensively when associated with significant planting buffers when the use of solid fencing is not required including where lots interface with open space areas). Typical height 1200mm - 1800mm. Refer Section 5.0 Fences & Walls.

Development Entry & Norman Road Frontage
Indicative wall alignment illustrated, subject to detailed design phase. Fence arrangement to ensure gated access. Refer to JPD Architectural Package for additional detail.

Wall Type D
Indicative alignment of entry feature wall. Blockwork wall (render & painted). Potential to apply additional treatment eg stone cladding or feature cladding to reflect architectural finishes palette when part of entry statement or way-finding signage.

Wall Type D.1
Frontage Wall / Fence to Norman Road frontage.
Wall Type D with portions of Fence Type C (50% transparent fencing) incorporated. Wall Type D to be panels or act as pillars between spans of transparent fencing. Fence to be stepped back 600 - 1000mm to facilitate planting to front.

Entry Gates
Potential location of vehicular/ pedestrian entry gates.

Landscape Design

2.3 Landscape Plan Primary Walls & Fences

0m 20 40 60 80 100 200

N



Subject Site
930-960 Norman Road & 19 McMillan Avenue, Parkhurst

1. **Club House**
2. **RV Parking**
3. **Lifestyle Pavilion**
4. **Lawn Bowls**
5. **Tennis Court**
6. **Pickleball Court**
7. **RV Wash Bay**
8. **Streetscape Primary Boulevard**
   Estate entry central medians (primary medians 4.0m width). Primary medians to feature tall signature palm trees with copses of mid sized support palms (or shade trees eg Elaeocarpus, Waterhousia or Tristaniopsis species). Understorey plantings of formal layered shrub species and prostrate groundcovers with placement and maximum heights cognisant of maintaining vehicular sightlines where required. RAB of 12.0m diameter to feature large feature palm or shade tree. Understorey plantings of formal layered shrub species to centre and mass planted prostrate groundcovers to outer 3.0m cognisant of maintaining vehicular sightlines.
9. **Streetscape Plantings General**
   Primary streetscape landscape zone located to dwelling frontages (refer to **3.0 Dwelling Streetscape** for details.). Planting area to feature small to medium feature tree set within layered plantings. Street trees will the planted at an average spacing of 14m based on lot width (average of one tree per lot). Tree species planted at minimum 600mm to rear of internal road edge with root guards incorporated as required.
10. **General Planting**
    Layered planting scheme to general planting areas as illustrated this sheet. Planting area to feature small to medium feature trees set within layered plantings, hedge species incorporated to rear of planting beds (typically along fencelines). Mass planted ground cover species to front of planting beds. Groundcover plantings to average height 300-400mm. Accent species planted in copses to frame feature trees and palm species.
11. **4.0m Water Easement**
    Existing water main and assoc easement along northern boundary to be retained.
12. **6.0m - 12.0m Setbacks (Vegetated)**
    Vegetated Cut Off Drain to development perimeter varies from 6m to 12m in width (refer notations this plan). Planting incorporated to outer edges of concrete / rock low-flow. Planting to reflect General Planting (3) with screening hedges incorporated to fencelines. Central concrete channel drain provides informal maintenance access. Small-medium screening trees to be incorporated where offsets from retaining structures and civil infrastructure permits. Refer to Landscape Master Plan and Cross Sections for further detail.
13. **7.0m Setback (Non-Vegetated)**
    Rock-lined Cut Off Drain to development perimeter 3m wide (refer notations this plan). 4.0m wide existing water easement to balance 7m setback. Refer to **Cross Section A** for additional information.
14. **Existing Drainage Easement**
    Existing earth drainage channel within Easement AS P307472. Width ranges from 20m to 40m with existing connection to the west under Norman Street and to the south under McMillan Avenue to Limestone Creek. Along the fencelines (of residential lots and Norman Road frontage) a 'structured' landscape treatment will be implemented. This structured landscape treatment will gradually transition into a more informal riparian palette. Any existing vegetation to be retained and supplemented as required with suitable riparian species. Low groundcover planting to batters to facilitate filtered views across the corridor. Accent species such as Doryanthes, Crinum, and Dietes to the outer edge of the low-flow. The low-flow area will mimic a naturalistic watercourse with copses of Water Sensitive Urban Design (WSUD) species eg Melaleuca, Livistonia, and Casuarina. Sedges to be incorporated to watercourse outer-edge and to proposed stormwater outlets (scour protection also incorporated) to assist with erosion control and bank stability.
15. **Norman Rd Frontage**
    Fenceline to Norman Road frontage to tie into Primary Entry Road and associated Entry Statement. Refer to **2.4 Landscape Plan** Primary Walls & Fences for fencing type and alignment. A 'structured' landscape located to rear of Norman Rd frontage fence. This treatment will adhere to General Planting (3) guidelines, featuring screening hedges, small to medium-sized shade trees, and layered landscaping to base. This structured landscape treatment will gradually transition into a more informal riparian palette associated with the existing and proposed drainage channels.
16. **Southern Boundary**
    3.0m wide setback to southern perimeter. Planting to reflect General Planting (3) with screening hedges incorporated to fencelines. Street trees to council standards to McMillan Avenue if deemed required.

Landscape Design
2.4 Landscape Design Master Plan

0m 20 40 60 80 100 200

Living Gems*

3.0

Dwelling Design.

Dwelling Design

3.1 Dwelling Frontage & Streetscape

1 **Primary Landscape Zone**
Primary landscape zone located within the dwelling setback as typically illustrated. Planting area to feature small to medium feature tree set within layered plantings (refer Dwelling Frontage species schedule). Signature character species will be repeated within these to ensure a coherent design outcome is achieved. Tree species are assigned by street and in this way are independent to the dwelling planting schemes. This ensures that a strong coherent design character is achieved within the streetscape through the repetition of tree species. Street trees will the planted at an average spacing of 12.5-13.5m (dictated by lot width with an average of one tree provided per dwelling lot where services locations, dwelling offsets and adherence to vehicular and pedestrian sight lines permit). Refer to planting palettes for street tree species types. **Refer to Section 6.0 Planting Palettes** for street tree species types.

2 **Secondary Landscape Zone**
Secondary landscape zone located within the dwelling setback as typically illustrated. The landscaped areas are located between access pathways and driveways and range in width from 500mm to 1000mm depending on lot frontages and context within the development. Planting will consist primarily of groundcovers with accent species incorporated where space permits. Species to reflect those used in the associated Primary Landscape Zone.

3 **Secondary Frontage Planting Zone**
Secondary frontage landscape zone located within the dwelling setback as typically illustrated. The secondary frontages provide significant areas for planting. Secondary frontages are typically 2000mm in width. The use of Fence Type A (semitransparent horizontal slat) allows for filtered views and assists in preventing a solid facade presenting to the streetscape. Planting here will feature the developments signature species (refer species schedules) including dense shrub or hedge species to the rear with layered groundcover species to the front. Accent species to be planted in copses between formal platings of small tree species as typically illustrated.

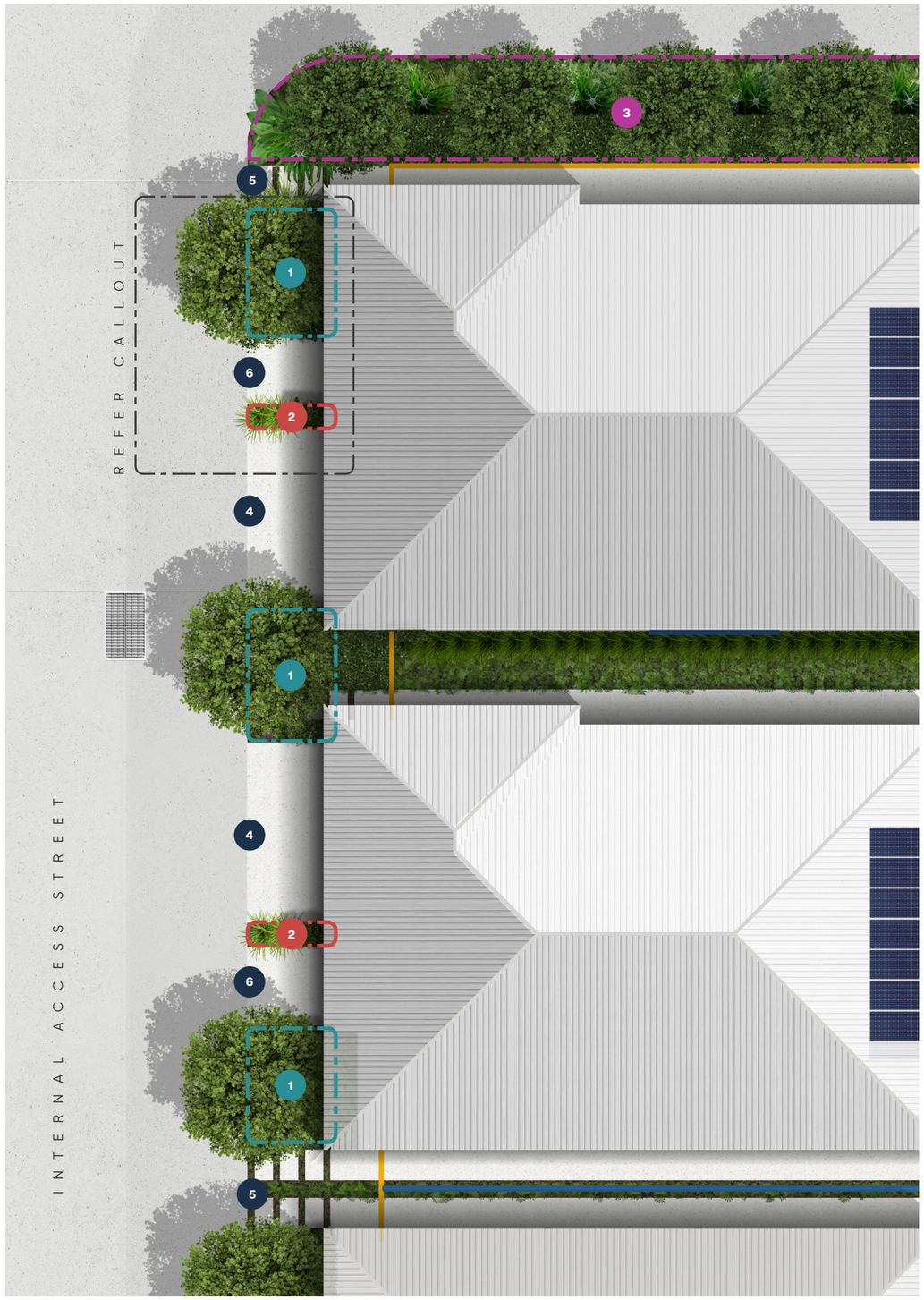
4 **Driveway Crossover**
Contrasting finish to driveways to compliment architectural finishes palette. Indicative colour and finish illustrated pending detailed design phase.

5 **Gate**
Side access to rear dwelling courtyard area.

6 **Dwelling Access**
Pathway to primary dwelling access.

Privacy Screening Fence (Slatted)
Privacy screening fence. Horizontal slat fencing with 75mm aluminium blades with 10-15mm spacings to allow filtered views. Typical span is 2400mm. Powder coated aluminium to colour to match architectural finishes palette. Stratco EzySlat Fencing or approved equivalent. This fence is typically used to the secondary frontage of corner lots to provide privacy to the residence without the use of solid fencing. Typical height 1800mm, this can be extended to 2100mm if required. If fencing above typical heights are proposed this will be noted on the fencing plan contained within this design package.

Privacy Screening Fence (Solid)
Privacy screening fence (100% solid). Colourbond Trimdek or approved equivalent to meet Australian Standard AS 1397. Colour to match architectural finishes palette. This fence is typically used to provide privacy between residences or to the boundary of the development where significant screening is required. Typical height 1800mm.



Dwelling Design

3.2 Dwelling Frontage & Streetscape Layering

1 **Primary Landscape Zone**
Primary landscape zone located within the dwelling setback as typically illustrated. Planting area to feature small to medium feature tree set within layered plantings (refer Dwelling Frontage species schedule). Signature character species will be repeated within these to ensure a coherent design outcome is achieved.

2 **Secondary Landscape Zone**
Secondary landscape zone located within the dwelling setback as typically illustrated. The landscaped areas are located between access pathways and driveways and range in width from 500mm to 1000mm depending on lot frontages and context within the development. Planting will consist primarily of groundcovers with accent species incorporated where space permits. Species to reflect those used in the associated Primary Landscape Zone.

A **Shrub / Hedge Layer**
Shrub species planted to rear of garden beds as illustrated. Refer to planting palettes for shrub species.
Spacings: Average of 750mm centres.

**Avoid variants that are psilid-prone or have significant red-coloured new growth.*

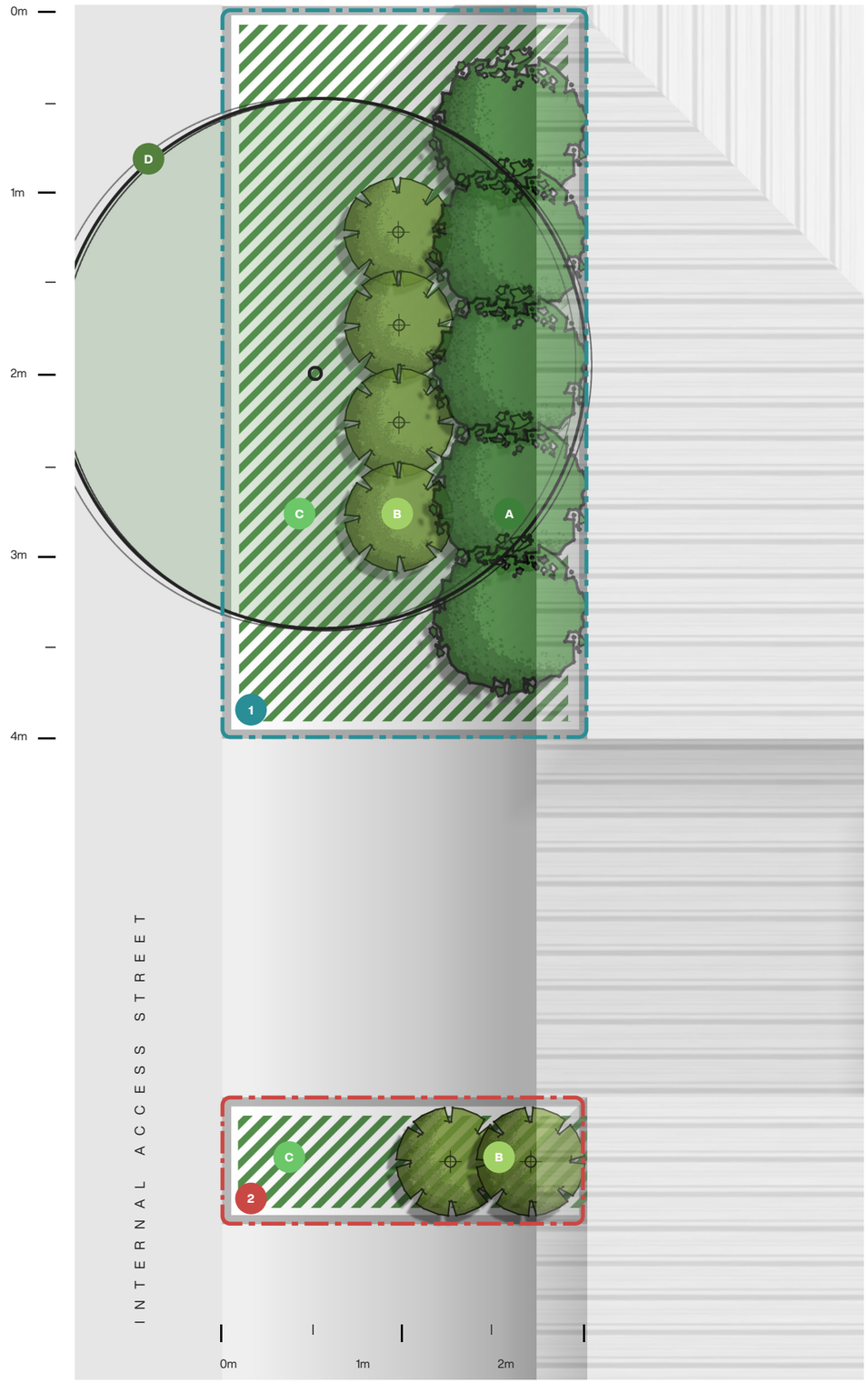
B **Accents**
Accent species planted as illustrated. Generally planted in groups of 3-4 centered to base of tree.
Spacings: 500-600mm centres.

└ Large planting beds only (dwelling secondary frontages, link parks and large general planting beds)

C **Ground Cover**
Ground cover species to average height 300-400mm planted in pattern as illustrated.
Spacings: 200-300mm centres.

D **Tree Species**
Tree species planted 600mm to rear of internal road edge with root guards incorporated as required. Tree species are assigned by street and in this way are independent to the dwelling planting schemes. This ensures that a strong coherent design character is achieved within the streetscape through the repetition of tree species. Street trees will the planted at an average spacing of 12.5-13.5m (dictated by lot width with an average of one tree provided per dwelling lot where services locations, dwelling offsets and adherence to vehicular and pedestrian sight lines permit). Refer to planting palettes for street tree species types. **Refer to Section 6.0 Planting Palettes** for street tree species types.

Important Note
The illustrations within this landscape concept package are representations of general layout and landscape treatments. Planting palette to take precedent over the rendered dwelling and streetscape treatments.



Dwelling Design

3.3 Dwelling Frontage & Streetscape Setout 01



1

Primary Landscape Zone

Primary landscape zone located within the dwelling setback as typically illustrated. Planting area to feature small to medium feature tree set within layered plantings (refer Dwelling Frontage species schedule). There are **four planting schemes** proposed ensure a range of treatments are incorporated. Signature character species will be repeated within these to ensure a coherent design outcome is achieved.

2

Secondary Landscape Zone

Secondary landscape zone located within the dwelling setback as typically illustrated. The landscaped areas are located between access pathways and driveways and range in width from 500mm to 1000mm depending on lot frontages and context within the development. Planting will consist primarily of groundcovers with accent species incorporated where space permits. Species to reflect those used in the associated Primary Landscape Zone.

A

Shrub / Hedge Layer

Shrub species planted to rear of garden beds as illustrated.
Refer to planting palettes for shrub species options.
Spacings: Average of 750mm centres.

Illustrated: Syzygium Species*(Maximum height 1-1.5m)

B

Accents (Optional - dependent on planting scheme type)

Accent species planted as illustrated. Generally planted in groups of 3-4 centered to base of tree.
Refer to planting palettes for accent species options. Note: Illustrated in Plan - nil illustrated in 3D visualisation.
Spacings: 500-600mm centres.

Illustrated: Philodendron Rojo Congo

C

Ground Cover

Ground cover species to average height 300-400mm planted in pattern as illustrated.
Refer to planting palettes for groundcover species options.
Spacings: 200-300mm centres.

Illustrated: Myoporum elipticum

D

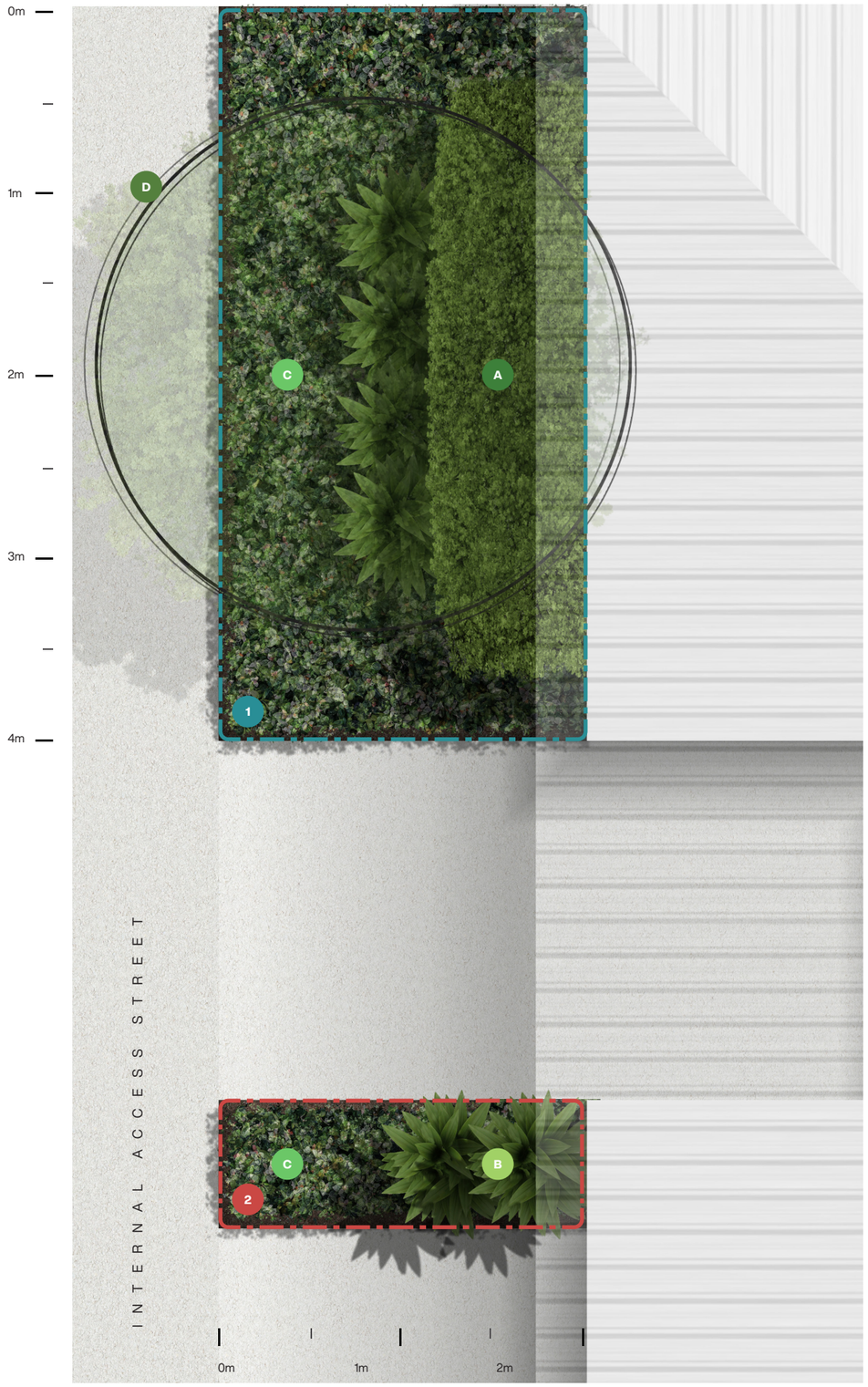
Tree Species

Tree species planted 600mm to rear of internal road edge with root guards incorporated as required. Tree species are assigned by street and in this way are independent to the dwelling planting schemes. This ensures that a strong coherent design character is achieved within the streetscape through the repetition of tree species. Street trees will the planted at an average spacing of 12.5-13.5m (dictated by lot width with an average of one tree provided per dwelling lot where services locations, dwelling offsets and adherence to vehicular and pedestrian sight lines permit). Refer to planting palettes for street tree species types. **Refer to Section 6.0 Planting Palettes** for street tree species types.

Refer to planting palettes for tree species options.

Illustrated: Tristaniopsis laurina 'Luscious'

Important Note
The illustrations within this landscape concept package are representations of general layout and landscape treatments. Planting palette to take precedent over the rendered dwelling and streetscape treatments.



Dwelling Design

3.4 Dwelling Frontage & Streetscape Setout 02

1

Primary Landscape Zone

Primary landscape zone located within the dwelling setback as typically illustrated. Planting area to feature small to medium feature tree set within layered plantings (refer Dwelling Frontage species schedule). There are four planting schemes proposed ensure a range of treatments are incorporated. Signature character species will be repeated within these to ensure a coherent design outcome is achieved.

2

Secondary Landscape Zone

Secondary landscape zone located within the dwelling setback as typically illustrated. The landscaped areas are located between access pathways and driveways and range in width from 500mm to 1000mm depending on lot frontages and context within the development. Planting will consist primarily of groundcovers with accent species incorporated where space permits. Species to reflect those used in the associated Primary Landscape Zone.

A

Shrub / Hedge Layer

Shrub species planted to rear of garden beds as illustrated.
Refer to planting palettes for shrub species options.
Spacings: Average of 750mm centres.

Illustrated: Syzygium Species*(Maximum height 1-1.5m)

B

Accents (Optional - dependent on planting scheme type)

Accent species planted as illustrated. Generally planted in groups of 3-4 centered to base of tree.
Refer to planting palettes for accent species options.
Spacings: 500-600mm centres.

Illustrated: Philodendron Rojo Conjo

C

Ground Cover

Ground cover species to average height 300-400mm planted in pattern as illustrated.
Refer to planting palettes for groundcover species options.
Spacings: 200-300mm centres.

Illustrated: Trachelospermum jasminoides 'Tricolor'

D

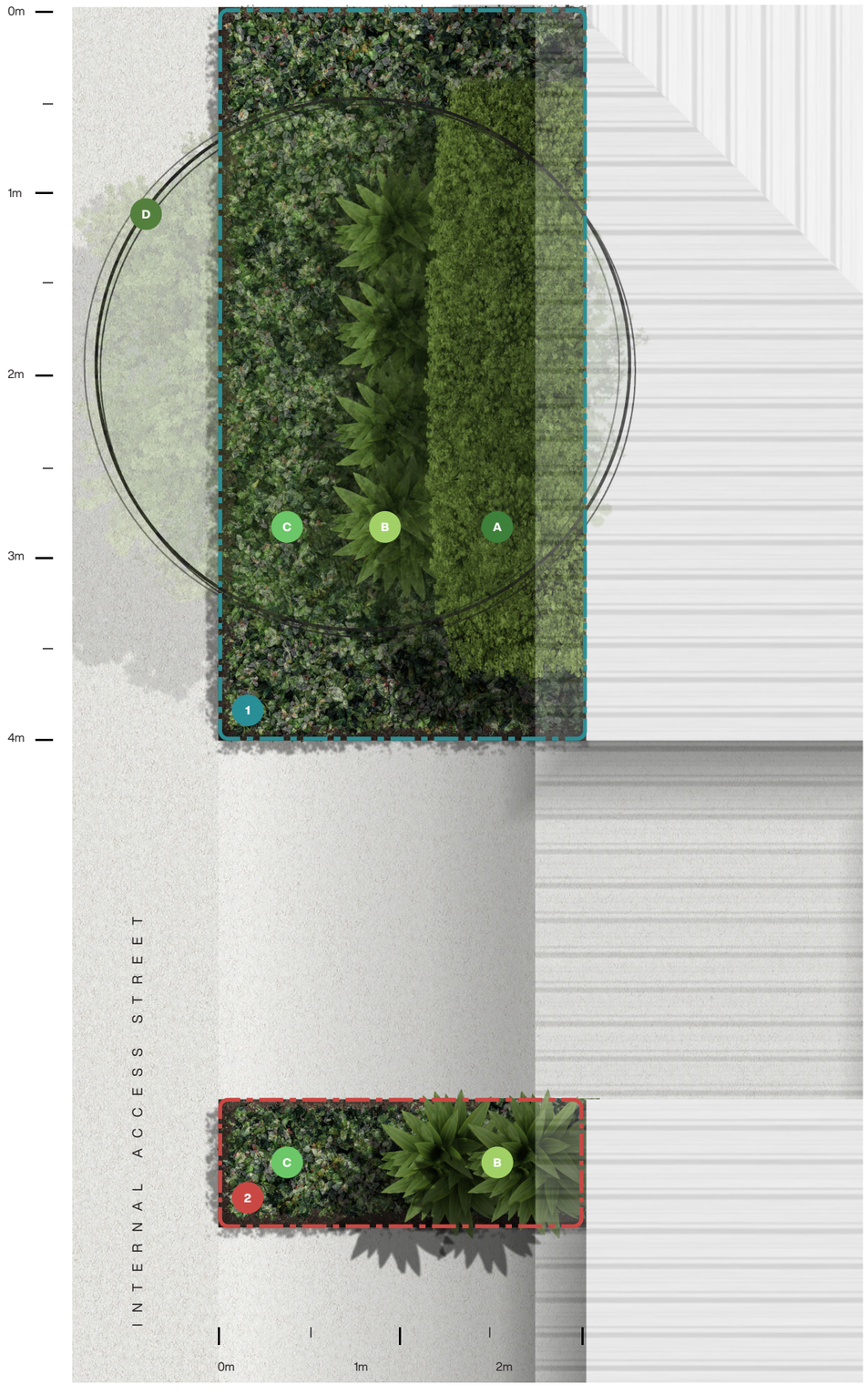
Tree Species

Tree species planted 600mm to rear of internal road edge with root guards incorporated as required. Tree species are assigned by street and in this way are independent to the dwelling planting schemes. This ensures that a strong coherent design character is achieved within the streetscape through the repetition of tree species. Street trees will the planted at an average spacing of 12.5-13.5m (dictated by lot width with an average of one tree provided per dwelling lot where services locations, dwelling offsets and adherence to vehicular and pedestrian sight lines permit). Refer to planting palettes for street tree species types. **Refer to Section 6.0 Planting Palettes** for street tree species types.

Refer to planting palettes for tree species options.

Illustrated: Tristaniopsis laurina 'Luscious'

Important Note
The illustrations within this landscape concept package are representations of general layout and landscape treatments. Planting palette to take precedent over the rendered dwelling and streetscape treatments.



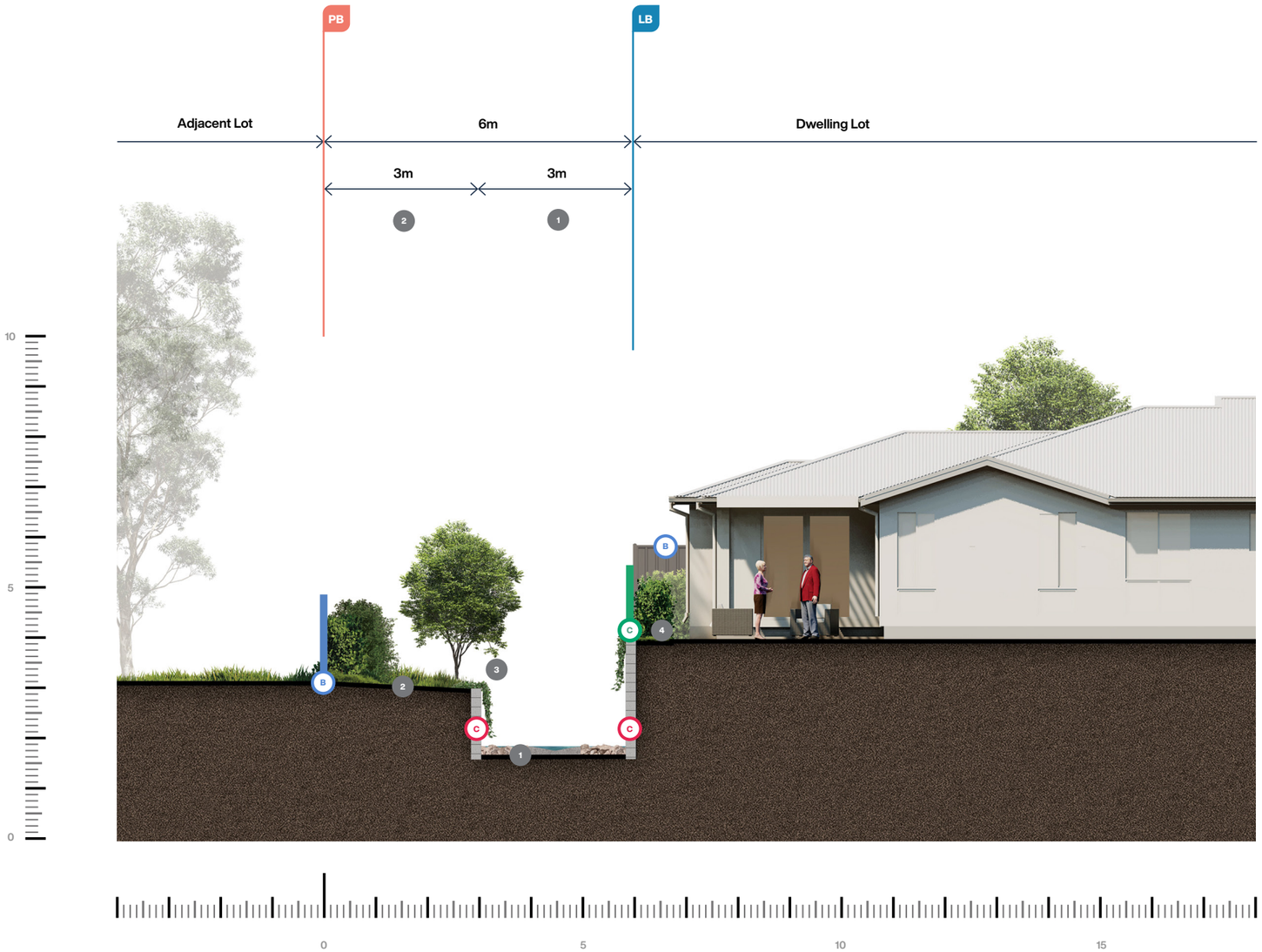
Living Gems*

4.0

Sections & Elevations.

Norman Road

Site Sections Typical Section A



PB **Property Boundary**
930-960 Norman Road & 19 McMillan Avenue, Parkhurst

LB **Lot Boundary**
Dwelling Lot Boundary.

C **Wall Type C (Typical)**
Core filled block work retaining wall or equivalent. Retaining wall type and heights vary, refer to Engineering plans for further details.

B **Fence Type B**
Privacy screening fence (100% solid). Colourbond Trimdek, Timber Good-Neighbor / Lapped and Capped or approved equivalent to meet Australian Standard AS 1397, colour to match architectural finishes palette. This fence is typically used to provide **privacy between residences** or to the **boundary of the development** when interfacing with residential landuses / where screening is required. Typical height 1800mm, increased to 2100mm if deemed required. If fencing above typical heights are proposed this will be noted on the fencing plan contained within this design package. Refer Section 5.0 Fences & Walls.

C **Fence Type C**
Aluminium spear top pool fence, colour to match architectural finishes palette. This fence is typically used to the perimeter of the development where views are to be promoted. This fence is also used extensively when associated with significant planting buffers when the use of solid fencing is not required including where lots interface with open space areas). Typical height 1200mm - 1800mm. Refer Section 5.0 Fences & Walls.

1 **3.0m Cutoff Drain (Non-Vegetated)**
3m wide rock-lined cutoff drain with concrete low-flow to development perimeter. Refer to Engineering Plans for specifications of all storm water infrastructure.

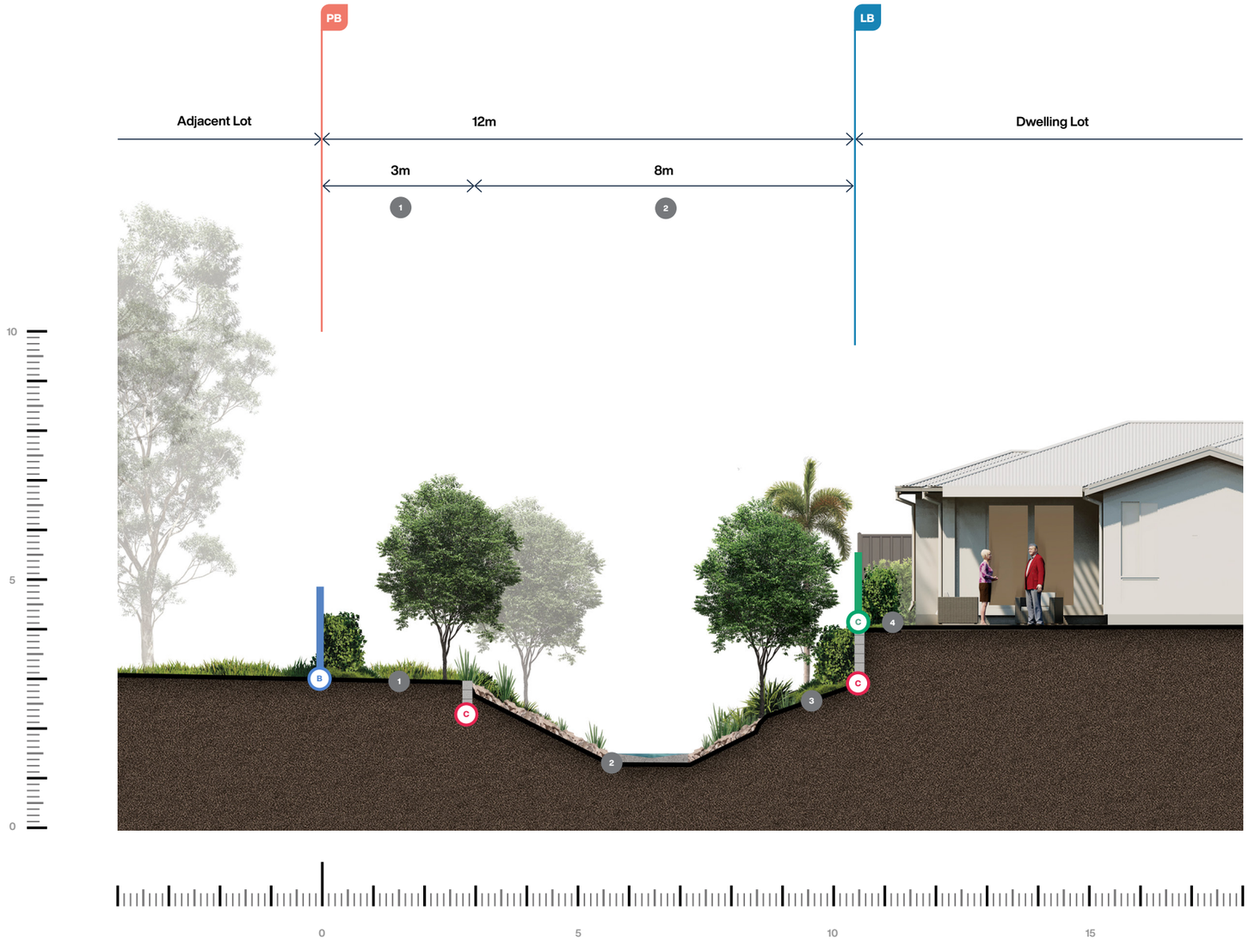
2 **3.0m Water Easement**
Existing water main and assoc easement along northern boundary to be retained. Potential to incorporate softening landscape treatment where offsets from civil infrastructure permit. Planting to reflect General Planting Character with screening hedges incorporated to fencelines. Low groundcover species to base to facilitate maintenance access. Small-medium screening trees to be incorporated where offsets from retaining structures and civil infrastructure permits (root guards incorporated where required).

3 **Scrambling Species**
Potential to incorporate scrambling species incorporated to soften retaining walls.

4 **Private Dwelling Landscape**
Indicative landscape treatment within private dwelling open space illustrated.

Norman Road

Site Sections Typical Section B



PB **Property Boundary**
930-960 Norman Road & 19 McMillan Avenue, Parkhurst

LB **Lot Boundary**
Dwelling Lot Boundary.

C **Wall Type C (Typical)**
Core filled block work retaining wall or equivalent. Retaining wall type and heights vary, refer to Engineering plans for further details.

B **Fence Type B**
Privacy screening fence (100% solid). Colourbond Trimdek, Timber Good-Neighbor / Lapped and Capped or approved equivalent to meet Australian Standard AS 1397, colour to match architectural finishes palette. This fence is typically used to provide **privacy between residences** or to the **boundary of the development** when interfacing with residential landuses / where screening is required. Typical height 1800mm, increased to 2100mm if deemed required. If fencing above typical heights are proposed this will be noted on the fencing plan contained within this design package. Refer Section 5.0 Fences & Walls.

C **Fence Type C**
Aluminium spear top pool fence, colour to match architectural finishes palette. This fence is typically used to the perimeter of the development where views are to be promoted. This fence is also used extensively when associated with significant planting buffers when the use of solid fencing is not required including where lots interface with open space areas). Typical height 1200mm - 1800mm. Refer Section 5.0 Fences & Walls.

1 **3.0m Water Easement**
Existing water main and assoc easement along northern boundary to be retained. Potential to incorporate softening landscape treatment where offsets from civil infrastructure permit. Planting to reflect General Planting Character with screening hedges incorporated to fencelines. Low groundcover species to base to facilitate maintenance access. Small-medium screening trees to be incorporated where offsets from retaining structures and civil infrastructure permits (root guards incorporated where required).

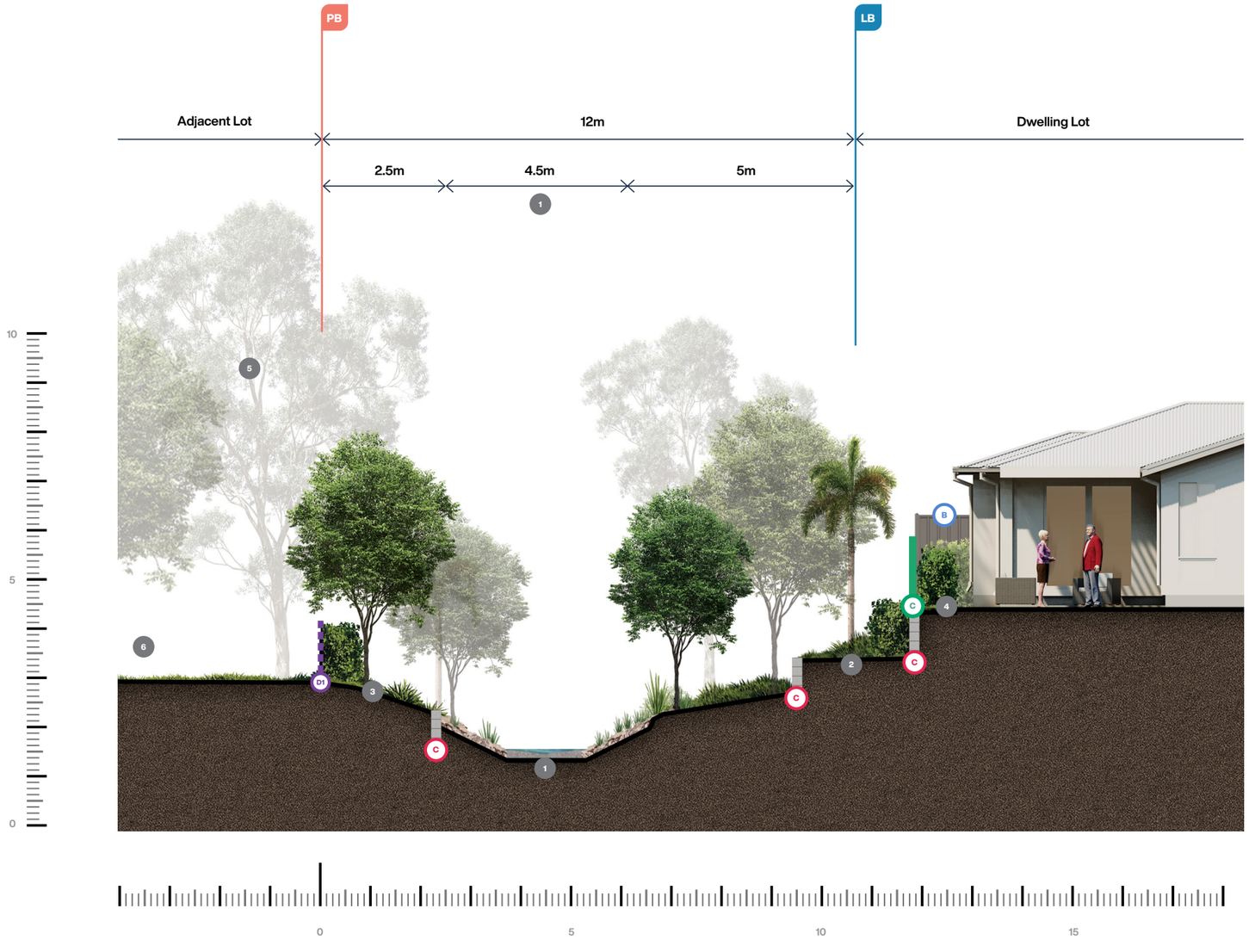
2 **Cutoff Drain (Vegetated)**
Vegetated Cut Off Drain to development perimeter. Planting incorporated to outer edges of concrete / rock low-flow. Planting to reflect General Planting Character with screening hedges incorporated to fencelines. Central concrete channel drain provides informal maintenance access. Small-medium screening trees to be incorporated where offsets from retaining structures and civil infrastructure permits.

3 **Batter Planting**
Planting to Retaining Wall to reflect General Planting Character and include screening hedges, small to medium-sized shade trees, and layered landscaping to base. This structured landscape treatment will gradually transition into a more informal riparian palette associated with the existing and proposed drainage channels. Low groundcover planting to batters to facilitate filtered views across the corridor. Accent species such as Doryanthes, Crinum, and Dietes to the outer edge of the low-flow.

4 **Private Dwelling Landscape**
Indicative landscape treatment within private dwelling open space illustrated.

Norman Road

Site Sections Typical Section C



PB **Property Boundary**
930-960 Norman Road & 19 McMillan Avenue, Parkhurst

LB **Lot Boundary**
Dwelling Lot Boundary.

C **Wall Type C (Typical)**
Core filled block work retaining wall or equivalent. Retaining wall type and heights vary, refer to Engineering plans for further details.

D1 **Wall Type D.1**
Frontage Wall / Fence to Norman Road frontage.
Wall Type D with portions of Fence Type C (50% transparent fencing) incorporated. Wall Type D to be panels or act as pillars between spans of transparent fencing. Refer Section 5.0 Fences & Walls.

B **Fence Type B**
Privacy screening fence (100% solid). Colourbond Trimdek, Timber Good-Neighbor / Lapped and Capped or approved equivalent to meet Australian Standard AS 1397, colour to match architectural finishes palette. This fence is typically used to provide **privacy between residences** or to the **boundary of the development** when interfacing with residential landuses / where screening is required. Typical height 1800mm, increased to 2100mm if deemed required. If fencing above typical heights are proposed this will be noted on the fencing plan contained within this design package. Refer Section 5.0 Fences & Walls.

C **Fence Type C**
Aluminium spear top pool fence, colour to match architectural finishes palette. This fence is typically used to the perimeter of the development where views are to be promoted. This fence is also used extensively when associated with significant planting buffers when the use of solid fencing is not required including where lots interface with open space areas). Typical height 1200mm - 1800mm. Refer Section 5.0 Fences & Walls.

1 **Cutoff Drain (Vegetated)**
Vegetated Cut Off Drain to development perimeter. Planting incorporated to outer edges of concrete / rock low-flow. Planting to reflect General Planting Character with screening hedges incorporated to fencelines. Central concrete channel drain provides informal maintenance access. Small-medium screening trees to be incorporated where offsets from retaining structures and civil infrastructure permits.

2 **Batter Planting**
Planting to Retaining Wall to reflect General Planting Character and include screening hedges, small to medium-sized shade trees, and layered landscaping to base. This structured landscape treatment will gradually transition into a more informal riparian palette associated with the existing and proposed drainage channels. Low groundcover planting to batters to facilitate filtered views across the corridor. Accent species such as Doryanthes, Crinum, and Dietes to the outer edge of the low-flow.

3 **Norman Rd Frontage**
Fenceline to Norman Road frontage to tie into Primary Entry Road and associated Entry Statement. Refer to **2.4 Landscape Plan** Primary Walls & Fences for fencing type and alignment. A 'structured' landscape located to rear of Norman Rd frontage fence. This treatment will adhere to General Planting (3) guidelines, featuring screening hedges, small to medium-sized shade trees, and layered landscaping to base. This structured landscape treatment will gradually transition into a more informal riparian palette associated with the existing and proposed drainage channels.

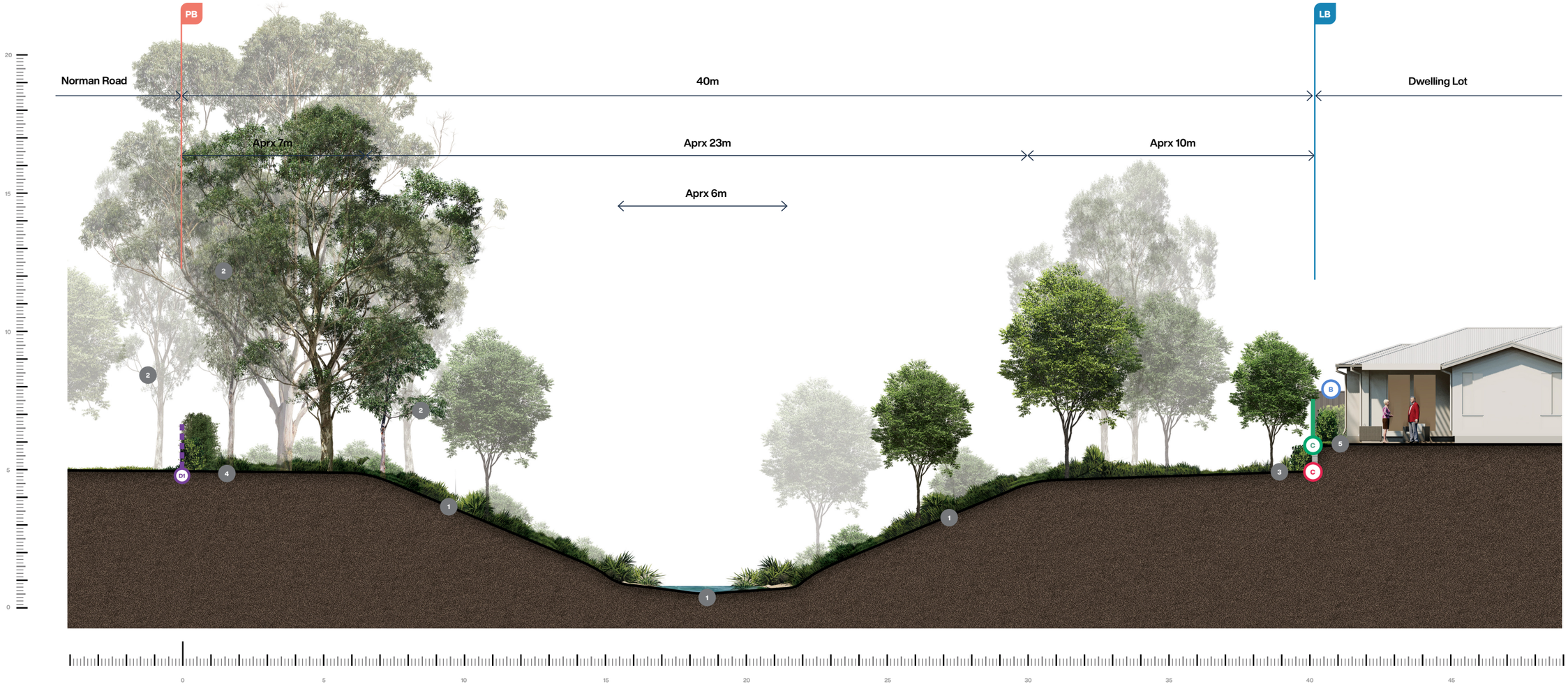
4 **Private Dwelling Landscape**
Indicative landscape treatment within private dwelling open space illustrated.

5 **Existing vegetation**
Existing vegetation located with road reserve and within Easement AS P307472 (Existing Drainage Easement) to be retained.

6 **Streetscape Upgrade**
Street trees to council standards to Norman Road if deemed required.

Norman Road

Site Sections Typical Section D



Wall Type C (Typical)
Core filled block work retaining wall or equivalent. Refer to Engineering plans for further details.

Wall Type D.1
Frontage Wall / Fence to Norman Road frontage.
Wall Type D with portions of Fence Type C (50% transparent fencing) incorporated. Wall Type D to be panels or act as pillars between spans of transparent fencing. Refer Section 5.0 Fences & Walls.

Fence Type B
Privacy screening fence (100% solid). Colourbond Trimdek, Timber Good-Neighbor / Lapped and Capped or approved equivalent to meet Australian Standard AS 1397, colour to match architectural finishes palette. This fence is typically used to provide **privacy between residences** where screening is required. Typical height 1800mm.

Fence Type C
Aluminium spear top pool fence, colour to match architectural finishes palette. This fence is typically used to the perimeter of the development where views are to be promoted. This fence is also used extensively when associated with significant planting buffers when the use of solid fencing is not required including where lots interface with open space areas). Typical height 1200mm - 1800mm. Refer Section 5.0 Fences & Walls.

1 **Existing Drainage Easement**
Existing earth drainage channel within Easement AS P307472. Width ranges from 20m to 40m with existing connection to the west under Norman Street and to the south under McMillan Avenue to Limestone Creek. Along the fencelines (of residential lots and Norman Road frontage) a 'structured' landscape treatment will be implemented. This treatment will adhere to General Planting (3) guidelines, featuring screening hedges, small to medium-sized shade trees, and layered landscaping to base. This structured landscape treatment will gradually transition into a more informal riparian palette. Any existing vegetation to be retained and supplemented as required with suitable riparian species. Low groundcover planting to batters to facilitate filtered views across the corridor. Accent species such as Doryanthes, Crinum, and Dietes to the outer edge of the low-flow. The low-flow area will mimic a naturalistic watercourse with copses of Water Sensitive Urban Design (WSUD) species eg Melaleuca, Livistonia, and Casuarina. Sedges to be incorporated to watercourse outer-edge and to proposed stormwater outlets (scour protection also incorporated) to assist with erosion control and bank stability. Refer to Engineering Plans for specifications of all storm water infrastructure. **2.4 Landscape Plan** Civil Overlay & Stormwater. Refer to Engineering Plans for specifications of all storm water infrastructure.

2 **Existing vegetation**
Existing vegetation located with road reserve and within Easement AS P307472 (Existing Drainage Easement) to be retained. Street trees to council standards to Norman Road if deemed required.

3 **Batter Planting**
Planting to Retaining Wall to reflect General Planting Character and include screening hedges, small to medium-sized shade trees, and layered landscaping to base. This structured landscape treatment will gradually transition into a more informal riparian palette associated with the existing and proposed drainage channels. Low groundcover planting to batters to facilitate filtered views across the corridor. Accent species such as Doryanthes, Crinum, and Dietes to the outer edge of the low-flow.

4 **Norman Rd Frontage**
Fenceline to Norman Road frontage to tie into Primary Entry Road and associated Entry Statement. Refer to **2.4 Landscape Plan** Primary Walls & Fences for fencing type and alignment. A 'structured' landscape located to rear of Norman Rd frontage fence. This treatment will adhere to General Planting (3) guidelines, featuring screening hedges, small to medium-sized shade trees, and layered landscaping to base. This structured landscape treatment will gradually transition into a more informal riparian palette associated with the existing and proposed drainage channels.

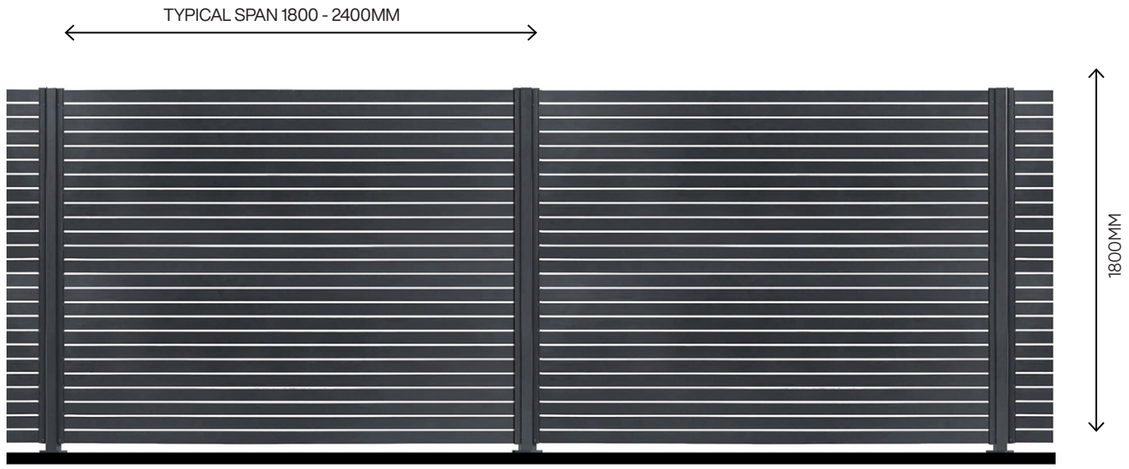
5 **Private Dwelling Landscape**
Indicative landscape treatment within private dwelling open space illustrated.

Living Gems*

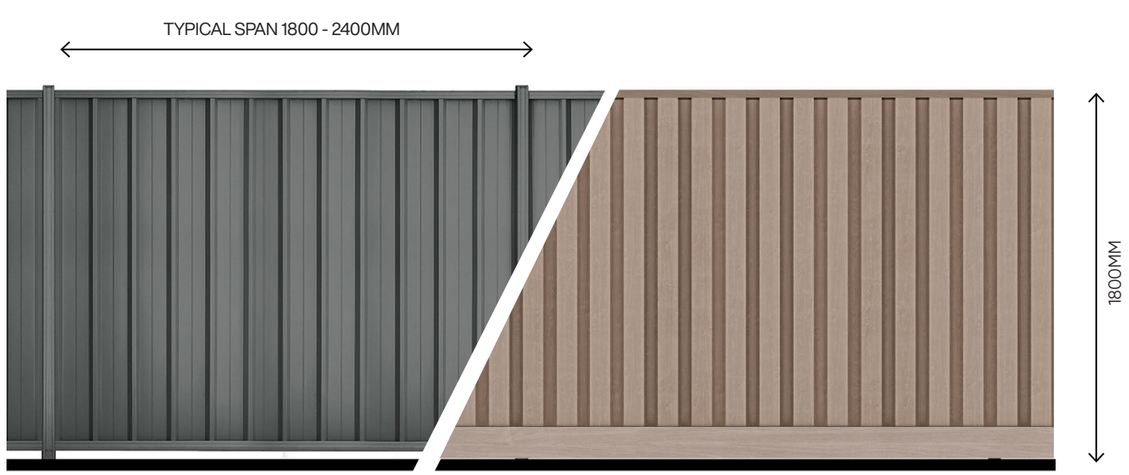
5.0

Fences & Walls.

Important Note This section contains a number of **Living Gems Typical Fence & Wall Types** not all types contained herein are necessarily proposed within this development. Further detail on fencing and retaining wall locations will be provided in detailed design phase.



Fence Type A: Typical Elevation



Fence Type B: Typical Elevation

Important Note This section contains a number of **Living Gems Typical Fence & Wall Types** not all types contained herein are necessarily proposed within this development. Further detail on fencing and retaining wall locations will be provided in detailed design phase.

A Fence Type A

Privacy screening fence. Horizontal slat fencing with 75mm aluminium blades with 10-15mm spacings to allow filtered views. Typical span is 2400mm. Powder coated aluminium to colour to match architectural finishes palette. Stratco EzySlat Fencing or approved equivalent. This fence is typically used to the secondary frontage of corner lots to provide privacy to the residence without the use of solid fencing. Typical height 1800mm, this can be extended to 2100mm if required. If fencing above typical heights are proposed this will be noted on the fencing plan contained within this design package.

Landscaping to feature layered plantings to provide softening to fence line. Landscape form as per typical elevations this sheet. Refer to fence line planting modules and schedules for species listings. Refer **Section 2.3 - Fencing Locations** and **Section 4.0 - Site Sections** for further information regarding layout and location of fence types and associated landscape treatments.

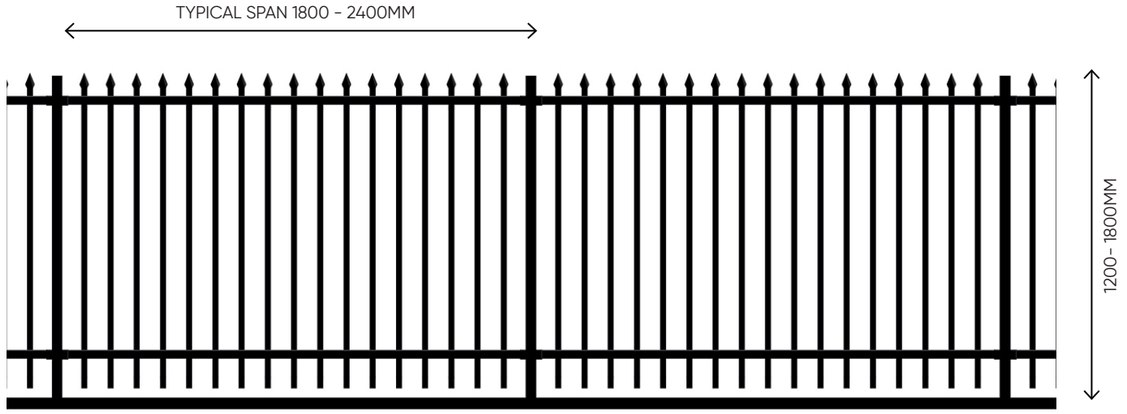


B Fence Type B

Privacy screening fence (100% solid). Colourbond Trimdek, Timber Good-Neighbor / Lapped and Capped or approved equivalent to meet Australian Standard AS 1397. Exterior grade lead-free paint (compliant with Australian Standard AS 2728) colour to match architectural finishes palette. Typical finishes illustrated below. This fence is typically used to provide privacy between residences or to the boundary of the development where significant screening is required. Typical height 1800mm, increased to 2100mm if deemed required. Posts 0.8mm min high tensile steel with fencing panels to min 0.35mm high tensile steel.

Landscaping to feature layered plantings to provide softening to fenceline. Landscape form as per typical elevations this sheet. Refer to fenceline planting modules and schedules for species listings. Refer to **Section 4.0 Site Sections** for additional information regarding wall alignments and associated landscape treatments.





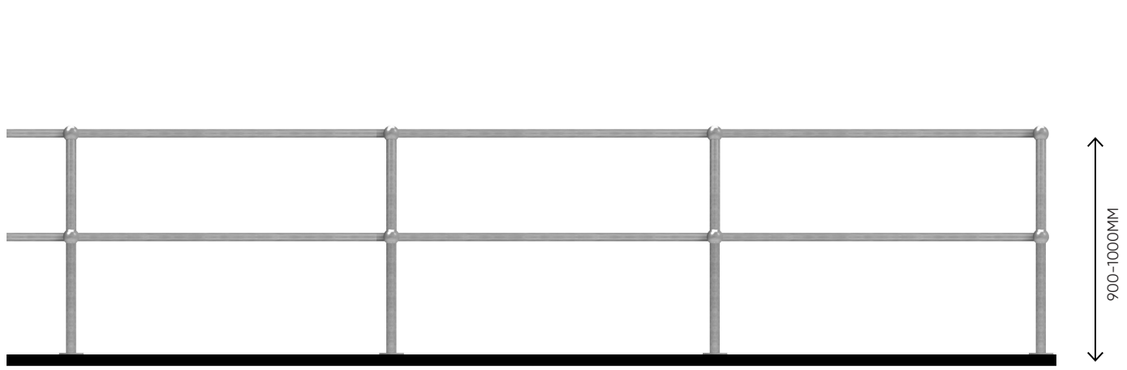
Fence Type C: Typical Elevation

C Fence Type C

Aluminium spear top pool fence. Typical span is 2400mm. Powder coated aluminium to colour to match architectural finishes palette. Typical finishes illustrated below. This fence is typically used to the perimeter of the development where views are to be promoted. This fence is also used extensively when associated with significant planting buffers when the use of solid fencing is not required. Typical height 1200mm - 1800mm. If fencing above typical heights are proposed this will be noted on the fencing plan contained within this design package.

Landscaping to feature layered plantings to provide softening to fence line. Landscape form as per typical elevations this sheet. Refer to fence line planting modules and schedules for species listings. Refer to **Section 4.0 Site Sections** for additional information regarding wall alignments and associated landscape treatments.

Refer to **Section 2.3 - Fencing Locations** for proposed location and alignment of Fence Type C.



Fence Type D: Typical Elevation

D Fence Type D

Safety Rail: Handrail/ Guardrail to a minimum height of 900mm. Where fall from height is significant it is recommended to increase the height of the guardrail to at least 1000mm.

The maximum distance between the base and the bottom of the intermediate rail is 560mm to comply with AS 1657, as a toeboard or kickplate is not necessary within this context.

Handrails proposed to provide edge protection at the edge of fall zones where required for maintenance staffs safety. Landscaping to feature layered plantings to provide softening to safety rail and associated retaining wall structure if / as incorporated.

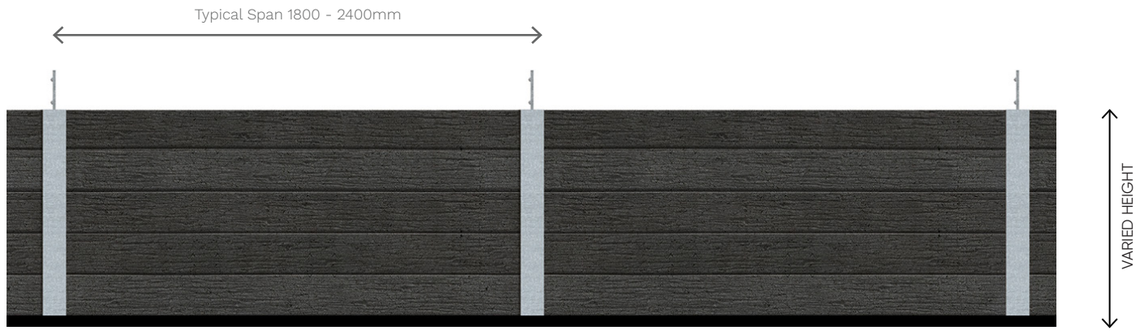
Refer to **Section 4.0 Site Sections** for additional information regarding wall alignments and associated landscape treatments.



Important Note This section contains a number of **Living Gems Typical Fence & Wall Types** not all types contained herein are necessarily proposed within this development. Further detail on fencing and retaining wall locations will be provided in detailed design phase.

Fences & Walls

5.2 Fence & Wall Types



Wall Type A: Typical Elevation



Wall Type B: Typical Elevation

Important Note This section contains a number of **Living Gems Typical Fence & Wall Types** not all types contained herein are necessarily proposed within this development. Further detail on fencing and retaining wall locations will be provided in detailed design phase.

Wall Type A

Concrete sleeper walls. Standard sleeper is 1800mm (200mm x 75mm) up to 2400mm where required (200mm x 120mm) weighing approximately 125kgs. The sleepers are steel reinforced and manufactured to engineer standards. Galvanised steel H posts with integrated fence brackets as illustrated to allow for fence mounting direct to retaining structure. Finish: charcoal coloured oxide illustrated.

Landscaping to feature layered plantings to provide softening to retaining structure and associated fenceline if this is incorporated.

Refer to **Section 4.0 Site Sections** for additional information regarding wall alignments and associated landscape treatments.







Wall Type B

Core filled block work retaining wall: Typical block dimensions 390 x 190 x 190mm. Wall to be laid in stretcher bond format and located only in areas where internal and external views to not allow views of the retaining wall.

Refer to **Section 4.0 Sections & Elevations** for additional information regarding wall alignments and associated landscape treatments.

Finish: Rendered & Painted to match architectural finishes palette.

Block work walls to engineers details.







Fences & Walls

5.3 Fence & Wall Types



Wall Type C & C1: Typical Elevation

Wall Type C

Core filled block work retaining wall: Typical block dimensions 390 x 190 x 190mm. Wall to be laid in stretcher bond format and located only in areas where internal and external views to not allow views of the retaining wall.

*Retaining and / or non retaining function. This wall may also feature at entry points or to development frontages. Potential stone cladding incorporated when part of entry statement or way-finding signage.

Refer to **Section 4.0 Sections & Elevations** for additional information regarding wall alignments and associated landscape treatments.

Finish: Rendered & Painted to match architectural finishes palette.

Block work walls to engineers details.

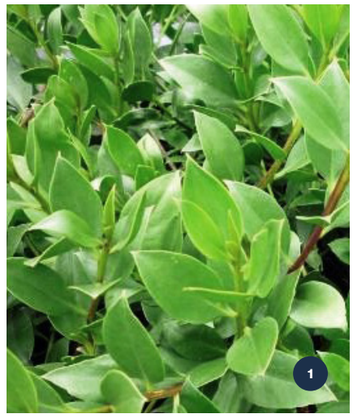
Wall Type C1

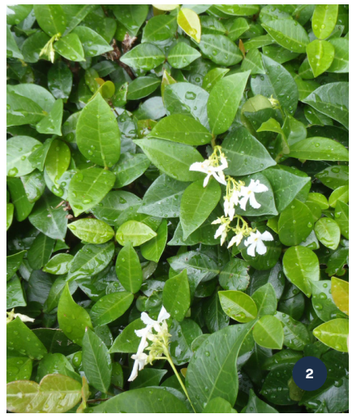
Frontage Wall / Fence to Hermans Road frontage.
Wall Type D with portions of Fence Type C (50% transparent fencing) incorporated. Wall Type D as panels or to serve as pillars between spans of transparent fencing. Fence to be stepped back 600 - 1000mm to facilitate planting to front as illustrated this sheet.

Living Gems*

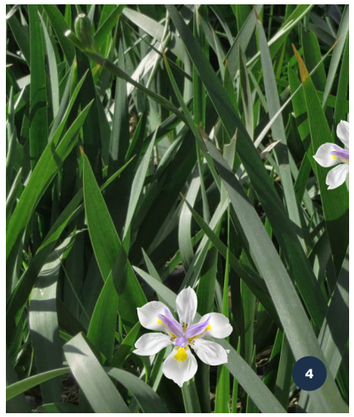
6.0

Planting Palettes.

















Groundcover Low

1	***Myoporum ellipticum***	Coastal Myoporum
2	***Trachelospermum jasminoides***	Star Jasmine
3	***Trachelospermum jasminoides 'Tricolor'***	Tricolor Star Jasmine

Groundcover Mid

4	***Dietes grandiflora***	Wild Iris
	Liriope Evergreen Giant	Evergreen Giant

Accents High

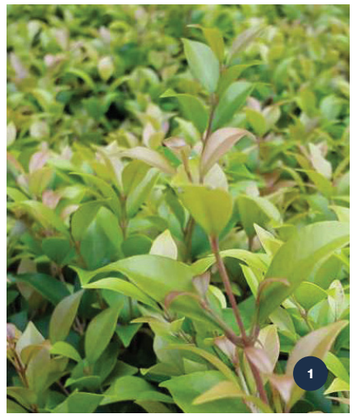
5	***Aspidistra elatior***	Cast Iron Plant
6	***Alpinia zerumbet***	Native Ginger
7	***Philodendron Emerald Green***	Emerald Green
8	***Zamia furfuracea***	Cardboard Palm

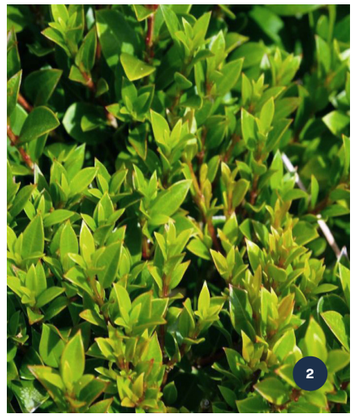
Casdcading Podium Planting

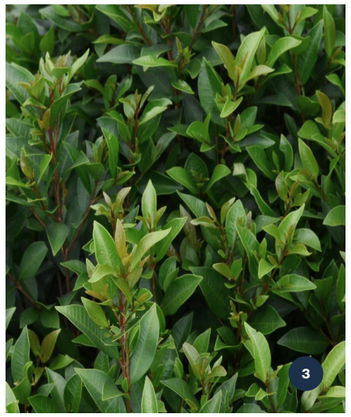
	Casuarina Glauca	Cousin It
	Rosmarinus Prostrate Rosemary	Trailing Rosemary
	Trachelospermum jasminoides 'Tricolor'	Tricolor Star Jasmine
	Trachelospermum jasminoides	Star Jasmine
	Myoporum ellipticum	Coastal Myoporum

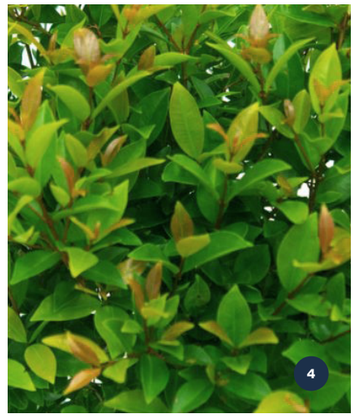
Planting Palette

6.1 Living Gems Character Species Groundcovers & Accents













Shrub Layer

1	***Acmena Allyn Magic***	Maintained to height	~0.5m
2	***Syzygium Tiny Trev***	Maintained to height	~0.6m
3	***Syzygium Baby Boomer***	Maintained to height	~1.0m - 1.5m
4	***Syzygium Aussie Boomer***	Maintained to height	~1.5m
5	***Syzygium Resilience***	Maintained to height	~1.5 - 2.0m
6	***Syzygium Express***	Maintained to height	~2.5 - 3.0m

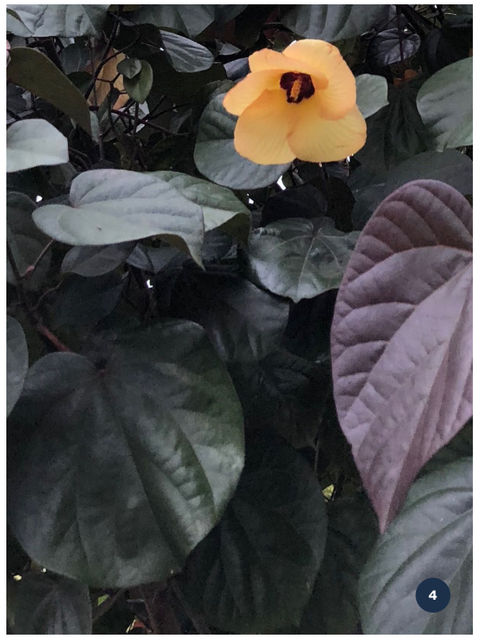
Syzygium species included this sheet allow for a range of heights. Hedge species within communal areas (streetscapes, entry areas, community use facilities) to be hedged. Shrub species are utilised within the development to screen fences, provide delineation and separation of uses, provide privacy to private open spaces and provide a dense backdrop to layered planting beds. A range of alternative / substitution species is included within **Supplementary Species** listings.

Planting Palette

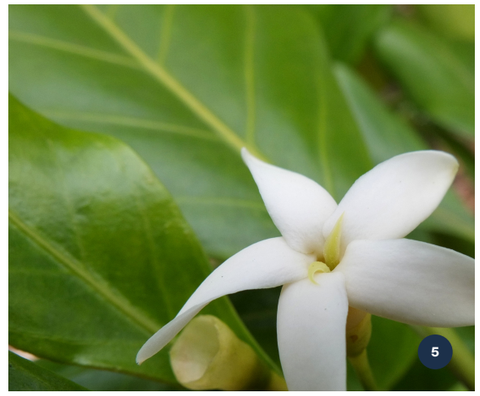
6.2 Living Gems Character Species Hedged Syzygium Species











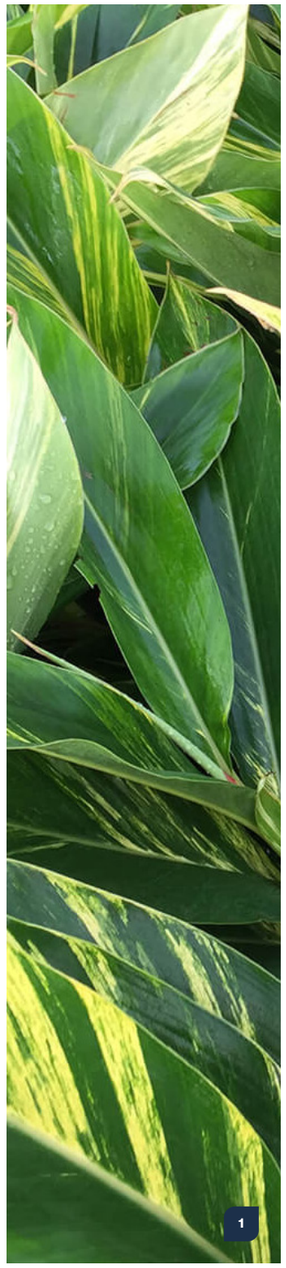


Trees & Palms

1	***Magnolia grandiflora***	Teddy Bear
2	***Magnolia grandiflora***	Little Gem
3	***Tristaniopsis laurina 'Luscious'***	Water Gum 'Luscious'
4	***Hibiscus tilleaceus Rubra***	Hibiscus Rubra
5	***Randia fitzalani***	Native Gardenia
6	***Waterhousia floribunda***	Weeping Lily Pilly
6	***Archontophoenix alexandrae***	Alex Palm
6	***Wodyetia bifurcata***	Foxtail Palm
6	***Phoenix canariensis***	Canary Island Date Palm

Planting Palette

6.3 Living Gems Character Species Trees & Palms











Accent Planting

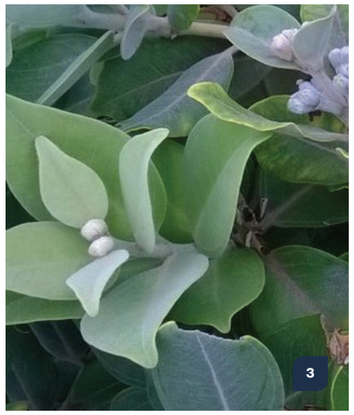
1	***Varigated Alpinea***	Native Ginger
2	***Cordyline fruiticosa***	Cordyline Red Rubra
3	***Crinum pendunculatum***	Swamp Lilly
4	***Zamia furfuracea***	Cardboard Palm
5	***Aspidistra elatior***	Majestic Palm
6	***Phoenix canariensis***	Canary Island Date Palm

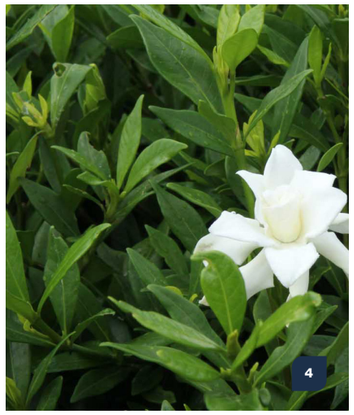
Planting Palette

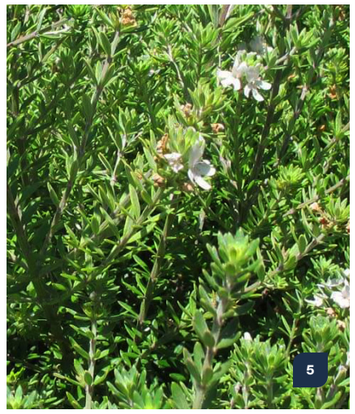
6.4 Supplementary Species Accents





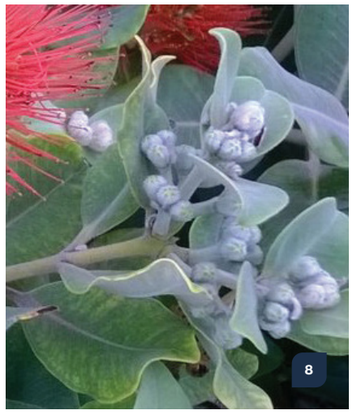




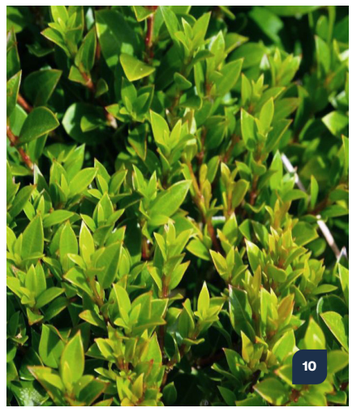




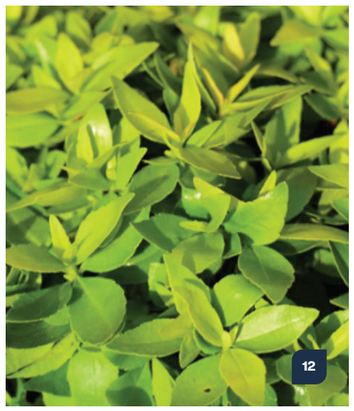












Shrub Type 1 (~1.5m Height)

1	***Michella figo***	Port Wine Magnolia Michelia Figo
2	***Syzygium Various***	Various
3	***Metrocideros 'Fiji Fire'***	Fiji Fire
4	***Gardenia Various***	Various
5	***Westringea Various***	Various

Shrub Type 2 (~1.0m Height)

6	***Murraya paniculata***	Murraya Min or Hip High
7	***Buxus microphylla var. japonica***	Japanese Box
8	***Metrocideros excelsa 'Mini Christmas'***	Mini Christmas

Shrub Type 3 (~0.6m Height)

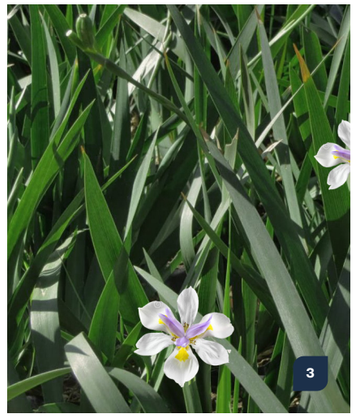
9	***Abelia grandiflora***	Little Gold
10	***Syzygium australe 'Tiny Trev'***	Isabella
11	***Myoporum ellipticum***	Coastal Myoporum
12	***Abelia grandiflora***	Little Gold

Planting Palette

6.5 Supplementary Species Shrubs















Groundcover Low

1	***Liriope Isabella***	Isabella
2	***Ophiopogon japonicus***	Dwarf Mondo Grass

Groundcover High

3	***Dietes grandiflora***	Wild Iris
4	***Liriope Evergreen Giant***	Evergreen Giant

Accent Layer

5	***Aspidistra elatior***	Cast Iron Plant
6	***Philodendron 'var'***	Hope

Shrub Layer

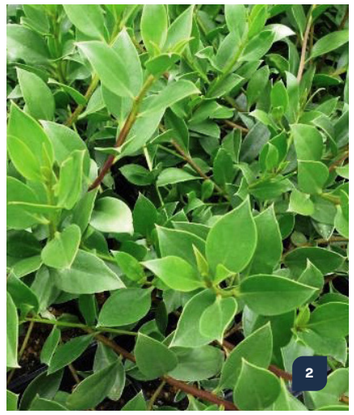
7	***Syzygium Baby Boomer***	Baby Boomer

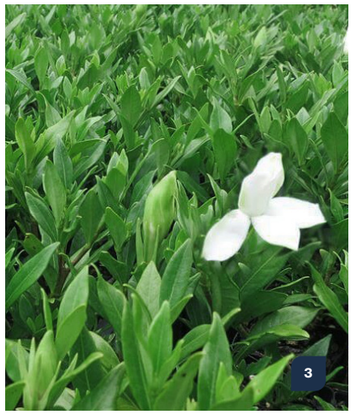
Refer to Section 3.0 for dwelling planting setout details.

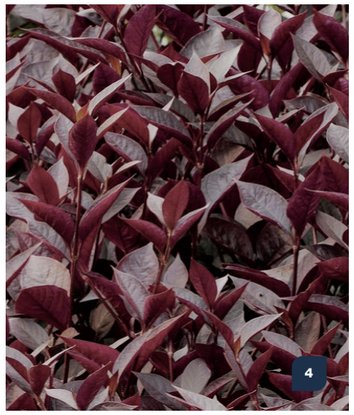
Planting Palette

6.6 Dwelling Frontages: Type 1















Groundcover Low

1	***Ophiopogon japonicus***	Dwarf Mondo Grass
2	***Myoporum ellipticum***	Coastal Myoporum

Groundcover High

3	***Gardenia randicans***	Various dwarf species available
4	***Alternanthera dentata***	Little Ruby

Accent Layer

5	***Alpinea sp.***	Native Ginger
6	***Cordyline fruiticosa***	Cordyline Red Rubra

Shrub Layer

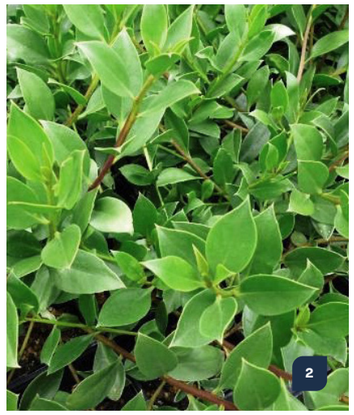
7	***Syzygium Baby Boomer***	Baby Boomer

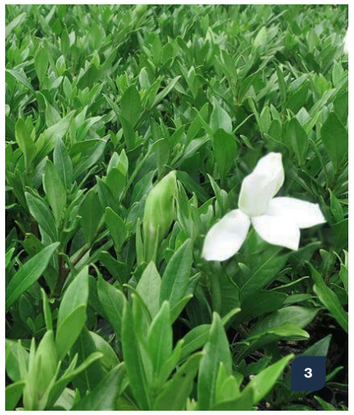
Refer to Section 3.0 for dwelling planting setout details.

Planting Palette

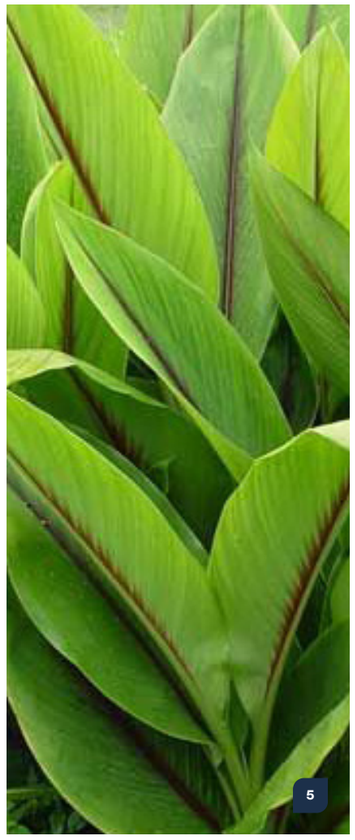
6.7 Dwelling Frontages: Type 2















Groundcover Low

1	***Trachelospermum jasminoides***	Star Jasmine
2	***Myoporum ellipticum***	Coastal Myoporum

Groundcover High

3	***Gardenia randicans***	Various dwarf species available
4	***Liriope Evergreen Giant***	Evergreen Giant

Accent Layer

5	***Alpinea sp.***	Native Ginger
6	***Zamia furfuracea***	Cardboard Palm

Shrub Layer

7	***Gardenia sp.***	Various

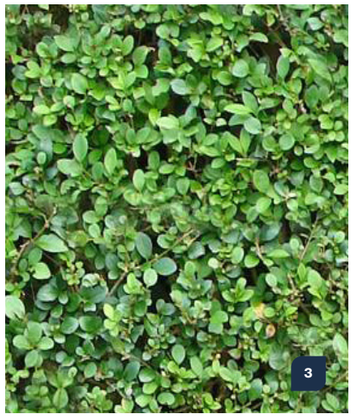
Refer to Section 3.0 for dwelling planting setout details.

Planting Palette

6.8 Dwelling Frontages: Type 3

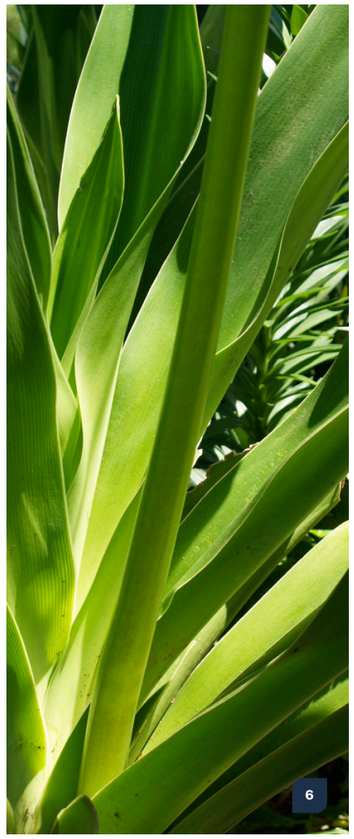


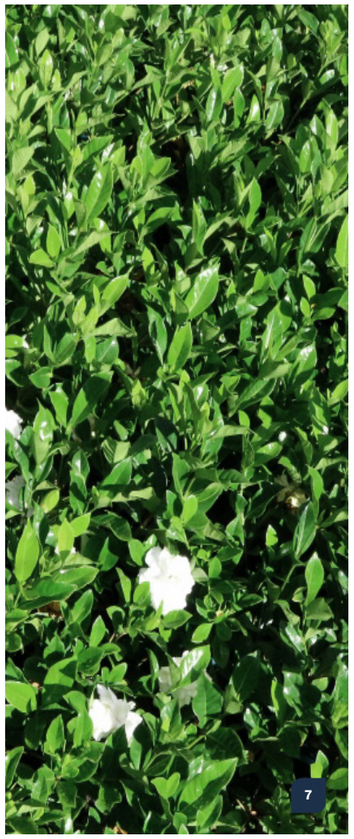














Groundcover Low

1	***Liriope Silver Dragon***	Silver Dragon
2	***Ophiopogon japonicus***	Dwarf Mondo Grass

Groundcover High

3	***Syzygium australe 'Tiny Trev'***	Tiny Trev
4	***Buxus japonica***	Japanese Box Hedge

Accent Layer

5	***Agave attenuata***	Foxtail Agave
6	***Crinum pendunculatum***	Swamp Lilly

Shrub Layer

7	***Gardenia sp.***	Various
8	***Syzygium Baby Boomer***	Baby Boomer

Refer to Section 3.0 for dwelling planting setout details.

Planting Palette

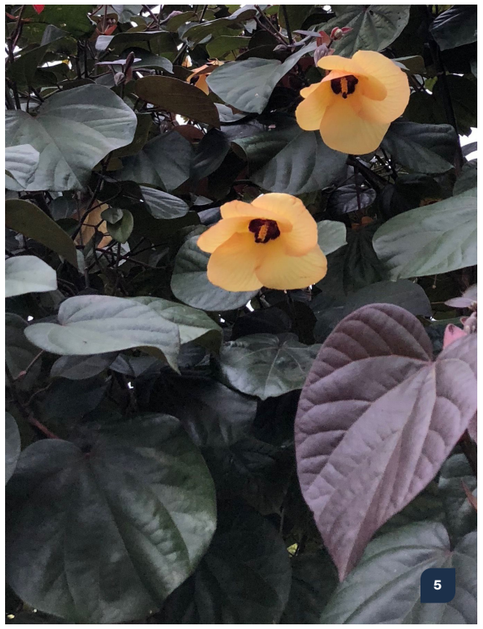
6.9 Dwelling Frontages: Type 4


1


2


3


4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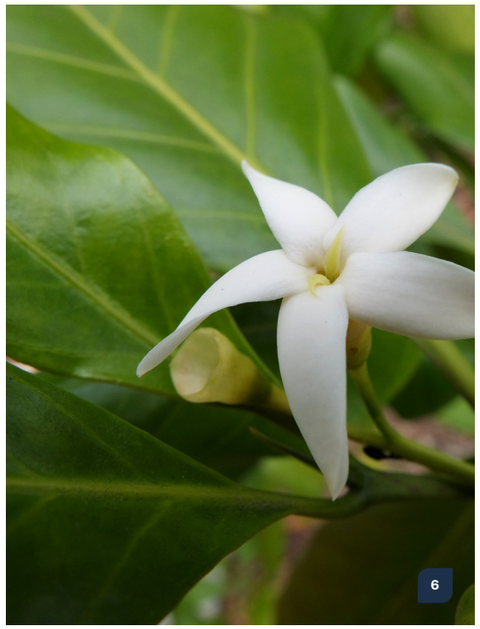
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Trees

1	***Cupaniopsis anacardioides***	Tuckeroo
2	***Magnolia grandiflora***	Teddy Bear
3	***Magnolia grandiflora***	Little Gem
4	***Tristaniopsis laurina 'Luscious'***	Water Gum 'Luscious'
5	***Hibiscus tilleaceus Rubra***	Hibiscus Rubra
6	***Randia fitzalani***	Native Gardenia

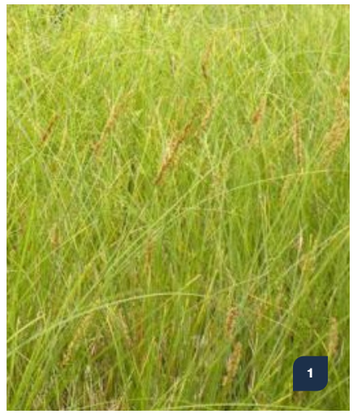
Refer to Section 3.0 for dwelling planting setout details.

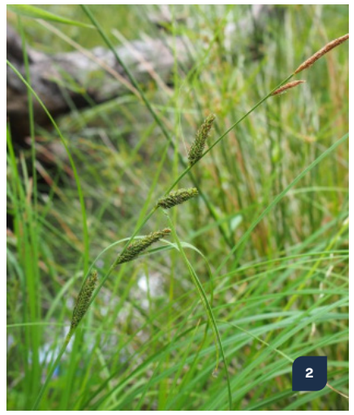
Street Trees

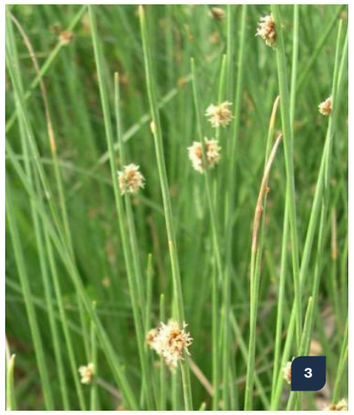
	Brachychiton acerifolius	Illawarra flame tree
	Corymbia ptychocarpa	Swamp Bloodwood
	Backhousia citriodora	Lemon Myrtle
	Cupaniopsis anacardioides	Tuckeroo
	Cupaniopsis parvifolia	Fine-leaved Tuckeroo
	Elaeocarpus eumundii	Eumundi quandong
	Harpullia pendula	Tulipwood
	Harpullia hillii	Blunt leaf Tulipwood
	Lophostemon confertus	Brushbox
	Tristaniopsis laurina 'Luscious'	Water Gum 'Luscious'

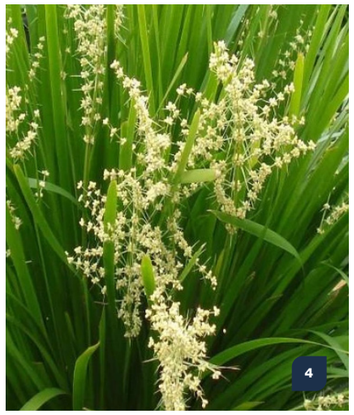
Planting Palette

6.10 Dwelling Frontages & Streetscapes

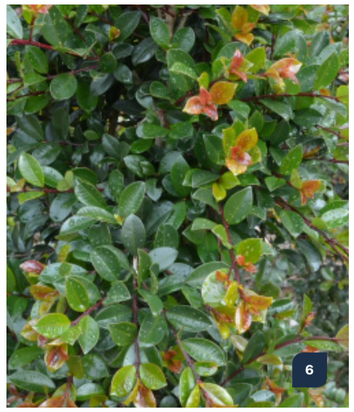


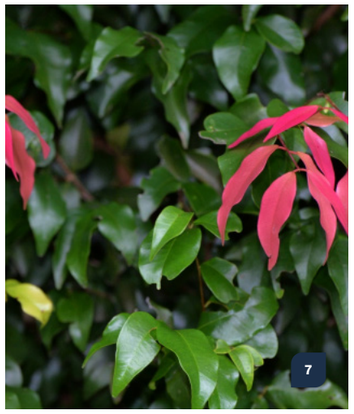


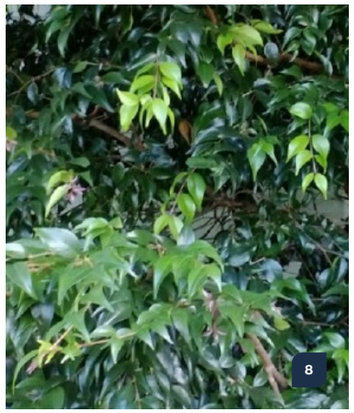


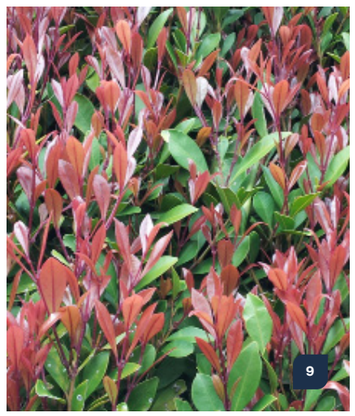


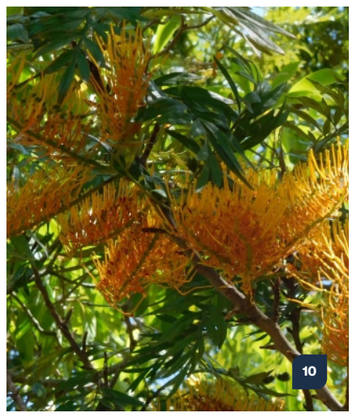




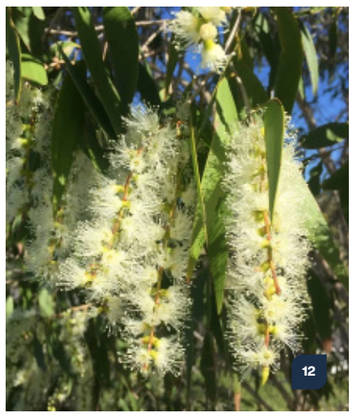












Groundcover

1	***Carex appressa***	Tall Sedge
2	***Carex gaudichaudiana***	Sedge
3	***Ficinia nodosa***	Knobby Club Rush
4	***Lomandra hystrix***	A Mat-rush
5	***Lomandra longifolia***	Spiny-headed Mat-rush

Shrubs & Accents

6	***Syzygium australe***	Coastal Rosemary
7	***Syzygium francisii***	Aussie Boomer
	Syzygium hemilamprum	Baby Boomer
	Syzygium moorei	Dwarf Japanese Box
8	***Syzygium luehmannii***	Various
9	***Syzygium smithii***	Lilly Pilly
	Crinum pendunculatum	Spider Lilly
	Doryanthes palmeri	Giant Spear Lilly

Trees

10	***Grevillea robusta***	Silky Oak
11	***Casuarina glauca***	Swamp Oak
	Melaleuca linarifolia	Flax-leaved Paperbark
12	***Melaleuca quinquenervia***	Broad-leaved Paperbark
	Livistonia australis	Cabbage Palm
	Archontophoenix alexandrae	Alex Palm

Planting Palette

6.11 Stormwater & Riparian

Living Gems

Landscape Architecture

Prepared By Zone Landscape Architecture | www.zonelandscape.com.au

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: **D/187-2023**

Dated: **18 September 2024**

Traffic Engineering Report

Proposed Residential Subdivision at 952 Norman Road, Rockhampton for GemLife



Disclaimer

This report has been prepared by Colliers for the exclusive use of the client for the specific purpose stated within. The findings, conclusions, and recommendations presented in this report are based on the information available, assumptions made, and methodologies applied at the time of analysis.

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Revision Record

No.	Author	Reviewed/Approved		Description	Date
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2.					
3.					
4.					

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Level 8, 369 Ann Street, Brisbane. PO Box 12015 George Street Brisbane 4003

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1. Introduction

1.1. Purpose

Colliers have been engaged by Living Gems to prepare a Transport Engineering Report investigating a proposed Retirement Village development at 952 Norman Road, Rockhampton, QLD. It is understood this report will accompany a response to the Request for Information (RFI) provided by the Rockhampton Regional Council (RRC) and the State Assessment and Referral Agency (SARA).

1.2. Background

This site benefits from a previous approval dated 18 September 2024 (Council ref: D/187-2023). Colliers (formerly TTM) was involved during the Development Application (DA) stage, preparing a Traffic Assessment Report to support the application (23BRT0757_LT01_2_231219). Colliers also responded to DA-related RFIs from both SARA (ref: 2401-38631) and RRC (ref: D187-2023).

Since then, an Other Change application (Ref: D/187-2023) has been proposed by the developer. As part of this RFI response, Colliers prepared a revised traffic impact assessment considering the increase in yield to 505 lots/dwellings, changes to the layout and new traffic surveys as requested by SARA.

1.3. Proposed Changes - Comparison

The revised development scheme's key characteristics compared to the approved scheme are summarised in Table 1.1. A copy of the revised plans is also included in Attachment 1.

Table 1.1: Development changes comparison.

Characteristic	Approved Scheme	Revised Scheme	Difference
Development lot area	18.2 ha	27.62 ha	+9.42 ha
Dwelling Yield	351 dwellings	505 dwellings	+154 dwellings
Resident Car Parking spaces	702 spaces (2 per dwelling)	1,010 spaces (2 per dwelling)	+308 spaces
Visitor Car Parking space	127 spaces	211 spaces	+84 spaces
Recreational Vehicle (RV) Parking spaces	52 spaces	105 spaces	+53 spaces
Access Configuration – Norman Road – McMillan (north) – McMillan (south)	 13m 6.0m No access	 13m 6.5m 6m	 No change Widened New Access
Traffic Generation Vehicle per Hour (vph) Vehicle per Day (vpd)	 140vph 737vpd	 117vph 1,313vpd	 -23vph* 576vpd

*The peak-hour generation has reduced due to the new rates applied to the development, which is detailed in Section 9.

Overall, the revised development scheme proposes an increase of 154 dwellings. Design changes are proposed to the overall layout of the development. Due to the increase in yield, the development's traffic generation is expected to increase.

Further commentary in relation to the transport engineering provision of the revised development scheme is detailed in the following sections

1.4. Scope

The scope of the transport aspects investigated includes:

- Reviewing the prevailing traffic and transport conditions surrounding the site.
- Identifying parking supply required to cater for development demands.
- Assessing the parking layout to provide efficient and safe internal circulation and manoeuvring.
- Assessing the access configuration to provide efficient and safe manoeuvring between the site and the public road network for cars, service vehicles, cyclists and pedestrians.
- Identifying the service vehicle needs for the site.
- Assessing the internal service vehicle layouts to provide efficiency and safety for on-site service vehicle operation.
- Reviewing access to a suitable level of public and active transport provisions.
- Internal road hierarchy to cater for lot access, vehicle design speeds and road user amenity requirements – for new subdivisions only.
- Identification of likely traffic volumes and traffic distribution from the development.
- Identification of likely traffic impacts of development on the surrounding road network.

The development plans have been assessed against the following guidelines and planning documents:

- Rockhampton Regional Council Planning Scheme (2015)
- Queensland State Development and Assessment Provisions (SDAP), specifically:
  - State Code 6: Protection of state transport networks
- Australian Standards for Parking Facilities, specifically:
  - Part 1: Off-street car parking (AS2890.1:2004)
  - Part 2: Off-street commercial vehicle facilities (AS2890.2:2018)

  - Part 3: Bicycle parking (AS2890.3:2015)
  - Part 6: Off-street parking for people with disabilities (AS2890.6:2009).
- Department of Transport and Main Roads 'Guide to Traffic Impact Assessment' (GTIA)
- Austroads 'Guide to Traffic Management' (GTM)
- IMEAQ 'Design Guidelines for Subdivisional Streetworks' (Queensland Streets)
- Roads and Maritime Service (RMS) 2002 *Guide to Traffic Generating Developments*

2. Site Location

The site is located at Norman Road, Rockhampton, as shown in Figure 2.1 and Figure 2.2, overleaf and corresponds to Lots 7, 8, 9, 10, 11 and 12 on RP603508 – which has a total site area of approximately 27.62ha. Currently, Lots 7, 11 and 12 are occupied by a rural residence, Lots 8 and 9 are vacant, and Lot 10 is occupied by a Golf Driving Range and Mini Golf.



Figure 2.1: Site location (Surrounding Context) Source: Queensland Globe

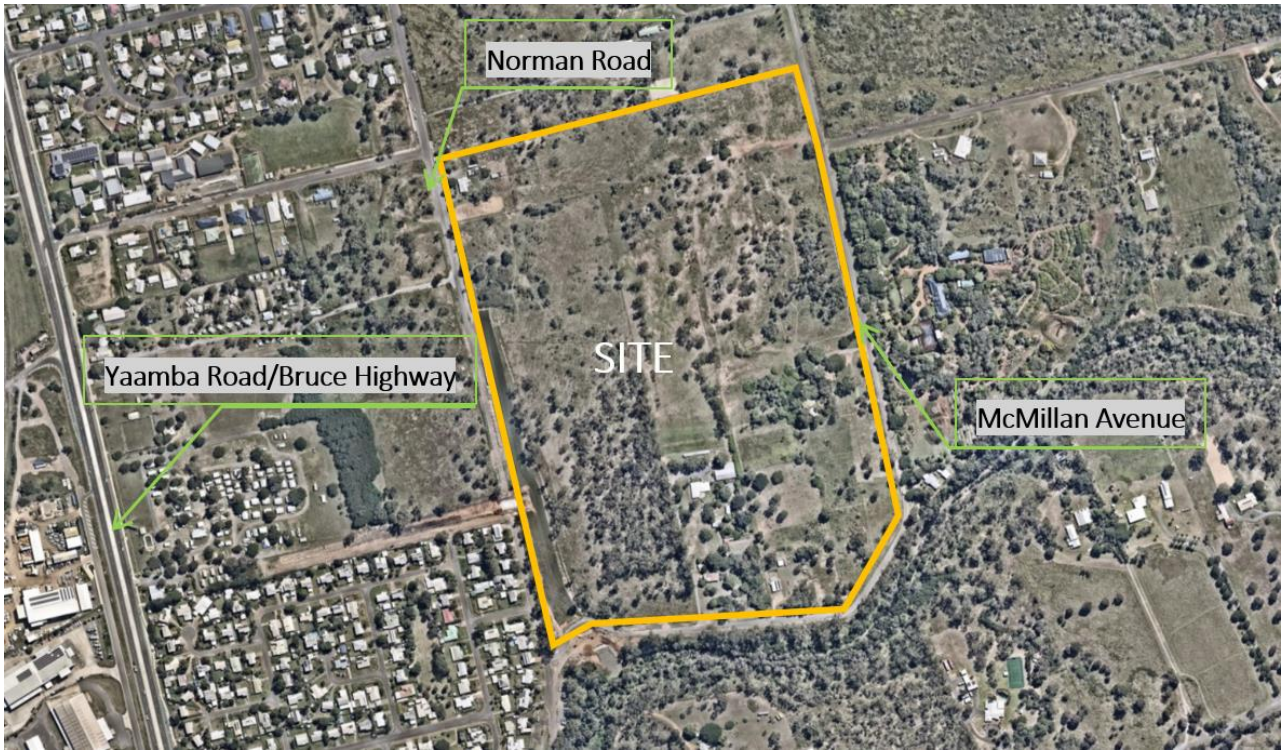


Figure 2.2: Site Location (Immediate Context) Source: Nearmap

3. The Proposed Development

3.1. Revised Development Profile

The development proposes a resort-style Retirement Village dedicated to people over 50 years. The proposed land uses for this development are summarised in Table 3.1.

Table 3.1: Proposed land uses

Land Use	Area/Qty
Retirement Village – Residential	505 Dwellings/Lots

3.2. Parking

The development plan includes the following parking supply:

- 1 garage per dwelling with a capacity of 2 cars.
- 211 visitor spaces (incl. 5 PWD spaces)
- 105 Recreational Vehicle (RV) spaces
- 1 Shuttle Bus parking.

Further details regarding the proposed parking provisions are included in Section 5.

3.3. Access

The development plan includes the following access arrangements:

- Main access to the development, configured as a 13m wide crossover to Norman Road on the northwestern side of the development, which will cater for vehicles up to the size of a 10.4m Refuse Collection Vehicle (RCV).
- 6.5m wide emergency access to Mc Millan Avenue on the northeastern side of the development.
- 6m wide access from the Recreational Vehicle (RV) parking area to MC Millan Avenue on the southeastern side of the development.
- Cyclists and Pedestrians will access the site via the same location as the vehicle access.

Further details regarding the proposed access arrangements are included in Section 6.

4. Site Travel Environment

4.1. Public Transport Facilities and Services

The site is located in proximity to the following bus stops, which are serviced by the 410 bus route:

- Jones St near Brosnan Cr hail 'n' ride
- Brosnan Cr at Jones Street
- Yaamba Rd at Parkhurst School

This route connects the City centre to Parkhurst and operates 5 days a week (weekdays), from 7.50am to 5 pm, with a departure interval of 1 hour. Pedestrian provisions are provided along the north side of Mason Avenue and along the eastern side of Yaamba Road

4.2. Active Transport Facilities

The Rockhampton Regional Planning Scheme 2015 (RRPS) Bicycle Network overlay classifies the surrounding road network based on cycling infrastructure, as shown in Figure 4.1.

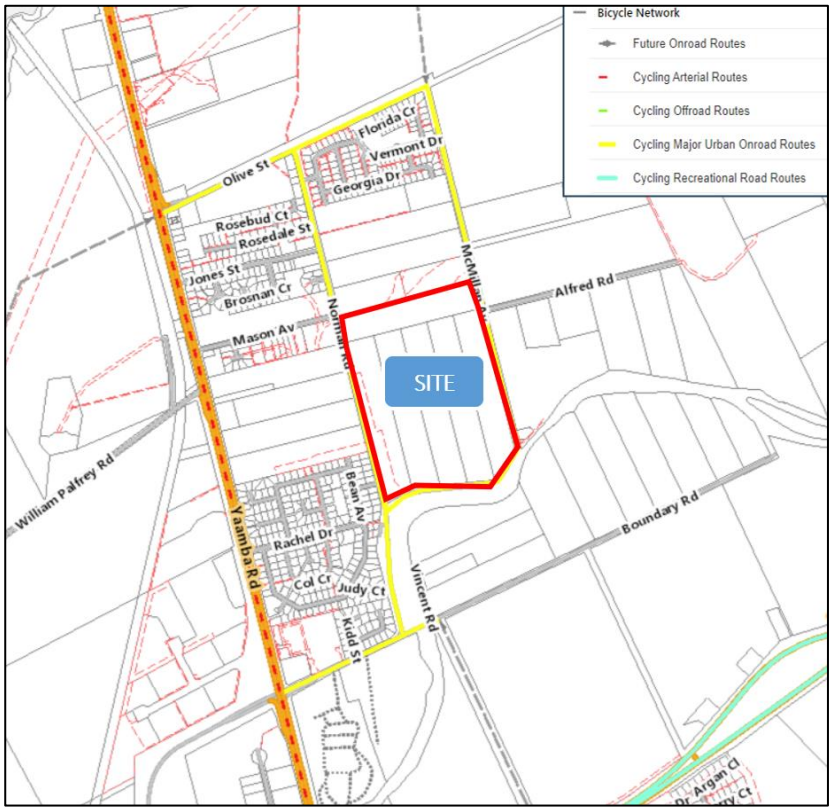


Figure 4.1: RRPS - Bicycle Network Overlay.

4.3. The Road Network

4.3.1. Road Hierarchy

The hierarchy and characteristics of roads in the immediate vicinity of the site are shown in Table 4.1.

Table 4.1: Surrounding Road Hierarchy

Road	Speed Limit	Lanes	Classification	Authority
Norman Road	60 km/h	2 lanes, unmarked	Major Urban Collector	Council
McMillan Avenue	70 km/h	2 lanes, unmarked	Major Rural Collector	Council
Mason Avenue*	50 km/h 40km/h School Zone	2 lanes, parking on both sides	Urban Access Street	Council
Yaamba Road	70 km/h	4 lanes, divided, bicycle lane	Highway	State Controlled Road

*Default speed limit on unsigned roads in built-up areas in Queensland

All the intersections immediately surrounding the subject site are priority-controlled.

4.3.2. Existing Traffic Volumes

Colliers conducted traffic surveys of the surrounding road network in March 2024 as part of the DA RFI response stage. As part of this RFI response, additional surveys were conducted on Tuesday March 18 2025, to establish updated base traffic conditions. The survey was undertaken from 7am to 6pm. Below is a summary of the intersections surveyed in both years.

2024 Surveys

- Mason Avenue/Norman Road intersection
- Bruce Highway/Mason Avenue intersection
- Bruce Highway/Boundary Road intersection

2025 Surveys

- Bruce Highway/Boundary Road intersection
- Bruce Highway/Rachel Drive intersection
- Bruce Highway/Mason Avenue intersection
- Bruce Highway/Jones intersection
- Bruce Highway/Oliver intersection

From this data, respective morning and afternoon peak hour movements were indentified across the various intersections. In general, the morning and afternoon peak hours were found to be between 7:45am-8:45am and 4:15pm-5:15pm, respectively.

Detailed network diagrams showing peak hour traffic movement splits at all surrounding road intersections are included in Appendix C.

4.3.3. Existing Road Network Performance

To evaluate the existing road network performance, the modelling of the key intersections as requested by SARA was conducted using the SIDRA Intersection 9.0 software package. The primary intersection operational outputs used to assess intersection operations were considered to be intersection Degree of Saturation (DOS), overall intersection and worst movement delays, Level of Service (LOS) and queuing. A summary SIDRA analysis of the existing intersections is included in Table 4.2. Further details regarding the inputs and assumptions used in calibrating the SIDRA modelling are provided in Section 11.

Table 4.2: Surrounding Road Network Existing Performance – SIDRA Results Summary

Scenario	Degree of Saturation	Average Delays		Level of Service	95th Percentile Queue			
		Total Intersection	Worst Movement		(N)	(E)	(S)	(W)
AM PEAK HOUR								
BruceHwy Boundary Rd	58.3%	28.4 sec	59.0sec Rt from Boundary Rd	C	120 m	23 m	58 m	47 m
BruceHwy Rachel Dr	24.8%	1.1 sec	17.7sec Rt from BruceHwy	C*	0 m	2 m	4 m	
BruceHwy Mason Av	46.4%	2.9 sec	20.5 Sec U from Bruce Highway	C*	0 m	4 m	15 m	
BruceHwy Jones St	22.5%	0.4 sec	15.3sec Rt from BruceHwy	C*	0 m	0 m	1 m	
BruceHwy Olive St	38.3%	11.0 sec	51.3sec Rt from Olive St	B	71 m	8 m	22 m	
PM PEAK HOUR								
BruceHwy Boundary Rd	71.7%	40.2 sec	54.7sec Rt from Boundary Rd	D	91 m	56 m	106 m	82 m
BruceHwy Rachel Dr	23.7%	0.9 sec	11.1sec Rt from BruceHwy	B*	0 m	1 m	4 m	
BruceHwy Mason Av	22.6%	0.9 sec	11.4sec U from Bruce Highway	B*	0 m	1 m	3 m	
BruceHwy Jones St	21.7%	0.3 sec	10.0sec Rt from BruceHwy	A	0 m	0 m	1 m	
BruceHwy Olive St	63.3%	20.8 sec	46.5 Sec Rt from Olive St	C	66 m	15 m	65 m	
*LOS based on worst movement. SIDRA does not provide an overall intersection LOS for priority controlled								

Overall, the SIDRA analysis indicates that the surrounding road network currently operates at an acceptable LOS, with a low DOS and limited queueing on any approach.

5. Parking Provisions

5.1. Parking Supply

Table 5.1 outlines the minimum on-site car parking supply requirement for the proposed development based on the parking rates identified in Table 9.3.1.3.2: Parking requirements of the RRPS Access, parking and transport code.

Table 5.1: Car Parking Supply Requirement

Use	RRC Requirement	Qty	RRC Requirement	Proposed
Retirement Facility - Resident	One (1) space per two (2) dwellings for the first twenty-five (25) dwellings and one (1) space per four (4) dwellings;	505 dwellings	133 spaces	1,010 resident spaces (2 per dwelling) 105 RV spaces
Retirement Facility - Visitor	One (1) space per four (4) dwellings for visitors.	505 dwellings	126 spaces	211 Visitor spaces
Total			**259 spaces**	**1,221 spaces (+105 RV spaces)**

The development proposes to provide 2 residential car parking spaces per dwelling. The development also proposes a dedicated Recreational Vehicle (RV) parking area located at the eastern corner of the site. This area will cater for 105 spaces. These spaces will be suitable to accommodate caravans, boats and RVs. The 214 visitor car parking spaces (including a minimum of 5 PWD) will be distributed throughout the development to allow for visitor parking in proximity to desired destinations.

Further, as per the Council's RFI, a Shuttle Bus loading area is provided next to the Country Club, which will also work as a loading area for Taxis and Private companies (i.e., Uber or similar).

The total proposed car parking supply exceeds the car parking required by the RRPS code. Therefore, the proposed parking supply is considered acceptable.

5.2. Parking Layout

Table 5.2 summarises the design compliance of the proposed visitor parking design in accordance with the Australian Standards Off-Street Parking Facilities Part 1:2004 (AS2890.1) and Part 2:2018 (AS2890.2) as required per RRPS.

Table 5.2: Visitor Car Parking Design Compliance

Design Aspect	AS2890 Provision	Proposed Provision	Compliance
Parking space length: General car parking RV*	 5.4m (min) 8.8m (min)	 5.4m 9m	 Compliant Compliant
Parking space width: Visitor RV*	 2.6m (min) 3.5m (min)	 2.6m 3.5m	 Compliant Compliant
Parking Aisle	5.8m	6.0m (min)	Compliant
PWD Parking Space width	2.4m with 2.4m wide shared area	2.4m (min) with 2.4m shared area	Compliant
Parallel space length	6.1m (min)	6.1m (min)	Compliant
Parallel bay parking width	2.1m (min)	2.1m (min)	Compliant
Height Clearance (min)	2.2m General Parking 2.5m above PWD parking spaces and shared area 4.5m MRV height clearance	Visitor parking to open-air	Compliant

*Based on an 8.8m long MRV vehicle size.

Based on the above, the proposed visitor car parking arrangement is considered fit for the purpose. The design of the in-lot resident car parking spaces is subject to further design but are anticipated to be provided in line with AS2890 recommendations.

The above parking geometry will also include a minimum of 0.3m clearances to walls or physical obstructions higher than 150 mm, as required. The development parking layouts are generally consistent with the provisions of the AS2890.1.

6. Access Arrangements

The development plans propose the main access to Normans Road, an emergency access to McMillan Avenue and an RV access to McMillan Avenue. The Norman Road development access arrangements have been reviewed against the requirements of the RRPS Access, Parking and Transport Code, with a summary provided in Table 6.1.

Table 6.1: Norman Road - Vehicle Access Design Requirements

Design Aspect	AS2890.1 Requirement	Proposed Provision	Compliance
Driveway: • Width • Lane width	 7.5m (min) 3.0m to 5.5m (min)	 13m 6.5m	 Compliant Compliant
Minimum sight lines (ped)	2.0m x 2.5m	2.0m x 2.5m minimum Sight lines available at the boundary	Compliant
Driveway Gradient	1:20 for the first 6m into the site	<1:20 for the first 6m into the site	Compliant
Sight Distance (Speed Limit 60km/h)	83m (Desirable) 65m (Minimum SSD)	>300m to the north >300m to the south	Compliant
Driveway Separation to Intersections	6m clear of tangent point (AS2890.1) 10m clear of unsignalised intersection (RRSP)	65m clear of Mason Ave	Compliant
Internal Vehicle Queuing	11 cars (66m) (for 881 car parking spaces)	83m clear of Norman Road	Compliant

A security line is proposed to be located close to the site entrance. The roundabout located between the security line and the site boundary is to work as a turnaround option for visitors if access to the development is declined. The site also includes a number of visitor spaces prior to the security line to allow visitors to park clear of the external road.

The McMillan Avenue emergency development access arrangements have been reviewed against the requirements of RRPS Access, Parking and Transport Code, with a summary provided in Table 6.2.

Table 6.2: McMillan Avenue – Vehicle Access Design Requirements – Emergency Access

Design Aspect	AS2890.2 Requirement	Proposed Provision	Compliance
Driveway Width	3.5m	6.5m	Compliant
Minimum sight lines (ped)	2.0m x 2.5m	2.0m x 2.5m minimum Sight lines available at the boundary	Compliant
Driveway Gradient	1:20 for the first 6m into the site	<1:20 for the first 6m into the site	Compliant
Sight Distance (Speed Limit 70km/h)	97m (Desirable) 85m (Minimum SSD)	>250m to the north Approximately 100m to the south	Compliant
Driveway Separation to Intersections	6m clear of tangent point (AS2890.1) 10m clear of unsignalised intersection (RRSP)	60m clear of Alfred Road	Compliant

The RV parking area access to McMillan Avenue arrangements have been reviewed against the requirements of RRPS Access, Parking and Transport Code, with a summary provided in Table 6.3 .

Table 6.3: McMillan Avenue – Vehicle Access Design Requirements – RV parking area access.

Design Aspect	AS2890.2 Requirement	Proposed Provision	Compliance
Driveway Width	3.5m	6m	Compliant
Minimum sight lines (ped)	2.0m x 2.5m	2.0m x 2.5m minimum Sight lines available at the boundary	Compliant
Driveway Gradient	1:20 for the first 6m into the site	<1:20 for the first 6m into the site	Compliant
Sight Distance (Speed Limit 70km/h)	97m (Desirable) 85m (Minimum SSD)	>100m to the east >100m to the west	Compliant
Driveway Separation to Intersections	6m clear of tangent point (AS2890.1) 10m clear of unsignalised intersection (RRSP)	No intersections or driveways in the surrounding	Compliant

The proposed access arrangements are generally consistent with the provisions of the Australian Standards and/RRSP and are therefore considered satisfactory for the proposed development

7. Service Vehicle Arrangements

Colliers has adopted a 10.3m RCV as the design vehicle for the development. The internal road design and site access were configured based on accommodating RCV turning movements. Colliers has prepared a set of swept paths (refer to Colliers Drawing 23BRT0757-01 & 02 in Attachment 2) demonstrating an RCV accessing and servicing the site.

The site is also expected to be serviced by removalist trucks. Due to the size of the dwellings and nature of the development, it is expected that service vehicles up to the size of an MRV will be sufficient to cater for this service. The furniture trucks are expected to park along the internal private roadway as needed, while retaining appropriate width to allow for vehicle passing. (refer to Colliers Drawing 23BRT0757-03 in Attachment 2)

Overall, the service vehicle provisions for the proposed development are considered acceptable.

8. Development Stages

It is understood that the project is to be delivered in stages. A summary of the currently anticipated staging and its compliance to visitor parking supply provisions is summarised in Table 8.1. Colliers notes that the proposed staging and project delivery may be subject to revisions as the project progresses.

Table 8.1: Proposed visitor parking at each development stage.

Stages	Yield		Visitor Parking Required		Visitor Parking Provided	
	Yield	Cumulative	Required	Cumulative	Spaces	Cumulative
Stage 1 & 12	49	49	13	13	54	54
Stage 2	52	101	13	26	18	72
Stage 3	55	156	14	40	6	78
Stage 4 & 13	39	195	10	50	21	99
Stage 5	47	242	12	62	9	108
Stage 6	44	286	11	73	8	116
Stage 7	48	334	12	85	29	145
Stage 8	48	382	12	97	18	163
Stage 9 & 14	40	422	10	107	24	187
Stage 10	50	472	13	120	13	200
Stage 11	33	505	9	129	6	206
Stage 15	0	505	0	129	5	211

As shown in the table above, the minimum provisions for visitor parking are expected to be achieved during each proposed stage.

9. Development Transport Demands

9.1. Development Traffic Demands

9.1.1. Traffic Generation

A peak hour generation rate of 0.23vph/dwelling has been applied for both peak hour periods. This rate is consistent with NSW RMS Guide to Traffic Generating Developments 2024 rate for 'Housing for Seniors' (Effective from 4th November 2024). The adopted rate is higher than rates obtained from two Colliers traffic generation surveys of existing retirement facility developments operated by the Applicant. Additionally, a daily traffic generation rate of 2.6 vpd/dwelling has been adopted, which is consistent with a 24-hour survey of an existing Gemlife retirement facility (Gemlife Highfields).

Directional splits it is in line with generally accepted traffic engineering practice, and it is estimated to be:

- AM Peak Hour: 30% inbound /70% outbound.
- PM Peak Hour: 60% inbound /40% outbound.

Application of the above generation rates and directional splits would result in proposed development traffic demand estimates as shown in Table 9.1.

Table 9.1: Development Traffic Demand Estimate

Land Use	Yield	Generation Rate	AM Peak Hour			PM Peak Hour			Daily Traffic
			In	Out	Total	In	Out	Total	
Retirement Village	505 Dwellings	0.23vph per dwelling	35vph	82vph	117vph	71vph	46vph	117vph	1313vpd

9.1.2. Traffic Distribution

These factors have led to the following assumed traffic distribution characteristics:

- Aerial view analysis – Analysis of the macro-infrastructure around the site.
- Review of the available local services and major trip attractors.

These traffic distribution assumptions are shown in Figure 9.1.

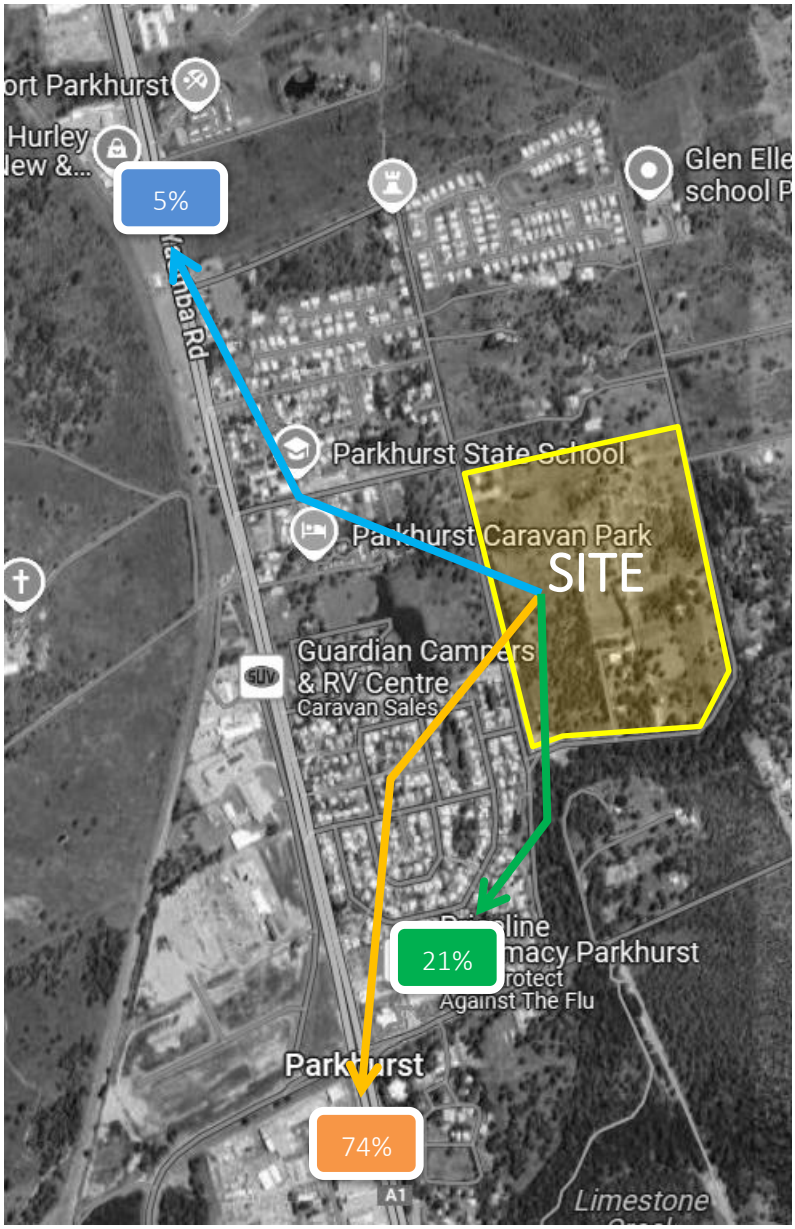


Figure 9.1: Assumed Development Distribution

9.2. Warrants for Further Assessment

As detailed in the SARA's RFI, a detailed TIA is requested as part of the development application. Therefore, the following sections refer to the detailed impact assessment of the proposed development.

10. Future Traffic Demands

10.1. Assessment Years and Traffic Growth

The applicant has indicated that the targeted completion date for the development is 2027. On this basis, the following assessment years have been considered:

- Opening Year (Full Completion): 2027

In accordance with the DTMR GTIA requirements, 2027 was adopted as the assessment year for the various roads/intersections. In order to determine an appropriate background traffic growth rate for the completed traffic analysis assessment. Colliers has undertaken a review of available Council planning documentation and DTMR historical count data for the state-controlled road (SCR) network.

Based on Table SC3.1.5.6 – *Existing and projected demand for the Rockhampton Local Government Infrastructure Plan (LGIP) transport network*, the local region is expected to observe a growth rate of approximately 4.5% per annum (p.a.). Colliers has adopted this LGIP-derived rate as the growth rate to be applied to the surveyed volumes for the year of opening analysis.

The 10-year historic growth for traffic volumes on the Bruce Highway (SCR) noted in the DTMR Traffic Analysis and Reporting System (TARS) AADT Segment report (site 60926) is noted to be 2.32% p.a.

The development is expected to be operating in 2027; with that and the surveyed volumes, Colliers estimated the future volumes in 2027, which are represented in the Network Diagram 5 in Appendix C.

10.2. Future Year Scenarios

The following future year scenarios have been derived for the purposes of the TIA:

- 2024 & 2025 Survey Scenario: To establish base operations of surrounding road network, based on the existing road configuration, to compare future operations against.

  2027 Base Case Scenario: To establish base operations at opening year, considering base traffic growth and any changes to the road network. This will be used to compare the net impact of the proposed development traffic demands against.

- 2027 Base + Development Case Scenario: This will be used to determine road network operations with inclusion of the proposed development at opening year. Comparison against the Base Case scenarios will determine the overall impact of the proposed development and any necessary mitigation works required.

Based on the development transport demand estimates (Section 9) and base traffic growth (Section 10.1), traffic network diagrams have been prepared showing traffic movements on the roads/intersections surrounding the development site for each of the above scenarios future year cases. These network diagrams are included in Appendix C with the respective diagrams identified as follows:

- **Traffic Network Diagram 1:** 2024 & 2025 Survey Traffic Volumes
- **Traffic Network Diagram 2:** 2027 Base
- **Traffic Network Diagram 3:** Development Traffic Distribution
- **Traffic Network Diagram 4:** Development Traffic Generation
- **Traffic Network Diagram 5:** 2027 Base + Development Traffic Generation

11. Traffic Impact Assessment

11.1. Extent of Assessment

Based on the SARA's RFI, the following intersections will be analysed as part of this TIA:

- Bruce Highway / Boundary Road intersection.
- Bruce Highway / Rachel Drive intersection
- Bruce Highway / Mason Avenue intersection
- Bruce Highway / Jones Street intersection
- Bruce Highway / Olive Street intersection

An assessment of the impacts in the opening year (2027) only for these intersections is proposed in line with DTMR GTIA. A net delay assessment has been completed based on a comparison of the base and project case results. This is included in Section 11.2.7.

11.2. Intersection Operational Assessment

11.2.1. Introduction

The SIDRA Intersection 9.0 software package has been used to assess the traffic operations of the intersections within the scope of this TIA. In most instances, all default SIDRA input parameters were adopted for the analysis. Any specific deviations to defaults adopted are nominated in each section. Detailed SIDRA output reports for all the various scenarios tested are also included in Appendix D.

11.2.2. Bruce Highway / Boundary Road Intersection

The existing intersection configuration has been analysed for the traffic volume scenarios of the opening year stage.

Traffic signal phasing and timing data were obtained through a detailed review of the traffic survey video footage from the respective peak periods.

Figure 11.1 shows the modelled intersection configuration. All default SIDRA modelling parameters were adopted for the purposes of the analysis.

Table 11.1 summarises the analysis outputs from the various scenarios assessed.

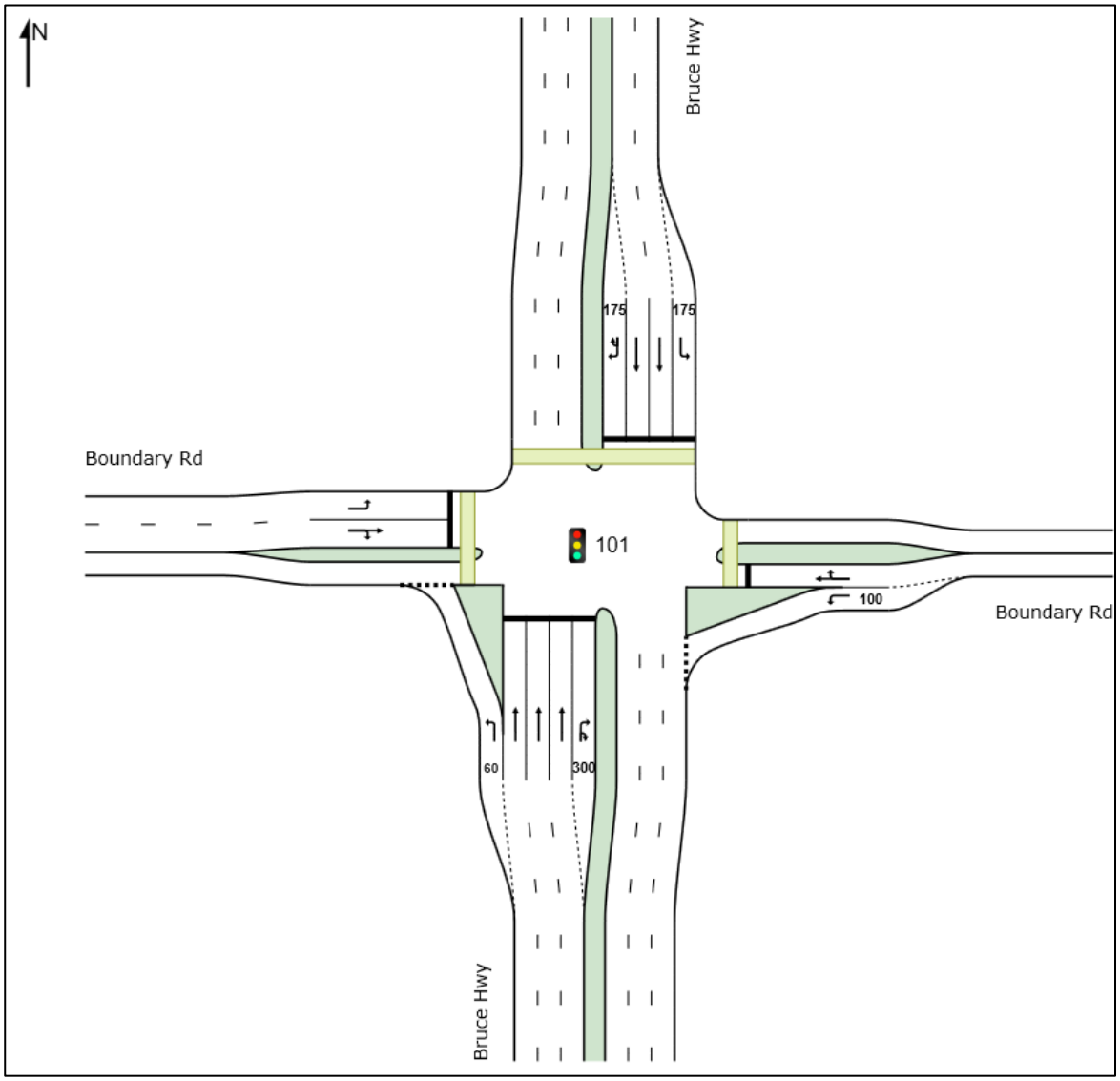


Figure 11.1: Bruce Highway / Boundary Road Intersection – Sidra Layout

Table 11.1: SIDRA Output - Bruce Highway / Boundary Road Intersection.

Scenario	Degree of Saturation	Average Delays		Level of Service	95th Percentile Queue			
		Total Intersection	Worst Movement		(N)	(E)	(S)	(W)
AM PEAK HOUR								
2027 Base_AM	67.1%	29.4 sec	59.7sec Rt from Boundary Rd	C	145 m	32 m	69 m	56 m
2027 Base+Dev_AM	68.4%	29.7 sec	59.7sec Rt from Boundary Rd	C	152 m	41 m	73 m	56 m
PM PEAK HOUR								
2027 Base_PM	82.5%	43.2 sec	58.7sec Rt from Boundary Rd	D	112 m	69 m	135 m	102 m
2027 Base+Dev_PM	85.3%	44.0 sec	58.7sec Rt from Boundary Rd	D	116 m	69 m	149 m	107 m
Rt= Right turn								

The analysis indicates that the intersection is expected to operate at suitable levels up to the 2027 design horizon, with an overall LOS C in the AM peak hour and LOS D in the PM peak hour and a maximum DOS of 85.3%, and it will have a minimal increase in the total intersection delay or queuing when compared to the base case scenario.

Based on this assessment, the proposed development is considered to have limited to no adverse impacts on the operations of this intersection.

11.2.3. Bruce Highway / Rachel Drive Intersection

The existing intersection configuration has been analysed for the traffic volume scenarios of the opening year stage.

Figure 11.2 shows the modelled intersection configuration. All default SIDRA modelling parameters were adopted for the purposes of the analysis.

Table 11.2 summarises the analysis outputs from the various scenarios assessed.

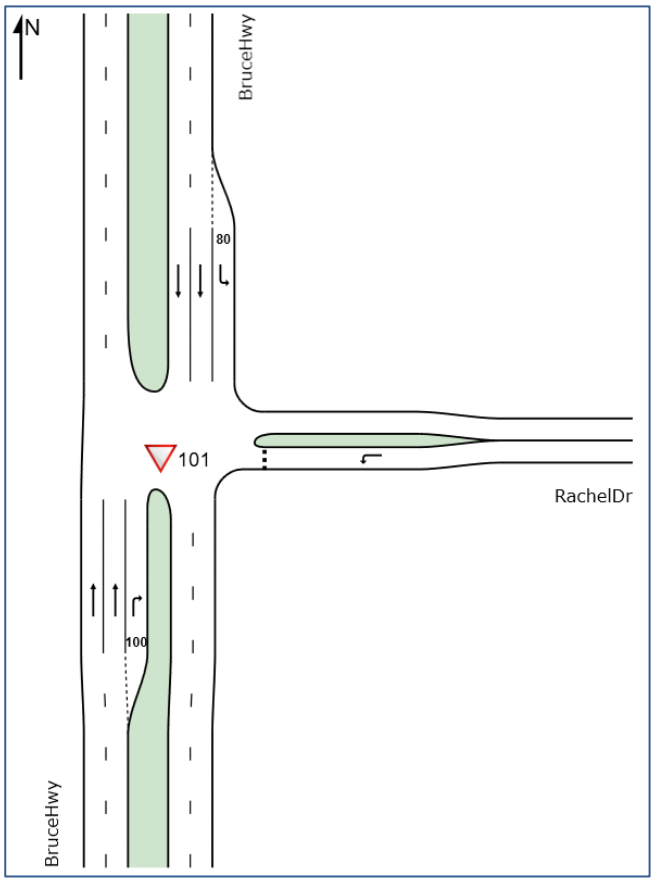


Figure 11.2: Bruce Highway / Rachel Drive Intersection – Sidra Layout

Table 11.2: SIDRA Layout - Bruce Highway / Rachel Drive Intersection.

Scenario	Degree of Saturation	Average Delays		Level of Service	95th Percentile Queue		
		Total Intersecti	Worst Movement		(N)	(E)	(S)
AM PEAK HOUR							
2027 Base_AM	30.4%	1.4 sec	23.8sec Rt from BruceHwy (S)	C	0 m	3 m	7 m
2027 Base+Dev_AM	31.9%	1.4 sec	24.7sec Rt from BruceHwy (S)	C	0 m	3 m	7 m
PM PEAK HOUR							
2027 Base_PM	27.3%	1.0 sec	13.0sec Rt from BruceHwy (S)	B	0 m	2 m	5 m
2027 Base+Dev_PM	27.9%	1.0 sec	13.2sec Rt from BruceHwy (S)	B	0 m	2 m	5 m

Rt= Right turn

*LOS based on worst movement. SIDRA does not provide an overall intersection LOS for priority controlled

The analysis indicates that the intersection is expected to operate at suitable levels up to the 2027 design horizon, with an overall LOS C in the AM peak hours and LOS B in the PM peak hours and a maximum DOS of 31.9%.

Based on this assessment, the proposed development is considered to have no significant impacts on the operations of this intersection.

11.2.4. Bruce Highway / Mason Avenue Intersection

The existing intersection configuration has been analysed for the traffic volume scenarios of the opening year stage.

Figure 11.2 shows the modelled intersection configuration. All default SIDRA modelling parameters were adopted for the purposes of the analysis.

Table 11.2 summarises the analysis outputs from the various scenarios assessed.

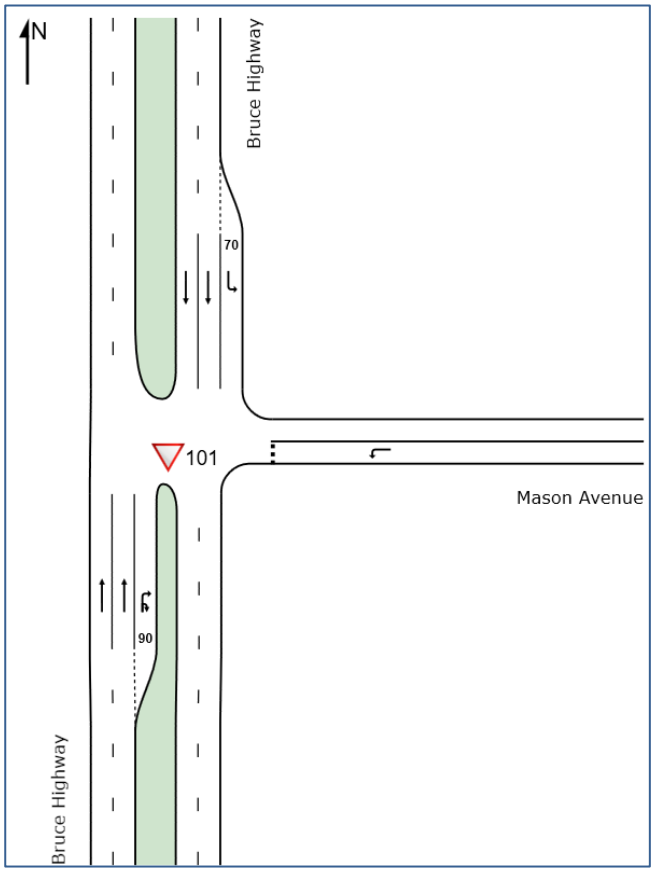


Figure 11.3: Bruce Highway / Mason Avenue Intersection – Sidra Layout

Table 11.3: SIDRA Layout - Bruce Highway / Mason Avenue Intersection.

Scenario	Degree of Saturation	Average Delays		Level of Service *	95th Percentile Queue		
		Total Intersecti	Worst Movement		(N)	(E)	(S)
AM PEAK HOUR							
2027 Base_AM	46.4%	2.9 sec	20.5sec U from Bruce Highway (S)	C	0 m	4 m	15 m
2027 Base+Dev_AM	69.5%	4.1 sec	30.6sec U from Bruce Highway (S)	D	0 m	6 m	27 m
PM PEAK HOUR							
2027 Base_PM	25.3%	1.0 sec	12.7sec U from Bruce Highway (S)	B	0 m	1 m	4 m
2027 Base+Dev_PM	25.3%	1.2 sec	13.0sec U from Bruce Highway (S)	B	0 m	2 m	6 m

Rt= Right turn

*LOS based on worst movement. SIDRA does not provide an overall intersection LOS for priority controlled

The analysis indicates that the intersection is expected to operate at suitable levels up to the 2027 design horizon, with an overall LOS C in the AM peak hours and LOS B in the PM peak hours and a maximum DOS of 31.9%.

Based on this assessment, the proposed development is considered to have no significant impacts on the operations of this intersection

11.2.5. Bruce Highway / Jones Street Intersection

The existing intersection configuration has been analysed for the traffic volume scenarios of the opening year stage.

Figure 11.2 shows the modelled intersection configuration. All default SIDRA modelling parameters were adopted for the purposes of the analysis.

Table 11.2 summarises the analysis outputs from the various scenarios assessed.

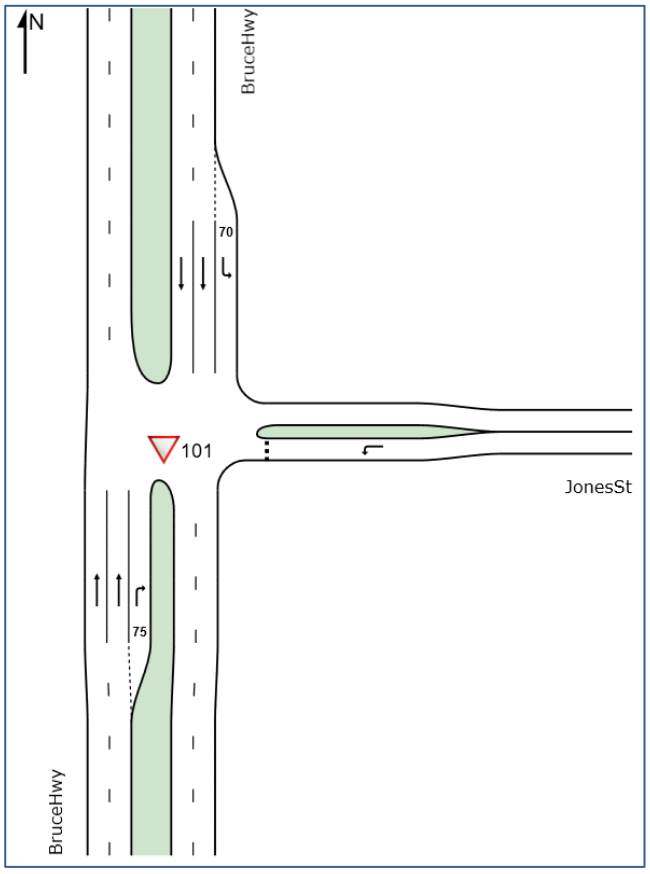


Figure 11.4: Bruce Highway / Jones Street Intersection – Sidra Layout

Table 11.4: SIDRA Layout - Bruce Highway / Jones Street Intersection.

Scenario	Degree of Saturation	Average Delays		Level of Service *	95th Percentile Queue		
		Total Intersecti	Worst Movement		(N)	(E)	(S)
AM PEAK HOUR							
2027 Base_AM	25.9%	0.4 sec	18.6sec Rt from BruceHwy (S)	C	0 m	0 m	1 m
2027 Base+Dev_AM	25.9%	0.4 sec	18.7sec Rt from BruceHwy (S)	C	0 m	0 m	1 m
PM PEAK HOUR							
2027 Base_PM	25.0%	0.3 sec	11.1sec Rt from BruceHwy (S)	B	0 m	0 m	1 m
2027 Base+Dev_PM	25.0%	0.3 sec	11.1sec Rt from BruceHwy (S)	B	0 m	0 m	1 m

Rt= Right turn

*LOS based on worst movement. SIDRA does not provide an overall intersection LOS for priority controlled

The analysis indicates that the intersection is expected to operate at suitable levels up to the 2027 design horizon, with an overall LOS C in the AM peak hours and LOS B in the PM peak hours and a maximum DOS of 25.9%.

Based on this assessment, the proposed development is considered to have no significant impacts on the operations of this intersection

11.2.6. Bruce Highway / Olive Street Intersection

The existing intersection configuration has been analysed for the traffic volume scenarios of the opening year stage. Colliers carried out an analysis of the surveyed video footage, which identified that this intersection operates on an actuated basis. With the signal cycle staying on the main phase (through traffic on Bruce Highway) until any other movement is actuated, through vehicle demand. Colliers has adjusted the SIDRA model settings to closely-reflect what was observed in the video footage.

Figure 11.2 shows the modelled intersection configuration. All default SIDRA modelling parameters were adopted for the purposes of the analysis.

Table 11.2 summarises the analysis outputs from the various scenarios assessed.

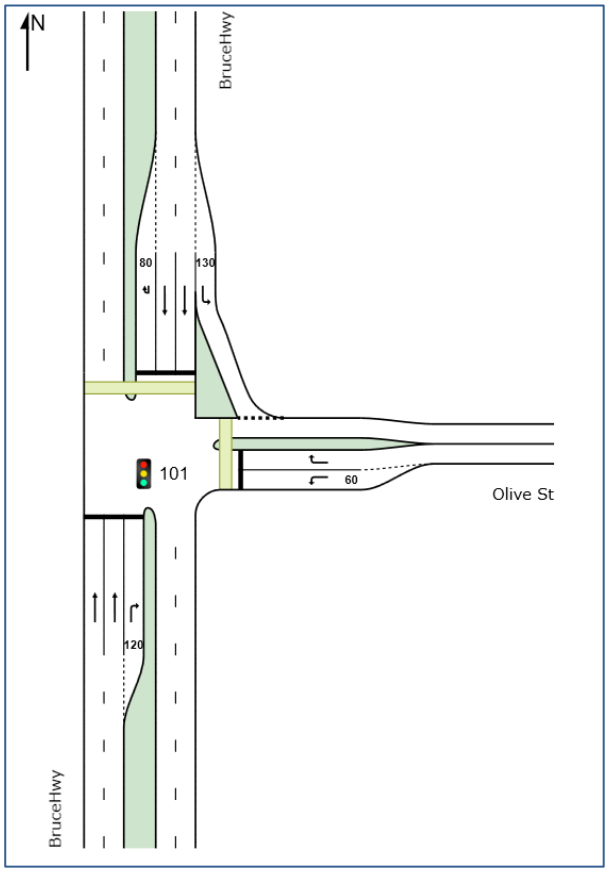


Figure 11.5: Bruce Highway / Olive Street Intersection – Sidra Layout

Table 11.5: SIDRA Layout - Bruce Highway / Olive Street Intersection.

Scenario	Degree of Saturation	Average Delays		Level of Service	95th Percentile Queue		
		Total Intersecti	Worst Movement		(N)	(E)	(S)
AM PEAK HOUR							
2027 Base_AM	41.2%	10.6 sec	57.3sec Rt from Olive St	B	86 m	11 m	26 m
2027 Base+Dev_AM	41.3%	10.7 sec	57.5sec Rt from Olive St	B	86 m	12 m	26 m
PM PEAK HOUR							
2027 Base_PM	72.8%	22.0 sec	46.8sec Rt from Olive St	C	78 m	17 m	81 m
2027 Base+Dev_PM	72.8%	22.1 sec	46.9sec Rt from Olive St	C	78 m	18 m	81 m

The analysis indicates that the intersection is expected to operate at suitable levels up to the 2027 design horizon, with an overall LOS B in the AM peak hours and LOS C in the PM peak hours and a maximum DOS of 72.8%

Based on this assessment, the proposed development is considered to have no significant impacts on the operations of this intersection

11.2.7. Net Delay Assessment

In line with the requirements of the DTMR GTIA, the net impact of the development traffic on the SCR network in terms of delays has also been quantified. Based on the respective SIDRA analysis results for the 2027 Base and Base + Development scenario, a comparison of the net intersection delay of the SCR network with and without the proposed development is shown in Table 11.6.

Table 11.6: SCR Intersections – Net Intersection Delay Comparison

Intersection	Scenario	Net Intersection Delay (vehicle-minutes)	
		2027 Base	2027 Project
Bruce Highway / Boundary Road	AM Peak Hour	1223	1247
	PM Peak Hour	1911	1956
Bruce Highway / Mason Avenue	AM Peak Hour	74	101
	PM Peak Hour	28	29
Bruce Highway / Rachel Drive	AM Peak Hour	72	74
	PM Peak Hour	56	56
Bruce Highway / Jones St	AM Peak Hour	17	17
	PM Peak Hour	15	15
Bruce Highway / Olive st	AM Peak Hour	256	256
	PM Peak Hour	565	566
Total Network Delay		3,395	3,495
Net Change in Delay		**100**	**2.951%**

*As per Section 8.3.1 of the DTMR GTIA, the net intersection delay of the development case has been calculated by adopting the '2026 Base + Development' movement delays (as derived from SIDRA) to the `2026 Base' traffic volumes to ensure that the net impact does not include significant additional delays to development traffic movements within the calculations.

As seen in Table 11.6, the development is likely to result in a +2.95% increase in net intersection delays on the state-controlled road network during peak hours. Section 11.3.1 of the DTMR GTIA indicates that mitigation works are only required to offset any development that results in more than a 5% increase in net intersection delays across the network. According to the DTMR GTIR, a net delay increase of less than 5% is considered to not represent a "material increase", which is also in recognition of the "variabilities inherent in traffic estimation and delay analysis".

As such, given that the development is likely to result in only a 2.95% net intersection delay increase, this indicates that no mitigation measures are necessary for any of the above intersections in accordance with the DTMR GTIA.

11.2.8. Safety Assessment

Based on the assessment above, the proposed development is not anticipated to result in any significant safety or operational impacts to the existing operations of the state-controlled road network.

All intersections analysed still have the capacity for an increase in traffic. Bruce Highway / Mason Avenue, which had a significant increase, has a long right-turn lane, which, as per the SIDRA analysis, is still underutilised.

Overall, the proposed development is not fundamentally changing the operations of the state-controlled road and is appropriate from a traffic engineering perspective.

11.2.9. Norman Road Turn Warrant Assessment

A turn lane warrant analysis has been undertaken in accordance with Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossing Management (2020) to determine if turn treatment upgrades are required as a result of the proposed development.

Table 11.7 details the parameters and turn lane treatment types required at the proposed development site access based on the estimated 2027 peak hour traffic volumes. Figure 11.6 shows the Turn Lane Warrant Assessment.

Table 11.7: Turn Lane Warrant Assessment – Norman Road / Site Access Intersection

Approach	Scenario	AM Peak Hour			PM Peak Hour		
		Q_R	Q_M	Treatment	Q_R	Q_M	Treatment
Left Turn-in	2027 Project	13	123	BAL	26	114	BAL
Right Turn-in	2027 Project	22	206	BAR(C)	43	269	CHR

The assessment indicates that the existing development site access should be upgraded to a Channelised Right Turn Treatment (CHR) treatment (AUL). A preliminary review indicates that the required treatments can be accommodated within the upgraded Norman Road.

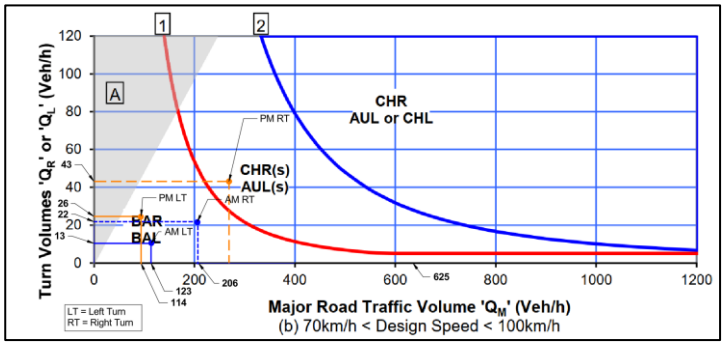


Figure 11.6: Norman Road/Site Access turn warrant access.

12. Internal Road Network

12.1. Internal roads

Significant changes to the internal road layout are proposed as part of the revised plans. In general, the internal road layout offers a 6m wide road, with all intersections operating as priority-controlled intersections. Turn-around areas are proposed for servicing vehicles where required at terminated roadways.

The development plans propose an internal pedestrian footpath adjacent to the internal road network. Furthermore, based on the development being a Retirement Village, which is expected to have an internal speed limit of 20km/h, the lower order roads are considered suitable for shared path for pedestrians and cars. The main internal collector road is to have a separated pedestrian path zone and vehicle roadway.

The internal intersections are to include line marking and signage as required to reinforce appropriate priorities to users. Speed control will be implemented as required to help manage speeds within the development as well. These items will progress further as more detailed design planning occurs.

12.2. Intersection Locations and Treatments

The internal roads have been planned with a carriageway width of 6m. Since these roads are intended to be private, compliance with Council Standards for road function and cross sections is not considered necessary. Instead, the design adheres to Australian Standards, Complete Streets, and Queensland Streets guidelines.

Swept paths analysis has been prepared to validate the adequacy of the proposed carriageway. The analysis confirms that the suggested carriageway is suitable for the passage of a B99 passenger vehicle and ensure the circulation of an RCV around the site.

It is noted that for road segments exceeding 100 meters, the implementation of local speed control devices is recommended to manage and maintain safe vehicle operating speeds.

12.3. Driveway Locations

The specific locations of residential lot driveways will be resolved as required as part of the Detail Design and Operations Works to minimise conflicts with adjacent road features. Based on the current set of plans, no significant traffic engineering issues are expected to impact the proposed driveway locations.

12.4. Active Travel Provisions

The development proposes an internal shared road, with the speed limited to 20km/h. Therefore, the internal road network is also considered as provisions for active travel.

Overall, the internal provision for footpaths and linkages will provide a permeable and walkable network, aligning with pedestrian desire lines and minimising walking distances.

It is generally proposed that bicycle provisions will be accommodated on-road. Shared usage of bicycles is proposed on the carriageway of the internal road, which is considered acceptable based on the low-speed environment and low traffic volumes of these roads.

13. Code Assessments

An assessment against the following codes is included in Appendix E:

- State Code 6: Protection of state transport networks

14. Summary and Conclusions

14.1. Proposed Development

The proposed development is for a Retirement Village located at 952 Norman Road, Rockhampton. The development proposes a total of 505 dwellings across a 27.62ha site, with associated facilities including RV parking and a clubhouse. The revised scheme reflects an increase in dwelling yield and site area compared to the previously approved scheme.

14.2. Parking Arrangements

The proposed development provides 1,221 car parking spaces, comprising 1,010 resident spaces (2 per dwelling), 211 visitor spaces (including 5 PWD spaces), and 105 RV parking spaces. The proposed parking supply exceeds the minimum requirements under the Rockhampton Regional Planning Scheme and is considered suitable to support the development.

14.3. Access Arrangements

The development includes three access points: a main 13m wide access to Norman Road, a 6.5m wide emergency access to McMillan Avenue, and a 6m wide access for RV parking also off McMillan Avenue. All access arrangements comply with relevant Australian Standards and Council guidelines and are considered acceptable.

14.4. Service Vehicle Arrangements

The internal road network has been designed to accommodate service vehicles, including a 10.3m refuse collection vehicle and a 12.5m heavy rigid vehicle for emergency services. Swept path analysis demonstrates that the internal layout can safely accommodate these vehicles. Removalist trucks (up to MRV size) are also expected to operate effectively within the site.

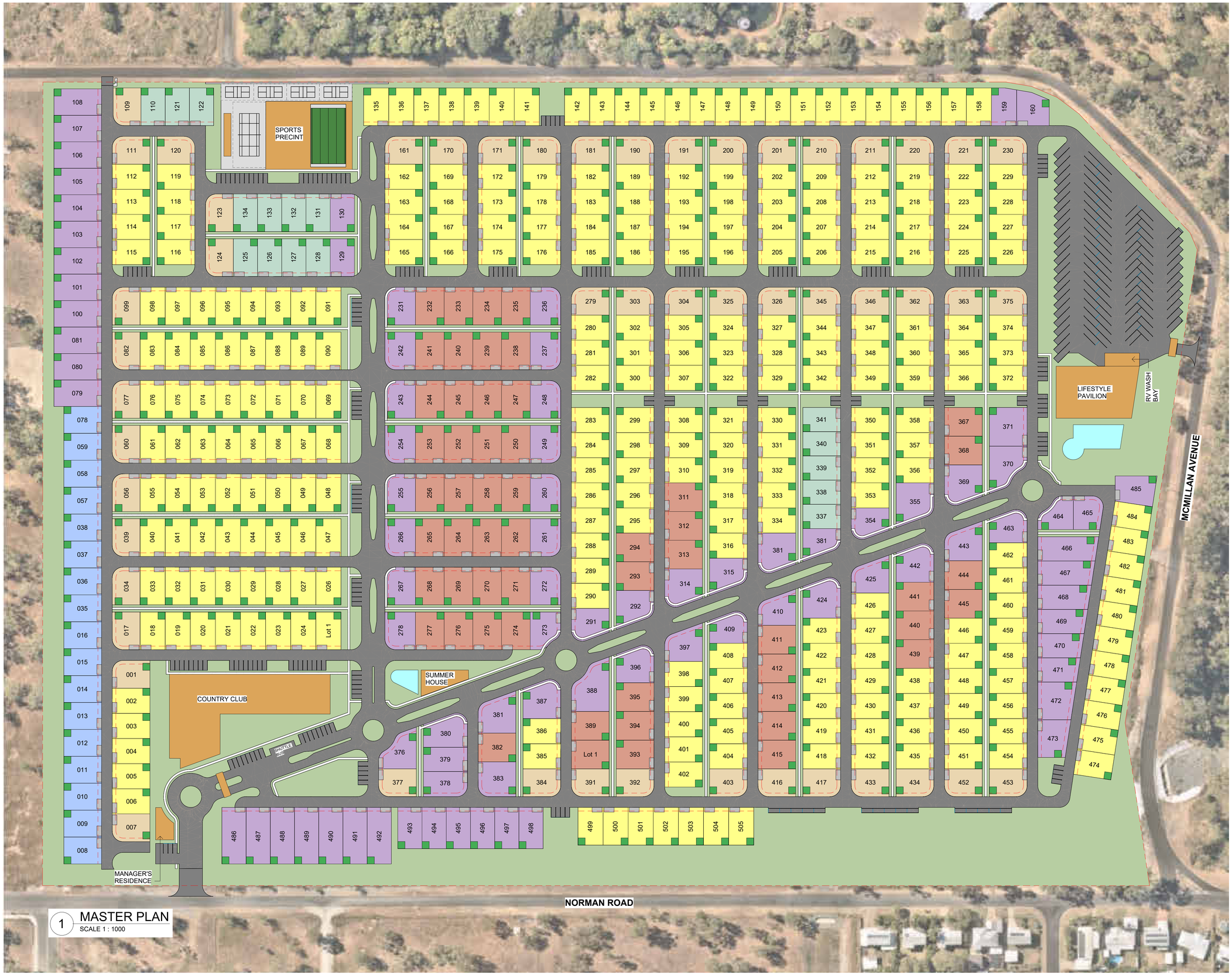
14.5. Traffic Impact Assessment

Traffic generation for the proposed development has been estimated at 116vph during peak hours and 1,313vpd. A detailed SIDRA analysis shows that surrounding intersections, including those on the Bruce Highway, will continue to operate at acceptable levels of service in the 2027 design horizon. The development is projected to increase net intersection delays by +2.95%, which is below the 5% DTMR GTIA threshold for requiring mitigation measures.

14.6. Conclusion

Based on the assessment contained within this report, Colliers see no traffic engineering reasons why the relevant approvals should not be granted.

Appendix A Development Plans



1 MASTER PLAN
SCALE 1 : 1000

Living Gems

120 SIGANTO DRIVE, HELENSVALE, QLD, 4212
INFO@GEMLIFE.COM.AU
WWW.GEMLIFE.COM.AU

REGISTERED ARCHITECT - PHILLIP
QLD-5581, NSW-10322
VIC-19672

DO NOT SCALE FROM PLAN - VERIFY ALL DIMENSIONS PRIOR TO ORDERING OR SHOP FABRICATION. IF IN DOUBT ASK.

ALL WORK TO COMPLY WITH THE POSITIONS OF THE BCA AND NCC OF AUSTRALIA, AUSTRALIAN STANDARDS AND ANY BYLAWS OR REQUIREMENTS OF THE LOCAL AUTHORITY.

PLEASE READ CAREFULLY

THIS PLAN CERTIFIED CORRECT IS THE ONE REFERRED TO IN THE CONTRACT & SPECIFICATIONS AND I UNDERSTAND CHANGES HEREAFTER MAY NOT BE POSSIBLE. THESE SUPERSEDE ALL OTHER PREVIOUS PLANS OR SKETCHES.

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REV	DESCRIPTION	DATE
AA	MASTER PLAN CONCEPT	26/09/24
AB	MASTER PLAN UPDATED	30/09/24
AC	MASTER PLAN UPDATED	08/10/24
AD	MASTER PLAN UPDATED	24/10/24
AE	MASTER PLAN UPDATED	28/11/24
AF	MASTER PLAN UPDATED	20/12/24
AG	MASTER PLAN UPDATED	07/01/25
AH	MASTER PLAN UPDATED	13/01/25
AI	MASTER PLAN UPDATED	07/02/25
AJ	MASTER PLAN UPDATED	12/02/25
AK	MASTER PLAN UPDATED	17/02/25
AL	MASTER PLAN UPDATED	17/02/25
AM	MASTER PLAN UPDATED	28/03/25
AN	MASTER PLAN UPDATED	28/03/25

SITE INFO
SITE AREA: 276,156.35 m2
VISITOR PARKING: 209
RV PARKING: 121
SHUTTLE BUS PARKING: 01

OPEN SPACE CALCS
LANDSCAPING:
RECREATIONAL SPACES:
PEDESTRIAN SHAREWAY:
TOTAL OPEN SPACE:

SITE COVERAGE
DESIGN AVERAGE (193m2):
CLUBHOUSE UNDER ROOF AREA:
RV PARKING: 126
LIFESTYLE PAVILION UNDER ROOF AREA:
TOTAL SITE COVERAGE:

LEGEND

- 13.5 x 21.0 m - TYPICAL LOT
- 14.0 x 21.0 m - TYPICAL LOT
- 15.0 x 21.0 m - TYPICAL LOT
- 15.5 x 21.0 m - TYPICAL CORNER LOT
- 16.0 x 21.0 m - TYPICAL LARGE LOT
- SPECIAL LOT - VARIOUS DIMENSIONS

YELD

13.5 x 21.0 TYPICAL LOT	16
14.0 x 21.0 TYPICAL LOT	283
15.0 x 21.0 TYPICAL LOT	17
15.5 x 21.0 TYPICAL CORNER LOT	50
16.0 x 21.0 TYPICAL LARGE LOT	55
SPECIAL LOT - VARIOUS DIMENSIONS	84
Grand total: 505	

SCALE
As indicated@A1
PRINT AT 50% @ A3

N

0 50m 100m

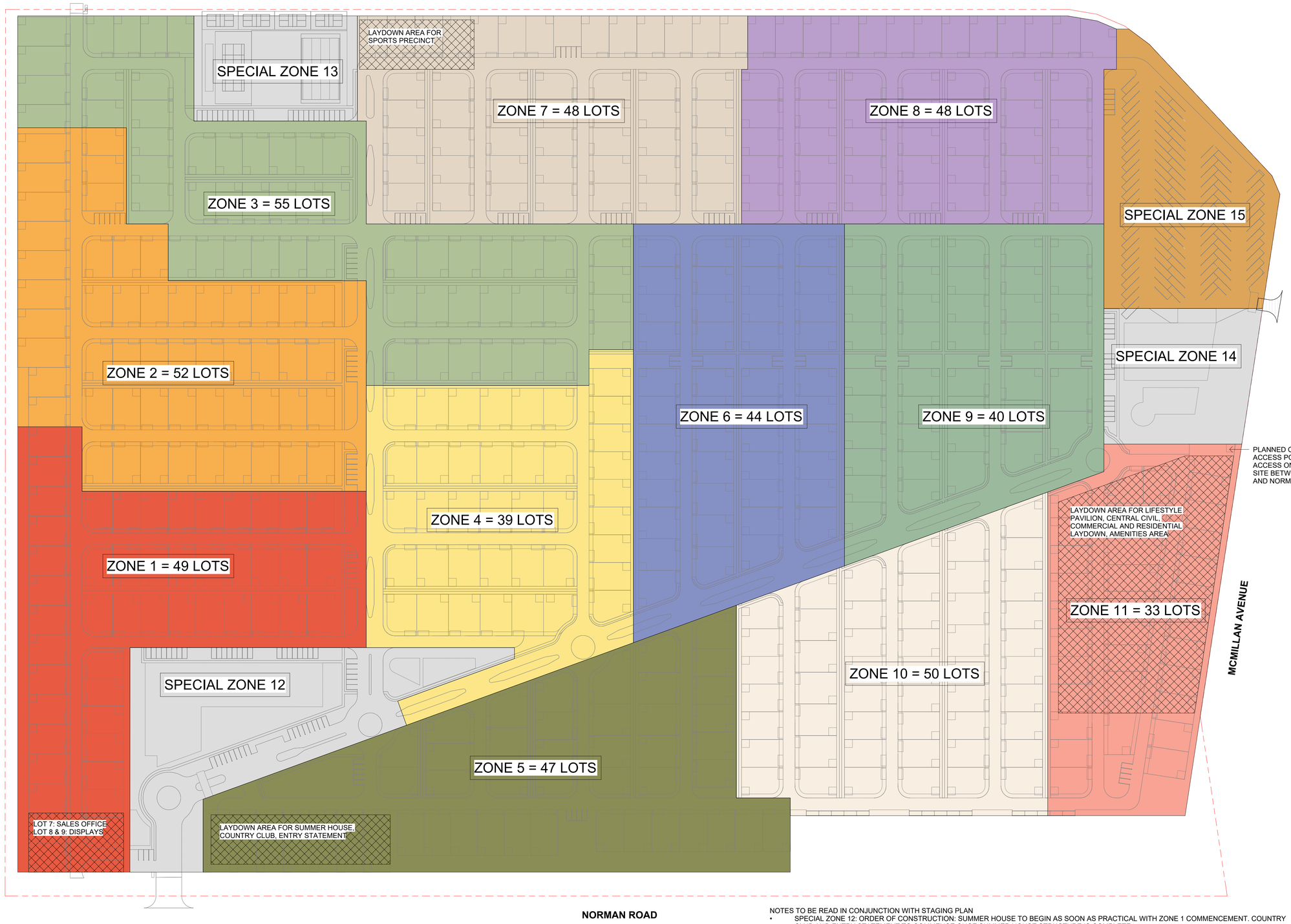
PROJECT
ROCKHAMPTON
19 McMillan Avenue, Parkhust, QLD 4702, Australia

BRANCH	SITE
LG	PKH
GATE	DOC TYPE
1	DWG
BUILDING CODE	DISCIPLINE
MP	A
DRAWING No	REVISION
A010	AN

DRAWN	CHECKED	APPROVED
BG	BG	PN

DRAWING TITLE
MASTER PLAN

FILE NAME
LG - PKH - DWG - MP - A - A010



NOTES TO BE READ IN CONJUNCTION WITH STAGING PLAN

- SPECIAL ZONE 12: ORDER OF CONSTRUCTION: SUMMER HOUSE TO BEGIN AS SOON AS PRACTICAL WITH ZONE 1 COMMENCEMENT. COUNTRY CLUB AND ENTRY STATEMENT TO COMMENCE ONCE SUMMER HOUSE STRUCTURE IS COMPLETE.
- SPECIAL ZONE 13 TO COMMENCE UPON COMMENCEMENT OF ZONE 4
- SPECIAL ZONE 14 TO COMMENCE UPON COMMENCEMENT OF ZONE 9
- TEMPORARY RESIDENT ACCESS DURING ENTRY STATEMENT CONSTRUCTION FROM VISITORS CARPARK ADJACENT TO MANAGERS RESIDENCE
- SALES OFFICE - LOT 7, DISPLAY HOMES - LOTS 8 AND 9
- CONSTRUCTION LAYDOWN AREA: ZONE 5 IS LAYDOWN AREA FOR SPECIAL ZONE 12; ZONE 7 IS LAYDOWN AREA FOR SPECIAL ZONE 13; ZONE 11 IS LAYDOWN AREA FOR SPECIAL ZONE 14, COMMERCIAL CONSTRUCTION OFFICE, RESIDENTIAL CONSTRUCTION OFFICES.

1 STAGING PLAN
SCALE 1 : 1000

Living Gems

120 SIGANTO DRIVE, HELENSVALE, QLD, 4212
INFO@GEMLIFE.COM.AU
WWW.GEMLIFE.COM.AU

REGISTERED ARCHITECT - PHILLIP
QLD-5581, NSW-10322
VIC-19672

DO NOT SCALE FROM PLAN - VERIFY ALL DIMENSIONS PRIOR TO ORDERING OR SHOP FABRICATION. IF IN DOUBT ASK.

ALL WORK TO COMPLY WITH THE POSITIONS OF THE BCA AND NCC OF AUSTRALIA, AUSTRALIAN STANDARDS AND ANY BYLAWS OR REQUIREMENTS OF THE LOCAL AUTHORITY.

PLEASE READ CAREFULLY

THIS PLAN CERTIFIED CORRECT IS THE ONE REFERRED TO IN THE CONTRACT & SPECIFICATIONS AND I UNDERSTAND CHANGES HEREAFTER MAY NOT BE POSSIBLE. THESE SUPERSEDE ALL OTHER PREVIOUS PLANS OR SKETCHES.

© 2024 REPRODUCTION IN PART OR WHOLE IS STRICTLY FORBIDDEN

REV	DESCRIPTION	DATE
AA	MASTER PLAN UPDATED	28/03/25
AB	MASTER PLAN UPDATED	28/03/25

SCALE
1 : 1000@A1
PRINT AT 50% @ A3

0 50m 100m

PROJECT
ROCKHAMPTON
19 McMillan Avenue, Parkhust, QLD 4702, Australia

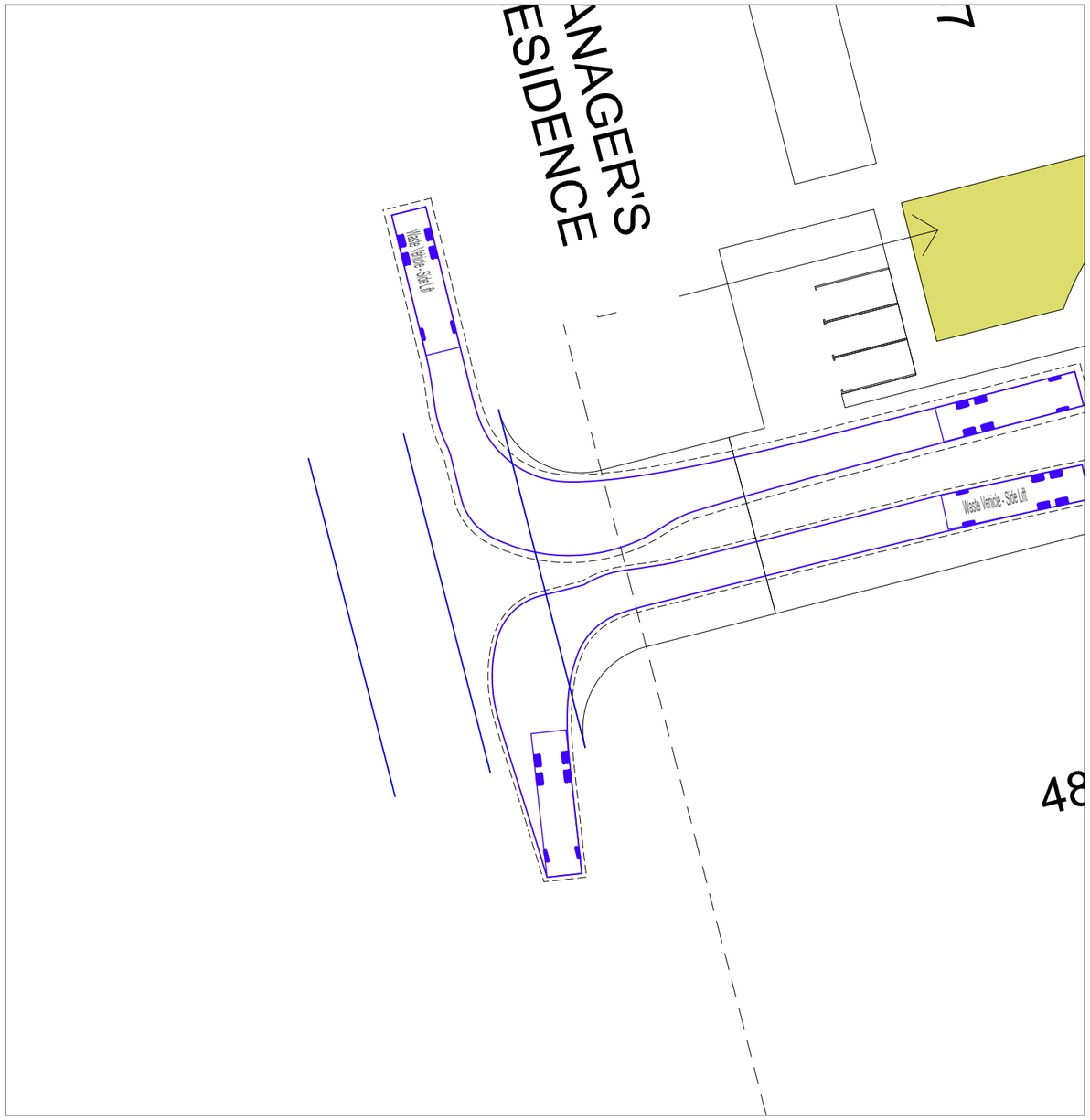
BRANCH	SITE
LG	PRH
GATE	DOC TYPE
1	DWG
BUILDING CODE	DISCIPLINE
MP	A
DRAWING No	REVISION
A050	AB

DRAWN	CHECKED	APPROVED
PN	PN	PN

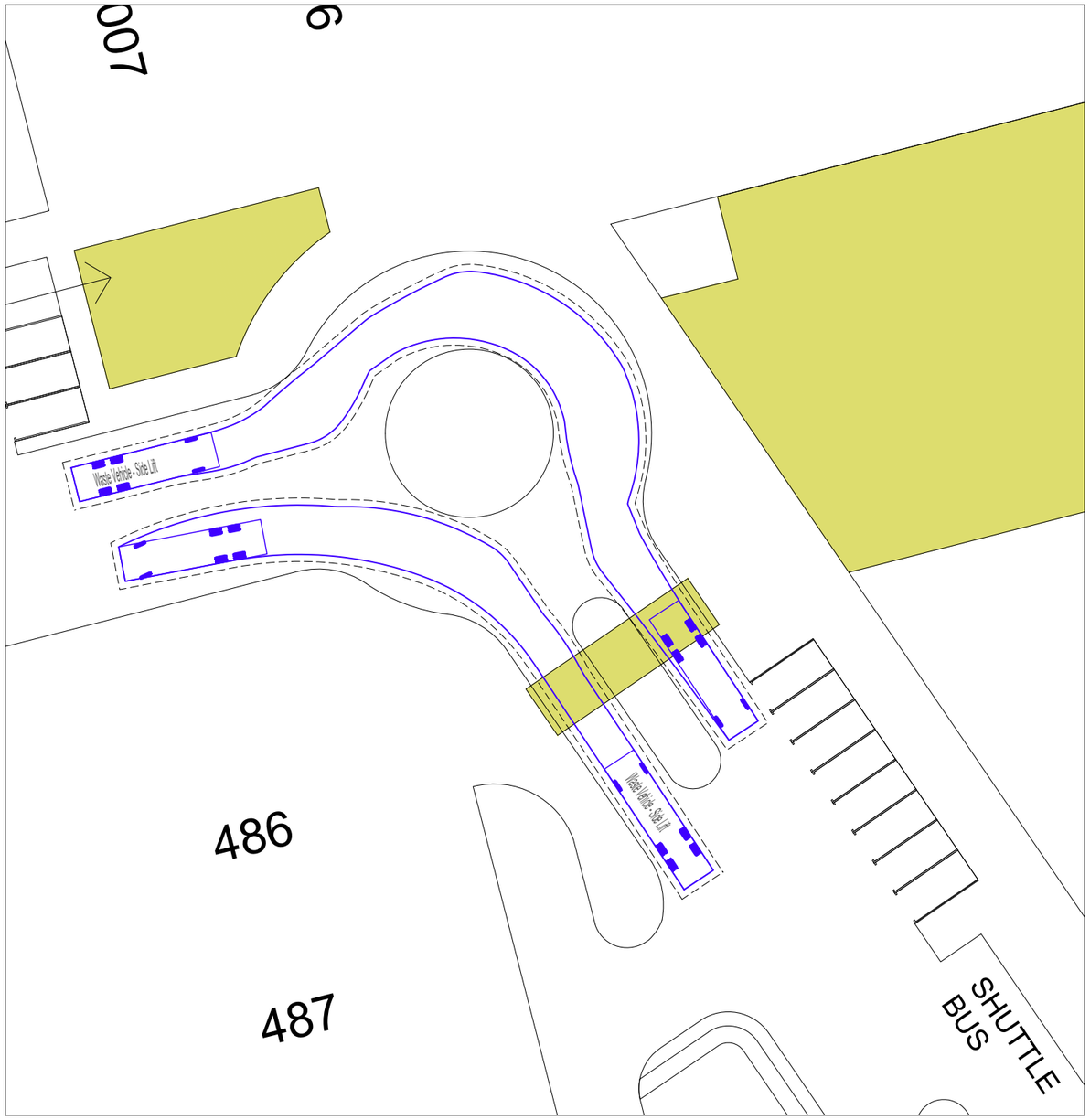
DRAWING TITLE
STAGING DIAGRAM

FILE NAME
LG - PRH - DWG - MP - A - A050

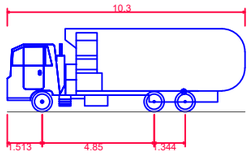
Appendix B Colliers Drawings



WCV - DEVELOPMENT ACCESS

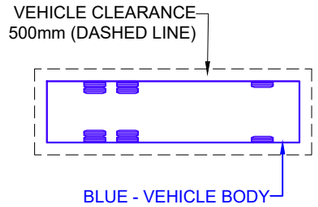


WCV - ROUNDABOUT ACCESS



RCV SIDE LOADER

Overall Length	10.300m
Overall Width	2.500m
Overall Body Height	3.600m
Min Body Ground Clearance	0.260m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	9.757m
Body Clearance	0.500m



NOT FOR CONSTRUCTION

14 April 2025

REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
A	14.04.2025	ORIGINAL ISSUE	BV	MGr	MGr

SCALE 0 4 8 12 16 20m

SCALE 1:400 AT ORIGINAL SIZE

NORTH

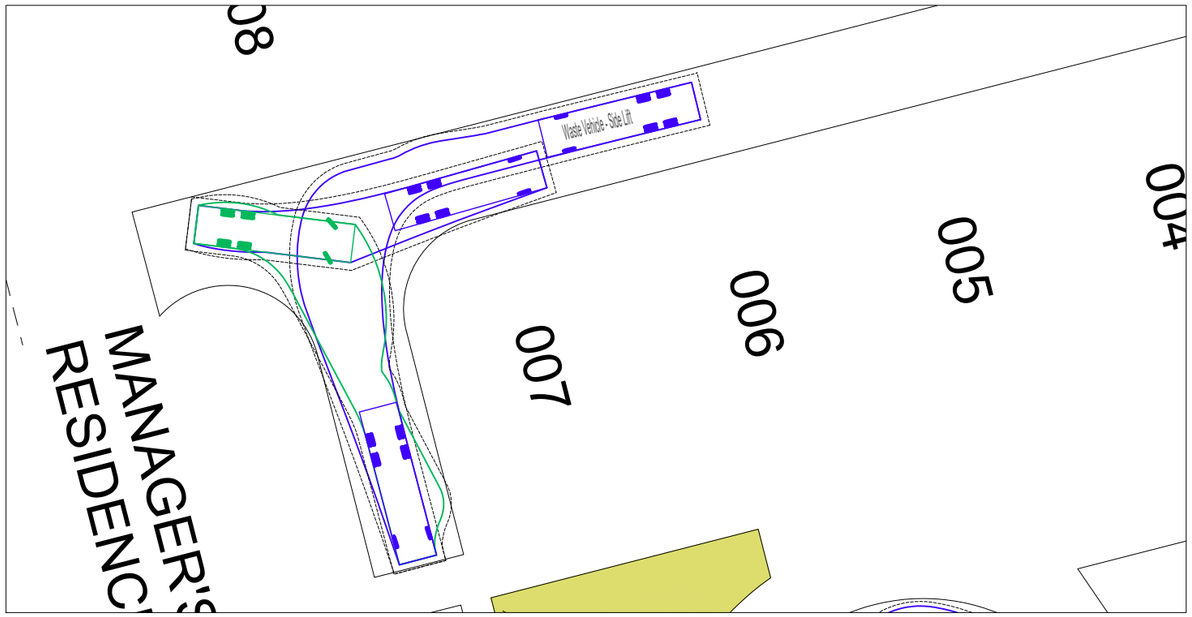
CLIENT: LivingGems

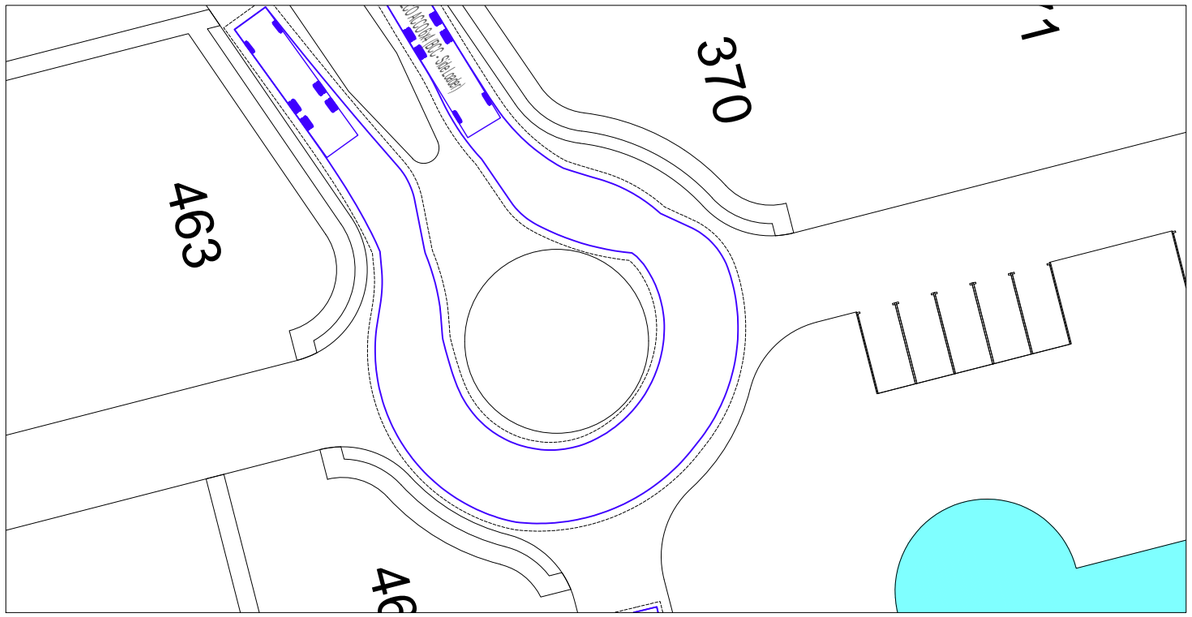
Colliers International Engineering & Design (TTMC) Pty Ltd
ABN 65 010 868 621
LEVEL 8, 369 Ann Street, BRISBANE QLD 4000
P.O. BOX 12015, BRISBANE QLD 4003
T: (07) 3327 9500 F: (07) 3327 9501
E: ttmbris@ttmgroup.com.au W: www.ttmgroup.com.au

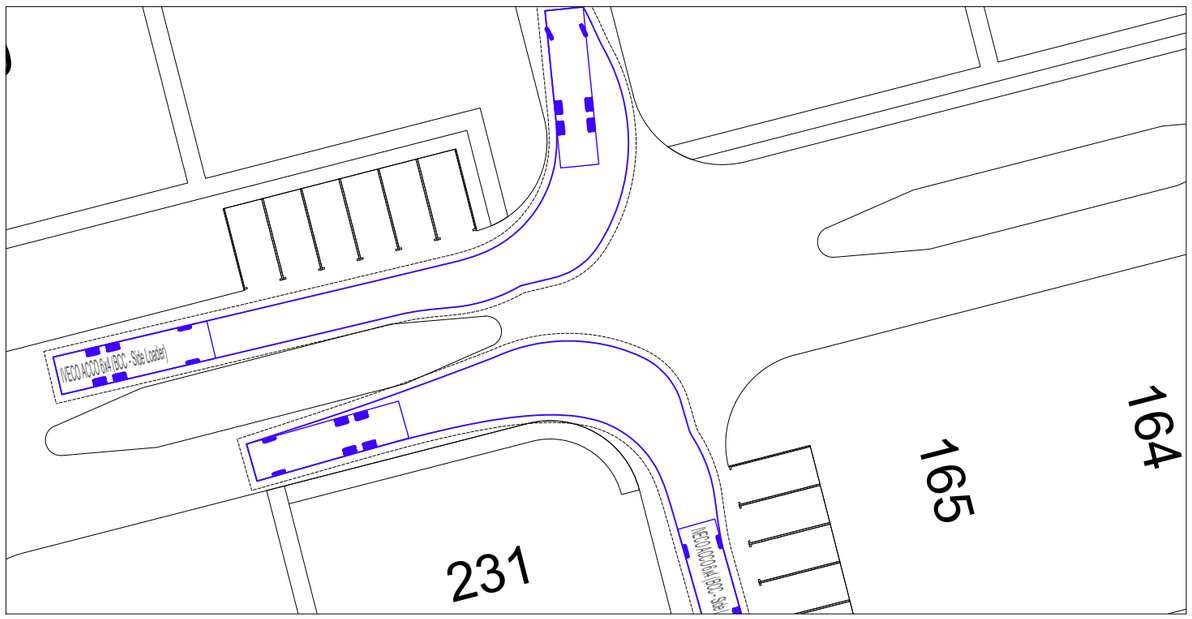
PROJECT: **952 Norman Road, Rockhampton**

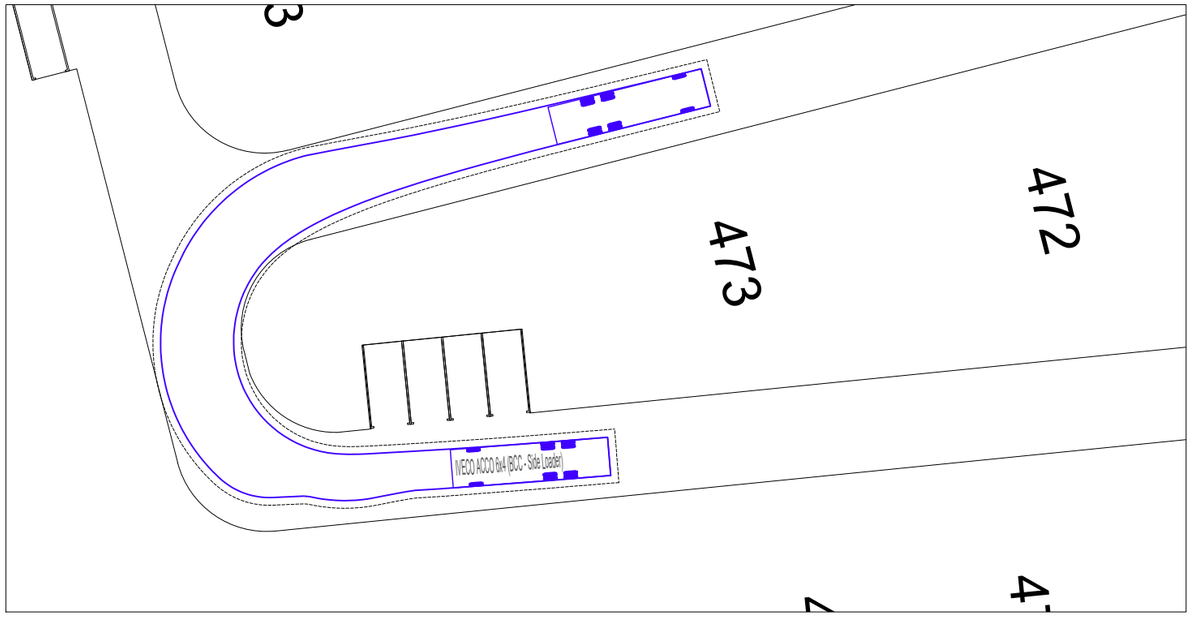
DRAWING TITLE: **SWEPT PATH ANALYSIS**
10.3m SIDE-LOADER RCV DESIGN VEHICLE

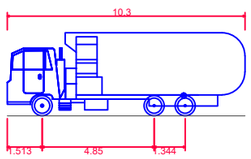
PROJECT NUMBER	23BRT0757
ORIGINAL SIZE	A3
DRAWING NUMBER	25BRT0757-01
REVISION	A
DATE	14 Apr 2025
SHEET	1 OF 1





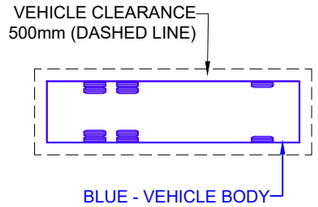






RCV SIDE LOADER

Overall Length	10.300m
Overall Width	2.500m
Overall Body Height	3.600m
Min Body Ground Clearance	0.260m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	9.757m
Body Clearance	0.500m



NOT FOR CONSTRUCTION

14 April 2025

REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
A	14.04.2025	ORIGINAL ISSUE	BV	MGr	MGr

SCALE 0 4 8 12 16 20m

SCALE 1:400 AT ORIGINAL SIZE

NORTH

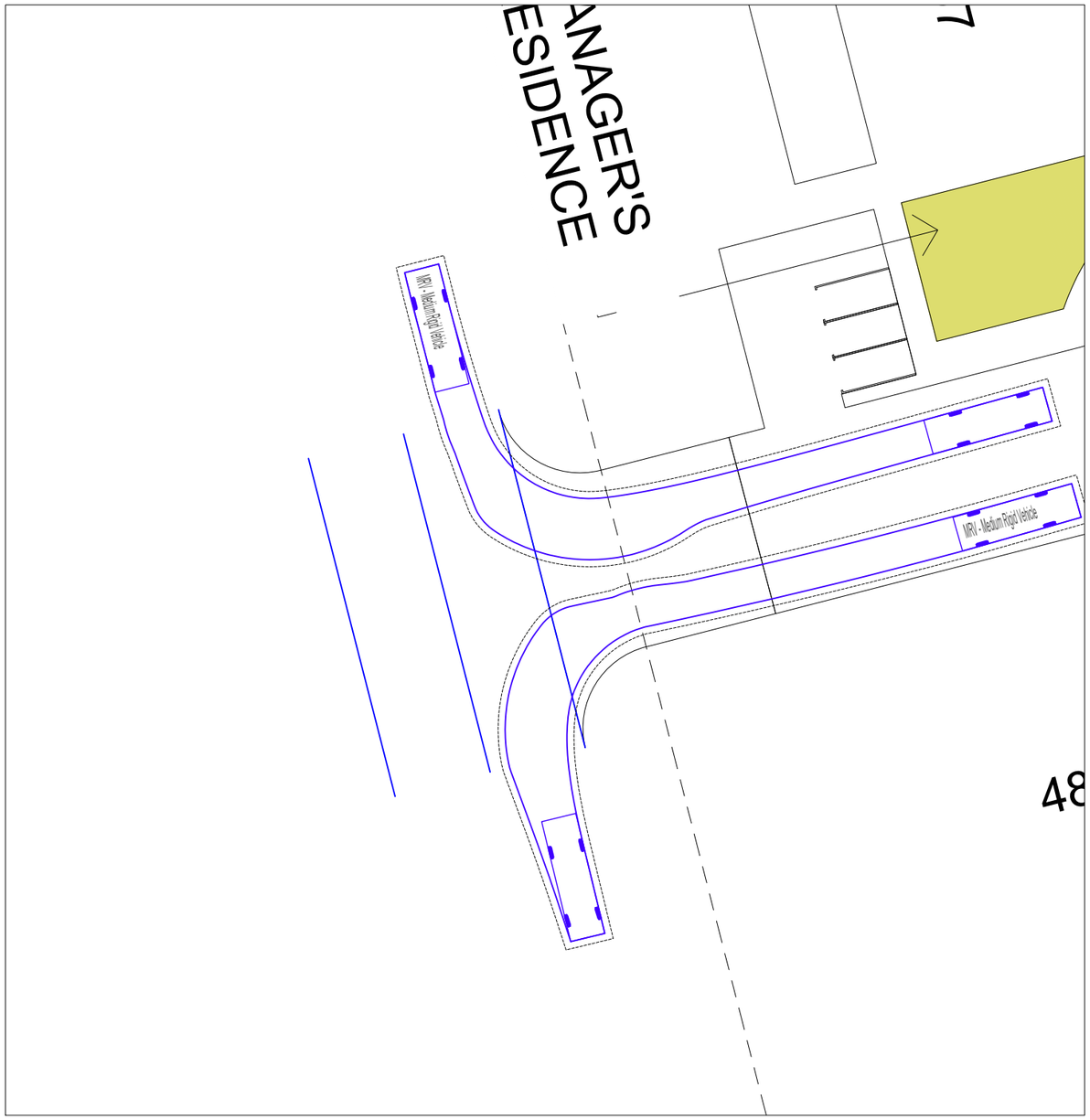
CLIENT: LivingGems

Colliers International Engineering & Design (TTMC) Pty Ltd
ABN 65 010 868 621
LEVEL 8, 369 Ann Street, BRISBANE QLD 4000
P.O. BOX 12015, BRISBANE QLD 4003
T: (07) 3327 9500 F: (07) 3327 9501
E: ttmbris@ttmgroup.com.au W: www.ttmgroup.com.au

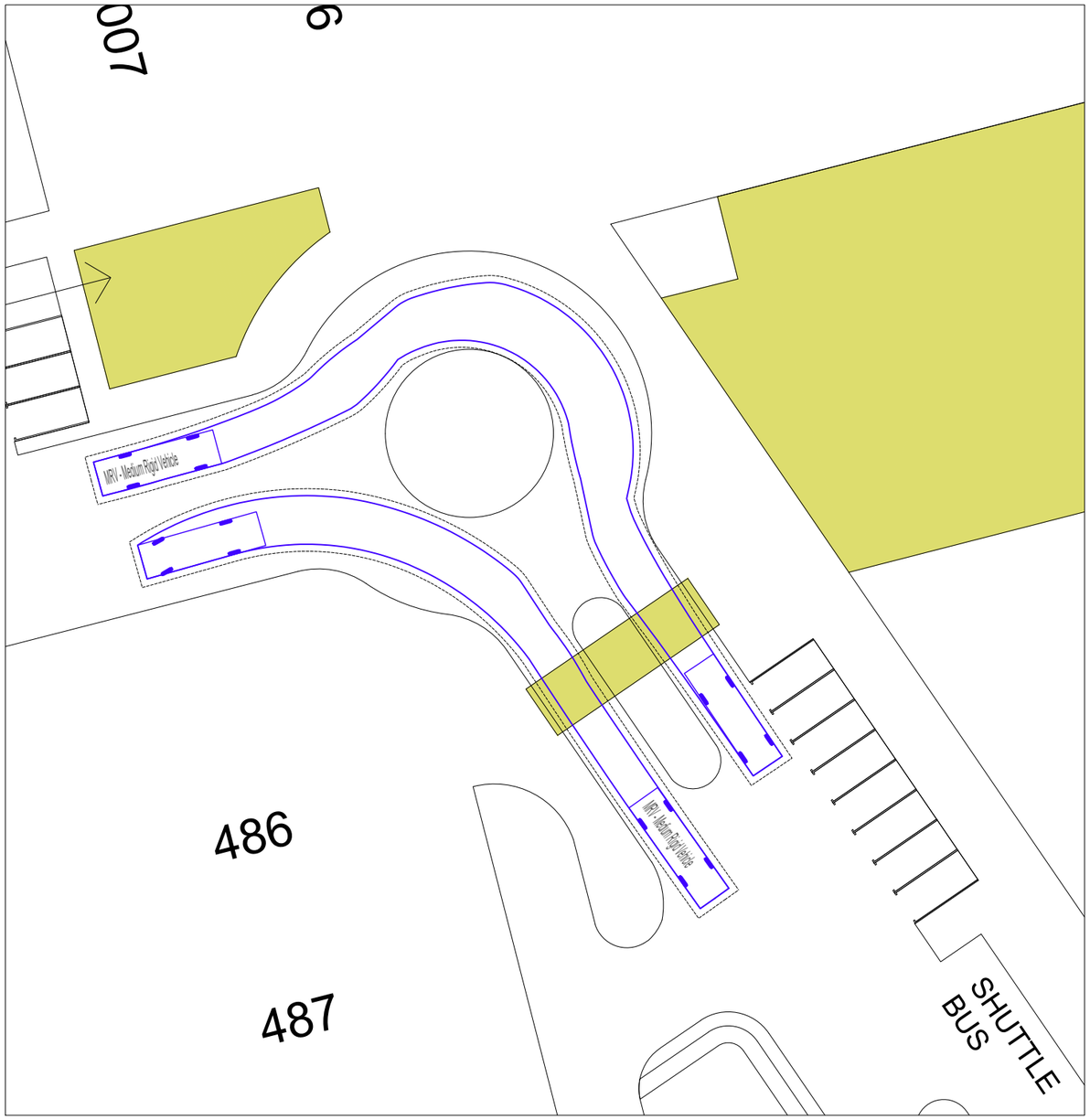
PROJECT: **952 Norman Road, Rockhampton**

DRAWING TITLE: **SWEPT PATH ANALYSIS**
10.3m SIDE-LOADER RCV DESIGN
VEHICLE - INTERNAL MANOEUVRES

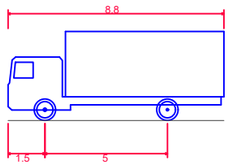
PROJECT NUMBER	23BRT0757
ORIGINAL SIZE	A3
DRAWING NUMBER	25BRT0757-02
REVISION	A
DATE	14 Apr 2025
SHEET	1 OF 2



MRV - DEVELOPMENT ACCESS



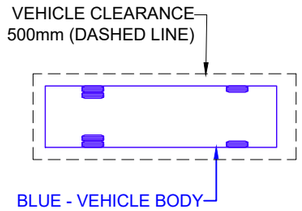
MRV - ROUNDABOUT ACCESS



VEHICLE PROFILES

MRV - Medium Rigid Vehicle

Overall Length	8.800m
Overall Width	2.500m
Overall Body Height	3.633m
Min Body Ground Clearance	0.428m
Track Width	2.500m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	10.000m
Design Speed Forward	5.0km/h
Clearance Envelope	0.500m



NOT FOR CONSTRUCTION

14 April 2025

REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
A	14.04.2025	ORIGINAL ISSUE	BV	MGr	MGr

SCALE 0 4 8 12 16 20m
SCALE 1:400 AT ORIGINAL SIZE

NORTH

CLIENT: LivingGems

Colliers International Engineering & Design (TTMC) Pty Ltd
ABN 65 010 868 621
LEVEL 8, 369 Ann Street, BRISBANE QLD 4000
P.O. BOX 12015, BRISBANE QLD 4003
T: (07) 3327 9500 F: (07) 3327 9501
E: ttmbris@ttmgroup.com.au W: www.ttmgroup.com.au

PROJECT: **952 Norman Road, Rockhampton**

DRAWING TITLE: **SWEPT PATH ANALYSIS**
8.8m Medium Rigid Vehicle - DESIGN VEHICLE

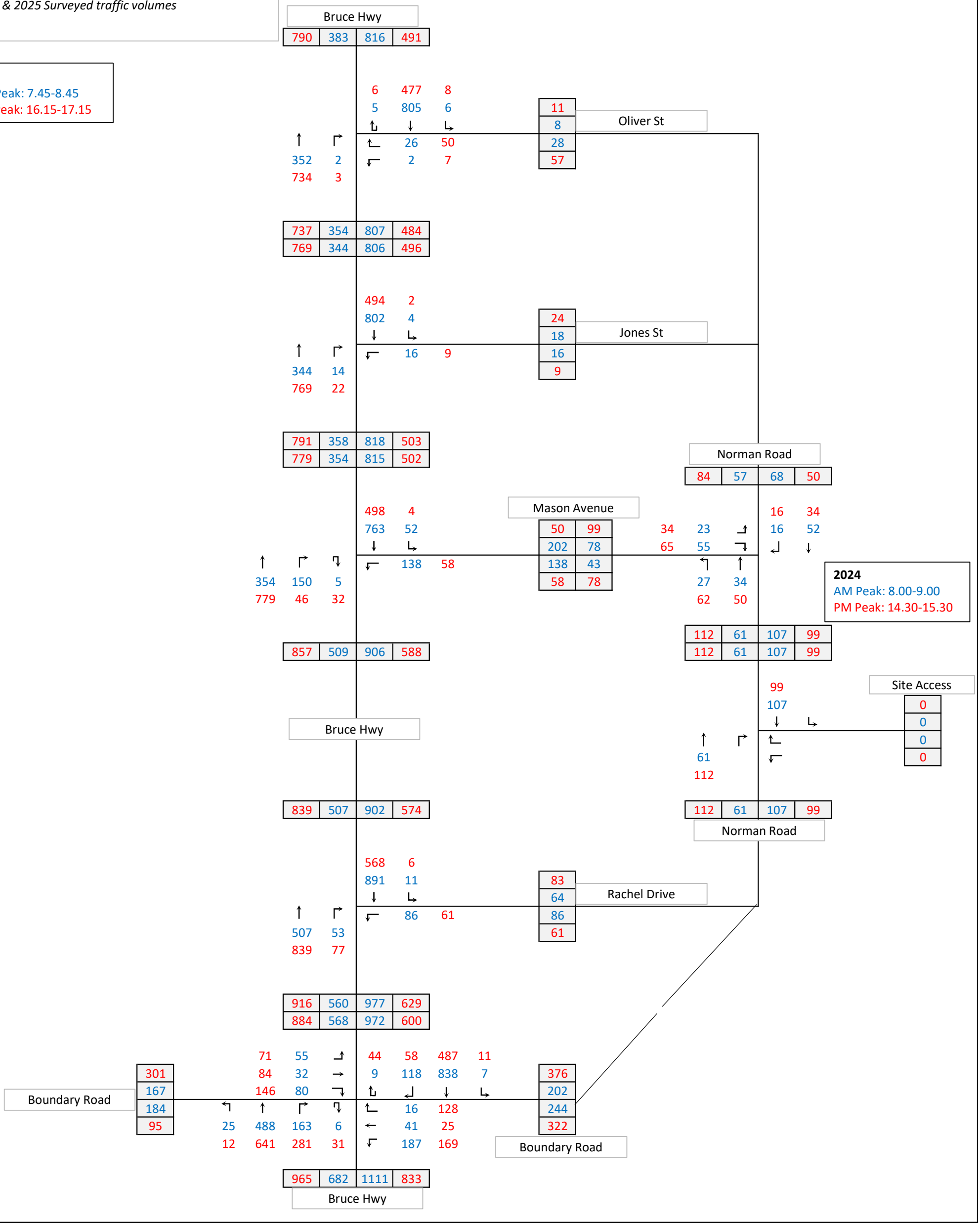
PROJECT NUMBER	ORIGINAL SIZE
23BRT0757	A3
DRAWING NUMBER	REVISION
25BRT0757-03	A
DATE	SHEET
14 Apr 2025	1 OF 1

Appendix C Traffic Network Diagrams

NETWORK DIAGRAM 01

2024 & 2025 Surveyed traffic volumes

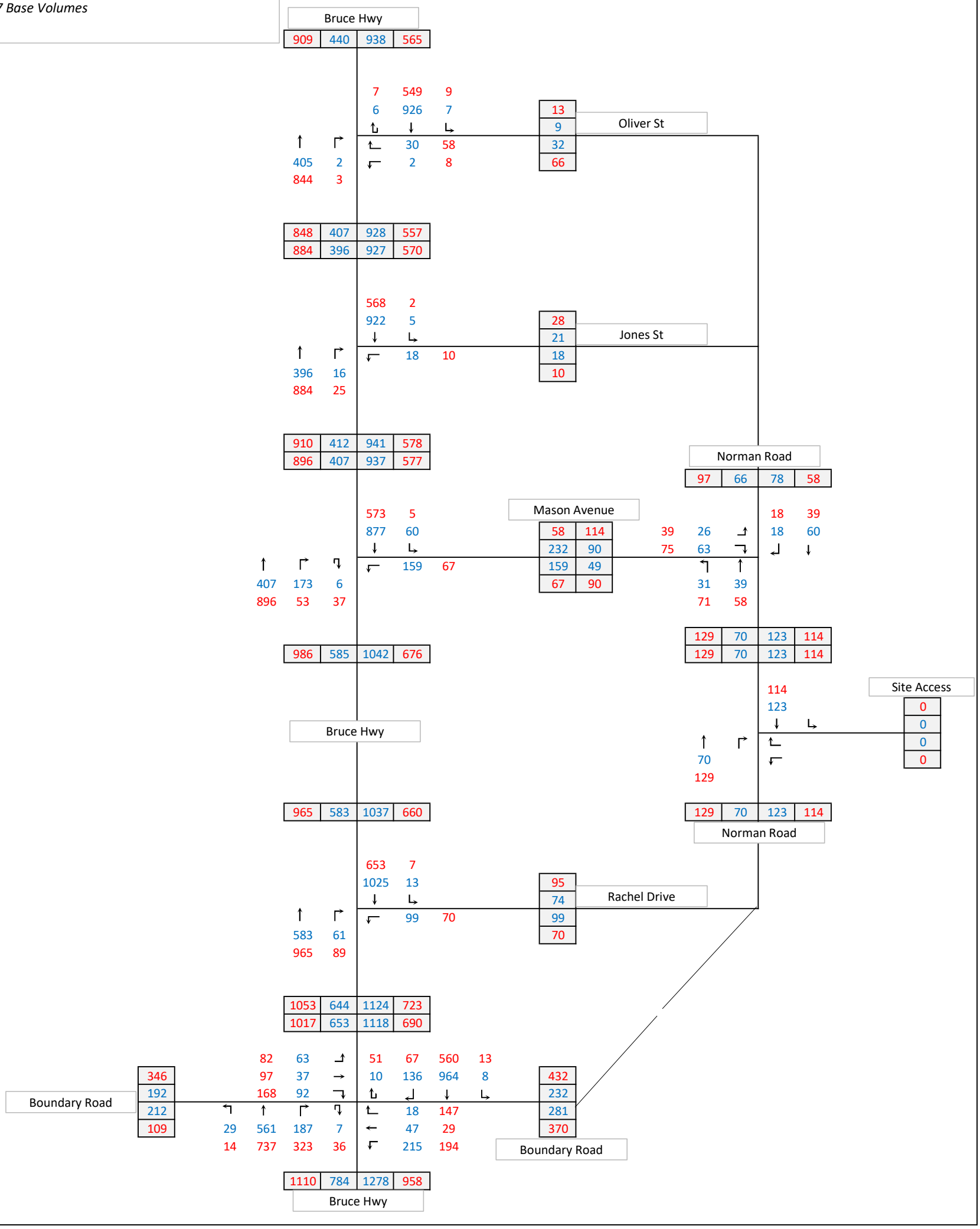
2025
AM Peak: 7.45-8.45
PM Peak: 16.15-17.15



NETWORK DIAGRAM 02

2027 Base Volumes

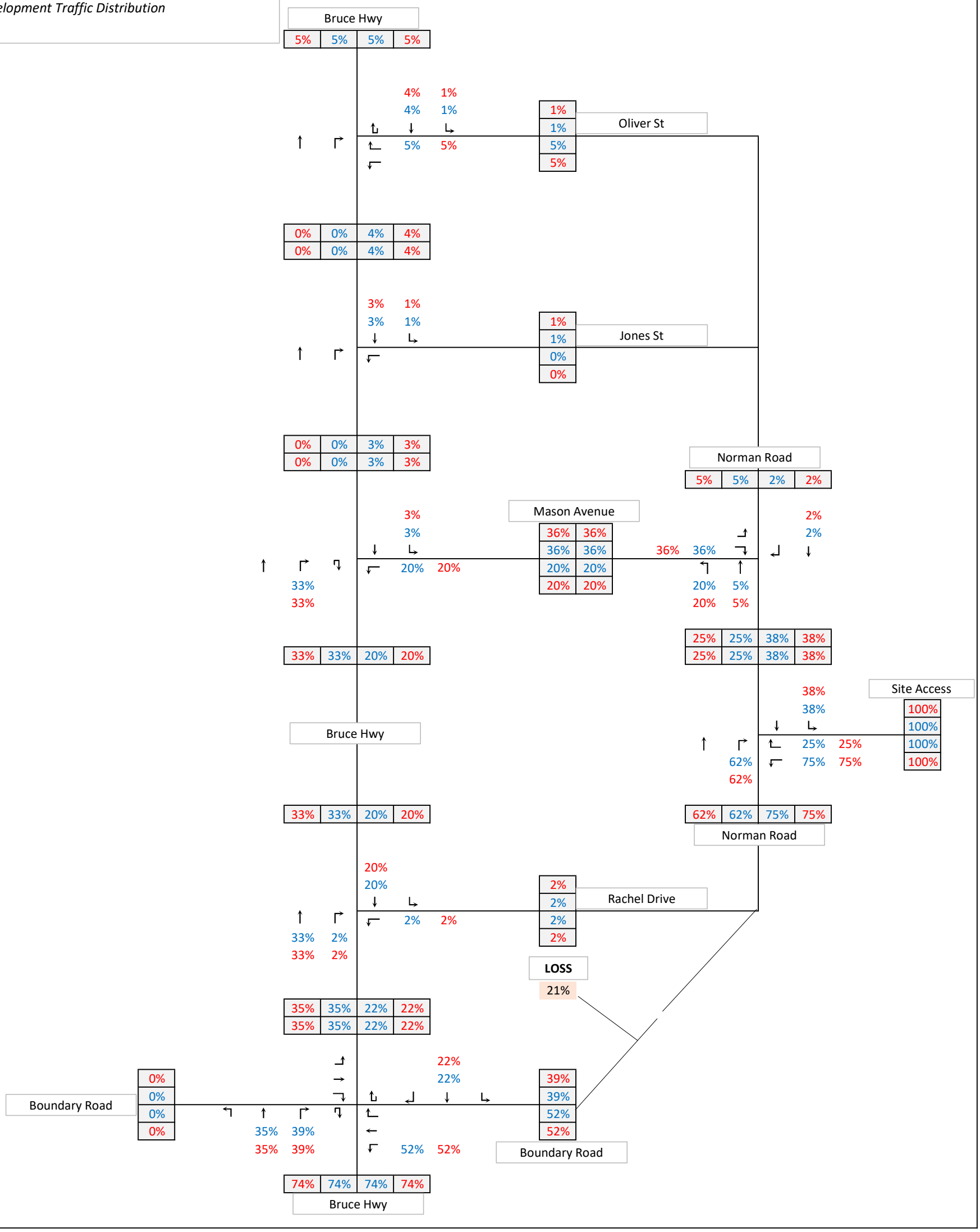
Rate	4.50%
Survey Year	2024
Opening Yea	2027
Growth Rate	1.15



NETWORK DIAGRAM 3

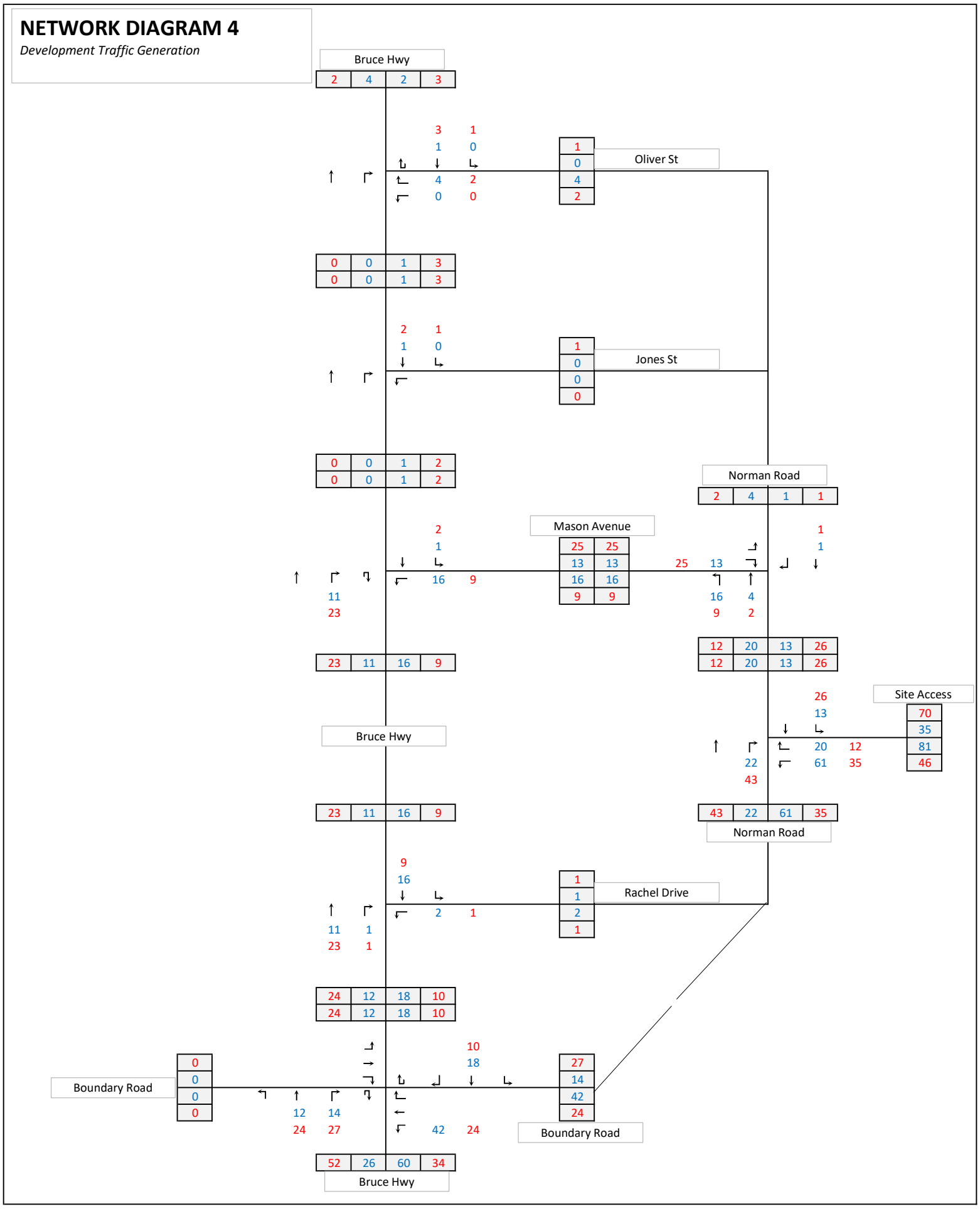
Development Traffic Distribution

	Out	In
Check	100%	100%



NETWORK DIAGRAM 4

Development Traffic Generation

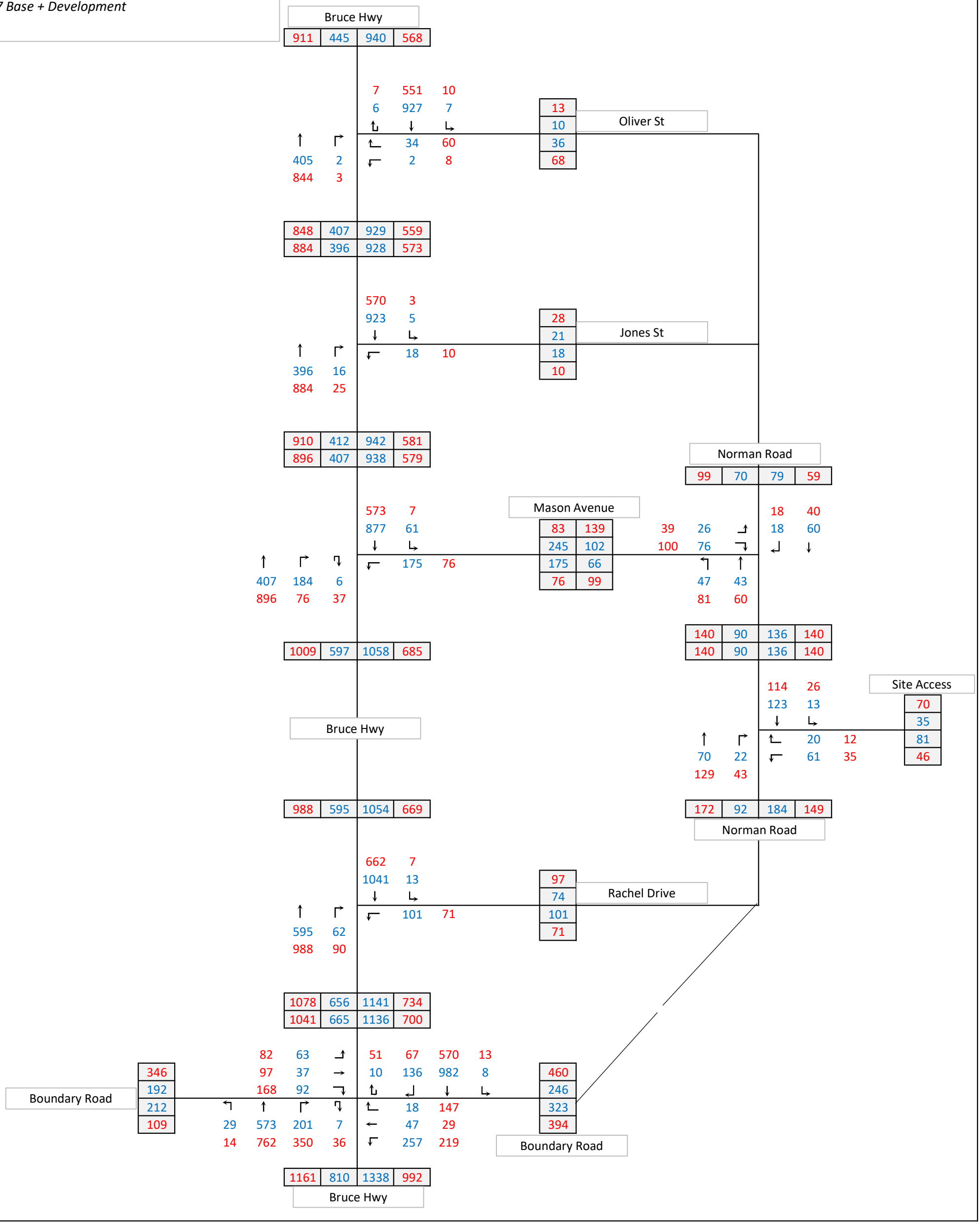


	Out	In
Check	81	35

Dev Gen		
Rate		0.23
Yield		505
Traffic Gen		116
	AM	PM
In	35	70
Out	81	46

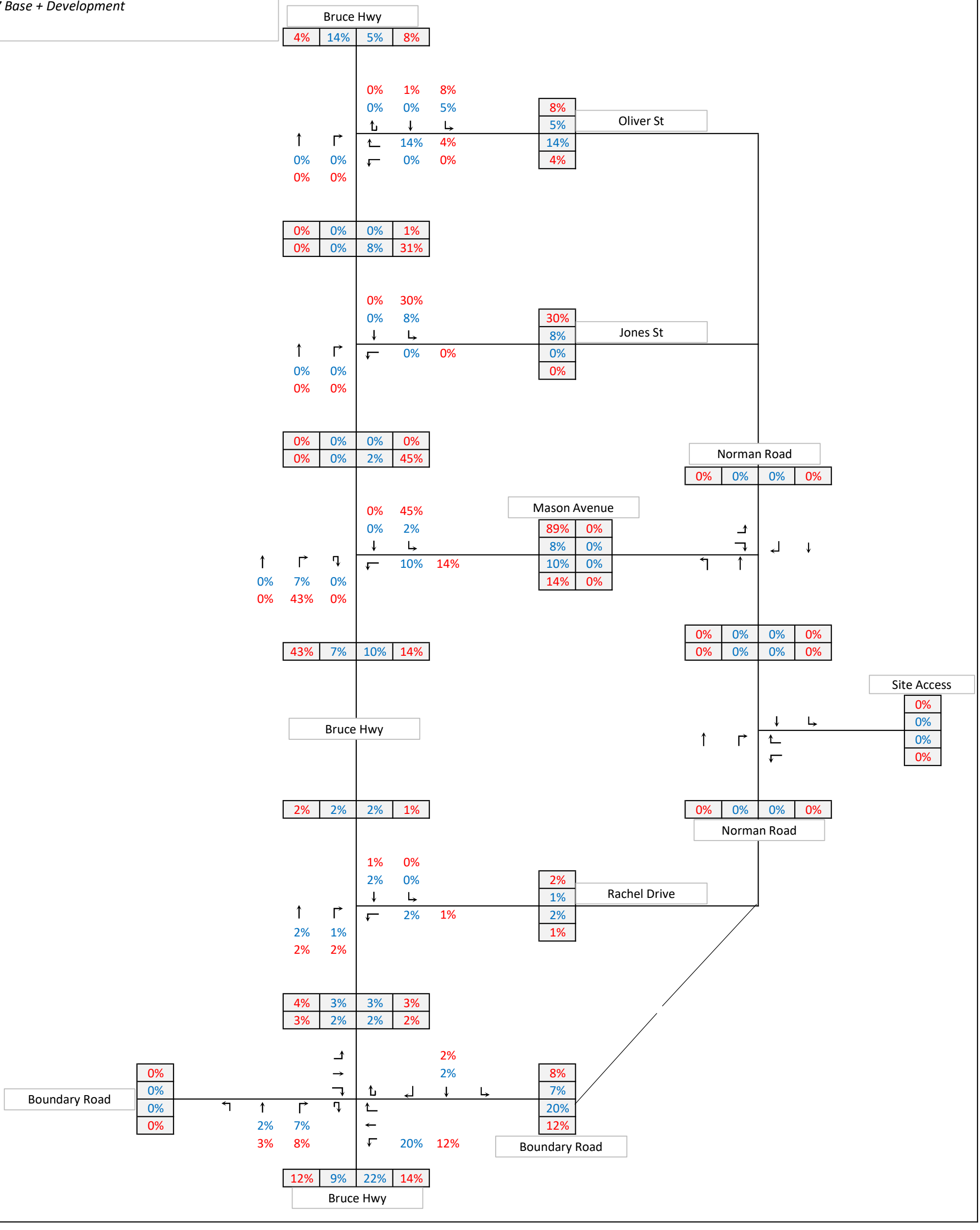
NETWORK DIAGRAM 5

2027 Base + Development



NETWORK DIAGRAM 5

2027 Base + Development



Appendix D SIDRA Output Reports

MOVEMENT SUMMARY

Site: 101 [BruceHwy/OliveSt_2027 Base+Dev_PM (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	844	6.0	888	6.0	*0.728	16.0	LOS B	11.0	81.3	0.94	0.83	0.98	47.5
3	R2	3	0.0	3	0.0	0.008	32.2	LOS C	0.1	0.7	0.81	0.63	0.81	38.6
Approach		847	6.0	892	6.0	0.728	16.1	LOS B	11.0	81.3	0.94	0.83	0.98	47.5
East: Olive St														
4	L2	8	0.0	8	0.0	0.015	26.5	LOS C	0.2	1.6	0.72	0.65	0.72	41.0
6	R2	60	2.0	63	2.0	*0.460	46.9	LOS D	2.6	18.2	1.00	0.75	1.00	33.6
Approach		68	1.8	72	1.8	0.460	44.5	LOS D	2.6	18.2	0.96	0.74	0.96	34.3
North: BruceHwy														
7	L2	10	0.0	11	0.0	0.007	6.1	LOS A	0.0	0.2	0.16	0.57	0.16	53.7
8	T1	551	12.0	580	12.0	0.611	28.6	LOS C	10.2	78.6	0.93	0.79	0.93	40.8
9u	U	7	0.0	7	0.0	*0.071	46.5	LOS D	0.3	2.0	0.95	0.67	0.95	33.3
Approach		568	11.6	598	11.6	0.611	28.4	LOS C	10.2	78.6	0.92	0.78	0.92	40.9
All Vehicles		1483	8.0	1561	8.0	0.728	22.1	LOS C	11.0	81.3	0.93	0.81	0.96	44.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Olive St												
P2	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	198.8	213.9	1.08
North: BruceHwy												
P3	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	203.9	220.5	1.08
All Pedestrians		100	105	34.3	LOS D	0.1	0.1	0.93	0.93	201.4	217.2	1.08

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/BoundaryRd_2025Survey_AM (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bruce Hwy														
1	L2	25	16.0	26	16.0	0.020	7.0	LOS A	0.2	1.4	0.21	0.59	0.21	47.7
2	T1	488	11.0	514	11.0	0.229	20.5	LOS C	5.4	41.4	0.69	0.57	0.69	44.9
3	R2	163	2.0	172	2.0	* 0.578	47.9	LOS D	8.2	58.5	0.97	0.81	0.97	31.6
3u	U	6	0.0	6	0.0	0.578	49.3	LOS D	8.2	58.5	0.97	0.81	0.97	33.1
Approach		682	8.9	718	8.9	0.578	26.8	LOS C	8.2	58.5	0.74	0.63	0.74	40.9
East: Boundary Rd														
4	L2	187	4.0	197	4.0	0.229	11.2	LOS B	3.3	23.8	0.44	0.68	0.44	49.1
5	T1	41	10.0	43	10.0	* 0.550	53.3	LOS D	3.1	23.2	1.00	0.77	1.04	21.9
6	R2	16	6.0	17	6.0	0.550	59.0	LOS E	3.1	23.2	1.00	0.77	1.04	29.8
Approach		244	5.1	257	5.1	0.550	21.4	LOS C	3.3	23.8	0.57	0.70	0.58	41.8
North: Bruce Hwy														
7	L2	7	14.0	7	14.0	0.011	24.1	LOS C	0.2	1.6	0.61	0.64	0.61	40.5
8	T1	838	5.0	882	5.0	* 0.570	24.4	LOS C	16.5	120.7	0.82	0.72	0.82	42.8
9	R2	118	5.0	124	5.0	0.450	47.0	LOS D	6.0	44.2	0.95	0.79	0.95	22.6
9u	U	9	11.0	9	11.0	0.450	48.4	LOS D	6.0	44.2	0.95	0.79	0.95	33.2
Approach		972	5.1	1023	5.1	0.570	27.4	LOS C	16.5	120.7	0.84	0.73	0.84	39.9
West: Boundary Rd														
10	L2	55	25.0	58	25.0	0.295	50.7	LOS D	2.7	22.9	0.95	0.75	0.95	24.5
11	T1	32	19.0	34	19.0	* 0.583	47.1	LOS D	5.7	47.8	0.99	0.80	1.01	22.9
12	R2	80	24.0	84	24.0	0.583	52.8	LOS D	5.7	47.8	0.99	0.80	1.01	24.8
Approach		167	23.4	176	23.4	0.583	51.0	LOS D	5.7	47.8	0.98	0.78	0.99	24.4
All Vehicles		2065	7.9	2174	7.9	0.583	28.4	LOS C	16.5	120.7	0.79	0.70	0.79	39.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Boundary Rd												
P2	Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	207.0	211.6	1.02
North: Bruce Hwy												

P3 Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	219.6	228.1	1.04
West: Boundary Rd											
P4 Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	209.8	215.3	1.03
All Pedestrians	3	3	44.2	LOS E	0.0	0.0	0.94	0.94	212.1	218.3	1.03

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [BruceHwy/BoundaryRd_2027 Base_AM (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bruce Hwy														
1	L2	29	16.0	31	16.0	0.024	7.2	LOS A	0.2	1.8	0.22	0.59	0.22	47.5
2	T1	561	11.0	591	11.0	0.264	20.9	LOS C	6.3	48.4	0.70	0.59	0.70	44.7
3	R2	187	2.0	197	2.0	* 0.663	49.2	LOS D	9.7	69.1	0.99	0.84	1.02	31.2
3u	U	7	0.0	7	0.0	0.663	50.6	LOS D	9.7	69.1	0.99	0.84	1.02	32.7
Approach		784	8.9	825	8.9	0.663	27.4	LOS C	9.7	69.1	0.75	0.65	0.76	40.7
East: Boundary Rd														
4	L2	215	4.0	226	4.0	0.281	13.0	LOS B	4.4	32.1	0.50	0.70	0.50	47.8
5	T1	47	10.0	49	10.0	* 0.628	54.1	LOS D	3.6	26.8	1.00	0.80	1.11	21.7
6	R2	18	6.0	19	6.0	0.628	59.7	LOS E	3.6	26.8	1.00	0.80	1.11	29.6
Approach		280	5.1	295	5.1	0.628	22.9	LOS C	4.4	32.1	0.62	0.72	0.64	41.0
North: Bruce Hwy														
7	L2	8	14.0	8	14.0	0.012	24.1	LOS C	0.2	1.9	0.61	0.65	0.61	40.5
8	T1	964	5.0	1015	5.0	* 0.655	25.6	LOS C	20.0	145.7	0.87	0.77	0.87	42.2
9	R2	136	5.0	143	5.0	0.517	47.5	LOS D	7.0	51.5	0.96	0.80	0.96	22.5
9u	U	10	11.0	11	11.0	0.517	49.0	LOS D	7.0	51.5	0.96	0.80	0.96	33.0
Approach		1118	5.1	1177	5.1	0.655	28.5	LOS C	20.0	145.7	0.88	0.77	0.88	39.4
West: Boundary Rd														
10	L2	63	25.0	66	25.0	0.338	51.0	LOS D	3.1	26.4	0.96	0.76	0.96	24.4
11	T1	37	19.0	39	19.0	* 0.671	48.6	LOS D	6.8	56.6	1.00	0.85	1.09	22.5
12	R2	92	24.0	97	24.0	0.671	54.2	LOS D	6.8	56.6	1.00	0.85	1.09	24.4
Approach		192	23.4	202	23.4	0.671	52.1	LOS D	6.8	56.6	0.99	0.82	1.04	24.1
All Vehicles		2374	7.9	2499	7.9	0.671	29.4	LOS C	20.0	145.7	0.81	0.73	0.82	38.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Boundary Rd												
P2	Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	207.0	211.6	1.02
North: Bruce Hwy												

P3 Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	219.6	228.1	1.04
West: Boundary Rd											
P4 Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	209.8	215.3	1.03
All Pedestrians	3	3	44.2	LOS E	0.0	0.0	0.94	0.94	212.1	218.3	1.03

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [BruceHwy/BoundaryRd_2027 Base+Dev_AM (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bruce Hwy														
1	L2	29	16.0	31	16.0	0.024	7.2	LOS A	0.2	1.8	0.22	0.59	0.22	47.5
2	T1	573	11.0	603	11.0	0.276	21.7	LOS C	6.6	50.5	0.72	0.60	0.72	44.2
3	R2	201	2.0	212	2.0	*0.671	48.5	LOS D	10.4	73.8	0.99	0.84	1.02	31.4
3u	U	7	0.0	7	0.0	0.671	49.9	LOS D	10.4	73.8	0.99	0.84	1.02	32.9
Approach		810	8.9	853	8.9	0.671	28.1	LOS C	10.4	73.8	0.77	0.66	0.78	40.3
East: Boundary Rd														
4	L2	257	4.0	271	4.0	0.335	13.8	LOS B	5.7	41.1	0.53	0.72	0.53	47.3
5	T1	47	10.0	49	10.0	*0.628	54.1	LOS D	3.6	26.8	1.00	0.80	1.11	21.7
6	R2	18	6.0	19	6.0	0.628	59.7	LOS E	3.6	26.8	1.00	0.80	1.11	29.6
Approach		322	5.0	339	5.0	0.628	22.2	LOS C	5.7	41.1	0.63	0.73	0.65	41.5
North: Bruce Hwy														
7	L2	8	14.0	8	14.0	0.012	24.8	LOS C	0.2	1.9	0.62	0.65	0.62	40.2
8	T1	982	5.0	1034	5.0	*0.684	26.7	LOS C	20.8	152.1	0.89	0.78	0.89	41.7
9	R2	136	5.0	143	5.0	0.489	46.4	LOS D	6.9	50.7	0.95	0.80	0.95	22.8
9u	U	10	11.0	11	11.0	0.489	47.9	LOS D	6.9	50.7	0.95	0.80	0.95	33.4
Approach		1136	5.1	1196	5.1	0.684	29.2	LOS C	20.8	152.1	0.89	0.79	0.89	39.1
West: Boundary Rd														
10	L2	63	25.0	66	25.0	0.338	51.0	LOS D	3.1	26.4	0.96	0.76	0.96	24.4
11	T1	37	19.0	39	19.0	*0.671	48.6	LOS D	6.8	56.6	1.00	0.85	1.09	22.5
12	R2	92	24.0	97	24.0	0.671	54.2	LOS D	6.8	56.6	1.00	0.85	1.09	24.4
Approach		192	23.4	202	23.4	0.671	52.1	LOS D	6.8	56.6	0.99	0.82	1.04	24.1
All Vehicles		2460	7.8	2589	7.8	0.684	29.7	LOS C	20.8	152.1	0.82	0.74	0.83	38.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Boundary Rd												
P2	Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	207.0	211.6	1.02
North: Bruce Hwy												

P3 Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	219.6	228.1	1.04
West: Boundary Rd											
P4 Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	209.8	215.3	1.03
All Pedestrians	3	3	44.2	LOS E	0.0	0.0	0.94	0.94	212.1	218.3	1.03

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [BruceHwy/BoundaryRd_2025Survey_PM (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bruce Hwy														
1	L2	12	58.0	13	58.0	0.012	7.0	LOS A	0.1	0.6	0.17	0.56	0.17	47.0
2	T1	641	6.0	675	6.0	0.599	40.0	LOS D	10.2	75.0	0.96	0.80	0.96	36.2
3	R2	281	1.0	296	1.0	* 0.709	43.1	LOS D	15.0	106.2	0.97	0.86	1.00	33.1
3u	U	31	3.0	33	3.0	0.709	44.5	LOS D	15.0	106.2	0.97	0.86	1.00	34.5
Approach		965	5.1	1016	5.1	0.709	40.6	LOS D	15.0	106.2	0.95	0.82	0.96	35.3
East: Boundary Rd														
4	L2	169	1.0	178	1.0	0.171	10.6	LOS B	2.7	19.3	0.41	0.67	0.41	49.6
5	T1	25	0.0	26	0.0	* 0.717	49.1	LOS D	8.1	56.8	1.00	0.86	1.12	22.1
6	R2	128	0.0	135	0.0	0.717	54.7	LOS D	8.1	56.8	1.00	0.86	1.12	30.1
Approach		322	0.5	339	0.5	0.717	31.1	LOS C	8.1	56.8	0.69	0.76	0.74	37.5
North: Bruce Hwy														
7	L2	11	18.0	12	18.0	0.035	40.6	LOS D	0.5	3.7	0.83	0.68	0.83	33.6
8	T1	487	9.0	513	9.0	* 0.696	41.8	LOS D	12.1	91.2	0.98	0.85	1.03	35.6
9	R2	58	22.0	61	22.0	0.274	38.1	LOS D	4.2	32.9	0.84	0.77	0.84	21.8
9u	U	44	0.0	46	0.0	0.274	39.2	LOS D	4.2	32.9	0.84	0.77	0.84	36.2
Approach		600	9.8	632	9.8	0.696	41.2	LOS D	12.1	91.2	0.96	0.84	0.99	34.3
West: Boundary Rd														
10	L2	71	17.0	75	17.0	0.242	44.2	LOS D	3.2	25.6	0.90	0.76	0.90	26.5
11	T1	84	2.0	88	2.0	* 0.699	43.4	LOS D	11.6	82.9	0.99	0.86	1.05	24.1
12	R2	146	3.0	154	3.0	0.699	49.0	LOS D	11.6	82.9	0.99	0.86	1.05	26.3
Approach		301	6.0	317	6.0	0.699	46.3	LOS D	11.6	82.9	0.97	0.84	1.01	25.8
All Vehicles		2188	5.8	2303	5.8	0.717	40.2	LOS D	15.0	106.2	0.92	0.82	0.95	34.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Boundary Rd												
P2	Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	207.0	211.6	1.02
North: Bruce Hwy												

P3 Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	219.6	228.1	1.04
West: Boundary Rd											
P4 Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	209.8	215.3	1.03
All Pedestrians	3	3	44.2	LOS E	0.0	0.0	0.94	0.94	212.1	218.3	1.03

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [BruceHwy/BoundaryRd_2027 Base_PM (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bruce Hwy														
1	L2	14	58.0	15	58.0	0.014	7.1	LOS A	0.1	0.8	0.18	0.56	0.18	46.9
2	T1	737	6.0	776	6.0	0.689	41.6	LOS D	12.1	89.4	0.98	0.85	1.02	35.7
3	R2	323	1.0	340	1.0	* 0.816	48.5	LOS D	19.1	135.1	1.00	0.92	1.15	31.4
3u	U	36	3.0	38	3.0	0.816	49.9	LOS D	19.1	135.1	1.00	0.92	1.15	32.8
Approach		1110	5.1	1168	5.1	0.816	43.4	LOS D	19.1	135.1	0.98	0.87	1.05	34.4
East: Boundary Rd														
4	L2	194	1.0	204	1.0	0.206	12.2	LOS B	3.7	25.8	0.46	0.69	0.46	48.5
5	T1	29	0.0	31	0.0	* 0.825	53.2	LOS D	9.9	69.1	1.00	0.95	1.27	21.1
6	R2	147	0.0	155	0.0	0.825	58.7	LOS E	9.9	69.1	1.00	0.95	1.27	29.0
Approach		370	0.5	389	0.5	0.825	33.9	LOS C	9.9	69.1	0.72	0.81	0.85	36.3
North: Bruce Hwy														
7	L2	13	18.0	14	18.0	0.042	40.7	LOS D	0.5	4.4	0.83	0.68	0.83	33.6
8	T1	560	9.0	589	9.0	* 0.800	46.0	LOS D	15.0	112.9	1.00	0.94	1.16	34.2
9	R2	67	22.0	71	22.0	0.317	38.5	LOS D	5.0	38.5	0.85	0.78	0.85	21.8
9u	U	51	0.0	54	0.0	0.317	39.7	LOS D	5.0	38.5	0.85	0.78	0.85	36.0
Approach		691	9.8	727	9.8	0.800	44.7	LOS D	15.0	112.9	0.97	0.91	1.10	33.1
West: Boundary Rd														
10	L2	82	17.0	86	17.0	0.279	44.6	LOS D	3.7	29.8	0.90	0.76	0.90	26.4
11	T1	97	2.0	102	2.0	* 0.806	47.5	LOS D	14.3	102.3	1.00	0.94	1.17	22.9
12	R2	168	3.0	177	3.0	0.806	53.1	LOS D	14.3	102.3	1.00	0.94	1.17	25.1
Approach		347	6.0	365	6.0	0.806	49.5	LOS D	14.3	102.3	0.98	0.90	1.11	24.8
All Vehicles		2518	5.8	2651	5.8	0.825	43.2	LOS D	19.1	135.1	0.94	0.88	1.04	33.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Boundary Rd												
P2	Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	207.0	211.6	1.02
North: Bruce Hwy												

P3 Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	219.6	228.1	1.04
West: Boundary Rd											
P4 Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	209.8	215.3	1.03
All Pedestrians	3	3	44.2	LOS E	0.0	0.0	0.94	0.94	212.1	218.3	1.03

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [BruceHwy/BoundaryRd_2027 Base+Dev_PM (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bruce Hwy														
1	L2	14	58.0	15	58.0	0.014	7.1	LOS A	0.1	0.8	0.18	0.56	0.18	46.9
2	T1	762	6.0	802	6.0	0.712	42.2	LOS D	12.7	93.7	0.99	0.86	1.04	35.4
3	R2	350	1.0	368	1.0	* 0.843	50.1	LOS D	21.2	149.8	1.00	0.94	1.18	31.0
3u	U	36	3.0	38	3.0	0.843	51.5	LOS D	21.2	149.8	1.00	0.94	1.18	32.4
Approach		1162	5.0	1223	5.0	0.843	44.5	LOS D	21.2	149.8	0.98	0.89	1.08	34.0
East: Boundary Rd														
4	L2	219	1.0	231	1.0	0.233	12.3	LOS B	4.2	29.8	0.47	0.69	0.47	48.4
5	T1	29	0.0	31	0.0	* 0.825	53.2	LOS D	9.9	69.1	1.00	0.95	1.27	21.1
6	R2	147	0.0	155	0.0	0.825	58.7	LOS E	9.9	69.1	1.00	0.95	1.27	29.0
Approach		395	0.6	416	0.6	0.825	32.6	LOS C	9.9	69.1	0.71	0.81	0.83	36.9
North: Bruce Hwy														
7	L2	13	18.0	14	18.0	0.042	40.7	LOS D	0.5	4.4	0.83	0.68	0.83	33.6
8	T1	570	9.0	600	9.0	* 0.814	46.9	LOS D	15.4	116.4	1.00	0.96	1.18	33.9
9	R2	67	22.0	71	22.0	0.305	37.6	LOS D	4.9	37.9	0.84	0.78	0.84	21.9
9u	U	51	0.0	54	0.0	0.305	38.7	LOS D	4.9	37.9	0.84	0.78	0.84	36.4
Approach		701	9.8	738	9.8	0.814	45.3	LOS D	15.4	116.4	0.97	0.92	1.11	33.0
West: Boundary Rd														
10	L2	82	17.0	86	17.0	0.296	45.6	LOS D	3.8	30.3	0.92	0.77	0.92	26.0
11	T1	97	2.0	102	2.0	* 0.853	51.6	LOS D	15.0	107.5	1.00	0.99	1.27	21.8
12	R2	168	3.0	177	3.0	0.853	57.2	LOS E	15.0	107.5	1.00	0.99	1.27	24.0
Approach		347	6.0	365	6.0	0.853	52.9	LOS D	15.0	107.5	0.98	0.94	1.18	23.9
All Vehicles		2605	5.8	2742	5.8	0.853	44.0	LOS D	21.2	149.8	0.94	0.89	1.07	32.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Boundary Rd												
P2	Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	207.0	211.6	1.02
North: Bruce Hwy												

P3 Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	219.6	228.1	1.04
West: Boundary Rd											
P4 Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	209.8	215.3	1.03
All Pedestrians	3	3	44.2	LOS E	0.0	0.0	0.94	0.94	212.1	218.3	1.03

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [BruceHwy/RachelDr_2025Sruvey_AM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	507	12.0	534	12.0	0.148	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	53	0.0	56	0.0	0.203	17.7	LOS C	0.7	4.7	0.77	0.92	0.82	45.3
Approach		560	10.9	589	10.9	0.203	1.7	NA	0.7	4.7	0.07	0.09	0.08	58.1
East: RachelDr														
4	L2	86	1.0	91	1.0	0.114	8.1	LOS A	0.4	2.9	0.48	0.72	0.48	51.6
Approach		86	1.0	91	1.0	0.114	8.1	LOS A	0.4	2.9	0.48	0.72	0.48	51.6
North: BruceHwy														
7	L2	11	9.0	12	9.0	0.007	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	53.2
8	T1	891	5.0	938	5.0	0.248	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		902	5.0	949	5.0	0.248	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
All Vehicles		1548	6.9	1629	6.9	0.248	1.1	NA	0.7	4.7	0.05	0.08	0.05	58.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/RachelDr_2027 Base_AM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	583	12.0	614	12.0	0.171	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	61	0.0	64	0.0	0.304	23.8	LOS C	1.0	7.2	0.85	0.97	1.00	42.1
Approach		644	10.9	678	10.9	0.304	2.3	NA	1.0	7.2	0.08	0.09	0.09	57.6
East: RachelDr														
4	L2	99	1.0	104	1.0	0.145	8.8	LOS A	0.5	3.7	0.53	0.77	0.53	51.2
Approach		99	1.0	104	1.0	0.145	8.8	LOS A	0.5	3.7	0.53	0.77	0.53	51.2
North: BruceHwy														
7	L2	13	9.0	14	9.0	0.008	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	53.2
8	T1	1025	5.0	1079	5.0	0.286	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		1038	5.1	1093	5.1	0.286	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
All Vehicles		1781	6.9	1875	6.9	0.304	1.4	NA	1.0	7.2	0.06	0.08	0.06	58.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/RachelDr_2027 Base+Dev_AM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	595	12.0	626	12.0	0.174	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	62	0.0	65	0.0	0.319	24.7	LOS C	1.1	7.6	0.86	0.98	1.02	41.7
Approach		657	10.9	692	10.9	0.319	2.4	NA	1.1	7.6	0.08	0.09	0.10	57.5
East: RachelDr														
4	L2	101	1.0	106	1.0	0.150	8.9	LOS A	0.5	3.8	0.53	0.78	0.53	51.1
Approach		101	1.0	106	1.0	0.150	8.9	LOS A	0.5	3.8	0.53	0.78	0.53	51.1
North: BruceHwy														
7	L2	13	9.0	14	9.0	0.008	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	53.2
8	T1	1041	5.0	1096	5.0	0.290	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		1054	5.0	1109	5.0	0.290	0.2	NA	0.0	0.0	0.00	0.01	0.00	59.7
All Vehicles		1812	6.9	1907	6.9	0.319	1.4	NA	1.1	7.6	0.06	0.08	0.06	58.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/RachelDr_2025Sruvey_PM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	839	6.0	883	6.0	0.237	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	77	0.0	81	0.0	0.173	11.1	LOS B	0.6	4.1	0.59	0.83	0.59	49.3
Approach		916	5.5	964	5.5	0.237	1.0	NA	0.6	4.1	0.05	0.07	0.05	58.8
East: RachelDr														
4	L2	61	2.0	64	2.0	0.067	7.0	LOS A	0.2	1.7	0.38	0.62	0.38	52.4
Approach		61	2.0	64	2.0	0.067	7.0	LOS A	0.2	1.7	0.38	0.62	0.38	52.4
North: BruceHwy														
7	L2	6	0.0	6	0.0	0.003	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	568	10.0	598	10.0	0.163	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		574	9.9	604	9.9	0.163	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
All Vehicles		1551	7.0	1633	7.0	0.237	0.9	NA	0.6	4.1	0.04	0.07	0.04	58.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/RachelDr_2027 Base_PM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	965	6.0	1016	6.0	0.273	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	89	0.0	94	0.0	0.230	13.0	LOS B	0.8	5.7	0.66	0.88	0.71	48.1
Approach		1054	5.5	1109	5.5	0.273	1.2	NA	0.8	5.7	0.06	0.07	0.06	58.6
East: RachelDr														
4	L2	70	2.0	74	2.0	0.081	7.3	LOS A	0.3	2.1	0.41	0.65	0.41	52.2
Approach		70	2.0	74	2.0	0.081	7.3	LOS A	0.3	2.1	0.41	0.65	0.41	52.2
North: BruceHwy														
7	L2	7	0.0	7	0.0	0.004	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	653	10.0	687	10.0	0.188	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		660	9.9	695	9.9	0.188	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
All Vehicles		1784	7.0	1878	7.0	0.273	1.0	NA	0.8	5.7	0.05	0.07	0.05	58.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/RachelDr_2027 Base+Dev_PM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	988	6.0	1040	6.0	0.279	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
3	R2	90	0.0	95	0.0	0.236	13.2	LOS B	0.8	5.9	0.67	0.88	0.73	48.0
Approach		1078	5.5	1135	5.5	0.279	1.2	NA	0.8	5.9	0.06	0.07	0.06	58.6
East: RachelDr														
4	L2	71	2.0	75	2.0	0.082	7.3	LOS A	0.3	2.1	0.41	0.65	0.41	52.2
Approach		71	2.0	75	2.0	0.082	7.3	LOS A	0.3	2.1	0.41	0.65	0.41	52.2
North: BruceHwy														
7	L2	7	0.0	7	0.0	0.004	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	662	10.0	697	10.0	0.190	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		669	9.9	704	9.9	0.190	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
All Vehicles		1818	7.0	1914	7.0	0.279	1.0	NA	0.8	5.9	0.05	0.07	0.05	58.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/MasonAv_2025Survey_AM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bruce Highway														
2	T1	354	17.0	373	17.0	0.107	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	150	2.0	158	2.0	0.464	17.9	LOS C	2.1	15.2	0.78	1.01	1.13	43.9
3u	U	5	0.0	5	0.0	0.464	20.5	LOS C	2.1	15.2	0.78	1.01	1.13	45.0
Approach		509	12.4	536	12.4	0.464	5.5	NA	2.1	15.2	0.24	0.31	0.34	54.3
East: Mason Avenue														
4	L2	138	1.0	145	1.0	0.165	7.7	LOS A	0.7	4.6	0.46	0.69	0.46	51.2
Approach		138	1.0	145	1.0	0.165	7.7	LOS A	0.7	4.6	0.46	0.69	0.46	51.2
North: Bruce Highway														
7	L2	52	6.0	55	6.0	0.031	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	52.7
8	T1	763	6.0	803	6.0	0.214	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		815	6.0	858	6.0	0.214	0.4	NA	0.0	0.0	0.00	0.04	0.00	59.4
All Vehicles		1462	7.8	1539	7.8	0.464	2.9	NA	2.1	15.2	0.13	0.19	0.16	56.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/MasonAv_2027 Base_AM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bruce Highway														
2	T1	354	17.0	373	17.0	0.107	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	150	2.0	158	2.0	0.464	17.9	LOS C	2.1	15.2	0.78	1.01	1.13	43.9
3u	U	5	0.0	5	0.0	0.464	20.5	LOS C	2.1	15.2	0.78	1.01	1.13	45.0
Approach		509	12.4	536	12.4	0.464	5.5	NA	2.1	15.2	0.24	0.31	0.34	54.3
East: Mason Avenue														
4	L2	138	1.0	145	1.0	0.165	7.7	LOS A	0.7	4.6	0.46	0.69	0.46	51.2
Approach		138	1.0	145	1.0	0.165	7.7	LOS A	0.7	4.6	0.46	0.69	0.46	51.2
North: Bruce Highway														
7	L2	52	6.0	55	6.0	0.031	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	52.7
8	T1	763	6.0	803	6.0	0.214	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		815	6.0	858	6.0	0.214	0.4	NA	0.0	0.0	0.00	0.04	0.00	59.4
All Vehicles		1462	7.8	1539	7.8	0.464	2.9	NA	2.1	15.2	0.13	0.19	0.16	56.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/MasonAv_2027 Base+Dev_AM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bruce Highway														
2	T1	407	17.0	428	17.0	0.123	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	184	2.0	194	2.0	0.695	27.3	LOS D	3.9	27.9	0.89	1.19	1.75	39.0
3u	U	6	0.0	6	0.0	0.695	30.6	LOS D	3.9	27.9	0.89	1.19	1.75	40.3
Approach		597	12.2	628	12.2	0.695	8.7	NA	3.9	27.9	0.28	0.38	0.56	51.7
East: Mason Avenue														
4	L2	175	1.0	184	1.0	0.224	8.3	LOS A	0.9	6.4	0.51	0.74	0.51	50.8
Approach		175	1.0	184	1.0	0.224	8.3	LOS A	0.9	6.4	0.51	0.74	0.51	50.8
North: Bruce Highway														
7	L2	61	6.0	64	6.0	0.036	5.6	LOS A	0.0	0.0	0.00	0.57	0.00	52.7
8	T1	877	6.0	923	6.0	0.246	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		938	6.0	987	6.0	0.246	0.4	NA	0.0	0.0	0.00	0.04	0.00	59.4
All Vehicles		1710	7.7	1800	7.7	0.695	4.1	NA	3.9	27.9	0.15	0.23	0.25	55.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/MasonAv_2025Survey_PM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bruce Highway														
2	T1	799	6.0	841	6.0	0.226	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	46	0.0	48	0.0	0.146	9.4	LOS A	0.5	3.8	0.53	0.80	0.53	49.1
3u	U	32	0.0	34	0.0	0.146	11.4	LOS B	0.5	3.8	0.53	0.80	0.53	49.8
Approach		877	5.5	923	5.5	0.226	1.0	NA	0.5	3.8	0.05	0.07	0.05	58.8
East: Mason Avenue														
4	L2	58	0.0	61	0.0	0.058	6.6	LOS A	0.2	1.5	0.34	0.59	0.34	51.9
Approach		58	0.0	61	0.0	0.058	6.6	LOS A	0.2	1.5	0.34	0.59	0.34	51.9
North: Bruce Highway														
7	L2	4	12.0	4	12.0	0.002	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	52.5
8	T1	498	0.0	524	0.0	0.134	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		502	0.1	528	0.1	0.134	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1437	3.4	1513	3.4	0.226	0.9	NA	0.5	3.8	0.04	0.07	0.04	58.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/MasonAv_2027 Base_PM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bruce Highway														
2	T1	896	6.0	943	6.0	0.253	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	53	0.0	56	0.0	0.188	10.3	LOS B	0.7	4.9	0.58	0.84	0.58	48.3
3u	U	37	0.0	39	0.0	0.188	12.7	LOS B	0.7	4.9	0.58	0.84	0.58	49.1
Approach		986	5.5	1038	5.5	0.253	1.1	NA	0.7	4.9	0.05	0.08	0.05	58.7
East: Mason Avenue														
4	L2	67	0.0	71	0.0	0.070	6.8	LOS A	0.3	1.9	0.37	0.61	0.37	51.8
Approach		67	0.0	71	0.0	0.070	6.8	LOS A	0.3	1.9	0.37	0.61	0.37	51.8
North: Bruce Highway														
7	L2	5	12.0	5	12.0	0.003	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	52.5
8	T1	573	0.0	603	0.0	0.155	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		578	0.1	608	0.1	0.155	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1631	3.3	1717	3.3	0.253	1.0	NA	0.7	4.9	0.05	0.07	0.05	58.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/MasonAv_2027 Base+Dev_PM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Bruce Highway														
2	T1	896	6.0	943	6.0	0.253	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	76	0.0	80	0.0	0.235	10.6	LOS B	0.9	6.3	0.59	0.85	0.61	48.2
3u	U	37	0.0	39	0.0	0.235	13.0	LOS B	0.9	6.3	0.59	0.85	0.61	49.0
Approach		1009	5.3	1062	5.3	0.253	1.3	NA	0.9	6.3	0.07	0.10	0.07	58.4
East: Mason Avenue														
4	L2	76	0.0	80	0.0	0.080	6.9	LOS A	0.3	2.1	0.37	0.61	0.37	51.8
Approach		76	0.0	80	0.0	0.080	6.9	LOS A	0.3	2.1	0.37	0.61	0.37	51.8
North: Bruce Highway														
7	L2	7	12.0	7	12.0	0.004	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	52.5
8	T1	573	0.0	603	0.0	0.155	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		580	0.1	611	0.1	0.155	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.8
All Vehicles		1665	3.3	1753	3.3	0.253	1.2	NA	0.9	6.3	0.06	0.09	0.06	58.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/JonesSt_2025Sruvey_AM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	344	18.0	362	18.0	0.104	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	14	7.0	15	7.0	0.049	15.3	LOS C	0.2	1.1	0.71	0.88	0.71	46.5
Approach		358	17.6	377	17.6	0.104	0.6	NA	0.2	1.1	0.03	0.03	0.03	59.3
East: JonesSt														
4	L2	16	13.0	17	13.0	0.022	8.0	LOS A	0.1	0.6	0.45	0.64	0.45	51.4
Approach		16	13.0	17	13.0	0.022	8.0	LOS A	0.1	0.6	0.45	0.64	0.45	51.4
North: BruceHwy														
7	L2	4	0.0	4	0.0	0.002	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	802	6.0	844	6.0	0.225	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		806	6.0	848	6.0	0.225	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.8
All Vehicles		1180	9.6	1242	9.6	0.225	0.4	NA	0.2	1.1	0.01	0.02	0.01	59.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/JonesSt_2027 Base_AM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	396	18.0	417	18.0	0.119	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	16	7.0	17	7.0	0.071	18.6	LOS C	0.2	1.6	0.77	0.91	0.77	44.6
Approach		412	17.6	434	17.6	0.119	0.8	NA	0.2	1.6	0.03	0.04	0.03	59.1
East: JonesSt														
4	L2	18	13.0	19	13.0	0.027	8.5	LOS A	0.1	0.7	0.48	0.68	0.48	51.0
Approach		18	13.0	19	13.0	0.027	8.5	LOS A	0.1	0.7	0.48	0.68	0.48	51.0
North: BruceHwy														
7	L2	5	0.0	5	0.0	0.003	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	922	6.0	971	6.0	0.259	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		927	6.0	976	6.0	0.259	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.8
All Vehicles		1357	9.6	1428	9.6	0.259	0.4	NA	0.2	1.6	0.02	0.02	0.02	59.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/JonesSt_2027 Base+Dev_AM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	396	18.0	417	18.0	0.119	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	16	7.0	17	7.0	0.071	18.7	LOS C	0.2	1.6	0.77	0.91	0.77	44.6
Approach		412	17.6	434	17.6	0.119	0.8	NA	0.2	1.6	0.03	0.04	0.03	59.1
East: JonesSt														
4	L2	18	13.0	19	13.0	0.027	8.5	LOS A	0.1	0.7	0.48	0.68	0.48	51.0
Approach		18	13.0	19	13.0	0.027	8.5	LOS A	0.1	0.7	0.48	0.68	0.48	51.0
North: BruceHwy														
7	L2	5	0.0	5	0.0	0.003	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	923	6.0	972	6.0	0.259	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		928	6.0	977	6.0	0.259	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.8
All Vehicles		1358	9.6	1429	9.6	0.259	0.4	NA	0.2	1.6	0.02	0.02	0.02	59.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/JonesSt_2025Sruvey_PM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	769	6.0	809	6.0	0.217	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	22	5.0	23	5.0	0.046	10.0	LOS A	0.1	1.1	0.52	0.75	0.52	50.0
Approach		791	6.0	833	6.0	0.217	0.3	NA	0.1	1.1	0.01	0.02	0.01	59.6
East: JonesSt														
4	L2	9	11.0	9	11.0	0.010	6.9	LOS A	0.0	0.3	0.35	0.57	0.35	52.1
Approach		9	11.0	9	11.0	0.010	6.9	LOS A	0.0	0.3	0.35	0.57	0.35	52.1
North: BruceHwy														
7	L2	2	0.0	2	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	494	12.0	520	12.0	0.144	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		496	12.0	522	12.0	0.144	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1296	8.3	1364	8.3	0.217	0.3	NA	0.1	1.1	0.01	0.02	0.01	59.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/JonesSt_2027 Base_PM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	884	6.0	931	6.0	0.250	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	25	5.0	26	5.0	0.059	11.1	LOS B	0.2	1.4	0.57	0.80	0.57	49.2
Approach		909	6.0	957	6.0	0.250	0.4	NA	0.2	1.4	0.02	0.02	0.02	59.5
East: JonesSt														
4	L2	10	11.0	11	11.0	0.012	7.1	LOS A	0.0	0.3	0.37	0.59	0.37	52.0
Approach		10	11.0	11	11.0	0.012	7.1	LOS A	0.0	0.3	0.37	0.59	0.37	52.0
North: BruceHwy														
7	L2	2	0.0	2	0.0	0.001	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	568	12.0	598	12.0	0.165	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		570	12.0	600	12.0	0.165	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1489	8.3	1567	8.3	0.250	0.3	NA	0.2	1.4	0.01	0.02	0.01	59.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/JonesSt_2027 Base+Dev_PM (Site Folder: General)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	884	6.0	931	6.0	0.250	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
3	R2	25	5.0	26	5.0	0.059	11.1	LOS B	0.2	1.4	0.57	0.80	0.57	49.2
Approach		909	6.0	957	6.0	0.250	0.4	NA	0.2	1.4	0.02	0.02	0.02	59.5
East: JonesSt														
4	L2	10	11.0	11	11.0	0.012	7.1	LOS A	0.0	0.3	0.37	0.59	0.37	52.0
Approach		10	11.0	11	11.0	0.012	7.1	LOS A	0.0	0.3	0.37	0.59	0.37	52.0
North: BruceHwy														
7	L2	3	0.0	3	0.0	0.002	5.5	LOS A	0.0	0.0	0.00	0.58	0.00	53.6
8	T1	570	12.0	600	12.0	0.166	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		573	11.9	603	11.9	0.166	0.1	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1492	8.3	1571	8.3	0.250	0.3	NA	0.2	1.4	0.01	0.02	0.01	59.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [BruceHwy/OliveSt_2025Survey_AM (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	352	18.0	371	18.0	*0.233	8.5	LOS A	2.8	22.5	0.64	0.53	0.64	52.7
3	R2	2	4.0	2	4.0	0.017	49.4	LOS D	0.1	0.6	0.95	0.61	0.95	32.6
Approach		354	17.9	373	17.9	0.233	8.7	LOS A	2.8	22.5	0.64	0.53	0.64	52.5
East: Olive St														
4	L2	2	0.0	2	0.0	0.008	41.1	LOS D	0.1	0.6	0.88	0.62	0.88	35.2
6	R2	26	0.0	27	0.0	*0.221	51.3	LOS D	1.2	8.5	0.98	0.71	0.98	32.3
Approach		28	0.0	29	0.0	0.221	50.6	LOS D	1.2	8.5	0.97	0.70	0.97	32.5
North: BruceHwy														
7	L2	6	17.0	6	17.0	0.004	6.2	LOS A	0.0	0.2	0.14	0.56	0.14	53.1
8	T1	805	6.0	847	6.0	*0.383	10.5	LOS B	9.8	72.0	0.57	0.50	0.57	51.2
9u	U	5	0.0	5	0.0	0.028	44.2	LOS D	0.2	1.4	0.89	0.66	0.89	34.0
Approach		816	6.0	859	6.0	0.383	10.6	LOS B	9.8	72.0	0.57	0.50	0.57	51.0
All Vehicles		1198	9.4	1261	9.4	0.383	11.0	LOS B	9.8	72.0	0.60	0.51	0.60	50.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Olive St												
P2	Full	10	11	39.2	LOS D	0.0	0.0	0.93	0.93	203.8	213.9	1.05
North: BruceHwy												
P3	Full	10	11	39.2	LOS D	0.0	0.0	0.93	0.93	208.8	220.5	1.06
All Pedestrians		20	21	39.2	LOS D	0.0	0.0	0.93	0.93	206.3	217.2	1.05

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [BruceHwy/OliveSt_2027 Base_AM (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	405	18.0	426	18.0	*0.244	8.0	LOS A	3.3	26.5	0.60	0.50	0.60	53.0
3	R2	2	4.0	2	4.0	0.019	55.0	LOS E	0.1	0.7	0.96	0.61	0.96	31.0
Approach		407	17.9	428	17.9	0.244	8.3	LOS A	3.3	26.5	0.60	0.50	0.60	52.8
East: Olive St														
4	L2	2	0.0	2	0.0	0.009	46.4	LOS D	0.1	0.6	0.89	0.62	0.89	33.5
6	R2	30	0.0	32	0.0	*0.283	57.3	LOS E	1.6	11.0	0.99	0.72	0.99	30.7
Approach		32	0.0	34	0.0	0.283	56.6	LOS E	1.6	11.0	0.98	0.71	0.98	30.8
North: BruceHwy														
7	L2	7	17.0	7	17.0	0.005	6.2	LOS A	0.0	0.2	0.12	0.56	0.12	53.2
8	T1	926	6.0	975	6.0	*0.412	9.8	LOS A	11.7	86.2	0.54	0.48	0.54	51.7
9u	U	6	0.0	6	0.0	0.035	48.7	LOS D	0.3	1.9	0.90	0.67	0.90	32.7
Approach		939	6.0	988	6.0	0.412	10.0	LOS B	11.7	86.2	0.54	0.48	0.54	51.5
All Vehicles		1378	9.4	1451	9.4	0.412	10.6	LOS B	11.7	86.2	0.57	0.49	0.57	51.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Olive St												
P2	Full	10	11	44.2	LOS E	0.0	0.0	0.94	0.94	208.7	213.9	1.02
North: BruceHwy												
P3	Full	10	11	44.2	LOS E	0.0	0.0	0.94	0.94	213.8	220.5	1.03
All Pedestrians		20	21	44.2	LOS E	0.0	0.0	0.94	0.94	211.3	217.2	1.03

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [BruceHwy/OliveSt_2027 Base+Dev_AM (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	405	18.0	426	18.0	*0.244	8.0	LOS A	3.3	26.5	0.60	0.50	0.60	53.0
3	R2	2	4.0	2	4.0	0.019	55.0	LOS E	0.1	0.7	0.96	0.61	0.96	31.0
Approach		407	17.9	428	17.9	0.244	8.3	LOS A	3.3	26.5	0.60	0.50	0.60	52.8
East: Olive St														
4	L2	2	0.0	2	0.0	0.009	46.4	LOS D	0.1	0.6	0.89	0.62	0.89	33.5
6	R2	34	0.0	36	0.0	*0.321	57.5	LOS E	1.8	12.6	0.99	0.73	0.99	30.6
Approach		36	0.0	38	0.0	0.321	56.9	LOS E	1.8	12.6	0.99	0.72	0.99	30.8
North: BruceHwy														
7	L2	7	17.0	7	17.0	0.005	6.2	LOS A	0.0	0.2	0.12	0.56	0.12	53.2
8	T1	927	6.0	976	6.0	*0.413	9.8	LOS A	11.7	86.4	0.54	0.48	0.54	51.7
9u	U	6	0.0	6	0.0	0.035	48.7	LOS D	0.3	1.9	0.90	0.67	0.90	32.7
Approach		940	6.0	989	6.0	0.413	10.0	LOS B	11.7	86.4	0.54	0.48	0.54	51.5
All Vehicles		1383	9.4	1456	9.4	0.413	10.7	LOS B	11.7	86.4	0.57	0.49	0.57	51.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Olive St												
P2	Full	10	11	44.2	LOS E	0.0	0.0	0.94	0.94	208.7	213.9	1.02
North: BruceHwy												
P3	Full	10	11	44.2	LOS E	0.0	0.0	0.94	0.94	213.8	220.5	1.03
All Pedestrians		20	21	44.2	LOS E	0.0	0.0	0.94	0.94	211.3	217.2	1.03

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [BruceHwy/OliveSt_2025Survey_PM (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	734	6.0	773	6.0	*0.633	14.3	LOS B	8.8	65.1	0.90	0.77	0.90	48.6
3	R2	3	0.0	3	0.0	0.008	32.2	LOS C	0.1	0.7	0.81	0.63	0.81	38.6
Approach		737	6.0	776	6.0	0.633	14.4	LOS B	8.8	65.1	0.90	0.77	0.90	48.5
East: Olive St														
4	L2	7	0.0	7	0.0	0.013	26.5	LOS C	0.2	1.4	0.72	0.65	0.72	41.0
6	R2	50	2.0	53	2.0	*0.383	46.5	LOS D	2.1	15.0	0.99	0.74	0.99	33.7
Approach		57	1.8	60	1.8	0.383	44.0	LOS D	2.1	15.0	0.96	0.73	0.96	34.4
North: BruceHwy														
7	L2	8	0.0	8	0.0	0.005	6.1	LOS A	0.0	0.2	0.16	0.57	0.16	53.7
8	T1	477	12.0	502	12.0	0.529	27.8	LOS C	8.6	66.3	0.91	0.76	0.91	41.2
9u	U	6	0.0	6	0.0	*0.060	46.3	LOS D	0.2	1.7	0.95	0.66	0.95	33.4
Approach		491	11.7	517	11.7	0.529	27.7	LOS C	8.6	66.3	0.90	0.76	0.90	41.2
All Vehicles		1285	8.0	1353	8.0	0.633	20.8	LOS C	8.8	66.3	0.90	0.76	0.90	44.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Olive St												
P2	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	198.8	213.9	1.08
North: BruceHwy												
P3	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	203.9	220.5	1.08
All Pedestrians		100	105	34.3	LOS D	0.1	0.1	0.93	0.93	201.4	217.2	1.08

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [BruceHwy/OliveSt_2027 Base_PM (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 80 seconds (Site Optimum Cycle Time - Minimum Delay)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: BruceHwy														
2	T1	844	6.0	888	6.0	*0.728	16.0	LOS B	11.0	81.3	0.94	0.83	0.98	47.5
3	R2	3	0.0	3	0.0	0.008	32.2	LOS C	0.1	0.7	0.81	0.63	0.81	38.6
Approach		847	6.0	892	6.0	0.728	16.1	LOS B	11.0	81.3	0.94	0.83	0.98	47.5
East: Olive St														
4	L2	8	0.0	8	0.0	0.015	26.5	LOS C	0.2	1.6	0.72	0.65	0.72	41.0
6	R2	58	2.0	61	2.0	*0.445	46.8	LOS D	2.5	17.5	0.99	0.75	0.99	33.6
Approach		66	1.8	69	1.8	0.445	44.3	LOS D	2.5	17.5	0.96	0.74	0.96	34.3
North: BruceHwy														
7	L2	9	0.0	9	0.0	0.006	6.1	LOS A	0.0	0.2	0.16	0.57	0.16	53.7
8	T1	549	12.0	578	12.0	0.609	28.5	LOS C	10.1	78.3	0.93	0.79	0.93	40.8
9u	U	7	0.0	7	0.0	*0.071	46.5	LOS D	0.3	2.0	0.95	0.67	0.95	33.3
Approach		565	11.7	595	11.7	0.609	28.4	LOS C	10.1	78.3	0.92	0.78	0.92	40.9
All Vehicles		1478	8.0	1556	8.0	0.728	22.0	LOS C	11.0	81.3	0.93	0.81	0.96	44.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Olive St												
P2	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	198.8	213.9	1.08
North: BruceHwy												
P3	Full	50	53	34.3	LOS D	0.1	0.1	0.93	0.93	203.9	220.5	1.08
All Pedestrians		100	105	34.3	LOS D	0.1	0.1	0.93	0.93	201.4	217.2	1.08

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Appendix E Codes Assessments

State code 6: Protection of state transport networks

Table 6.2 Development in general

Performance outcomes	Acceptable outcomes	Response
Network impacts		
PO1 Development does not compromise the safety of users of the **state-controlled road** network.	No acceptable outcome is prescribed.	Complies with PO1 – refer to section 11 of Colliers' report and Development Plans.
PO2 Development does not adversely impact the structural integrity or physical condition of a **state-controlled road** or **road transport infrastructure**.	No acceptable outcome is prescribed.	Complies with PO2 – refer to section 11 of Colliers' report and Development Plans.
PO3 Development ensures **no net worsening** of the operating performance the **state-controlled road** network.	No acceptable outcome is prescribed.	Complies with PO3 – refer to section 11 of Colliers' report.
PO4 Traffic movements are not directed onto a **state-controlled road** where they can be accommodated on the **local road** network.	No acceptable outcome is prescribed.	Complies with PO4 – refer to sections 6 and 11 of Colliers' report and Development Plans.
PO5 Development involving haulage exceeding 10,000 tonnes per year does not damage the pavement of a **state-controlled road**.	No acceptable outcome is prescribed.	Refer to Civil report.
PO6 Development does not require a new **railway** level crossing.	No acceptable outcome is prescribed.	Complies with PO6. Refer to Development Plans
PO7 Development does not adversely impact the operating performance of an existing **railway crossing**.	No acceptable outcome is prescribed.	Complies with PO7.
PO8 Development does not adversely impact on the safety of an existing **railway crossing**.	No acceptable outcome is prescribed.	Complies with PO8.
PO9 Development is designed and constructed to allow for on-site circulation to ensure vehicles do not queue in a **railway crossing**.	No acceptable outcome is prescribed.	Complies with PO9.
PO10 Development does not create a safety hazard within the **railway corridor**.	No acceptable outcome is prescribed.	Complies with PO10.
PO11 Development does not adversely impact the operating performance of the **railway corridor**.	No acceptable outcome is prescribed.	Complies with PO11.
PO12 Development does not interfere with or obstruct the **railway transport infrastructure** or **other rail infrastructure**.	No acceptable outcome is prescribed.	Complies with PO12. Refer to Development Plans

Performance outcomes	Acceptable outcomes	Response
PO13 Development does not adversely impact the structural integrity or physical condition of a **railway corridor** or **rail transport infrastructure**.	No acceptable outcome is prescribed.	Complies with PO13. Refer to Development Plans
Stormwater and overland flow		
PO14 Stormwater run-off or overland flow from the development site does not create or exacerbate a safety hazard for users of a **state transport corridor** or **state transport infrastructure**.	No acceptable outcome is prescribed.	Refer to Stormwater/Flood report.
PO15 Stormwater run-off or overland flow from the development site does not result in a material worsening of operating performance of a **state transport corridor** or **state transport infrastructure**.	No acceptable outcome is prescribed.	Refer to Stormwater/Flood report
PO16 Stormwater run-off or overland flow from the development site does not interfere with the structural integrity or physical condition of the **state transport corridor** or **state transport infrastructure**.	No acceptable outcome is prescribed.	Refer to Stormwater/Flood report
PO17 Development associated with a **state-controlled road** or **road transport infrastructure** ensures that stormwater is lawfully discharged.	**AO17.1** Development does not create any new points of discharge to a **state transport corridor** or **state transport infrastructure**. AND **AO17.2** Development does not concentrate flows to a **state transport corridor**. AND **AO17.3** Stormwater run-off is discharged to a **lawful point of discharge**. AND **AO17.4** Development does not worsen the condition of an existing **lawful point of discharge** to a **state transport corridor** or **state transport infrastructure**.	Refer to Stormwater/Flood report

Performance outcomes	Acceptable outcomes	Response
Flooding		
PO18 Development does not result in a material worsening of flooding impacts within a **state transport corridor** or **state transport infrastructure**	*For a **state-controlled road** or **road transport infrastructure**, all of the following apply:* **AO18.1** For all flood events up to 1% **annual exceedance probability**, development ensures there are negligible impacts (within +/- 10mm) to existing flood levels within a **state transport corridor**. AND **AO18.2** For all flood events up to 1% **annual exceedance probability**, development ensures there are negligible impacts (up to a 10% increase) to existing peak velocities within a **state transport corridor**. AND **AO18.3** For all flood events up to 1% annual exceedance probability, development ensures there are negligible impacts (up to a 10% increase) to existing time of submergence of a **state transport corridor**. *No acceptable outcome is prescribed for a **railway corridor** or **rail transport infrastructure**.*	Refer to Stormwater/Flood report
Drainage infrastructure		
PO19 Drainage infrastructure does not create a safety hazard in a **state transport corridor**.	*For a **state-controlled road** environment, both of the following apply:* **AO19.1** Drainage infrastructure associated with, or in a **state-controlled road** is wholly contained within the development site, except at the **lawful point of discharge**. AND	Refer to Stormwater/Flood report

Performance outcomes	Acceptable outcomes	Response
	AO19.2 Drainage infrastructure can be maintained without requiring access to a **state transport corridor**. *For a **railway** environment both of the following apply:* **AO19.3** Drainage infrastructure associated with a **railway corridor** or **rail transport infrastructure** is wholly contained within the development site. AND **AO19.4** Drainage infrastructure can be maintained without requiring access to a **state transport corridor**.	
PO20 Drainage infrastructure associated with, or in a **state-controlled road** or **road transport infrastructure** is constructed and designed to ensure the structural integrity and physical condition of existing drainage infrastructure and the surrounding drainage network is maintained.	No acceptable outcome is prescribed.	Refer to Stormwater/Flood report
Planned upgrades		
PO21 Development does not impede delivery of **planned upgrades** of **state transport infrastructure**.	No acceptable outcome is prescribed.	Refer to Stormwater/Flood report

Table 6.3 Public passenger transport infrastructure and active transport

Performance outcomes	Acceptable outcomes	Response
PO22 Development does not damage or interfere with **public passenger transport infrastructure**, **active transport infrastructure** or **public passenger services**.	No acceptable outcome is prescribed.	Complies with PO22 – Refer to sections 4, 6 and 11 of Colliers' report. Refer to Development Plans

Performance outcomes	Acceptable outcomes	Response
PO23 Development does not compromise the safety of **public passenger transport infrastructure**, **public passenger services** and **active transport infrastructure**.	No acceptable outcome is prescribed.	Complies with PO23 – Refer to sections 4, 6 and 11 of Colliers' report.
PO24 Development does not adversely impact the operating performance of **public passenger transport infrastructure, public passenger services** and **active transport infrastructure**.	No acceptable outcome is prescribed.	Complies with PO24 – Refer to sections 4, 6 and 11 of Colliers' report.
PO25 Development does not adversely impact the structural integrity or physical condition of **public passenger transport infrastructure** and **active transport infrastructure**.	No acceptable outcome is prescribed.	Complies with PO25 – Refer to sections 4, 6 and 11 of Colliers' report. Refer to Development Plans
PO26 Upgraded or new **public passenger transport infrastructure** and **active transport infrastructure** is provided to accommodate the demand for **public passenger transport** and **active transport** generated by the development.	No acceptable outcome is prescribed.	Complies with PO26 – Refer to sections 4, 6 and 11 of Colliers' report
PO27 Development is designed to ensure the location of **public passenger transport infrastructure** prioritises and enables efficient **public passenger services**.	No acceptable outcome is prescribed.	Complies with PO27 – Refer to sections 4 and 11 of Colliers' report. Refer to Development Plans
PO28 Development enables the provision or extension of **public passenger services**, **public passenger transport infrastructure** and **active transport infrastructure** to the development and avoids creating indirect or inefficient routes for **public passenger services**.	No acceptable outcome is prescribed.	Complies with PO28 – Refer to sections 4, 6 and 11 of Colliers' report. Refer to Development Plans
PO29 New or modified road networks are designed to enable development to be serviced by **public passenger services**.	**AO29.1** Roads catering for buses are arterial or **sub-arterial roads**, collector or their equivalent. AND **AO29.2** Roads intended to accommodate buses are designed and constructed in accordance with: 1. Road Planning and Design Manual, 2nd Edition, Volume 3 – Guide to Road Design; Department of Transport and Main Roads;	Complies with PO29 – Refer to sections 4, 6 and 11 of Colliers' report. Refer to Development Plans

Performance outcomes	Acceptable outcomes	Response
	2. Supplement to Austroads Guide to Road Design (Parts 3, 4-4C and 6), Department of Transport and Main Roads; 3. Austroads Guide to Road Design (Parts 3, 4-4C and 6); 4. Austroads Design Vehicles and Turning Path Templates; 5. Queensland Manual of Uniform Traffic Control Devices, Part 13: Local Area Traffic Management and AS 1742.13-2009 Manual of Uniform Traffic Control Devices – Local Area Traffic Management; AND **AO29.3** Traffic calming devices are not installed on roads used for buses in accordance with section 2.3.2 Bus Route Infrastructure, Public Transport Infrastructure Manual, Department of Transport and Main Roads, 2015.	
PO30 Development provides safe, direct and convenient access to existing and future **public passenger transport infrastructure** and **active transport infrastructure**.	No acceptable outcome is prescribed.	Complies with PO30 – Refer to sections 4, 6 and 11 of Colliers' report. Refer to Development Plans.
PO31 On-site vehicular circulation ensures the safety of both **public passenger transport services** and pedestrians.	No acceptable outcome is prescribed.	Complies with PO31 – Refer to sections 4, 6 and 11 of Colliers' report. Refer to Development Plans
PO32 Taxi facilities are provided to accommodate the demand generated by the development.	No acceptable outcome is prescribed.	N/A
PO33 Facilities are provided to accommodate the demand generated by the development for community transport services, courtesy transport services, and **booked hire services** other than taxis.	No acceptable outcome is prescribed.	Complies with PO33 – Refer to sections 4, 6 and 11 of Colliers' report. Refer to Development Plans

Performance outcomes	Acceptable outcomes	Response
PO34 Taxi facilities are located and designed to provide convenient, safe and equitable access for passengers.	**AO34.1** A **taxi facility** is provided parallel to the kerb and adjacent to the main entrance. AND **AO34.2 Taxi facilities** are designed in accordance with: 1. AS2890.5–1993 Parking facilities – on-street parking and AS1428.1–2009 Design for access and mobility – general requirements for access – new building work; 2. AS1742.11–1999 Parking controls – manual of uniform traffic control devices 3. AS/NZS 2890.6–2009 Parking facilities –off street parking for people with disabilities; 4. Disability standards for accessible public 5. transport 2002 made under section 31(1) of the Disability Discrimination Act 1992; 6. AS/NZS 1158.3.1 – Lighting for roads and public spaces, Part 3.1: Pedestrian area (category P) lighting – Performance and design requirements; 7. Chapter 7 Taxi Facilities, Public Transport Infrastructure Manual, Department of Transport and Main Roads, 2015.	N/A
PO35 Educational establishments are designed to ensure the safe and efficient operation of **public passenger services**, pedestrian and cyclist access and **active transport infrastructure**.	**AO35.1** Educational establishments are designed in accordance with the provisions of the Planning for Safe Transport Infrastructure at Schools, Department of Transport and Main Roads, 2011.	N/A

Engineering Services Report

Proposed Retirement Living Facility

930-960 Norman Road & 19-71 McMillan Avenue
Parkhurst

For: Ruby Developments Pty Ltd

13 March 2025

Ref: S25-028

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/187-2023

Dated: 18 September 2024

A QUALITY ASSURED COMPANY

CERTIFIED QUALITY ASSURANCE – ISO AS/NZS 9001, 4801 & 14001

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Certified for Issue by:



Jared Hill RPEQ 19891

13 March 2025

Document Control:

Revision	Author	Checked for Issue	Date
A	J. Hill RPEQ 19891	J. Hill RPEQ 19891	13.03.2025

This report has been prepared for Ruby Developments Pty Ltd for the purpose of accompanying a Development Application to Rockhampton Regional Council. This report must only be used by Ruby Developments Pty Ltd for this purpose and must not be used or relied upon by any other person for any other purpose.

The assessment, conclusions or recommendations in this report are based on conditions encountered and information received at the time of preparing the report and may not be relied upon as site conditions or operations vary over time.

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1 INTRODUCTION

Westera Partners Pty Ltd has been commissioned by Ruby Developments Pty Ltd to prepare an Engineering Services Report to accompany a development application for a proposed Retirement Living Facility.

The proposal involves 505 villas including associated internal access roads, carparking and ground level features. The primary access point will be provided from Norman Road.

This report documents how the site will be serviced by the necessary infrastructure in accordance with Rockhampton Regional Council's (RRC's) requirements.

2 SITE DESCRIPTION

2.1 Location and Land Use

The proposed development site is located at 930-960 Norman Road & 19-71 McMillan Avenue Parkhurst, also known as Lots 7-12 RP603508. The site area is approximately 27.628Ha and is currently mostly vacant rural land improved with dwellings and a golf driving range. The site falls at varying grade to the south and west towards a recently constructed open drain and McMillan Avenue.

The site is bound by rural properties to the north and east, McMillan Ave to the south and east and Norman Road to the west. Refer to Figure 1 for an indicative site location and Appendix C for detail site survey information.



Figure 1 – Indicative site location (Nearmap, 2024)

3 EXTERNAL ROADWORKS

Norman Road to the west as well as McMillan Ave to the south and east are both currently unformed sealed rural roads. It is noted that Norman Road is currently mapped as a major urban collector on Council's road hierarchy mapping with McMillan Avenue mapped as a major rural collector. It is proposed to upgrade both roads for the full frontage of the development site as well as to provide a BAR treatment to he proposed site entry. Refer to road functional layout plans contained within Appendix B.

4 STORMWATER DISCHARGE

Stormwater drainage for the proposed development shall ensure no adverse impact to upstream, downstream or adjoining properties. The existing site currently discharges stormwater to west and south towards the existing overland flow channel and McMillan Avenue, ultimately reaching Limestone Creek to the south of McMillan Avenue via recently constructed culverts under McMillan Avenue. Stormwater runoff from the development site will be collected discharged to the overland flow channel and Limestone Creek via a number of separate pipe outlets generally in line with existing site conditions. Stormwater detention is proposed to be provided to achieve the waterway stability objectives of the State Planning Policy (2017) only via 5 underground tanks. Refer to detailed Stormwater Report prepared by Westera Partners Pty Ltd and engineering drawings contained within Appendix B for further information on proposed stormwater works for the development.

The proposed development is required to address the State Planning Policy (2017) as the development site area exceeds 2500m^2. It is proposed to provide the necessary water quality treatment through the provision proprietary filter cartridges in the combined treatment/detention tanks and filter basket inserts within field inlets. Refer to separate Stormwater Management Report prepared by Westera Partners Pty Ltd for further information on how stormwater quality is proposed to be managed on site.

All stormwater works shall be in accordance with Rockhampton Regional Council's standards and specifications.

5 SEWER RETICULATION

The site is not currently connected to Council's sewerage infrastructure. Council's infrastructure mapping indicates that there is existing sewerage infrastructure to the west of the development. Based on advice received from Council it is proposed to connect the site to the existing sewer infrastructure within at the intersection of Rachel Drive to the west of the site via construction of a private sewer pump station and new rising main for the initial stages of the development.

Council have flagged that the ultimate development yield will trigger the requirement for trunk sewerage infrastructure to service the site. This involves large diameter gravity mains south to Boundary Road, the construction of a Council pump station and a 150mm diameter rising main extension across Limestone Creek and south along Norman Road to the existing 900mm diameter sewer at the intersection of Nagle Drive and Norman Road. A property connection will be constructed from this proposed trunk sewer to service the development site which will enable the pump station and rising main to be retired.

All sewer reticulation works shall be in accordance with Council's standards and specifications.

6 WATER RETICULATION

Council records indicate that there is currently a 600mm trunk water main as well as a smaller 100mm diameter reticulation water main within Norman Road. A 200mm diameter reticulation main branches from the 600mm main near the north-west corner of the development site. Records also indicate that there is an existing 100mm diameter reticulation main running along the north boundary of the property that services properties to the east of the development site. Council have provided advice that this water main can remain in place as long as the main is not impacted by the construction of the development. The existing dwelling and golf driving range are both currently serviced via connections to the water infrastructure within Norman Road. The existing services will need to be sealed and a new service, sized for the development demand, will need to be constructed from the 200mm main in north-west corner of the site.

The proposed connection strategy for the additional loading will be subject to Council approval.

All water reticulation works shall be in accordance with Council's standards and specifications.

7 FLOODING

The development site is mapped as being impacted by overland flow flooding from external catchments to the north and east. This overland flow flooding is proposed to be collected and diverted around the development footprint to establish flood free homes. Refer to separate Flood Impact Assessment by Westera Partners for further information on flooding.

8 EARTHWORKS

Earthworks operations for the development are anticipated to occur over the entire development footprint to establish flat sites for the future homes and manage stormwater appropriately. Levels have generally been set to minimise visual impact to the neighbouring properties and road frontages. Refer to Appendix B for concept earthworks plans.

A geotechnical investigation for the site should be undertaken and should include an assessment of whether unsuitable material is present on site.

All earthworks undertaken on site shall be in accordance with Rockhampton Regional Council's standards and specifications.

9 GAS, ELECTRICITY & COMMUNICATIONS

There are currently gas mains to the south west of the development site within Norman Road.

There is currently above ground electrical infrastructure within both Norman Road and McMillan Avenue with underground infrastructure within Norman Road to the south-west.

Telstra and NBN telecommunications infrastructure is available within both Norman Road and McMillan Avenue.

Refer to Appendix A & B for further information.

10 CONCLUSION

The engineering services report establishes that the proposed development can be adequately serviced by the stormwater, sewer, water and other services infrastructure surrounding the site.

Both Norman Road and McMillan Avenue are currently unformed with Norman Road mapped as an urban district collector. Upgrades to the external road infrastructure may be conditioned by Council.

The proposed development will direct stormwater runoff to the south-west towards the overland flow channel and Limestone Creek. Stormwater detention for waterway stability will be provided through the construction of five underground tanks. Stormwater quality treatment will be managed on site through the provision of proprietary treatment measures within each tank.

The development will require a sewer rising main extension to the existing sewer infrastructure within Rachel Drive to service the initial stages of the development. The full development though will trigger trunk gravity & rising main sewer works as well as a new pump station to direct sewerage south to the existing 900mm diameter sewer within Norman Road to the south of the site.

The 100mm diameter water main within the development site will need to be preserved. A new water service shall be constructed from the 200mm water main within Norman Road to service the site.

The development site is impacted by overland flow flooding from external catchments to the north and east. Diversion channels are proposed to be constructed to manage the runoff from the external catchments and establish a flood free footprint for the proposed development.

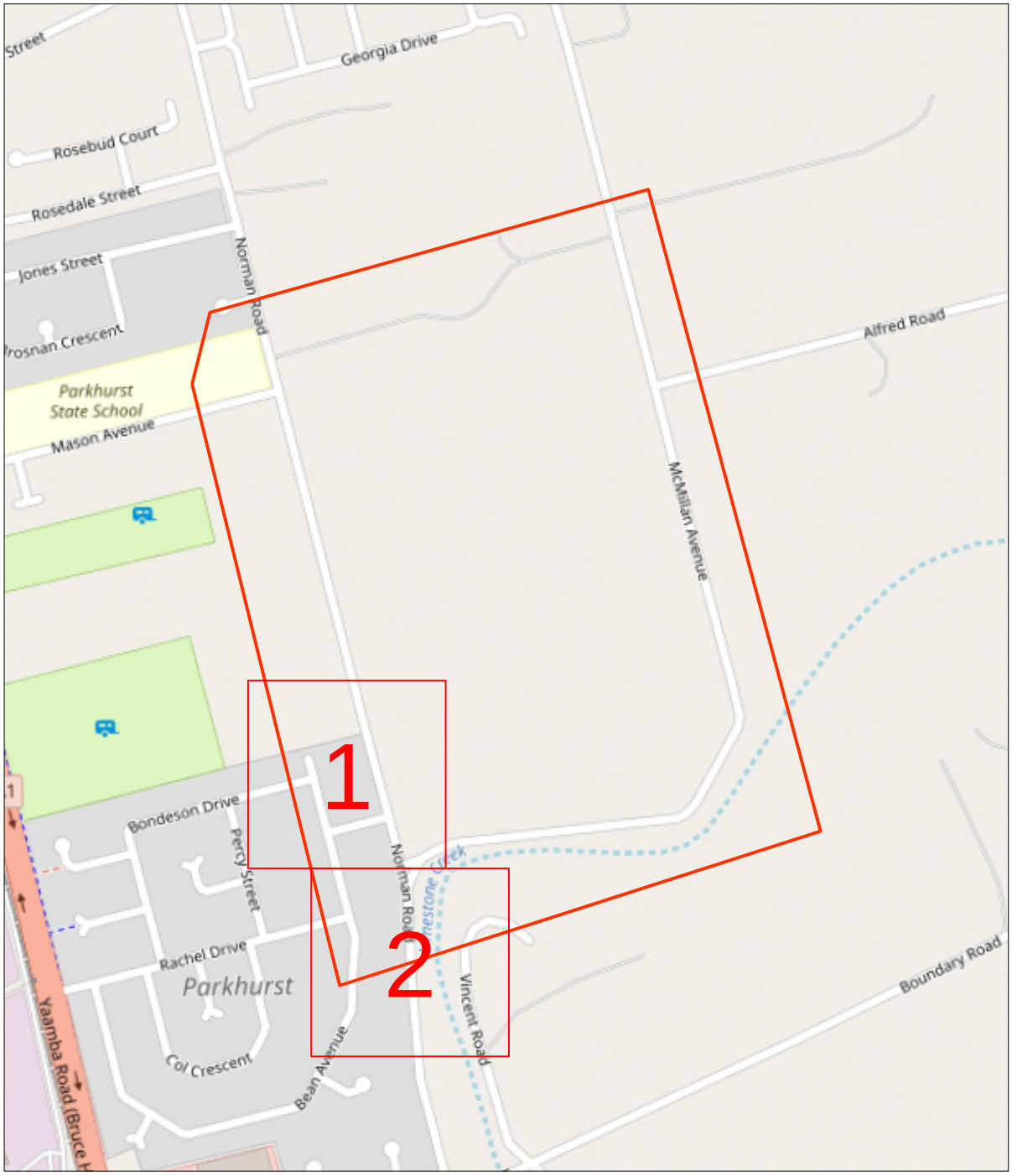
Earthworks shall be undertaken across the whole development site to establish building pads for the proposed development as well as to appropriately manage stormwater.

Final details regarding stormwater, sewer, water and other services can be addressed during the detailed design stage.

11 APPENDICES

Appendix A – Dial Before You Dig Information

Site Address	19 McMillan Avenue Parkhurst 4702	**Sequence No**	232483009
Name	Seb Moorrees		
Email	sebm@westerapartners.com.au		



Scale 1: 6000	N	Enquiry Area / Map Key Area

Site Address	19 McMillan Avenue Parkhurst 4702	Sequence No	232483009

Before you commence any works you are required to complete the attached 'Work In The Vicinity Of Critical Gas Assets' request form and forward this to APA as soon as practicable.



LEGEND

PIPE AND BOUNDARIES		PIPE CODE / MATERIALS		OBJECTS or TERMS	
LOW PRESSURES		C# *(e.g. C2)*	Cast Iron	VALVES	
MEDIUM PRESSURES		CU	Copper	BURIED VALVES	
HIGH PRESSURES		N2	Nylon	REGULATORS	
TRANSMISSION PRESSURES		P# *(e.g. P6)*	Polyethylene (PE)	GAS SUPPLIED = YES	
PRIORITY MAIN (BEHIND PIPE)		P6,P7,P9-P12	Medium Density PE	CP RECTIFIER UNIT	
PROPOSED (COLOUR BY PRESSURE)		P2,P4,P8	High Density PE	CP TEST POINT/ ANODE	/
LPG (COLOUR BY PRESSURE)		S# *(e.g. S8)*	Steel	SYPHON	
ABANDONED		W2	Wrought Galv. Iron	TRACE WIRE POINT	
IDLE		W3	Poly Coat Wrought Galv. Iron	PIPELINE MARKER	
SLEEVE		*Pipe diameter in millimetres is shown before pipe code*		NOT TIED IN	N.T.I.
CASING / SPLIT (BEHIND PIPE)		*e.g. 40P6 = 40mm nominal diameter*		DEPTH OF COVER	C
EASEMENT/ JURISDICTION				BACK / FRONT OF KERB	Bok Fok

EXAMPLES

40P6 in 80C2 — 40mm High Pressure Medium Density Polyethylene in an 80mm Cast Iron Casing

63S8 — 63mm Medium Pressure Steel

This map is created in colour and shall be printed in colour

Line / Polygon Request

Map Key

1

2

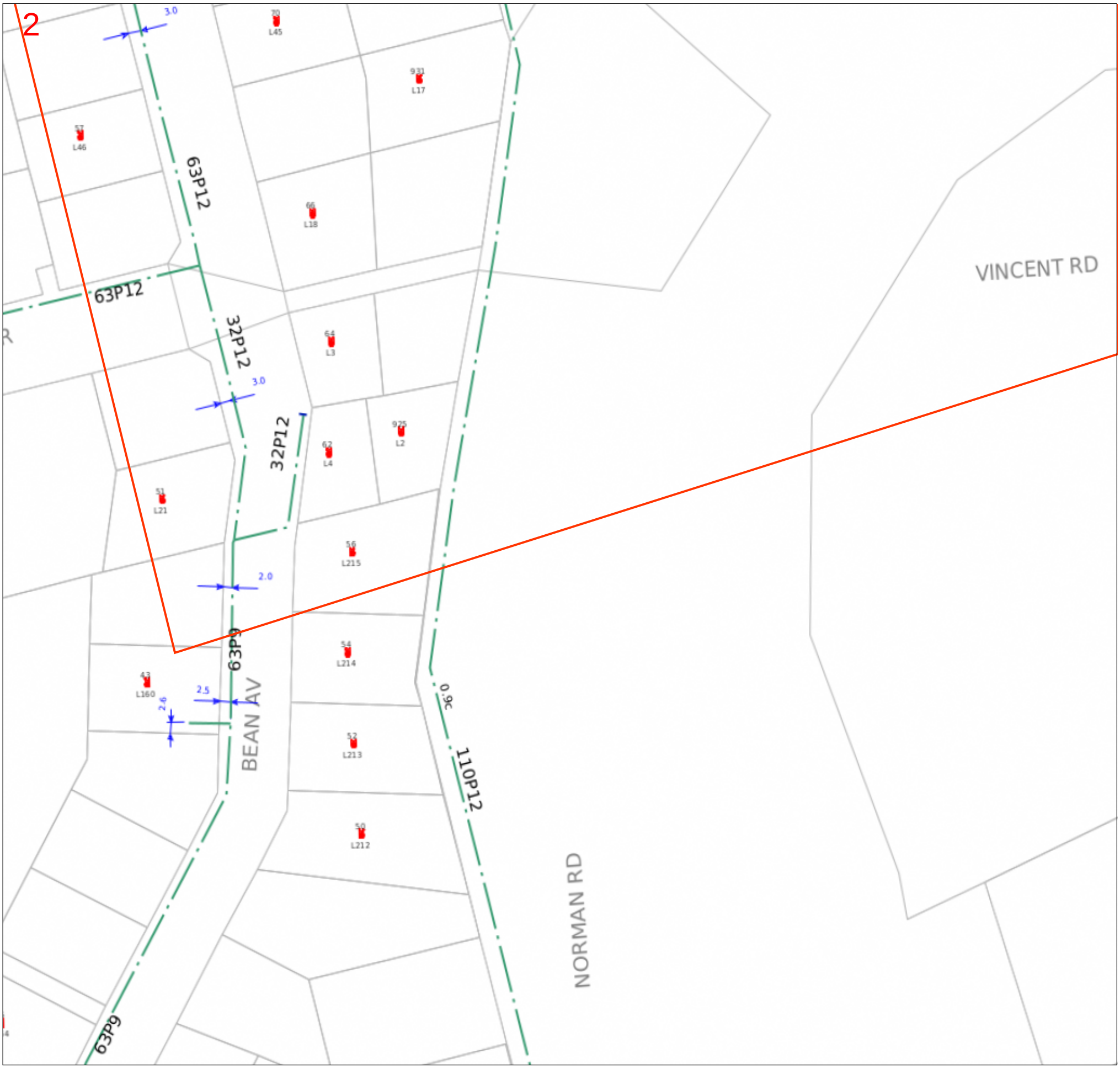
Scale 1:700

0 0.009km

N

Site Address	19 McMillan Avenue Parkhurst 4702	Sequence No	232483009

Before you commence any works you are required to complete the attached 'Work In The Vicinity Of Critical Gas Assets' request form and forward this to APA as soon as practicable.



LEGEND

PIPE AND BOUNDARIES		PIPE CODE / MATERIALS		OBJECTS or TERMS	
LOW PRESSURES		C# *(e.g. C2)*	Cast Iron	VALVES	
MEDIUM PRESSURES		CU	Copper	BURIED VALVES	
HIGH PRESSURES		N2	Nylon	REGULATORS	
TRANSMISSION PRESSURES		P# *(e.g. P6)*	Polyethylene (PE)	GAS SUPPLIED = YES	
PRIORITY MAIN (BEHIND PIPE)		P6,P7,P9-P12	Medium Density PE	CP RECTIFIER UNIT	
PROPOSED (COLOUR BY PRESSURE)		P2,P4,P8	High Density PE	CP TEST POINT/ ANODE	/
LPG (COLOUR BY PRESSURE)		S# *(e.g. S8)*	Steel	SYPHON	
ABANDONED		W2	Wrought Galv. Iron	TRACE WIRE POINT	
IDLE		W3	Poly Coat Wrought Galv. Iron	PIPELINE MARKER	
SLEEVE		*Pipe diameter in millimetres is shown before pipe code e.g. 40P6 = 40mm nominal diameter*		NOT TIED IN	N.T.I.
CASING / SPLIT (BEHIND PIPE)				DEPTH OF COVER	C
EASEMENT/ JURISDICTION				BACK / FRONT OF KERB	Bok Fok

EXAMPLES
40P6 in 80C2 — 40mm High Pressure Medium Density Polyethylene in an 80mm Cast Iron Casing
63S8 — 63mm Medium Pressure Steel

This map is created in colour and shall be printed in colour

Line / Polygon Request

Map Key

1
2

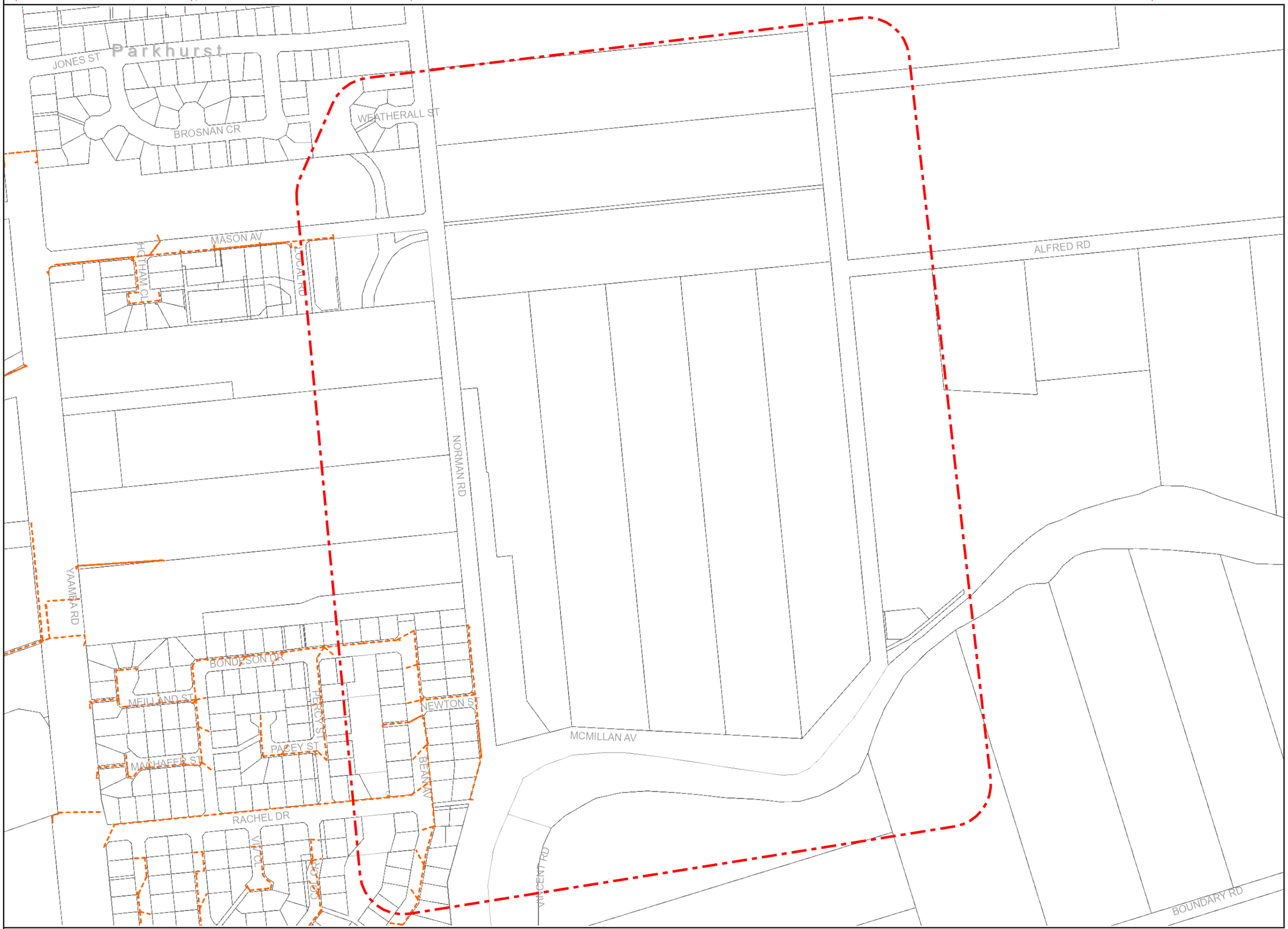
Scale 1:700

0 0.009km

N

All underground cables shall be treated as being energised. Where a cable is located that is not represented on the ERGON ENERGY BYDA map, then ERGON ENERGY shall be contacted immediately.

For Emergency Situations please call 13 16 70



This output provides details of the ERGON ENERGY electrical network. As variations map exist no responsibility is incurred by ERGON ENERGY for the accuracy or completeness of the information provided. Exact positions of cables and electrical connectivity should be confirmed on site.

ERGON ENERGY NETWORK
Part of Energy Queensland

BYDA

Sequence: 232483007
Date: 22/11/2023

Scale: 1:4136

OVERVIEW

For a full list of Map Symbols, please refer to the supplied BYDA Symbology Legend page

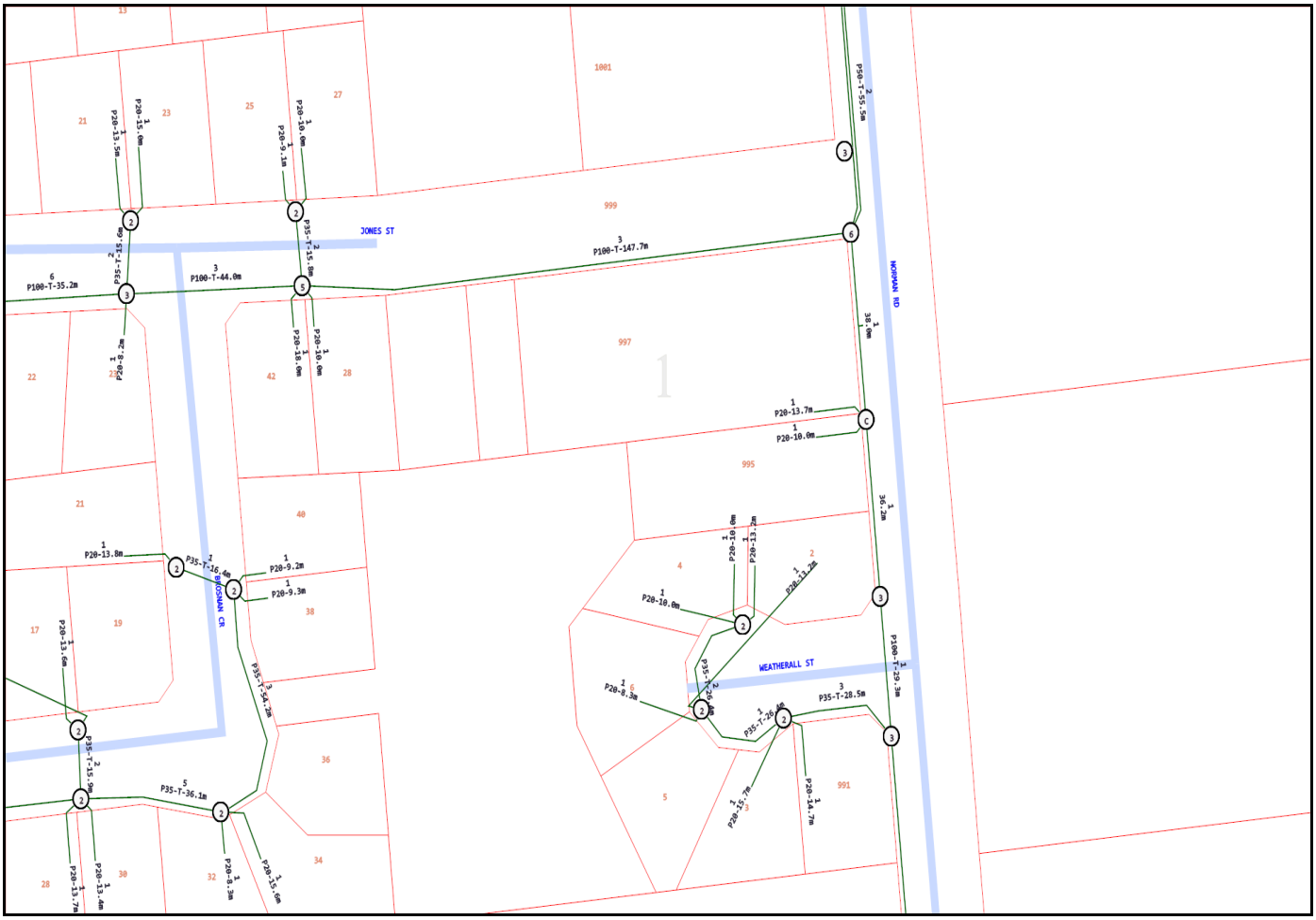
AS5488 Category "D" Plan

N
W E
S

DISCLAIMER: While reasonable measures have been taken to ensure the accuracy of the information contained in this plan response, neither Ergon Energy nor PelicanCorp shall have any liability whatsoever in relation to any loss, damage, cost or expense arising from the use of this plan response or the information contained in it or the completeness or accuracy of such information. Use of such information is subject to and constitutes acceptance of these terms.

LEGEND

34	Parcel and the location
5	Pit with size "5"
2E	Power Pit with size "2E". Valid PIT Size: e.g. 2E, 5E, 6E, 8E, 9E, E, null.
	Manhole
	Pillar
2 PO – T- 25.0m P40 – 20.0m 5 9	Cable count of trench is 2. One "Other size" PVC conduit (PO) owned by Telstra (-T-), between pits of sizes, "5" and "9" are 25.0m apart. One 40mm PVC conduit (P40) owned by NBN, between pits of sizes, "5" and "9" are 20.0m apart.
2 10.0m 5 9	2 Direct buried cables between pits of sizes ,"5" and "9" are 10.0m apart.
5 9	Trench containing any INSERVICE/CONSTRUCTED (Copper/RF/Fibre) cables.
5 9	Trench containing only DESIGNED/PLANNED (Copper/RF/Fibre/Power) cables.
5 9	Trench containing any INSERVICE/CONSTRUCTED (Power) cables.
BROADWAY ST	Road and the street name "Broadway ST"
Scale	0 20 40 60 Meters 1:2000 1 cm equals 20 m


JONES ST
NORMAN RD
BROSNAN CR
WEATHERALL ST
P100-T-35.2m
P100-T-44.0m
P100-T-147.7m
P50-T-55.5m
P35-T-15.6m
P35-T-15.8m
P35-T-16.4m
P35-T-54.2m
P35-T-36.1m
P35-T-15.9m
P35-T-26.4m
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P20-13.5m
P20-15.0m
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P20-10.0m
P20-8.2m
P20-18.0m
P20-13.7m
P20-10.0m
P20-13.8m
P20-9.2m
P20-9.3m
P20-13.6m
P20-13.7m
P20-13.4m
P20-8.3m
P20-15.6m
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P20-8.3m
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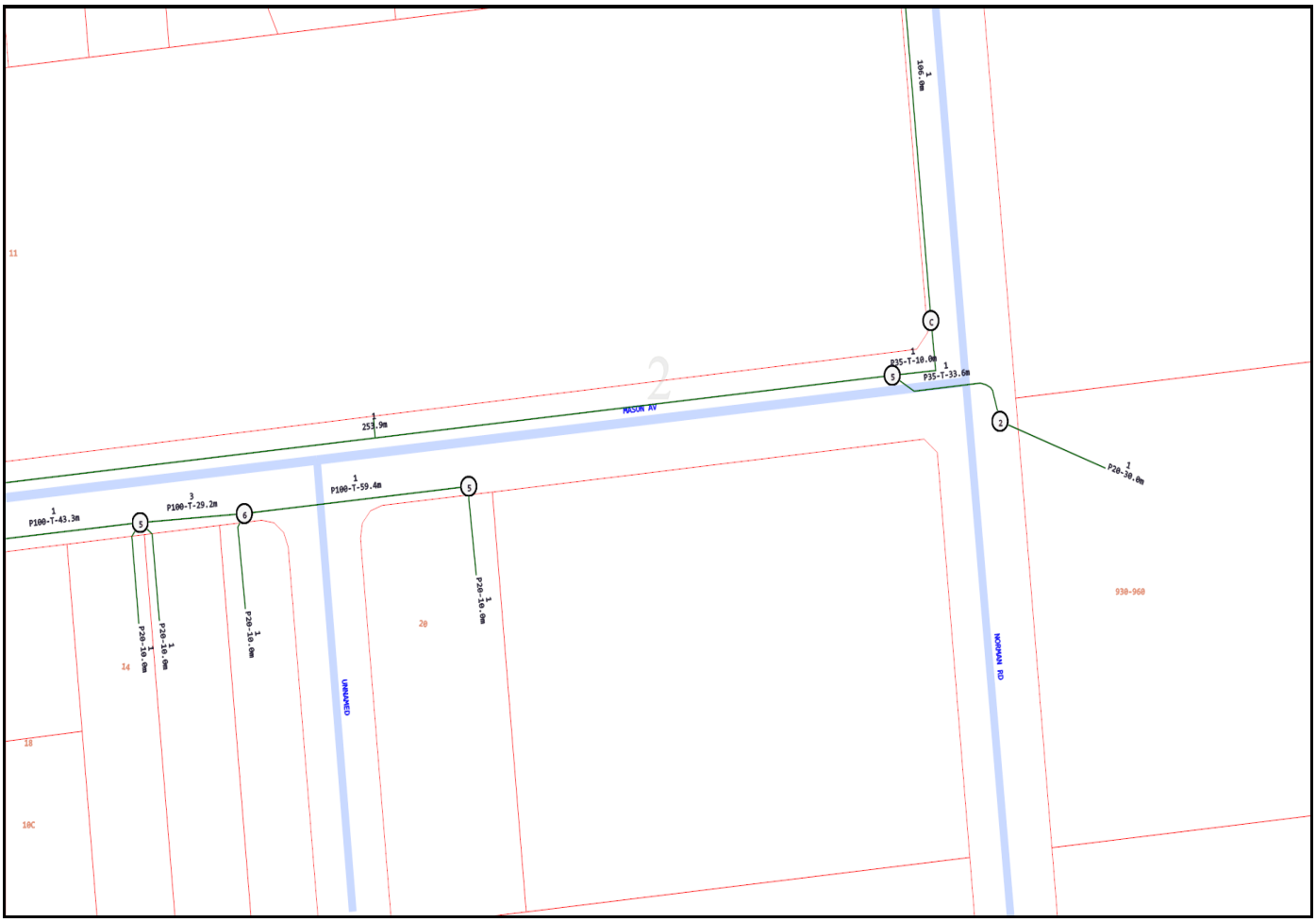
1001
999
997
995
991



106.0m
P35-T-10.0m
P35-T-33.6m
253.9m
MASON AV
P20-30.0m
P100-T-43.3m
P100-T-29.2m
P100-T-59.4m
P20-10.0m
P20-10.0m
P20-10.0m
P20-10.0m
UNNAMED
NORMAN RD
930-960
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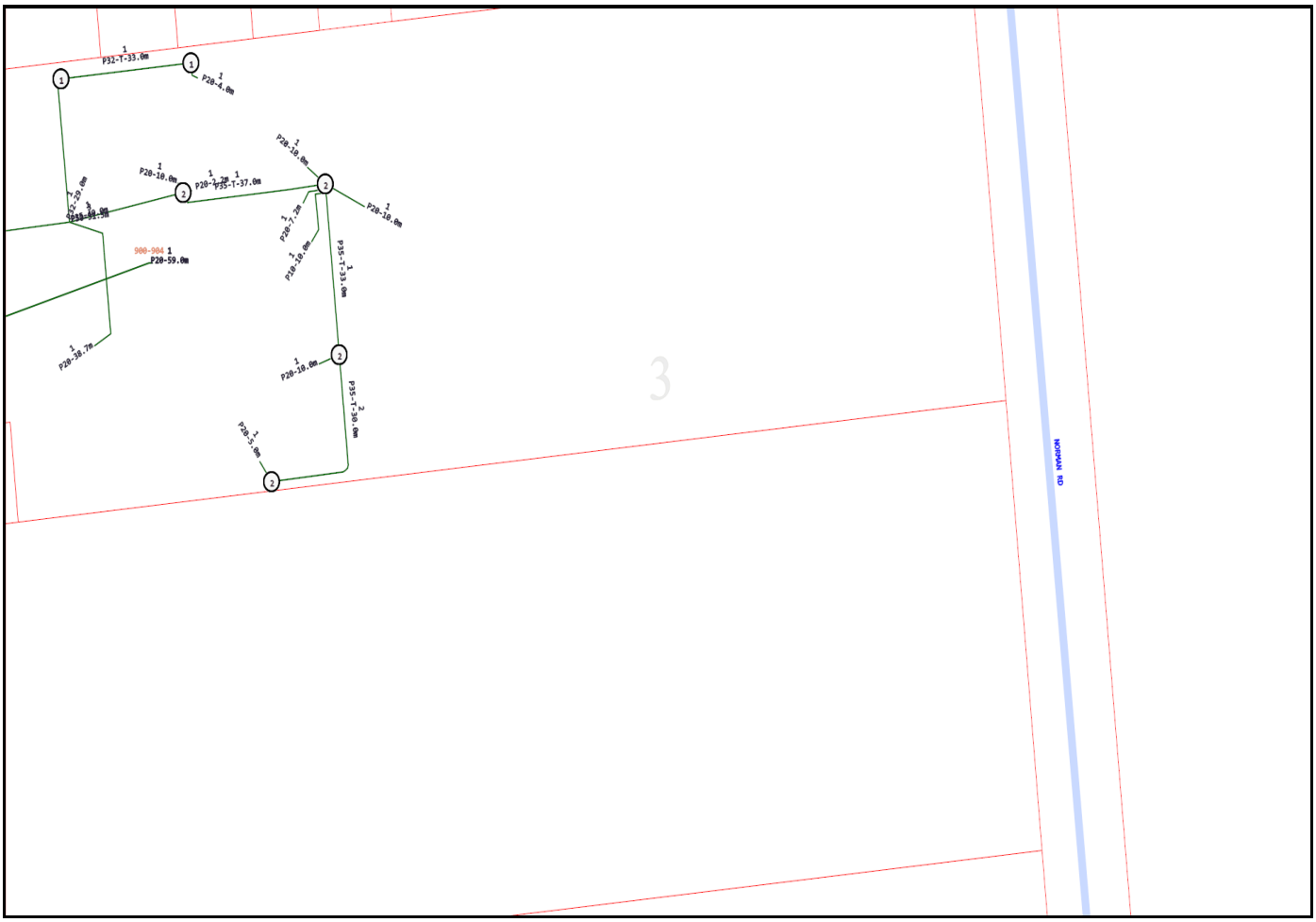
P32-T-33.0m
P20-4.0m
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P35-T-33.0m
900-904
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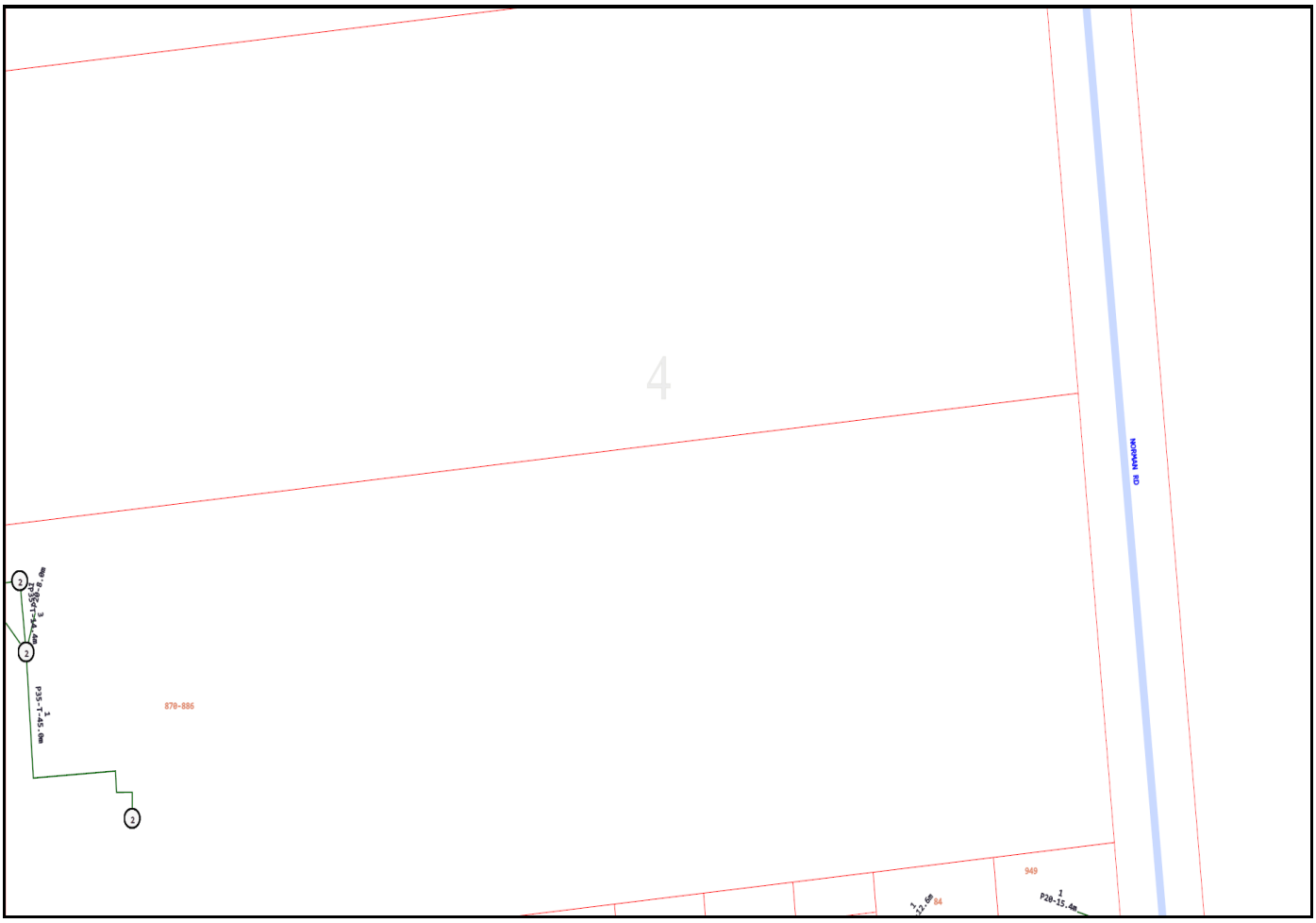
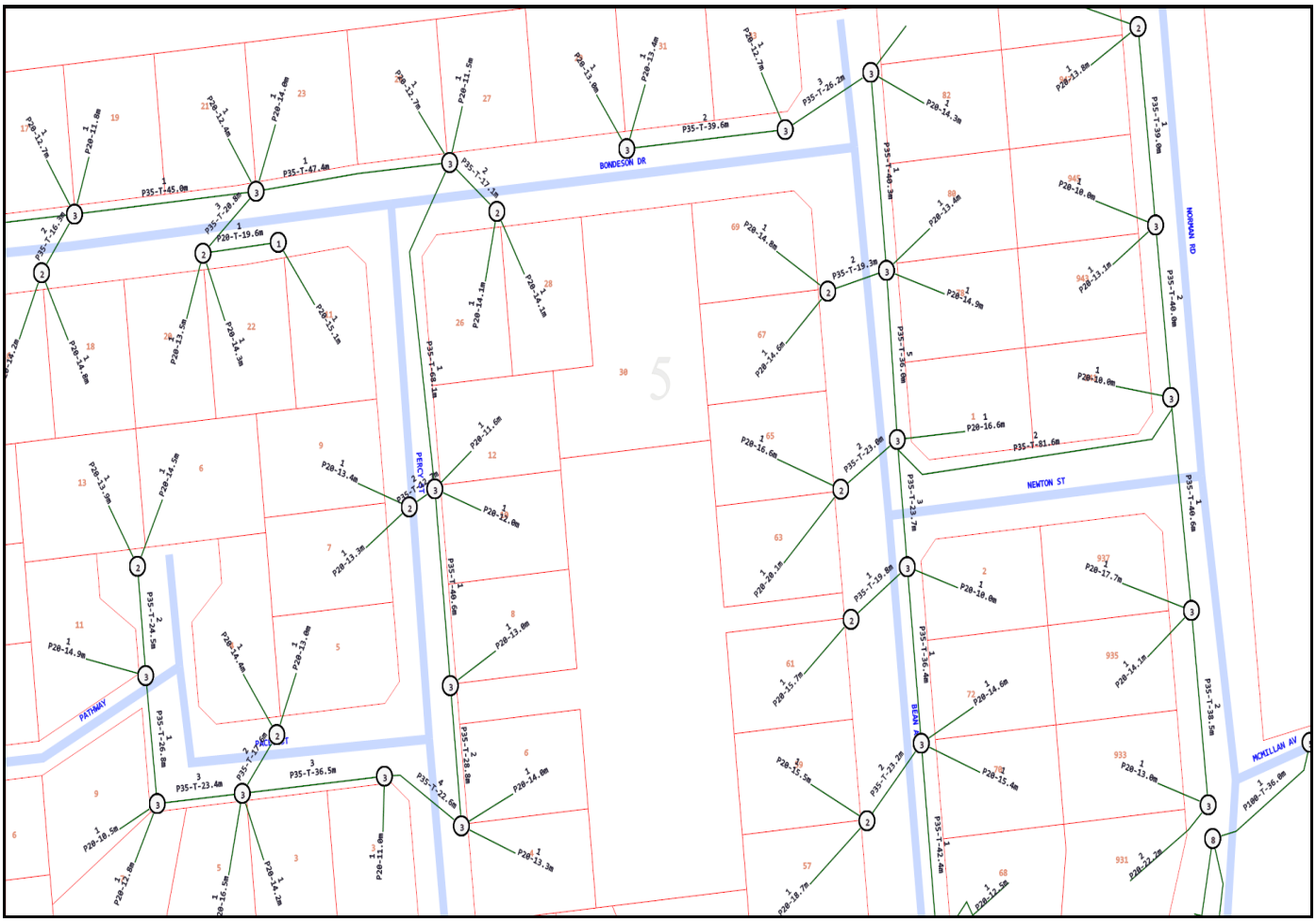
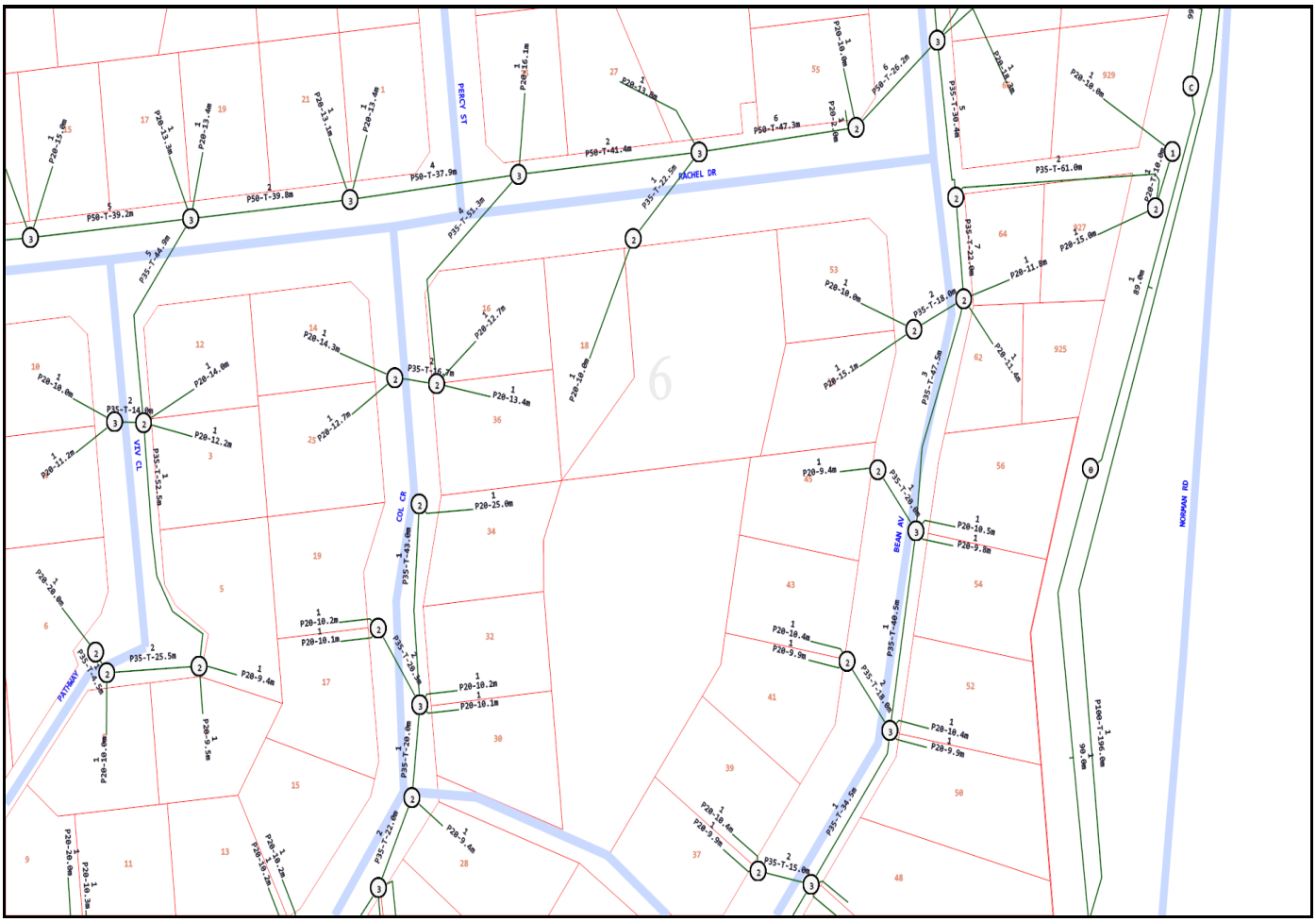
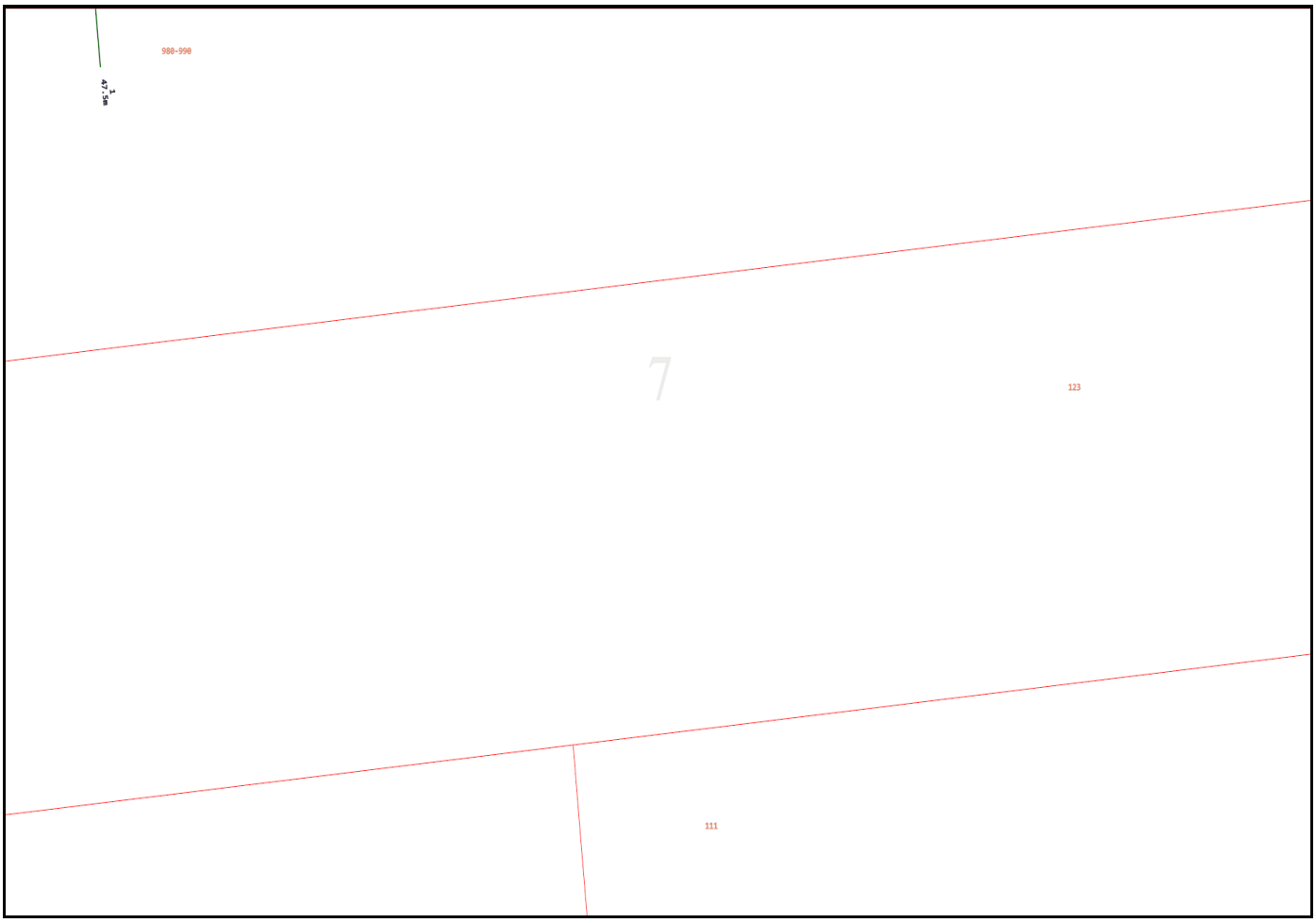
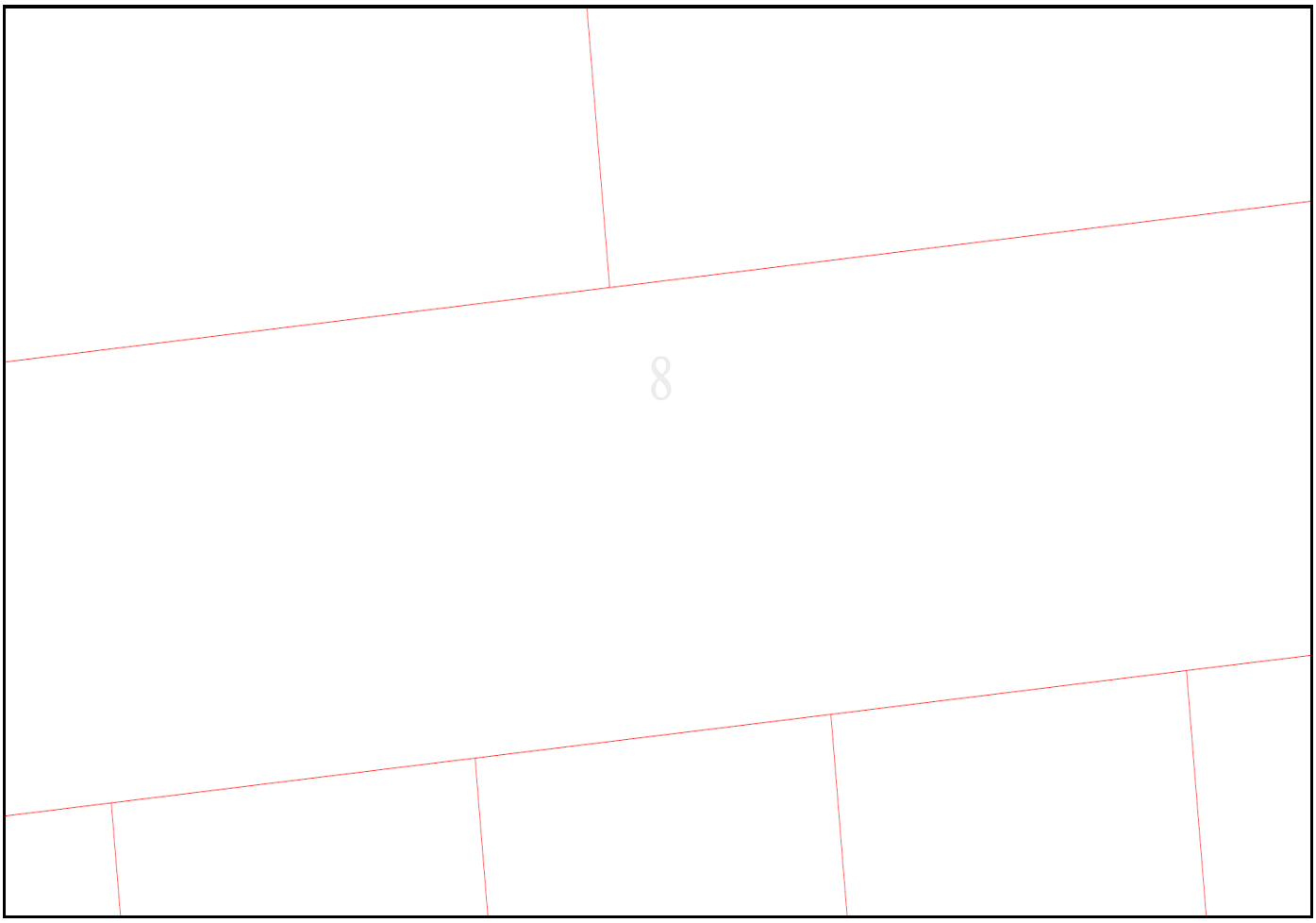
P20-10.0m
P35-T-36.0m
P20-5.0m
3
NORMAN RD


4
NORMAN RD
870-886
949
84
P35-7.45.4m
P20-15.4m


BONDESON DR
PERCY ST
NEWTON ST
MORMAN RD
PATHWAY
BEAN ST
MCKILLAN AV


PERCY ST
RACHEL DR
VIV CL
COL CR
BEAN AV
NORMAN RD
PATHWAY
6


988-990
47.58
7
123
111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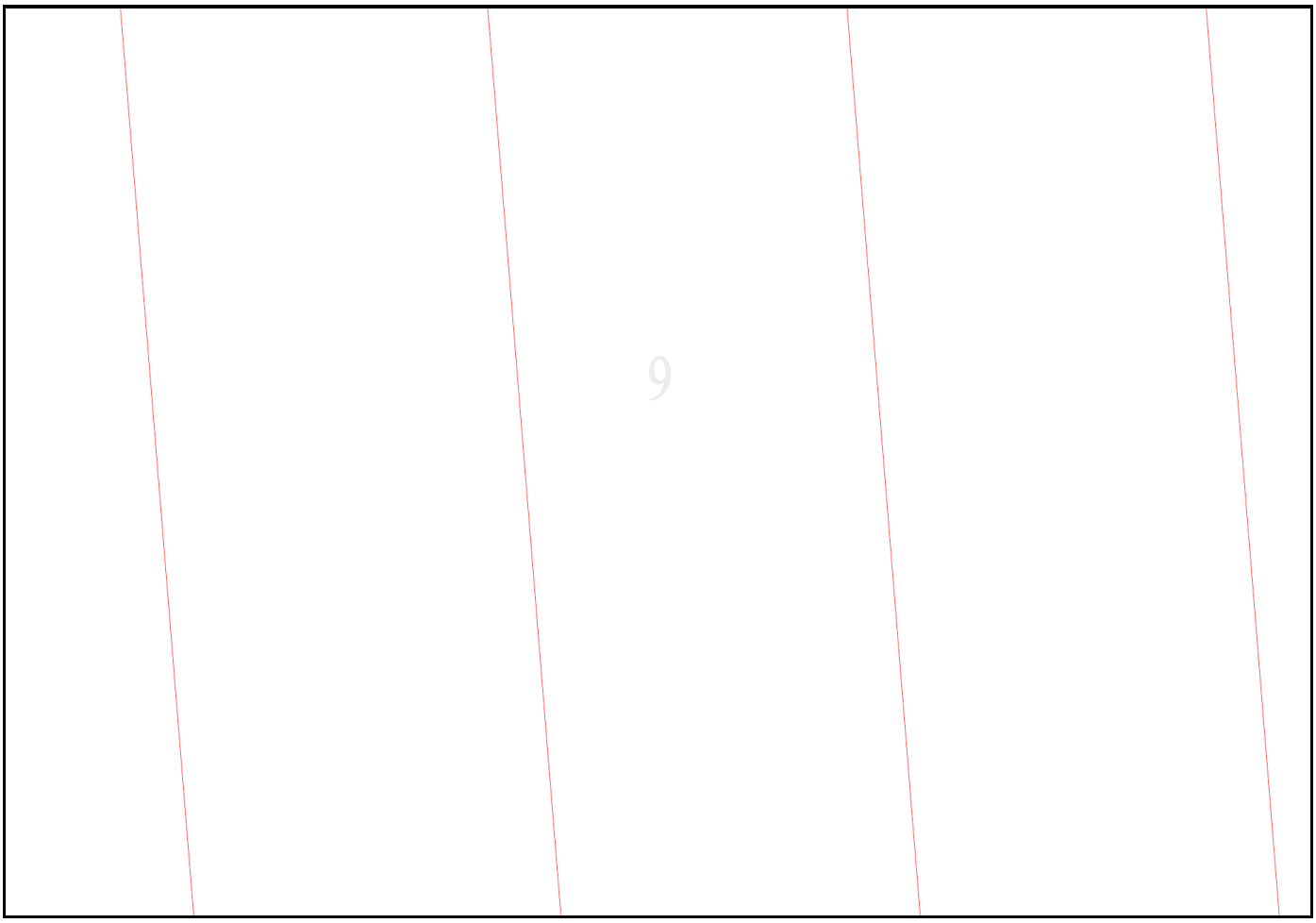
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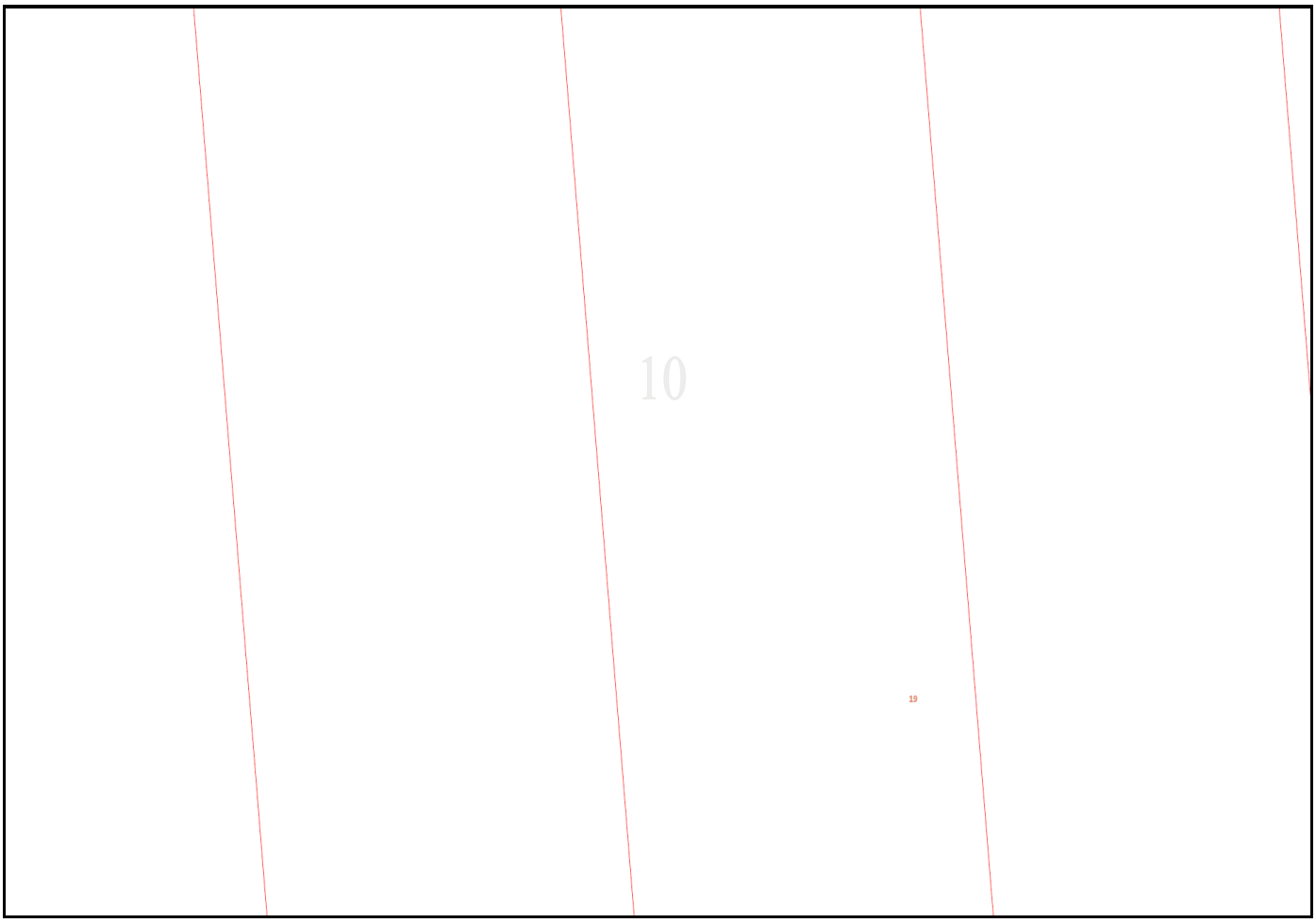
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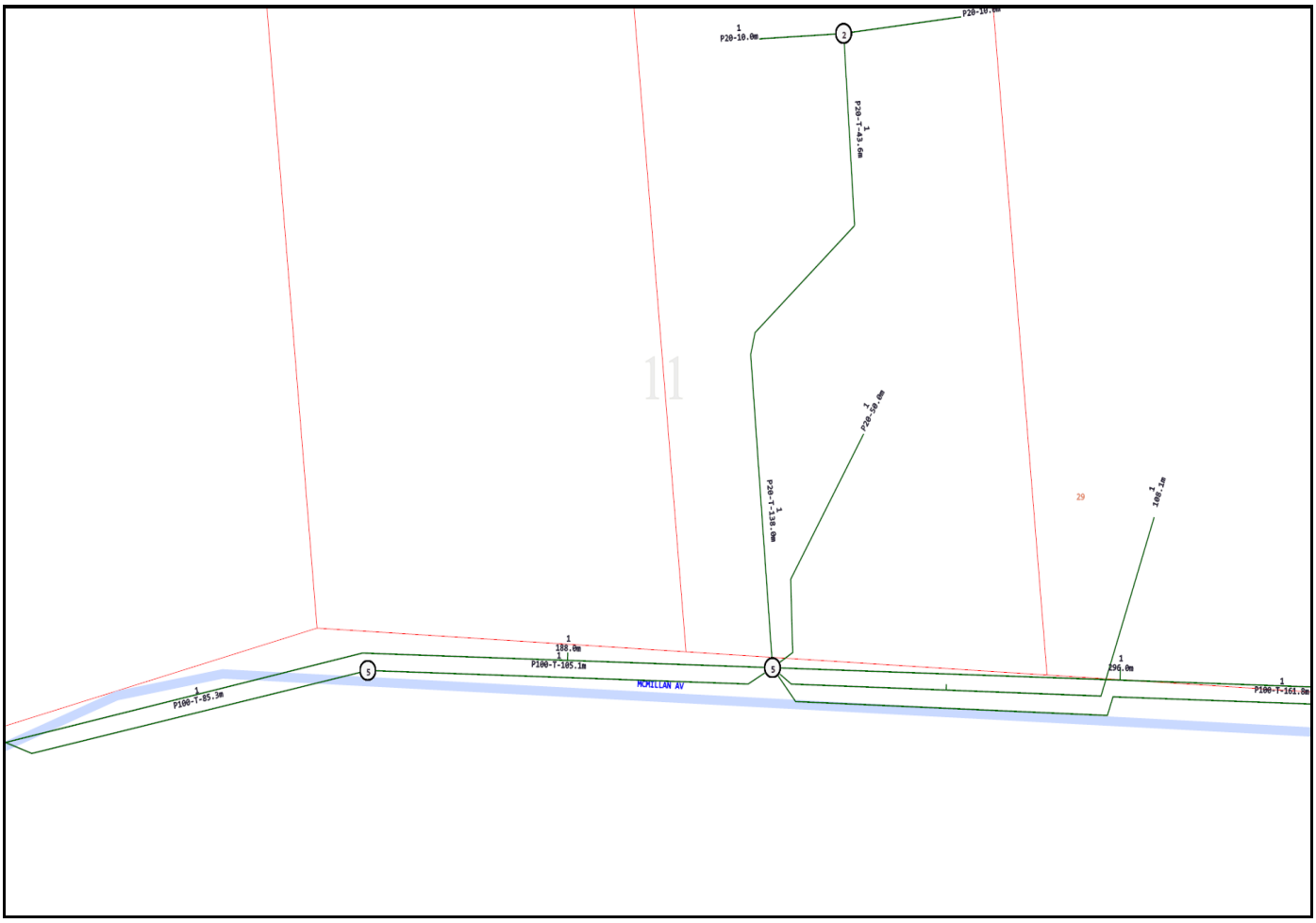
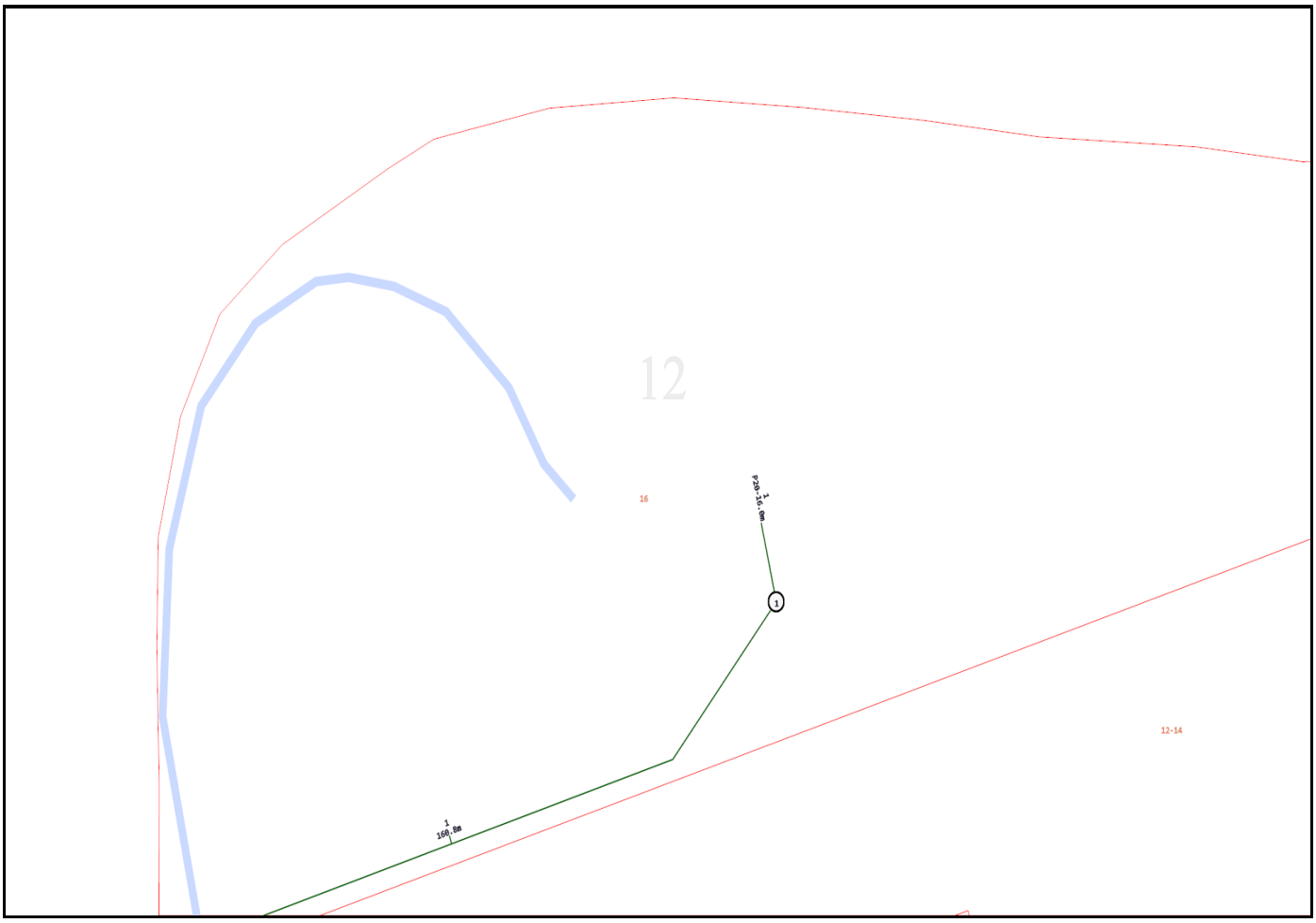
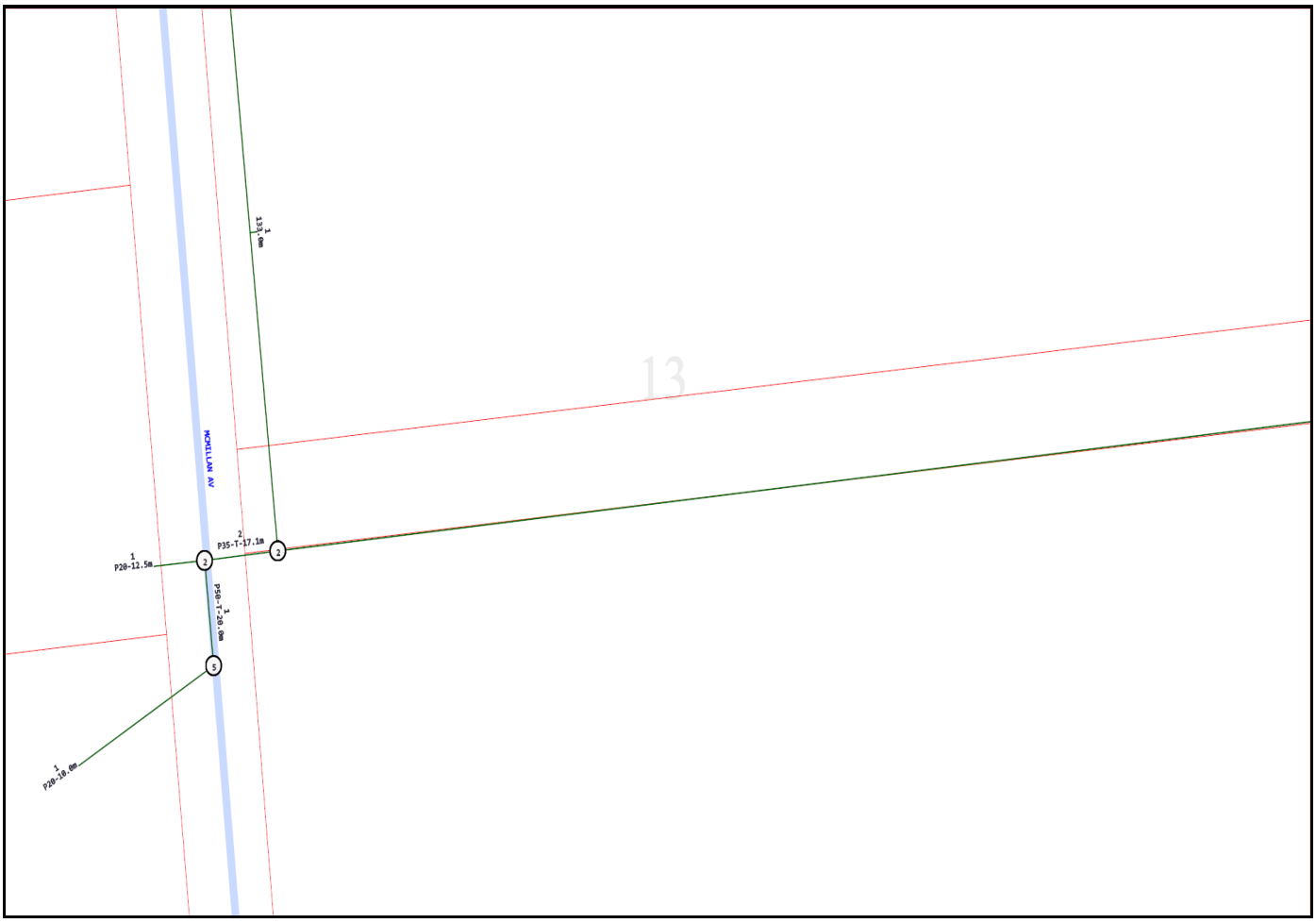
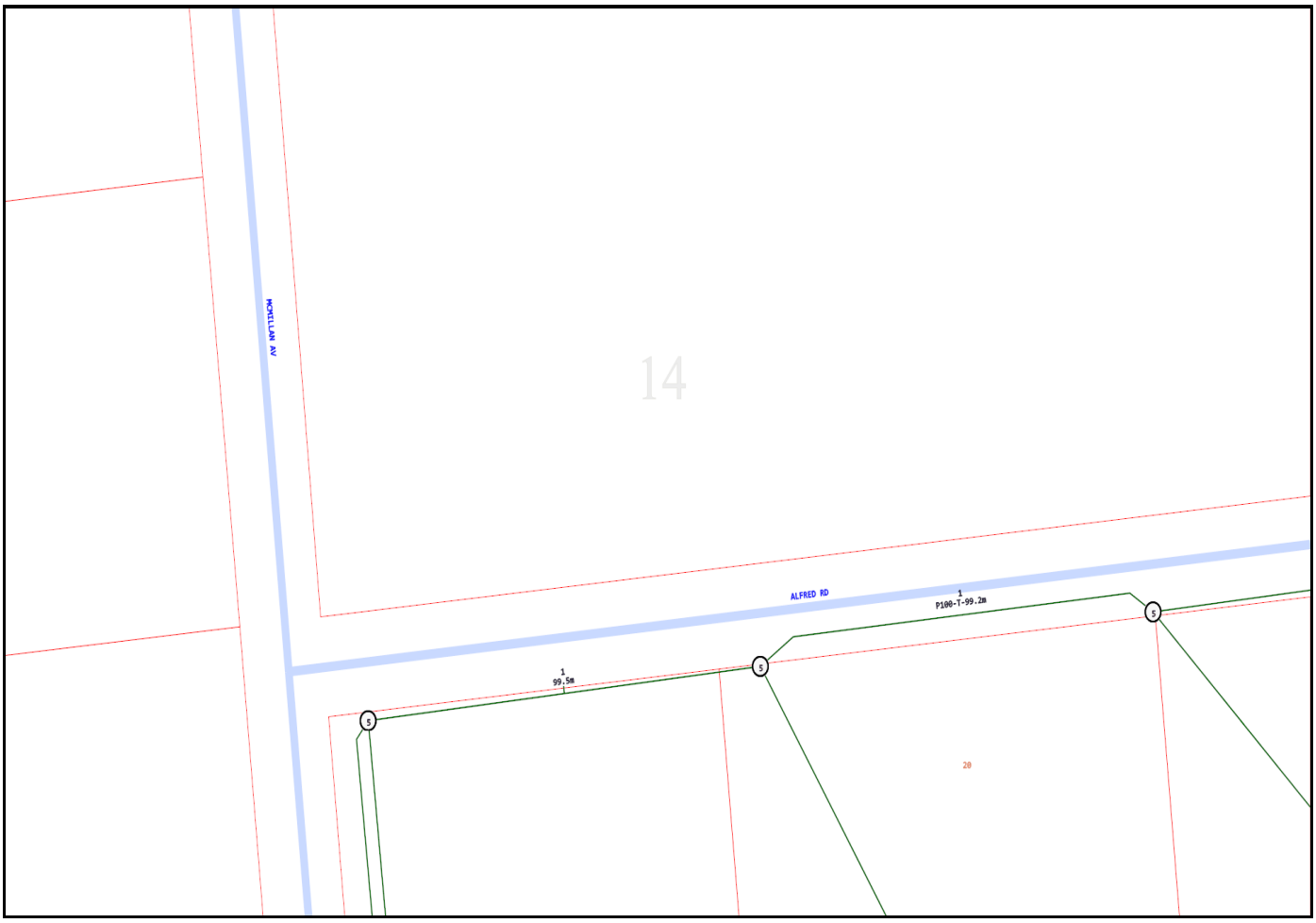
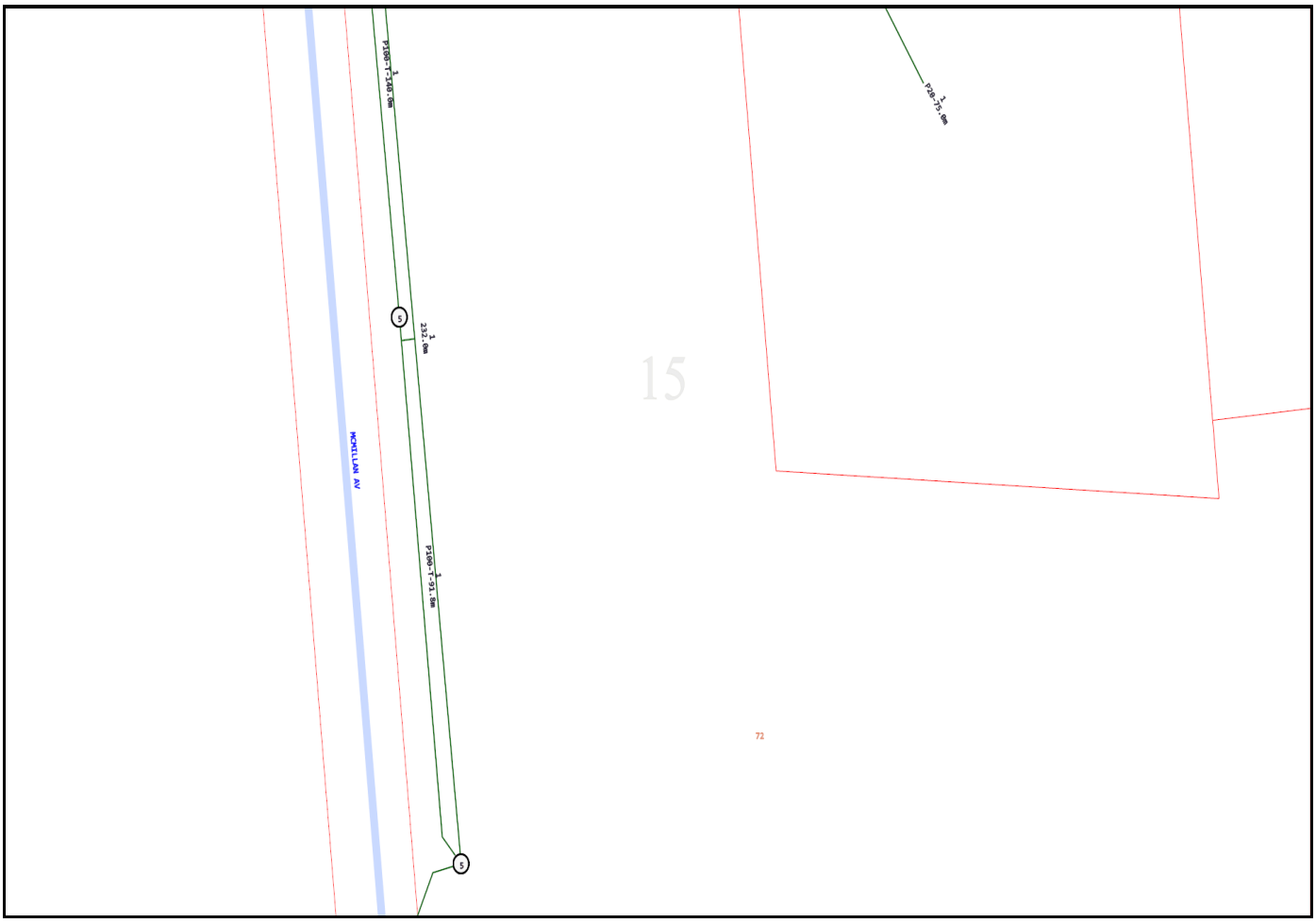

1
P20-10.0m
2
P20-10.0m
1
P20-T-143.6m
1
P20-30.0m
1
P20-T-139.0m
1
188.1m
1
188.0m
1
P100-T-105.1m
1
P100-T-85.3m
5
5
MCMILLAN AV
1
196.0m
1
P100-T-161.8m

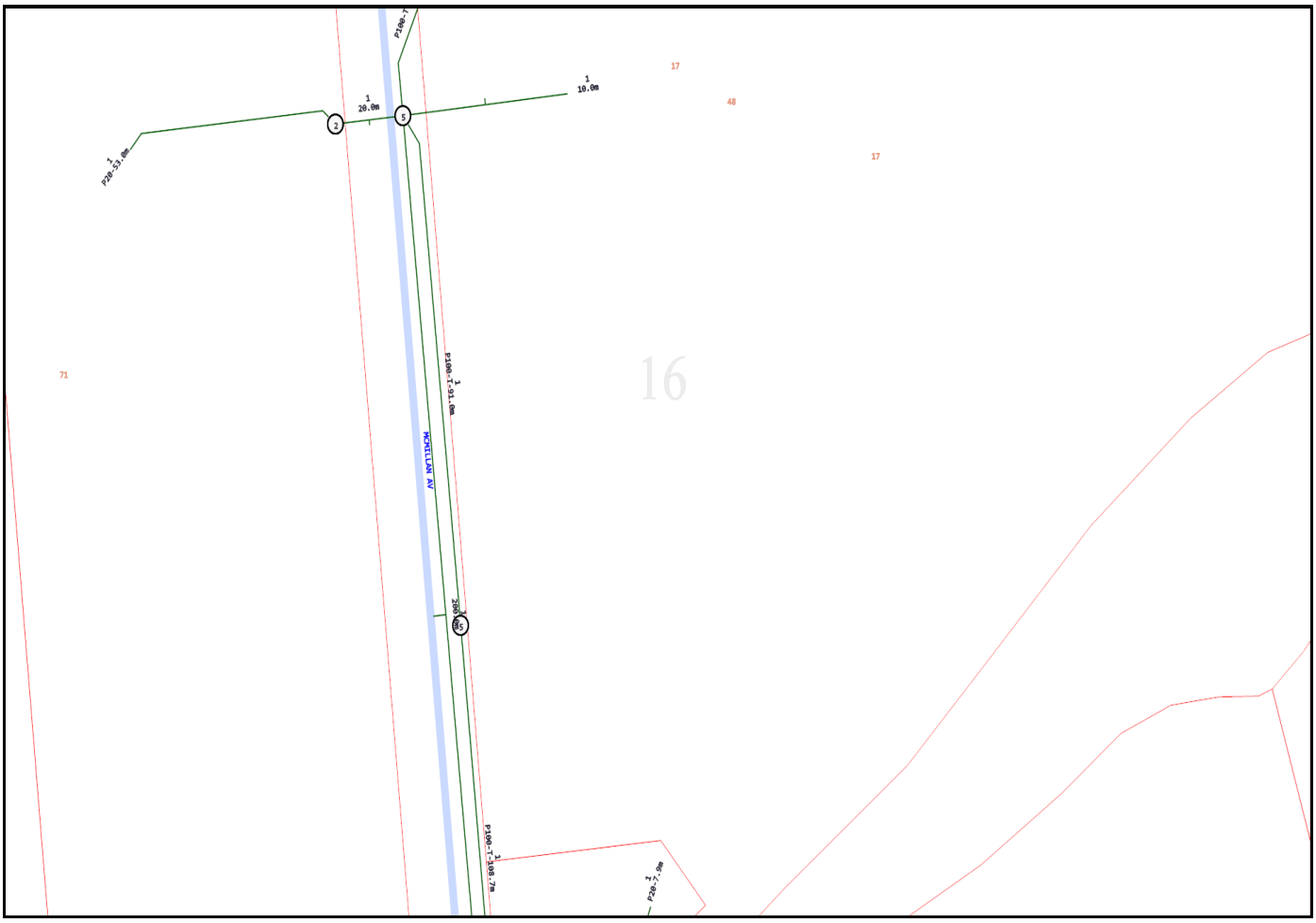

12
16
P20-16.0m
1
1
160.8m
12-14


13
MCKILLAN AV
1
P20-12.5m
2
P35-T-17.1m
1
P50-T-20.0m
1
P20-10.0m

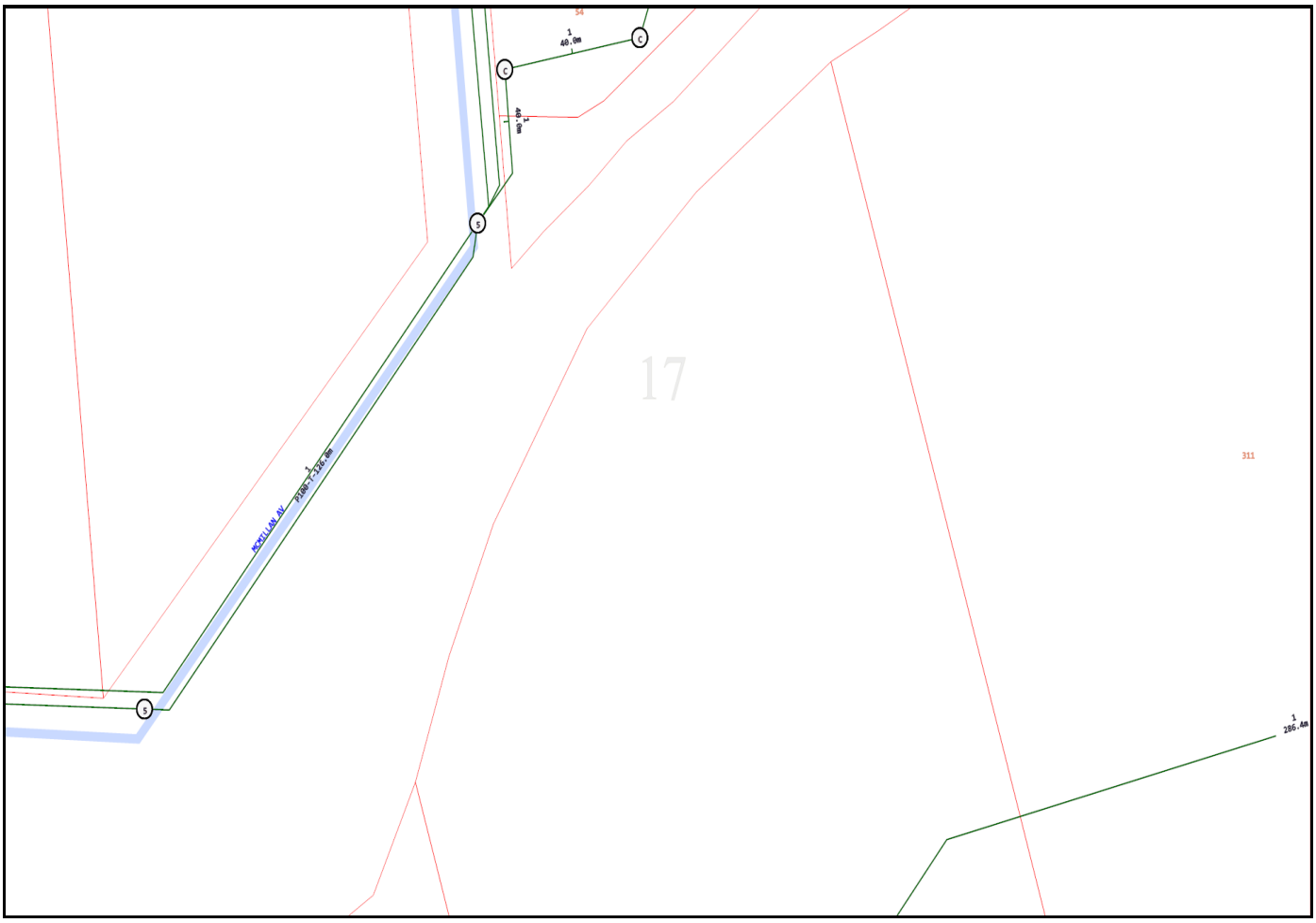

MCKELLAR AV
14
ALFRED RD
1
P100-T-99.2m
1
99.5m
5
5
5
20



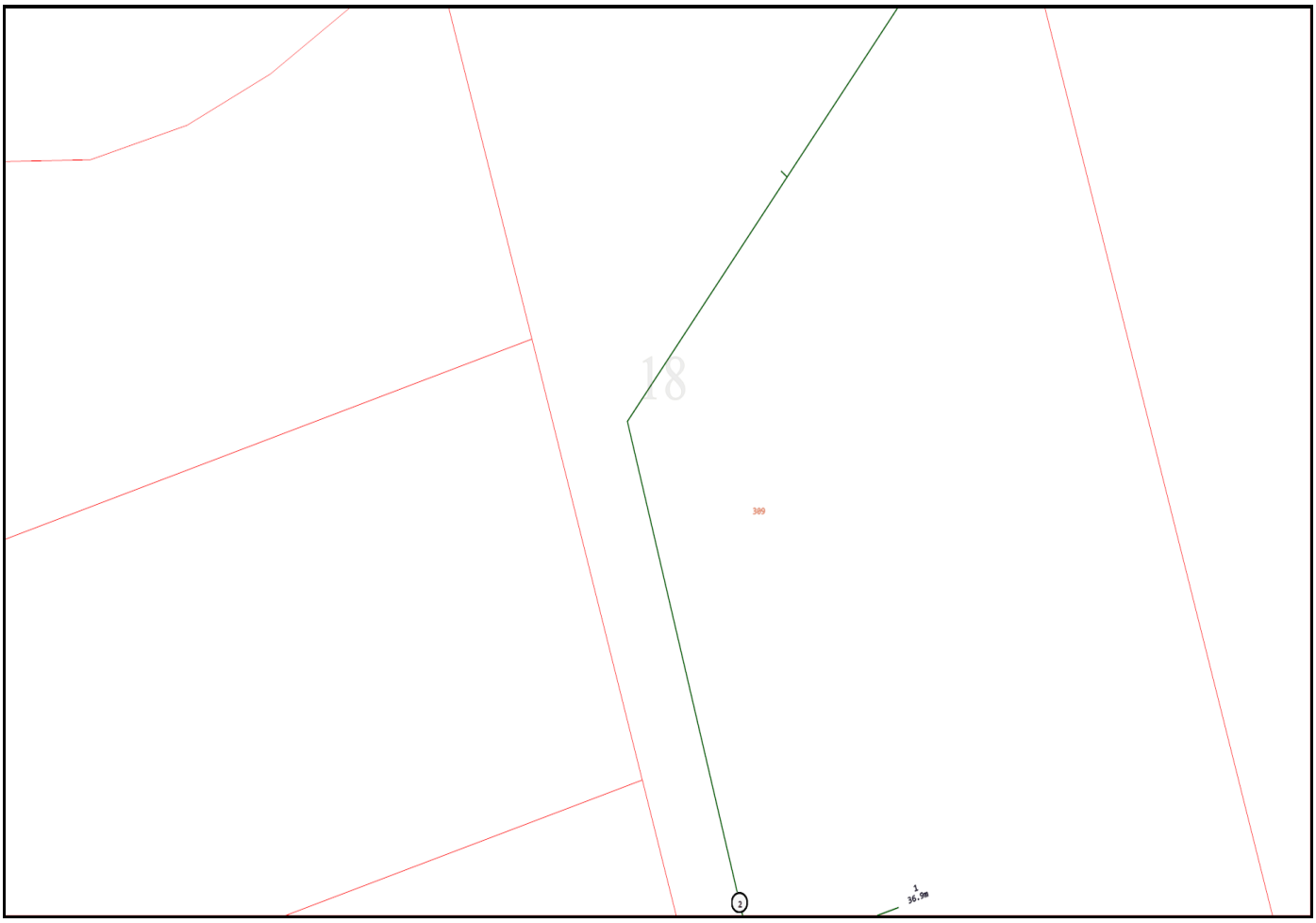
P100-T-140.0m
1
P20-75.0m
1
232.0m
1
P100-T-91.8m
1
MCMILLAN AV
5
5
15
72



17
48
17
71
16
1
20.0m
1
10.0m
1
P20-53.0m
1
P100-T-91.0m
MCMILLAN AV
1
P100-T-108.7m
1
P20-7.9m



54
1
40.0m
C
C
1
40.0m
5
17
311
1
PIPE-T-126.0m
MCMILLAN AV
5
1
286.4m



Emergency Contacts

You must immediately report any damage to the **nbn™** network that you are/become aware of. Notification may be by telephone - 1800 626 329.

N.B.,
Please note that the mapping details shown on sub-maps includes some labels for sub-soil infrastructure with text like "0Ø" for dimension data or "SL 0 IL 0" or "USIL 0 DSIL 0" for level data. Where this occurs, Council's spatial datasets currently lack dimension or level details for these features.

N.B.,
Please be aware that the relevant area for this Dial Before You Dig request may contain private infrastructure that is not mapped by Rockhampton Regional Council.

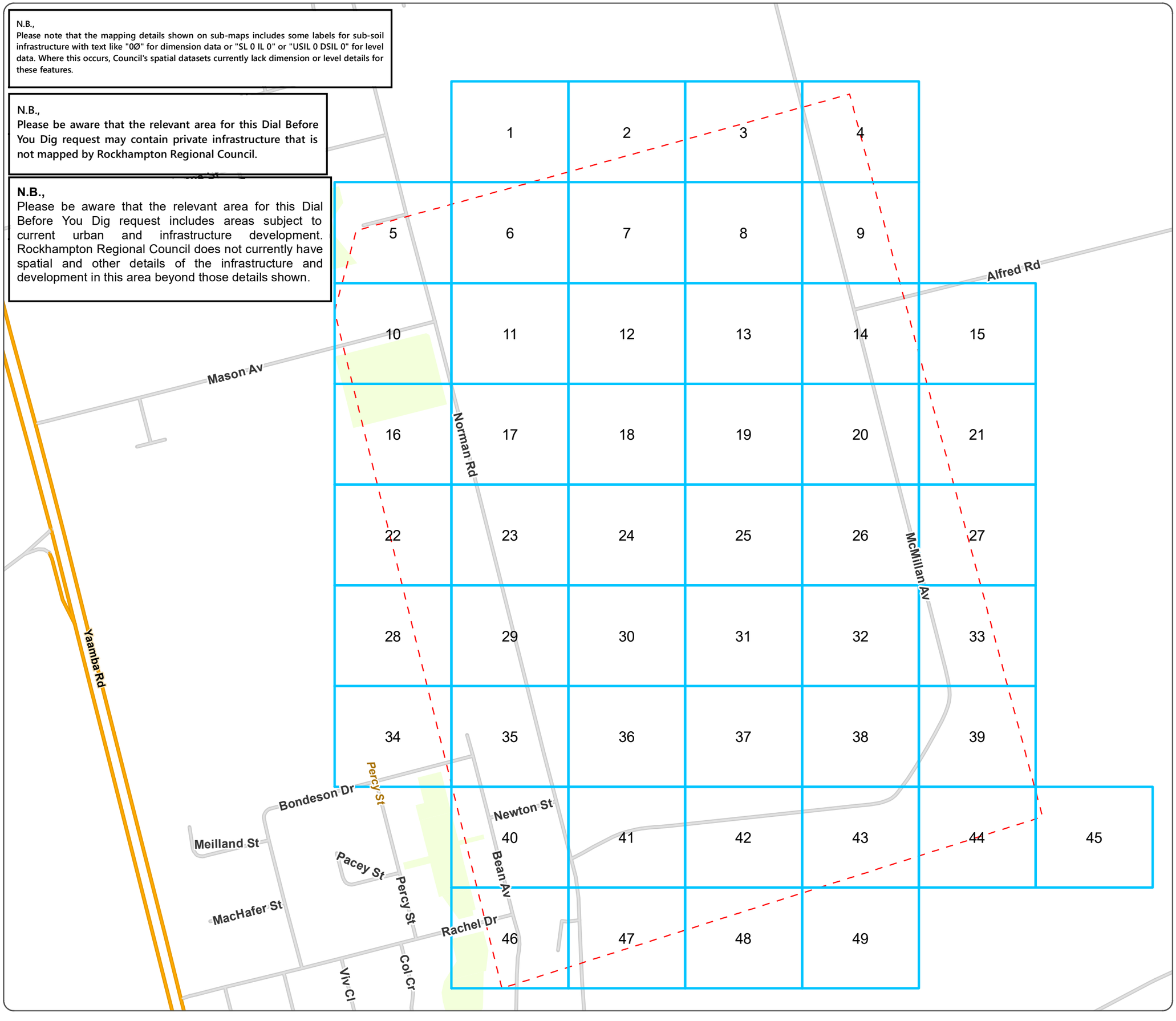
N.B.,
Please be aware that the relevant area for this Dial Before You Dig request includes areas subject to current urban and infrastructure development. Rockhampton Regional Council does not currently have spatial and other details of the infrastructure and development in this area beyond those details shown.

DBYD JOB:35529594
SEQ:232483006
19 McMillan Avenue
Parkhurst, QLD, 4702
User Ref = 19 McMillan Avenue

Index/key to maps

Scale: 1:4,000 at A3

0 40 80 160 m



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- Gate, Sluice, Butterfly
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- Ball Valve
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- Non Return Valve
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- RPZ Valve
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- Closed - Zone
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- Reticulation Main
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- Scour Line
- Other Main Type
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- Hydrants
- Reservoirs
- Intake
- Pump Station
- Treatment Plant
- Unknown
- Abandoned Mains

Private Water
- Private Water Hydrants
- Private Water Valves
- Private Water Mains
- Private Water Abandoned Mains

Stormwater
- Flood Mitigation Devices
- Culverts
- Headwalls
- Stormwater Junctions
- Pollution Trap
- Subsoil Clean-Out pit
- Stormwater Jump ups
- Connector; Reticulation Main
- Culvert Pipe; LinkSlab
- Inter-Allotment
- Low Flow Pipe
- Other
- Stormwater Drop Structures
- Batter Chute; Open Channel
- Bio-Retention Swale
- Subsoil Drain
- Weirs
- Bio-Retention
- Detention/Retention
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Effluent
- Effluent Structures
- Effluent Valves
- Effluent Mains

Sewer
- Pump Station
- STP Treatment Plant
- Sewer Gravity Mains
- Sewer Rising Mains
- Roll Over
- Lamp Hole | Inspection Opening
- Overflow Chamber
- Access Chambers
- Sewer Valves
- Sewer Jump Ups
- Sewer Access Chambers Abandoned
- Sewer Mains Abandoned

Private Sewer
- Pump Station
- STP Treatment Plant
- Sewer Access Chambers Private
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- Sewer Access Chambers Abandoned Private

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- Areas requiring dig permit (RRWR)

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N

Date: 23/11/2023

992-1000

980-990

123

DBYD JOB:35529594
SEQ:232483006
19 McMillan Avenue
Parkhurst, QLD, 4702
User Ref = 19 McMillan Avenue

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Scale:
1:500 at A3

0 5 10 20 m

Water
- Gate, Sluice, Butterfly
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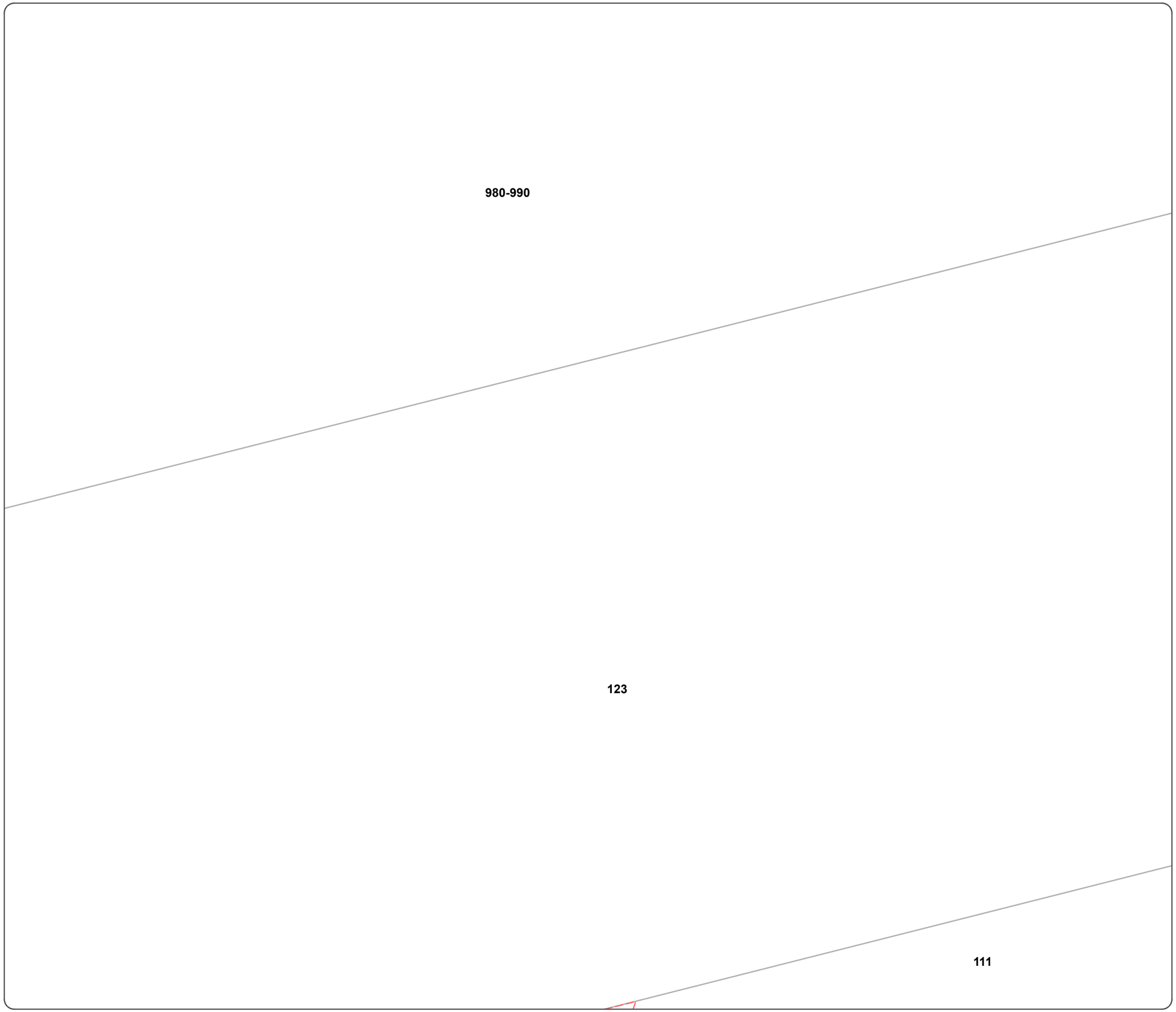

DBYD JOB:35529594
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19 McMillan Avenue
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Scale:
1:500 at A3

0 5 10 20 m

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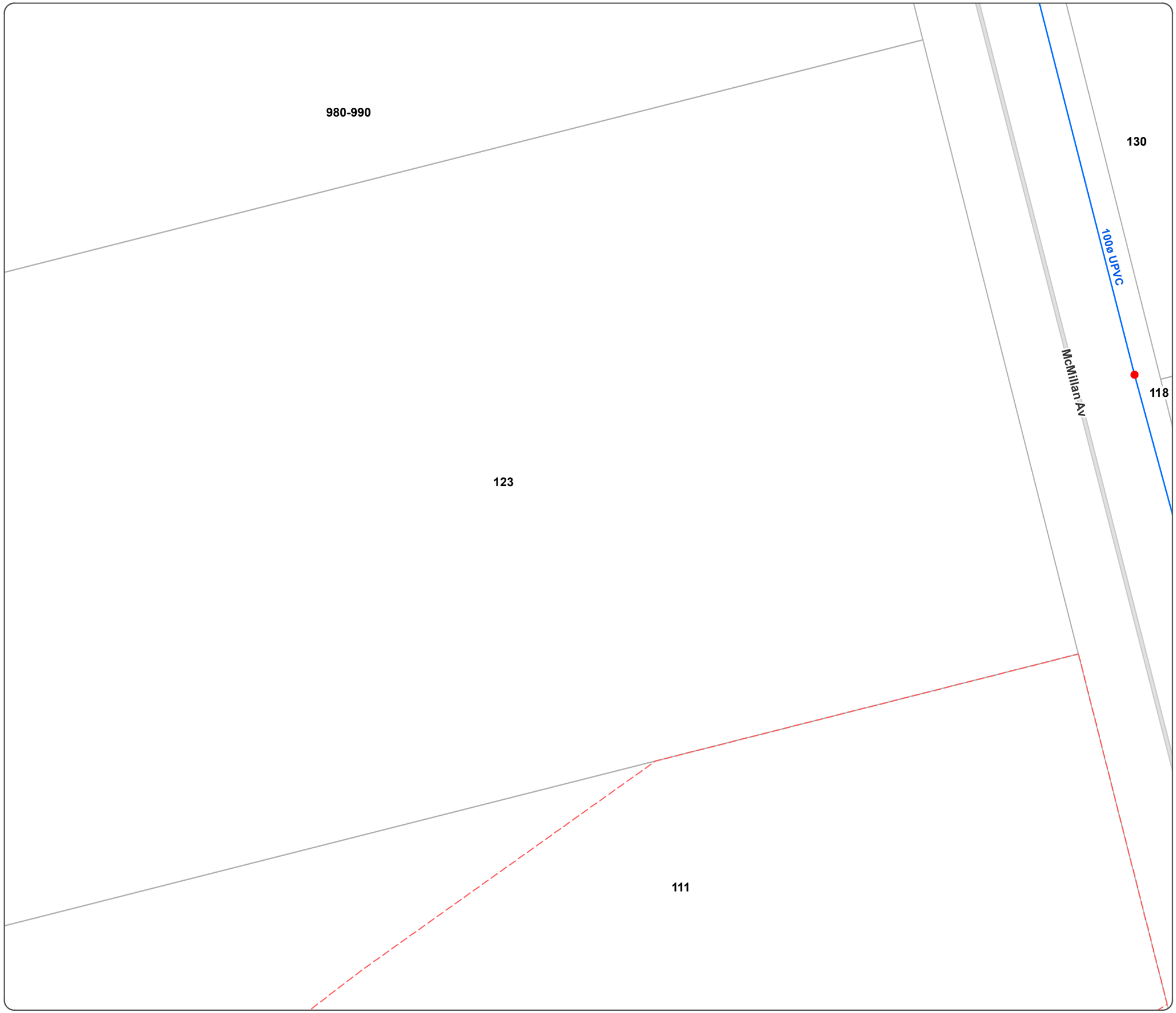

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19 McMillan Avenue
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Scale: 1:500 at A3

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19 McMillan Avenue
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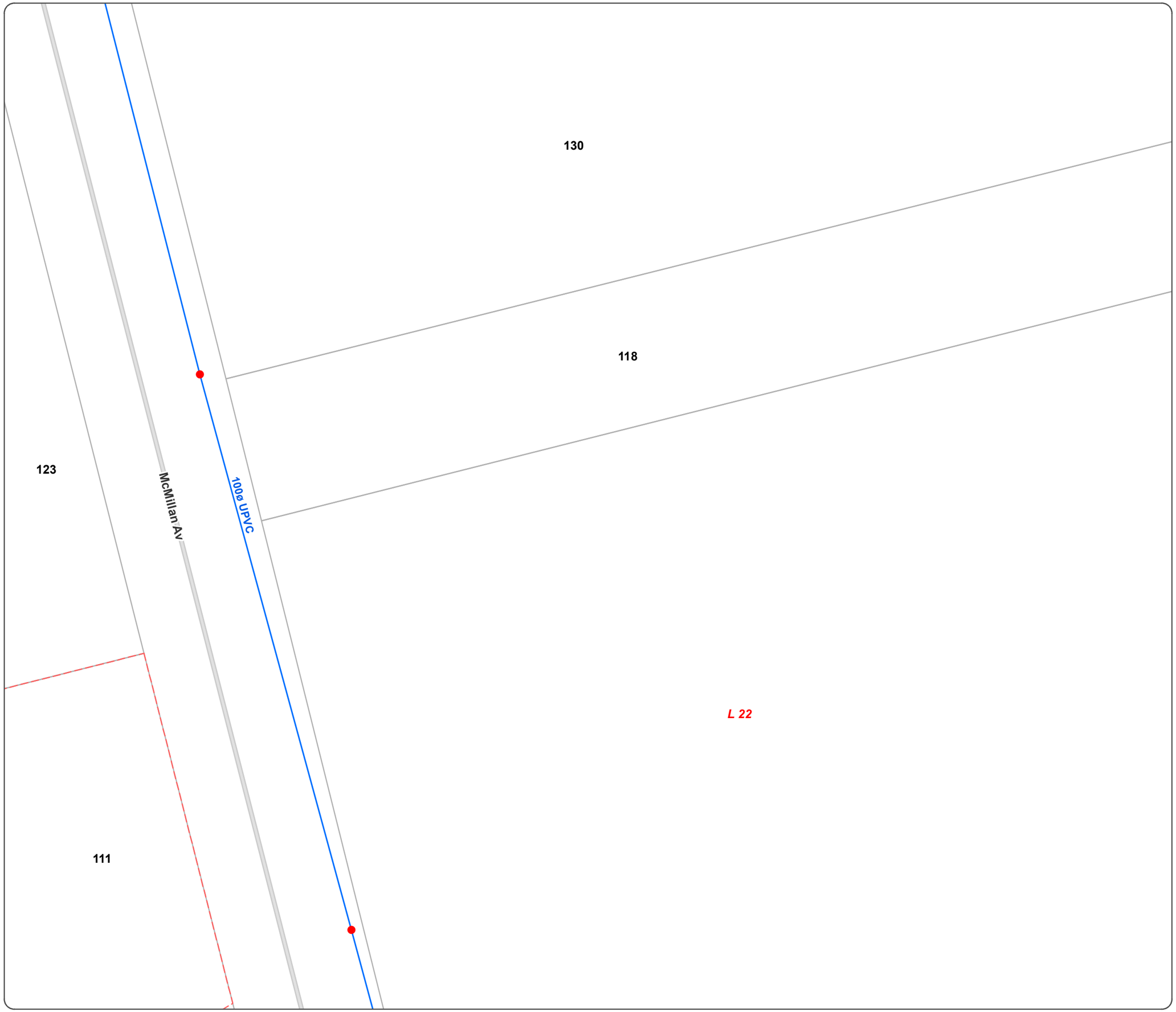
Map 4 of 49

Scale:
1:500 at A3

0 5 10 20 m



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Rockhampton Regional Council

N

Date: 23/11/2023

DBYD JOB:35529594
SEQ:232483006
19 McMillan Avenue
Parkhurst, QLD, 4702
User Ref = 19 McMillan Avenue

Map 5 of 49

Scale:
1:500 at A3

0 5 10 20 m

997
995
123
2
4
6
Joseph Harrison Park
36A
5
3
991
11
962
Weatherall St
Norman Rd
100ø UPVC
150ø PVC USIL 33.663 DSIL 32.489
150ø PVC USIL 32.517 DSIL 32.169
150ø PVC USIL 32.419 DSIL 32.079
450 RCP USIL 32.478 DSIL 32.349
100ø MPVC
150ø MPVC
200ø MPVC
600ø DICL
100ø UPVC
150ø PVC USIL 32.046 DSIL 31.838
375 RCP USIL 32.338 DSIL 32.309
150ø PVC USIL 31.806 DSIL 31.184
150ø PVC USIL 31.788 DSIL 31.254
150ø PVC USIL 31.231 DSIL 31.156
150ø PVC USIL 31.129 DSIL 30.899
150ø PVC USIL 30.526 DSIL 28.669

Water
- Gate, Sluice, Butterfly
- Air Valve
- Ball Cock, Stop Cock
- Ball Valve
- Motor Sluice Valve
- Non Return Valve
- Pressure Reducing Valve
- RPZ Valve
- Reflux Valve
- Scour Valve
- Sluice Bypass Valve
- Tap
- Other Valve Type
- Open - Dialysis
- Closed - Zone
- Valve Normally Open
- Valve Normally Closed
- Trunk Main
- Reticulation Main
- Raw Water Main
- Scour Line
- Other Main Type
- Water Service
- Hydrants
- Reservoirs
- Intake
- Pump Station
- Treatment Plant
- Unknown
- Abandoned Mains

Private Water
- Private Water Hydrants
- Private Water Valves
- Private Water Mains
- Private Water Abandoned Mains

Stormwater
- Flood Mitigation Devices
- Culverts
- Headwalls
- Stormwater Junctions
- Pollution Trap
- Subsoil Clean-Out pit
- Stormwater Jump ups
- Connector; Reticulation Main
- Culvert Pipe; LinkSlab
- Inter-Allotment
- Low Flow Pipe
- Other
- Stormwater Drop Structures
- Batter Chute; Open Channel
- Bio-Retention Swale
- Subsoil Drain
- Weirs
- Bio-Retention
- Detention/Retention
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- Abandoned Culverts
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Effluent
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- Effluent Valves
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Sewer
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- Treatment Plant
- Sewer Gravity Mains
- Sewer Rising Mains
- Roll Over
- Lamp Hole | Inspection Opening
- Overflow Chamber
- Access Chambers
- Sewer Valves
- Sewer Jump Ups
- Sewer Access Chambers Abandoned
- Sewer Mains Abandoned

Private Sewer
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Date: 23/11/2023

123

962

100ø UPVC 930-960

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19 McMillan Avenue
Parkhurst, QLD, 4702
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Scale: 1:500 at A3

0 5 10 20 m

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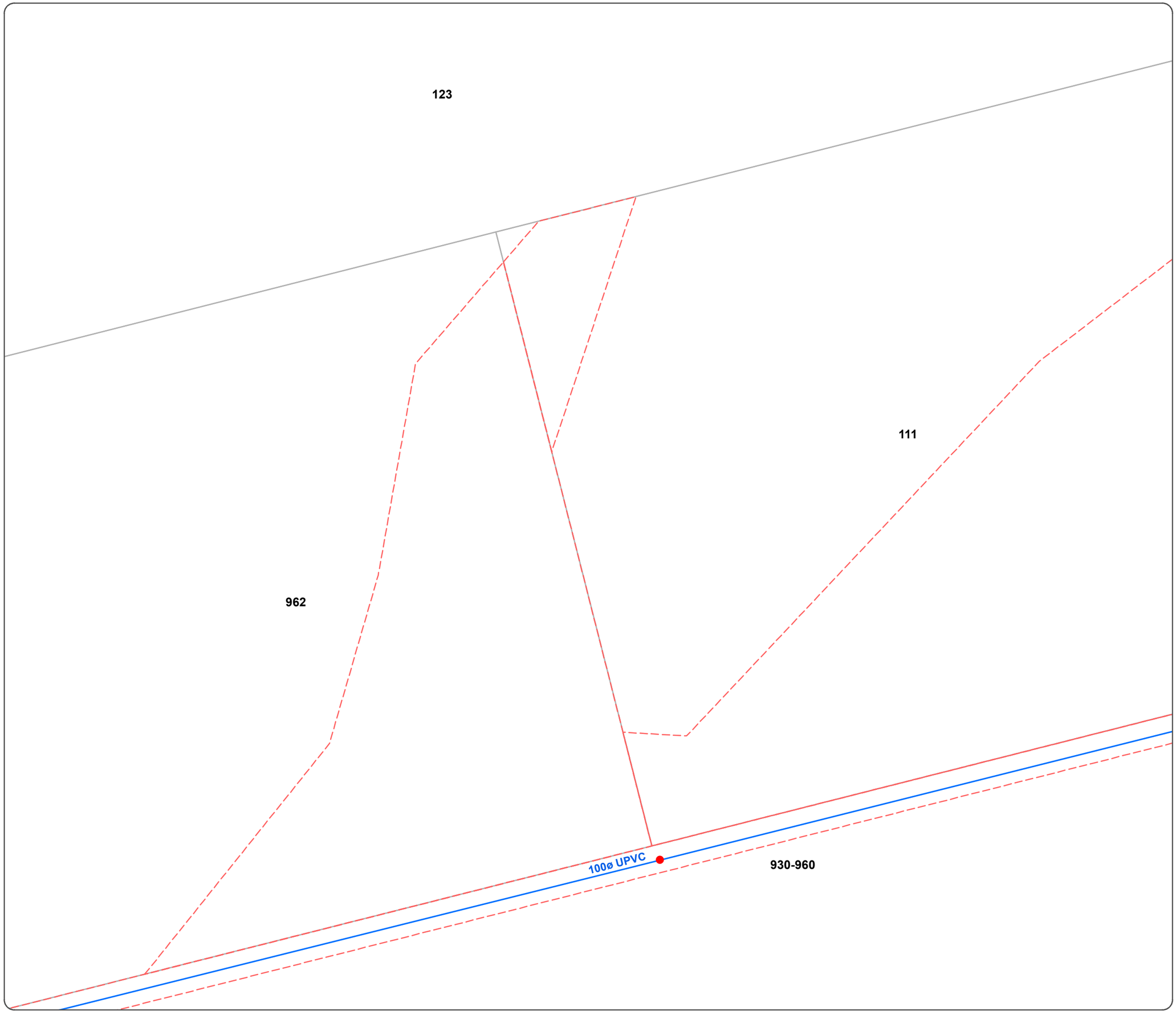

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19 McMillan Avenue
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Scale:
1:500 at A3

0 5 10 20 m

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- Unknown
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- Private Water Valves
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- Private Water Abandoned Mains

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Private Stormwater
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19 McMillan Avenue
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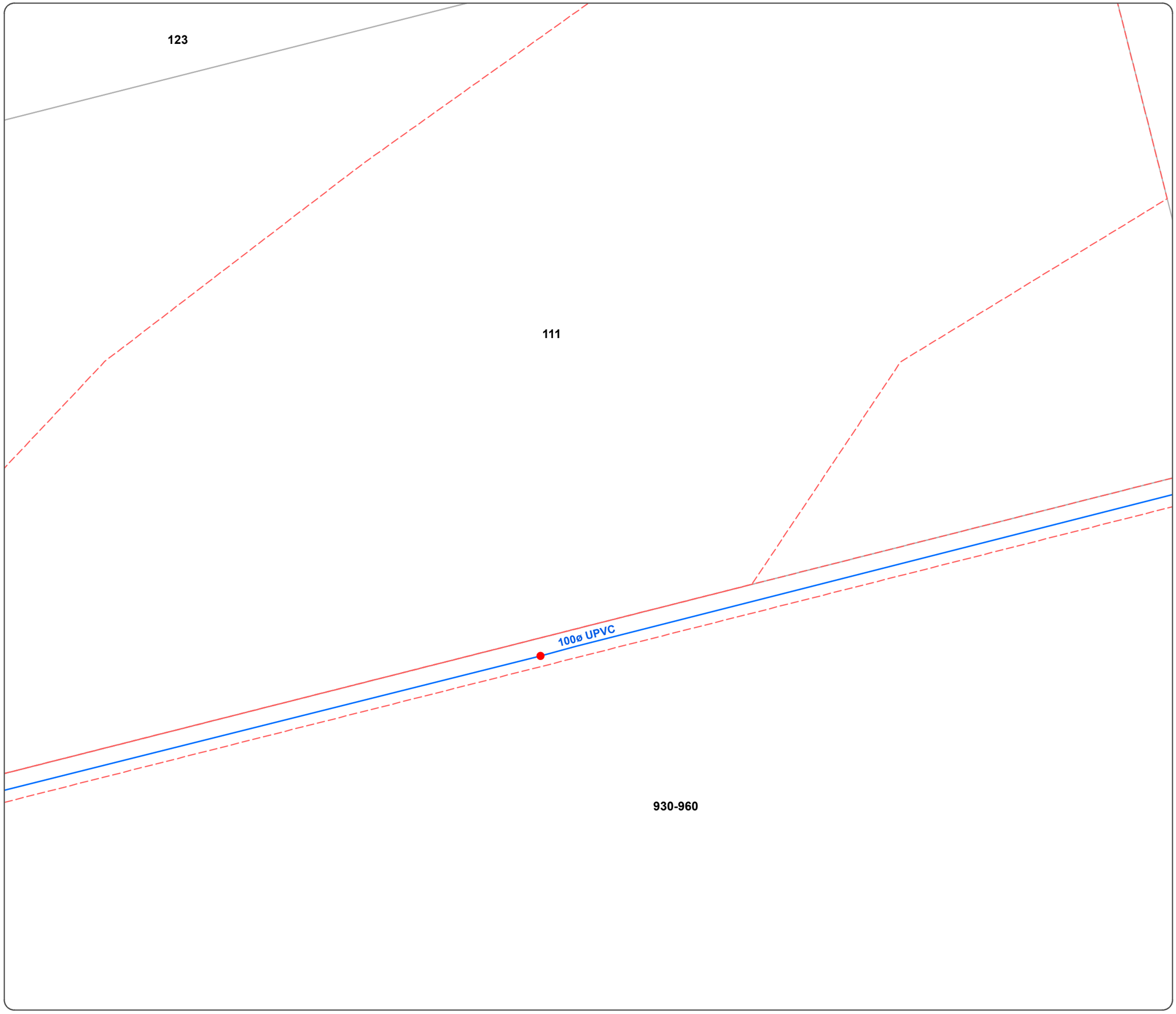
Map 8 of 49

Scale:
1:500 at A3

0 5 10 20 m



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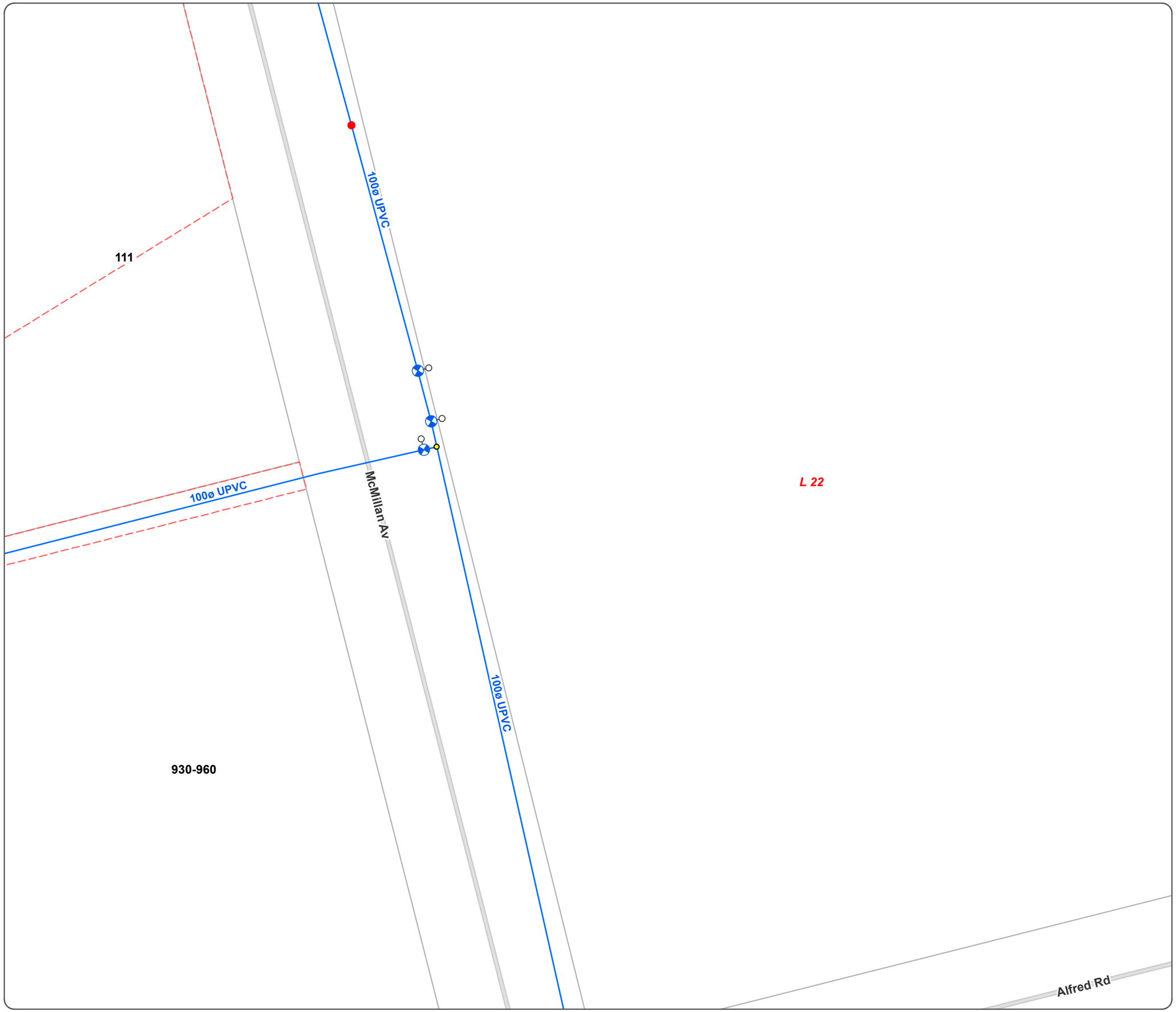
Map 9 of 49

Scale:
1:500 at A3

0 5 10 20 m



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Map 10 of 49

Scale:
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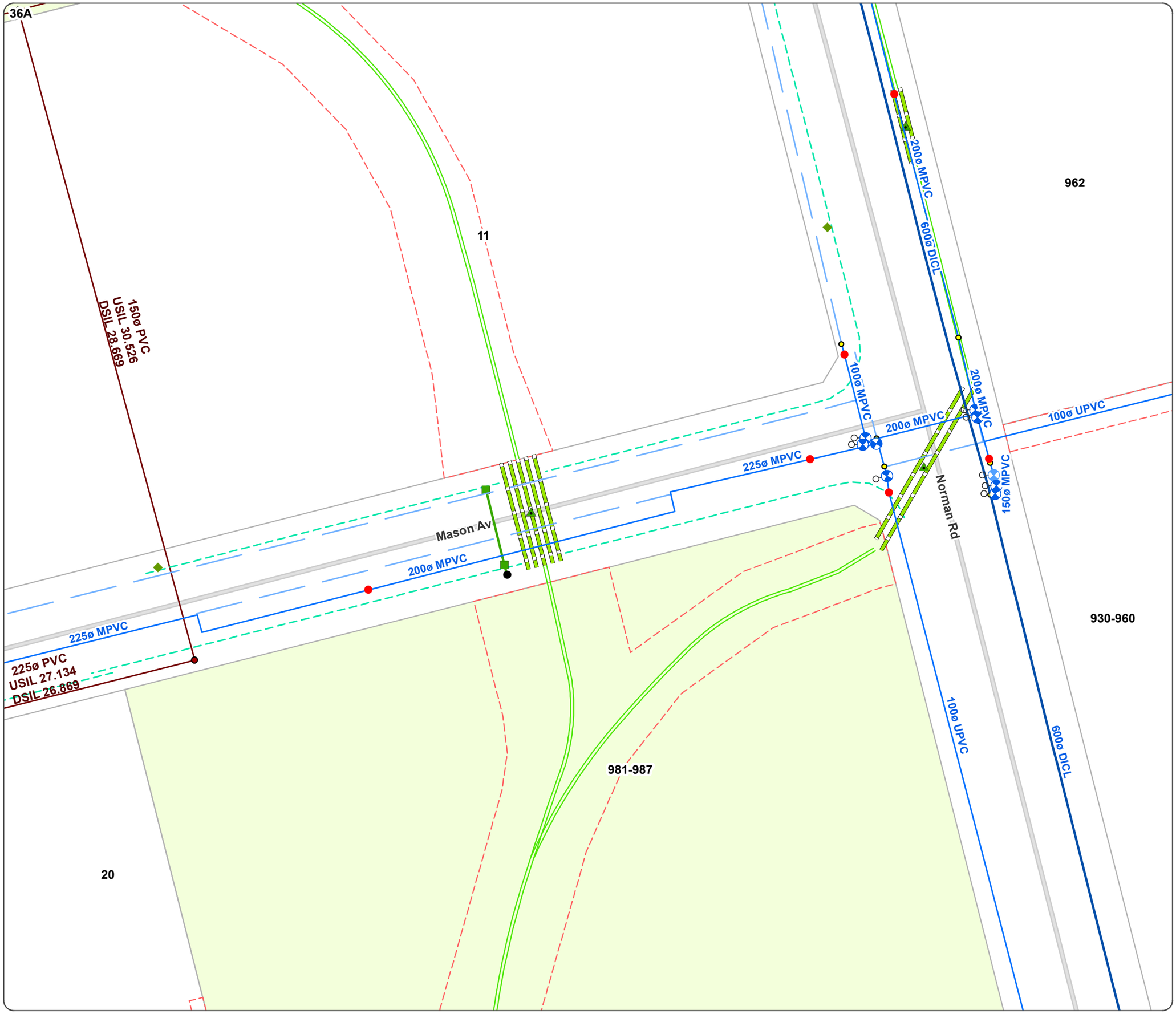

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Map 11 of 49

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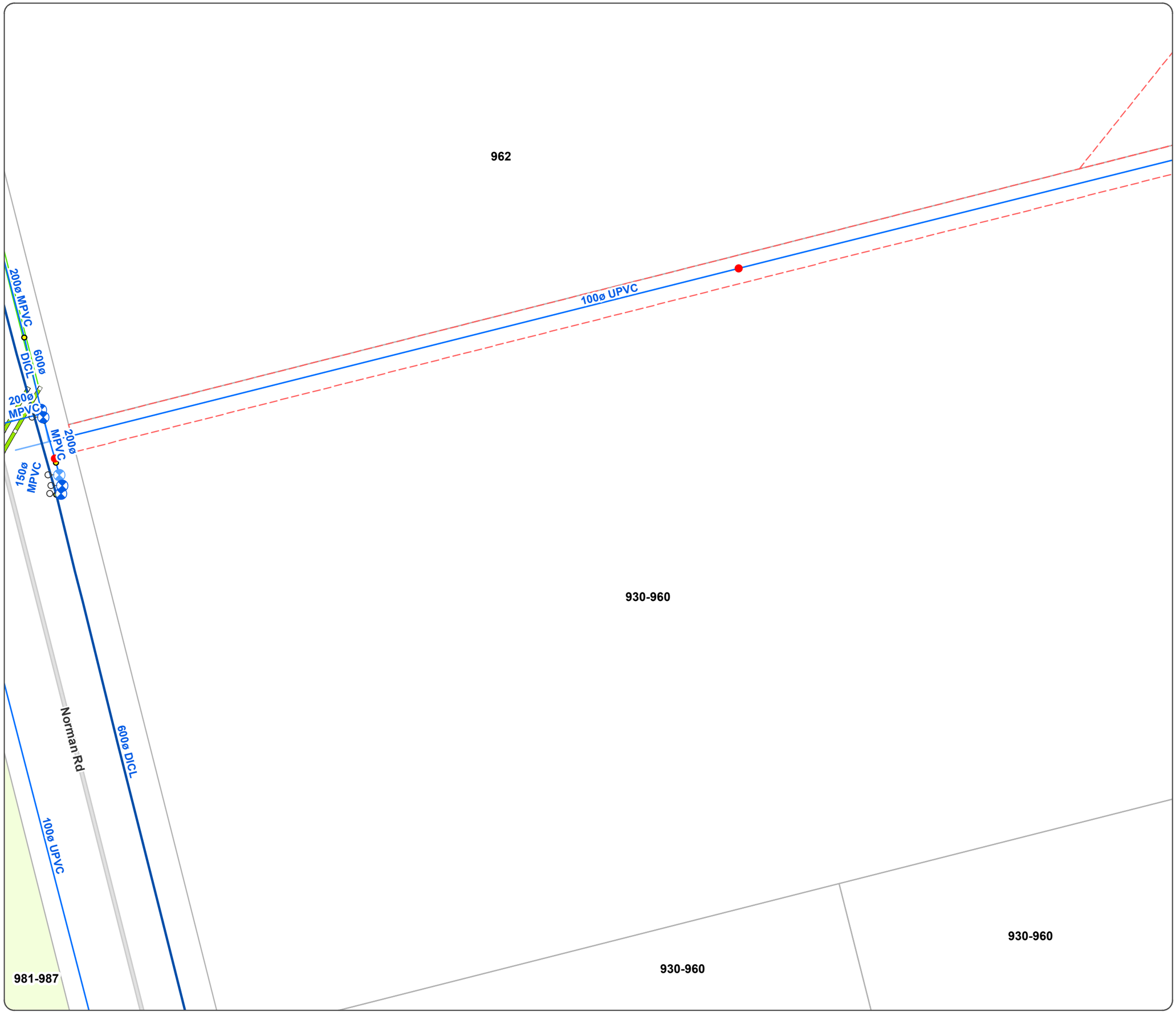
0 5 10 20 m



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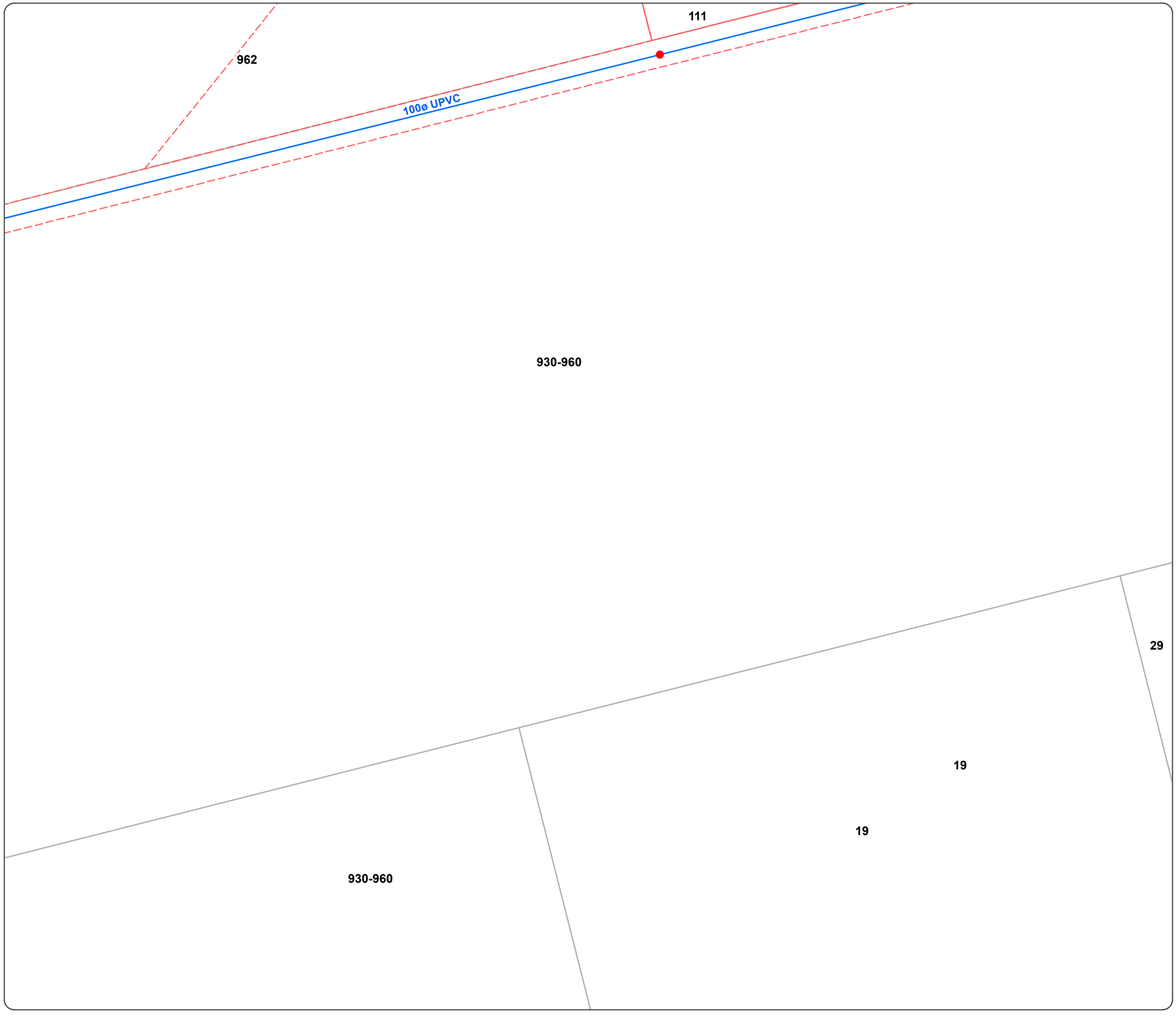

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Map 12 of 49

Scale:
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0 5 10 20 m

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- Reflux Valve
- Scour Valve
- Sluice Bypass Valve
- Tap
- Other Valve Type
- Open - Dialysis
- Closed - Zone
- Valve Normally Open
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- Trunk Main
- Reticulation Main
- Raw Water Main
- Scour Line
- Other Main Type
- Water Service
- Hydrants
- Reservoirs
- Intake
- Pump Station
- Treatment Plant
- Unknown
- Abandoned Mains

Private Water
- Private Water Hydrants
- Private Water Valves
- Private Water Mains
- Private Water Abandoned Mains

Stormwater
- Flood Mitigation Devices
- Culverts
- Headwalls
- Stormwater Junctions
- Pollution Trap
- Subsoil Clean-Out pit
- Stormwater Jump ups
- Connector; Reticulation Main
- Culvert Pipe; LinkSlab
- Inter-Allotment
- Low Flow Pipe
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- Batter Chute; Open Channel
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- Bio-Retention
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19 McMillan Avenue
Parkhurst, QLD, 4702
User Ref = 19 McMillan Avenue

Map 13 of 49

Scale:
1:500 at A3

0 5 10 20 m

Water
- Gate, Sluice, Butterfly
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- Ball Cock, Stop Cock
- Ball Valve
- Motor Sluice Valve
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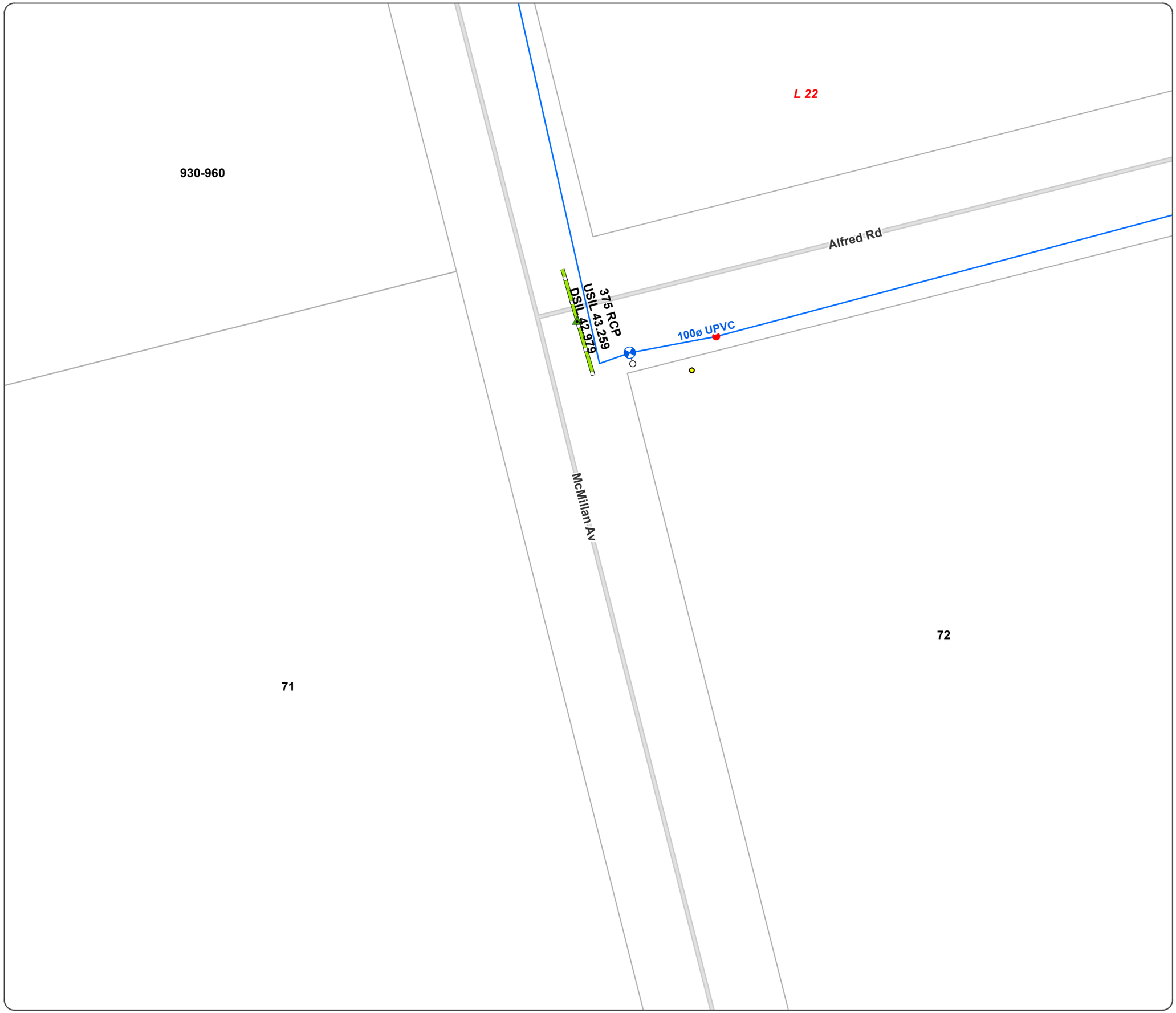
Map 14 of 49

Scale:
1:500 at A3

0 5 10 20 m



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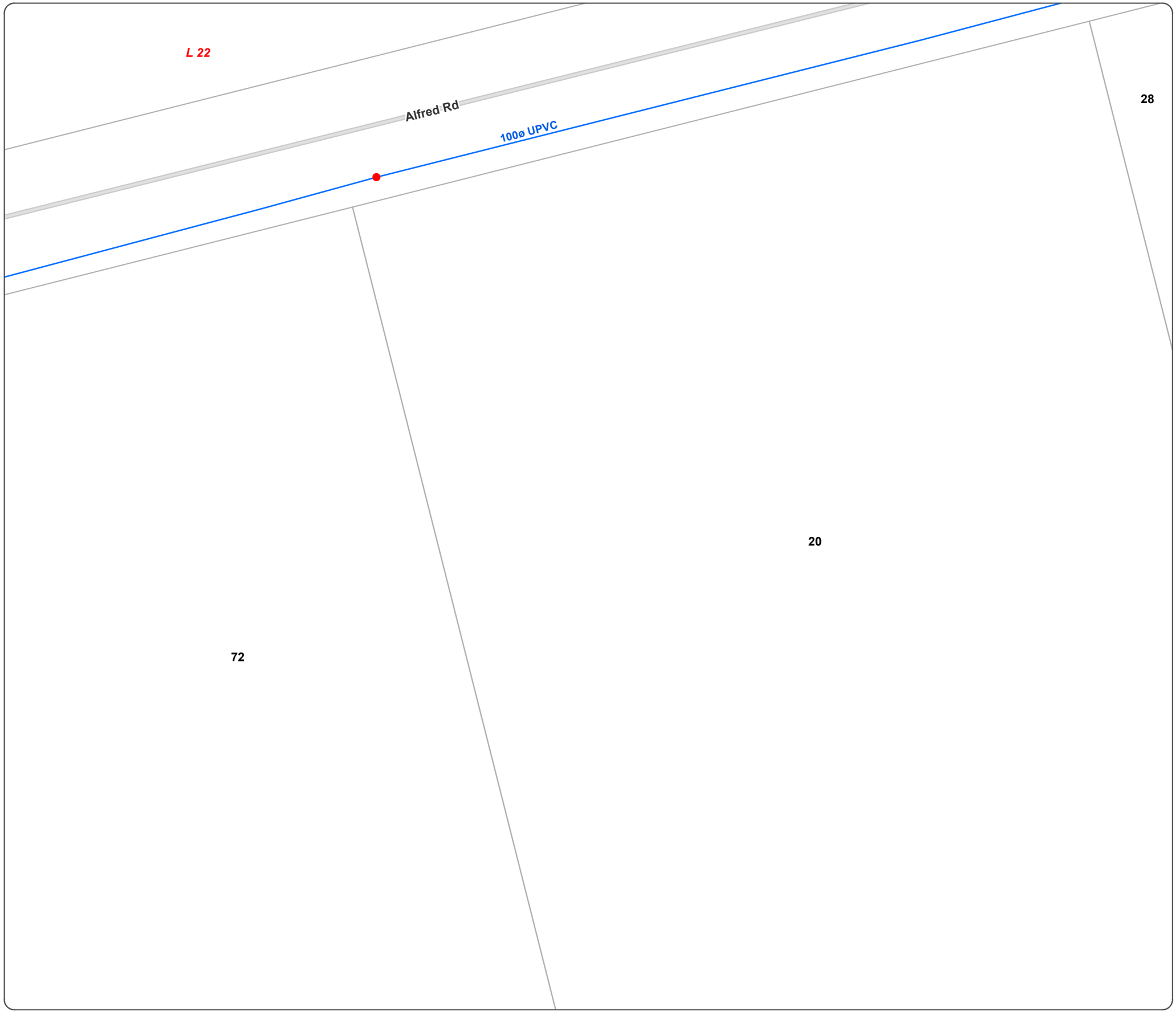

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19 McMillan Avenue
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Scale:
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0 5 10 20 m

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19 McMillan Avenue
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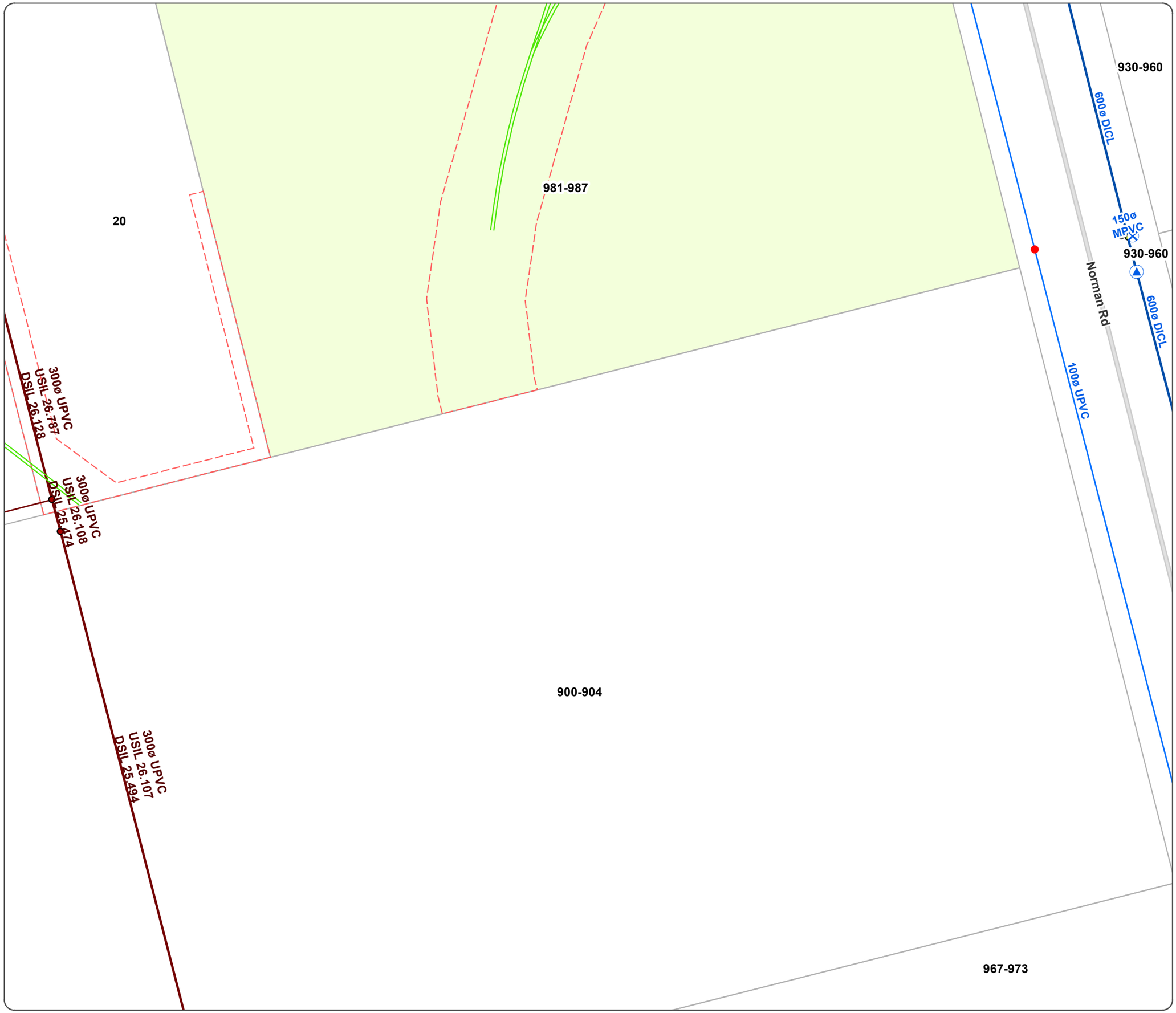
Scale:
1:500 at A3

0 5 10 20 m



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Scale:
1:500 at A3

0 5 10 20 m



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19 McMillan Avenue
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Scale:
1:500 at A3

0 5 10 20 m

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19 McMillan Avenue
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Scale:
1:500 at A3

0 5 10 20 m

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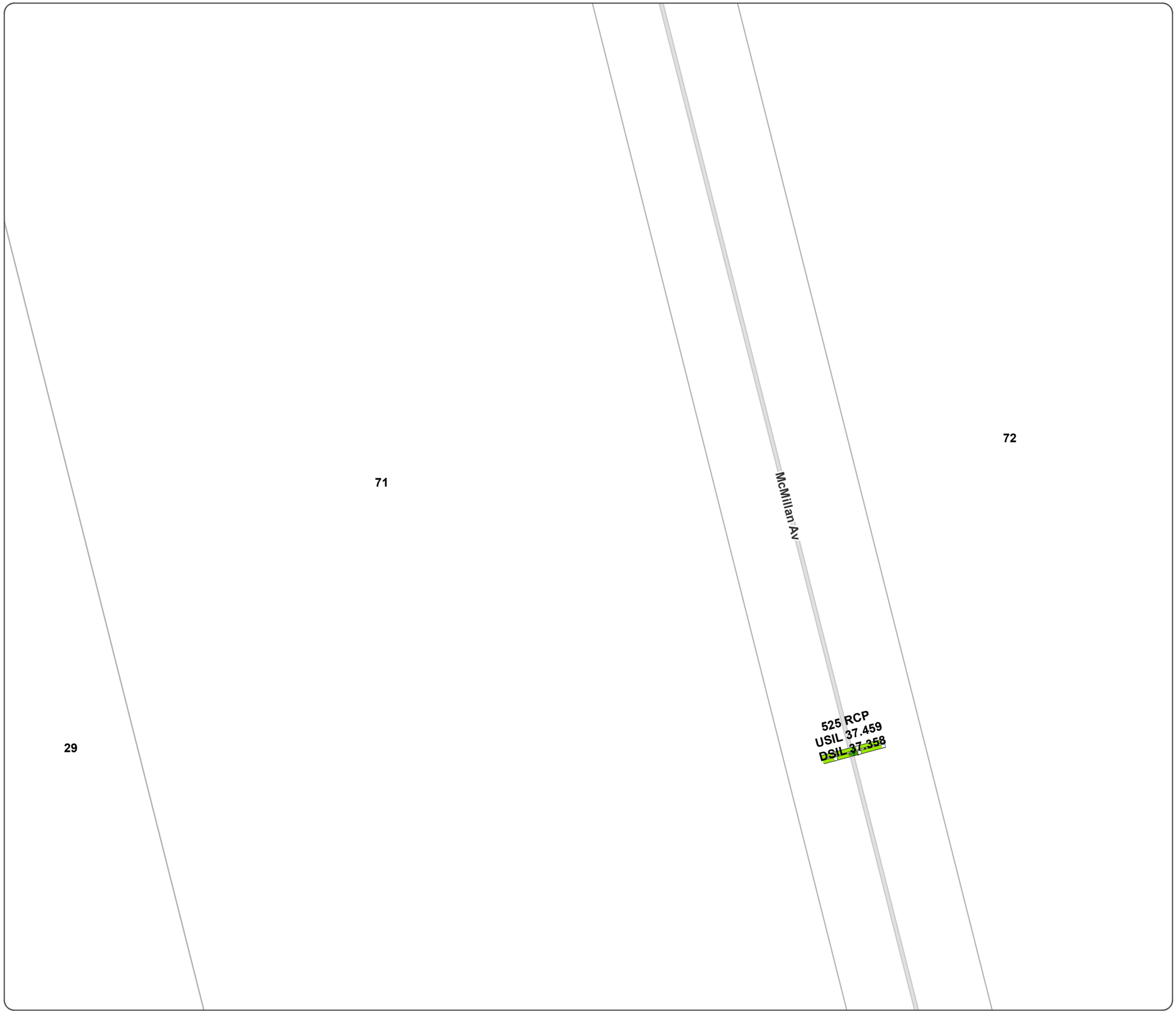
1:500 at A3

0 5 10 20 m



Water
- Gate, Sluice, Butterfly
- Air Valve
- Ball Cock, Stop Cock
- Ball Valve
- Motor Sluice Valve
- Non Return Valve
- Pressure Reducing Valve
- RPZ Valve
- Reflux Valve
- Scour Valve
- Sluice Bypass Valve
- Tap
- Other Valve Type
- Open - Dialysis
- Closed - Zone
- Valve Normally Open
- Valve Normally Closed
- Trunk Main
- Reticulation Main
- Raw Water Main
- Scour Line
- Other Main Type
- Water Service
- Hydrants
- Reservoirs
- Intake
- Pump Station
- Treatment Plant
- Unknown
- Abandoned Mains

Private Water
- Private Water Hydrants
- Private Water Valves
- Private Water Mains
- Private Water Abandoned Mains

Stormwater
- Flood Mitigation Devices
- Culverts
- Headwalls
- Stormwater Junctions
- Pollution Trap
- Subsoil Clean-Out pit
- Stormwater Jump ups
- Connector; Reticulation Main
- Culvert Pipe; LinkSlab
- Inter-Allotment
- Low Flow Pipe
- Other
- Stormwater Drop Structures
- Batter Chute; Open Channel
- Bio-Retention Swale
- Subsoil Drain
- Weirs
- Bio-Retention
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Effluent
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- Effluent Valves
- Effluent Mains

Sewer
- Pump Station
- Treatment Plant
- Sewer Gravity Mains
- Sewer Rising Mains
- Roll Over
- Lamp Hole | Inspection Opening
- Overflow Chamber
- Access Chambers
- Sewer Valves
- Sewer Jump Ups
- Sewer Access Chambers Abandoned
- Sewer Mains Abandoned

Private Sewer
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- Treatment Plant
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- Sewer Joints Private
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19 McMillan Avenue
Parkhurst, QLD, 4702
User Ref = 19 McMillan Avenue

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Scale:
1:500 at A3

0 5 10 20 m

Water
- Gate, Sluice, Butterfly
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- Ball Valve
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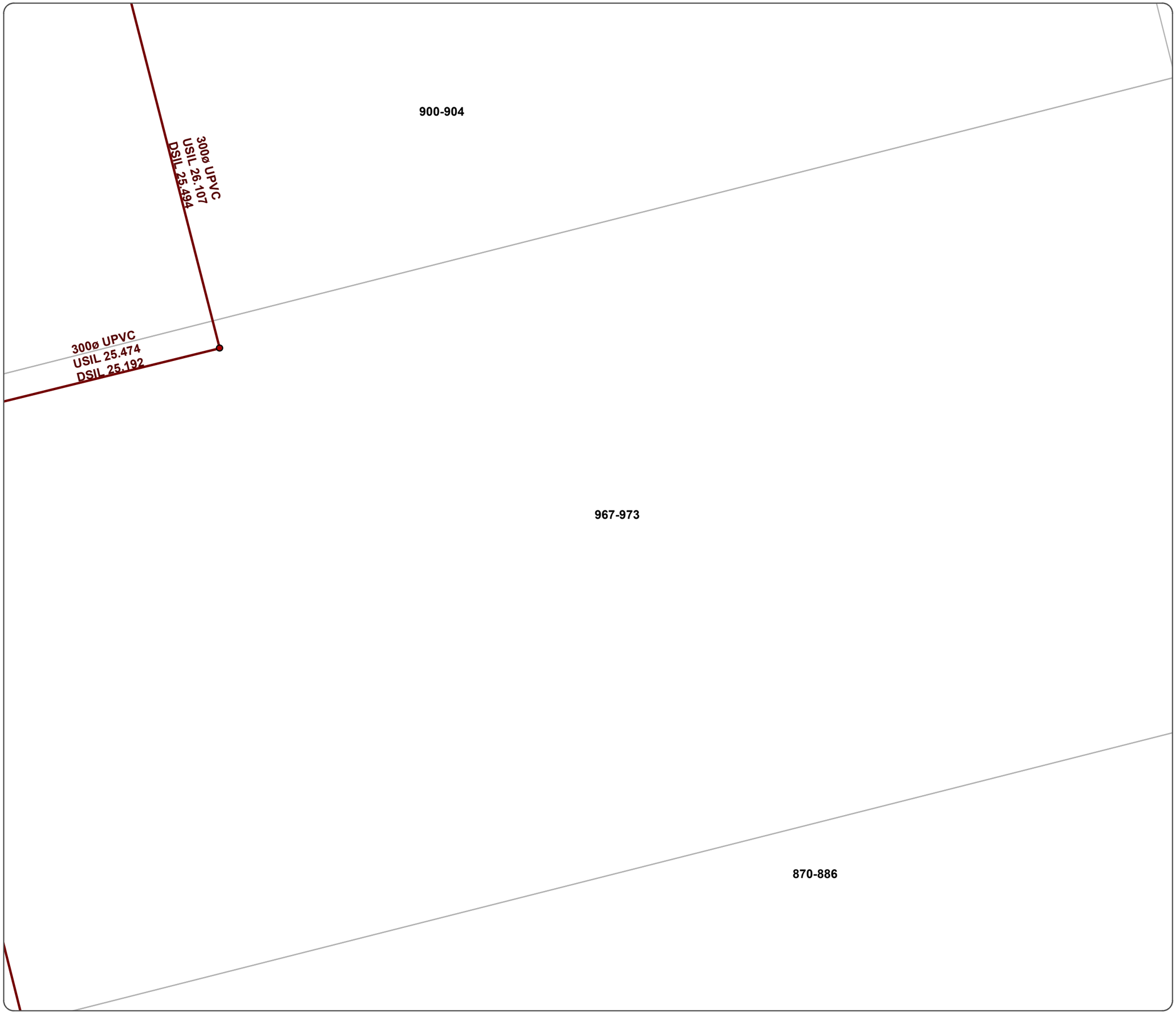

DBYD JOB:35529594
SEQ:232483006
19 McMillan Avenue
Parkhurst, QLD, 4702
User Ref = 19 McMillan Avenue

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Scale: 1:500 at A3

0 5 10 20 m

Water
- Gate, Sluice, Butterfly
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- Treatment Plant
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Private Water
- Private Water Hydrants
- Private Water Valves
- Private Water Mains
- Private Water Abandoned Mains

Stormwater
- Flood Mitigation Devices
- Culverts
- Headwalls
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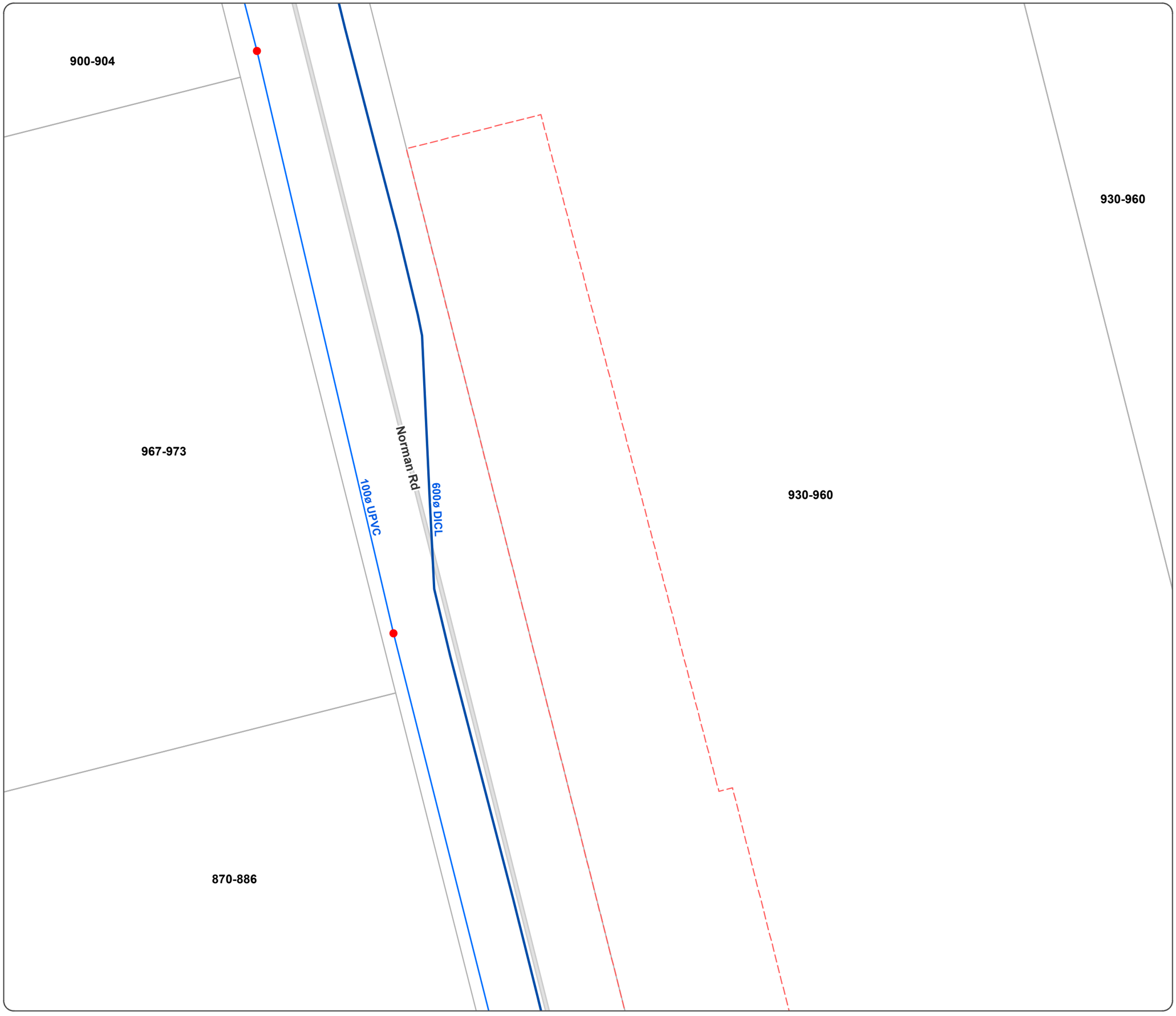

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SEQ:232483006
19 McMillan Avenue
Parkhurst, QLD, 4702
User Ref = 19 McMillan Avenue

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Scale:
1:500 at A3

0 5 10 20 m

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19

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SEQ:232483006
19 McMillan Avenue
Parkhurst, QLD, 4702
User Ref = 19 McMillan Avenue

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Scale:
1:500 at A3

0 5 10 20 m

Water
- Gate, Sluice, Butterfly
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- Ball Cock, Stop Cock
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- Private Water Mains
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19 McMillan Avenue
Parkhurst, QLD, 4702
User Ref = 19 McMillan Avenue

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Scale:
1:500 at A3

0 5 10 20 m

Water
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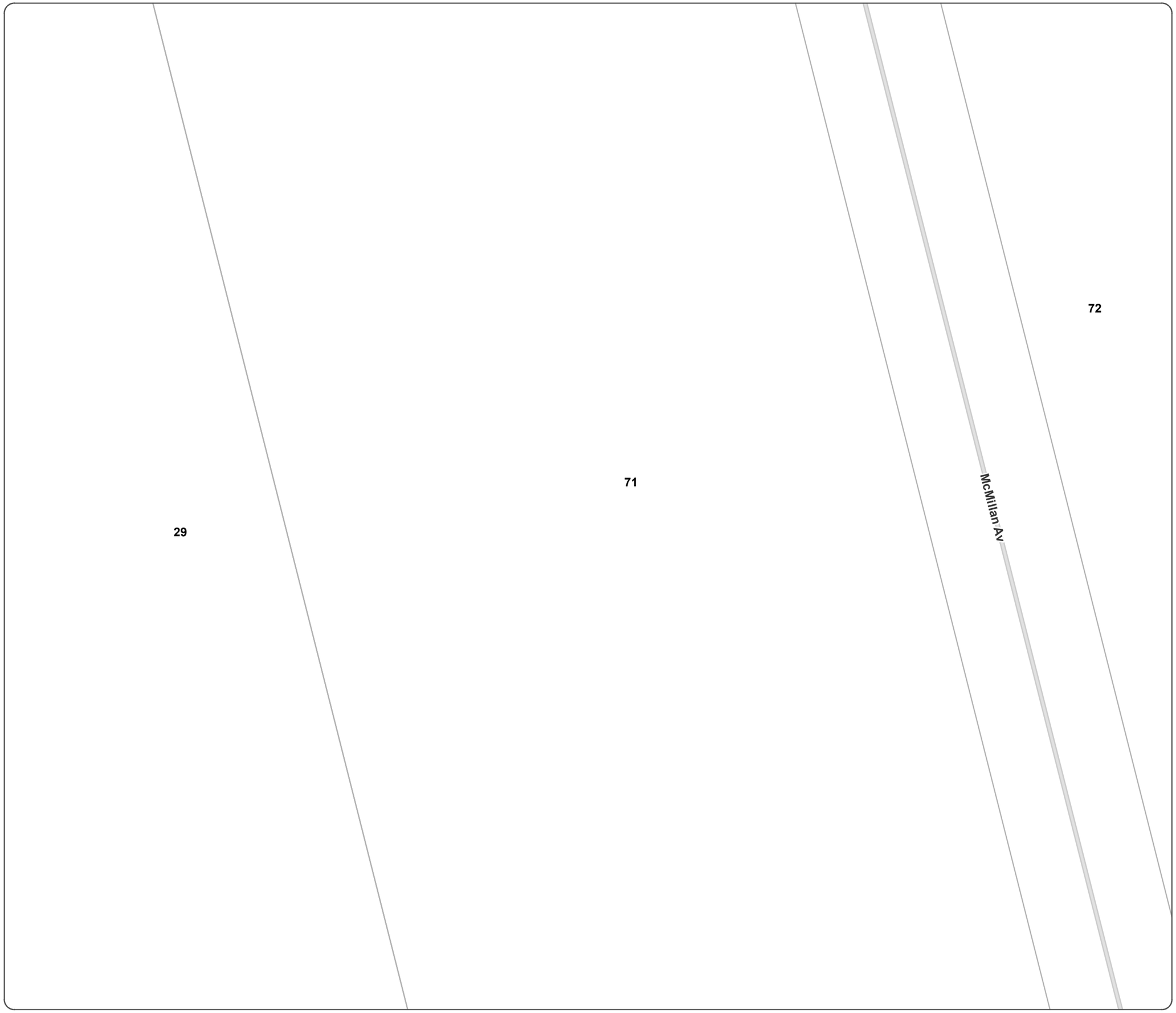

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19 McMillan Avenue
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Scale:
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0 5 10 20 m

Water
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Parkhurst, QLD, 4702
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Scale: 1:500 at A3

0 5 10 20 m



Water
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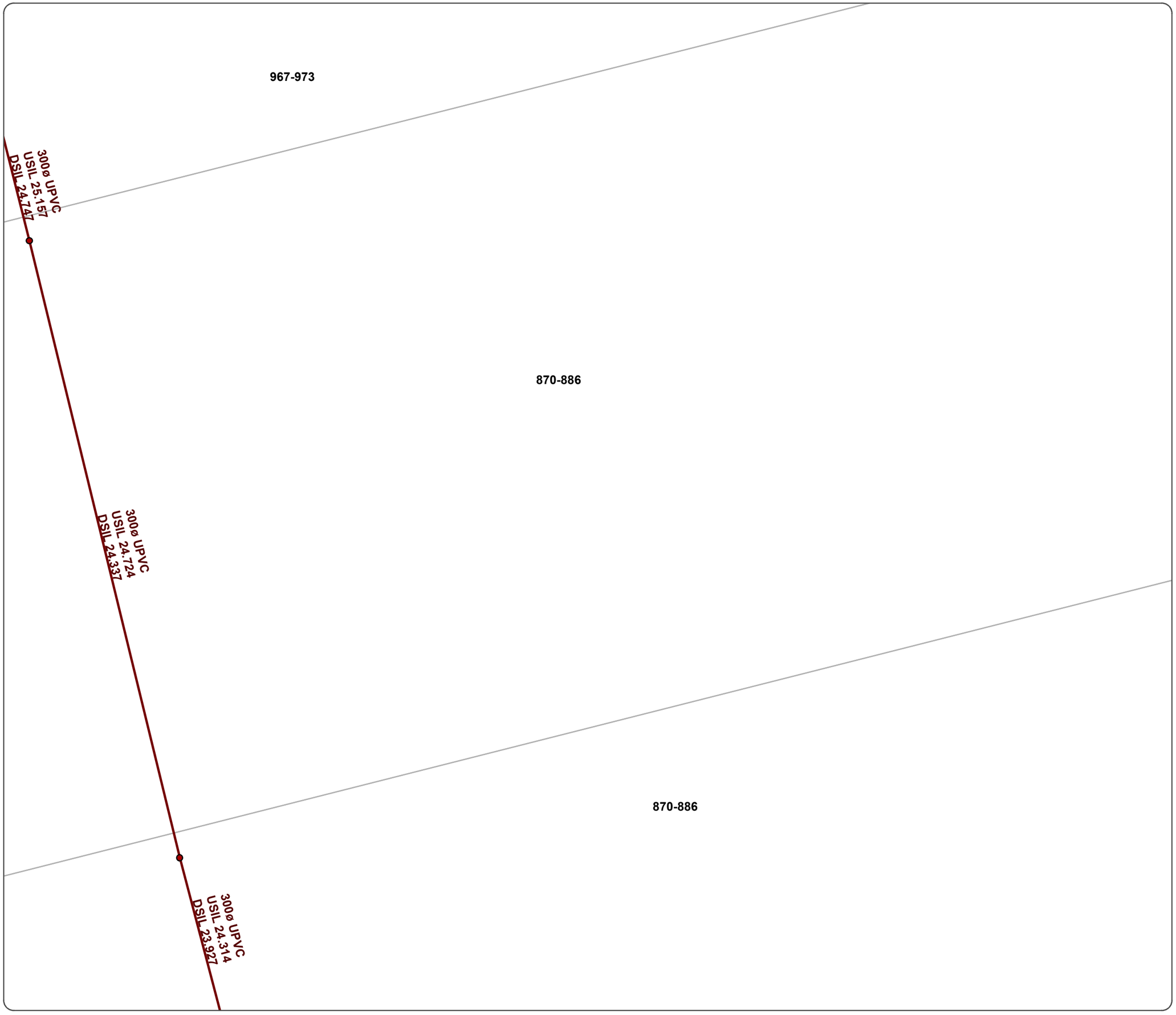

DBYD JOB:35529594
SEQ:232483006
19 McMillan Avenue
Parkhurst, QLD, 4702
User Ref = 19 McMillan Avenue

Map 28 of 49

Scale: 1:500 at A3

0 5 10 20 m

Water
- Gate, Sluice, Butterfly
- Air Valve
- Ball Cock, Stop Cock
- Ball Valve
- Motor Sluice Valve
- Non Return Valve
- Pressure Reducing Valve
- RPZ Valve
- Reflux Valve
- Scour Valve
- Sluice Bypass Valve
- Tap
- Other Valve Type
- Open - Dialysis
- Closed - Zone
- Valve Normally Open
- Valve Normally Closed
- Trunk Main
- Reticulation Main
- Raw Water Main
- Scour Line
- Other Main Type
- Water Service
- Hydrants
- Reservoirs
- Intake
- Pump Station
- Treatment Plant
- Unknown
- Abandoned Mains

Private Water
- Private Water Hydrants
- Private Water Valves
- Private Water Mains
- Private Water Abandoned Mains

Stormwater
- Flood Mitigation Devices
- Culverts
- Headwalls
- Stormwater Junctions
- Pollution Trap
- Subsoil Clean-Out pit
- Stormwater Jump ups
- Connector; Reticulation Main
- Culvert Pipe; LinkSlab
- Inter-Allotment
- Low Flow Pipe
- Other
- Stormwater Drop Structures
- Batter Chute; Open Channel
- Bio-Retention Swale
- Subsoil Drain
- Weirs
- Bio-Retention
- Detention/Retention
- Abandoned Mains
- Abandoned Headwalls
- Abandoned Culverts
- Abandoned Junctions

Private Stormwater
- Culverts Private
- Headwalls Private
- Stormwater Junctions Private
- Pollution Trap Private
- Subsoil Clean-Out pit Private
- Stormwater Jump Up Private
- Stormwater Main Private
- Open Channel Private
- Subsoil Drain Private
- Retention Basins Private

Effluent
- Effluent Structures
- Effluent Valves
- Effluent Mains

Sewer
- Pump Station
- Treatment Plant
- Sewer Gravity Mains
- Sewer Rising Mains
- Roll Over
- Lamp Hole | Inspection Opening
- Overflow Chamber
- Access Chambers
- Sewer Valves
- Sewer Jump Ups
- Sewer Access Chambers Abandoned
- Sewer Mains Abandoned

Private Sewer
- Pump Station
- Treatment Plant
- Sewer Access Chambers Private
- Sewer Joints Private
- Sewer Valves Private
- Sewer Gravity Mains Private
- Sewer Rising Mains Private
- Sewer Jump Ups Private
- Sewer Mains Abandoned Private
- Sewer Access Chambers Abandoned Private

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19 McMillan Avenue
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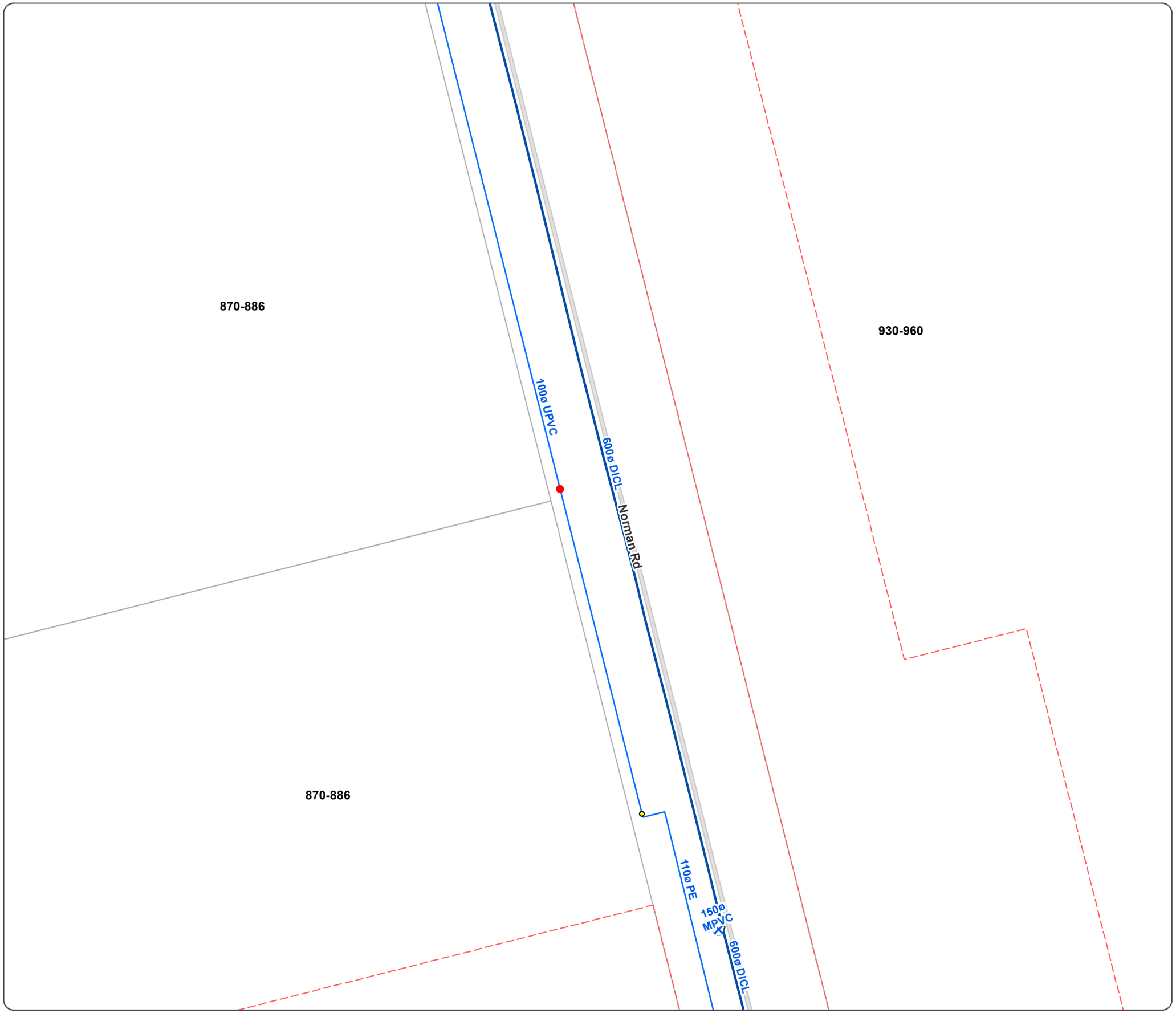
Scale:
1:500 at A3

0 5 10 20 m



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- Hydrants
- Reservoirs
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- Pump Station
- Treatment Plant
- Unknown
- Abandoned Mains

Private Water
- Private Water Hydrants
- Private Water Valves
- Private Water Mains
- Private Water Abandoned Mains

Stormwater
- Flood Mitigation Devices
- Culverts
- Headwalls
- Stormwater Junctions
- Pollution Trap
- Subsoil Clean-Out pit
- Stormwater Jump ups
- Connector; Reticulation Main
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- Inter-Allotment
- Low Flow Pipe
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- Stormwater Drop Structures
- Batter Chute; Open Channel
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- Bio-Retention
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- Abandoned Junctions

Private Stormwater
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- Stormwater Main Private
- Open Channel Private
- Subsoil Drain Private
- Retention Basins Private

Effluent
- Effluent Structures
- Effluent Valves
- Effluent Mains

Sewer
- Pump Station
- STP Treatment Plant
- Sewer Gravity Mains
- Sewer Rising Mains
- Roll Over
- Lamp Hole | Inspection Opening
- Overflow Chamber
- Access Chambers
- Sewer Valves
- Sewer Jump Ups
- Sewer Access Chambers Abandoned
- Sewer Mains Abandoned

Private Sewer
- Pump Station
- STP Treatment Plant
- Sewer Access Chambers Private
- Sewer Joints Private
- Sewer Valves Private
- Sewer Gravity Mains Private
- Sewer Rising Mains Private
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19 McMillan Avenue
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Scale: 1:500 at A3

0 5 10 20 m

19

19

930-960

930-960

Water
- Gate, Sluice, Butterfly
- Air Valve
- Ball Cock, Stop Cock
- Ball Valve
- Motor Sluice Valve
- Non Return Valve
- Pressure Reducing Valve
- RPZ Valve
- Reflux Valve
- Scour Valve
- Sluice Bypass Valve
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- Other Valve Type
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- Reticulation Main
- Raw Water Main
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- Hydrants
- Reservoirs
- Intake
- Pump Station
- Treatment Plant
- Unknown
- Abandoned Mains

Private Water
- Private Water Hydrants
- Private Water Valves
- Private Water Mains
- Private Water Abandoned Mains

Stormwater
- Flood Mitigation Devices
- Culverts
- Headwalls
- Stormwater Junctions
- Pollution Trap
- Subsoil Clean-Out pit
- Stormwater Jump ups
- Connector; Reticulation Main
- Culvert Pipe; LinkSlab
- Inter-Allotment
- Low Flow Pipe
- Other
- Stormwater Drop Structures
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- Subsoil Drain
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- Bio-Retention
- Detention/Retention
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- Abandoned Culverts
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Scale:
1:500 at A3

0 5 10 20 m

Water
- Gate, Sluice, Butterfly
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- Ball Cock, Stop Cock
- Ball Valve
- Motor Sluice Valve
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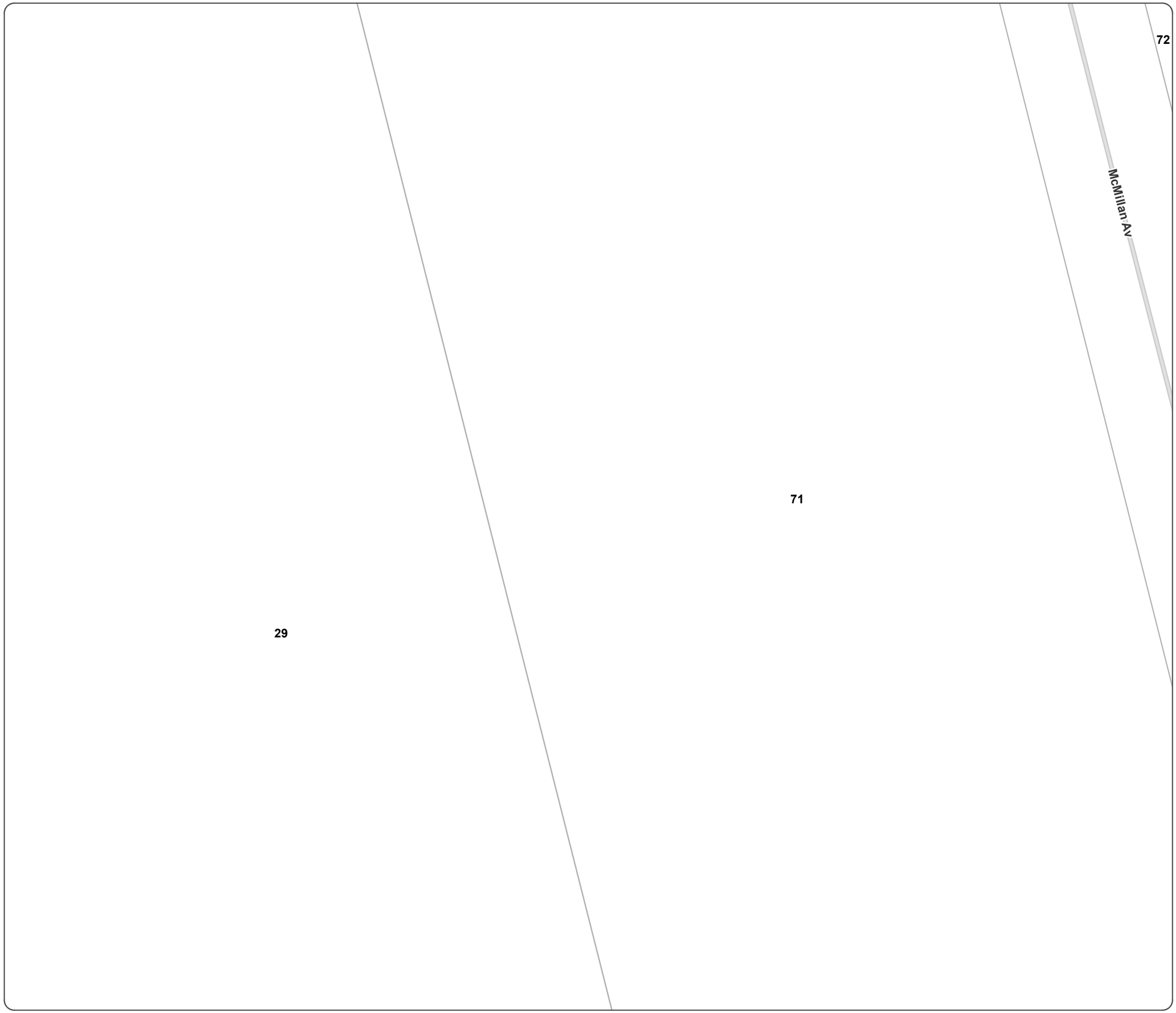

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19 McMillan Avenue
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Scale:
1:500 at A3

0 5 10 20 m

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19 McMillan Avenue
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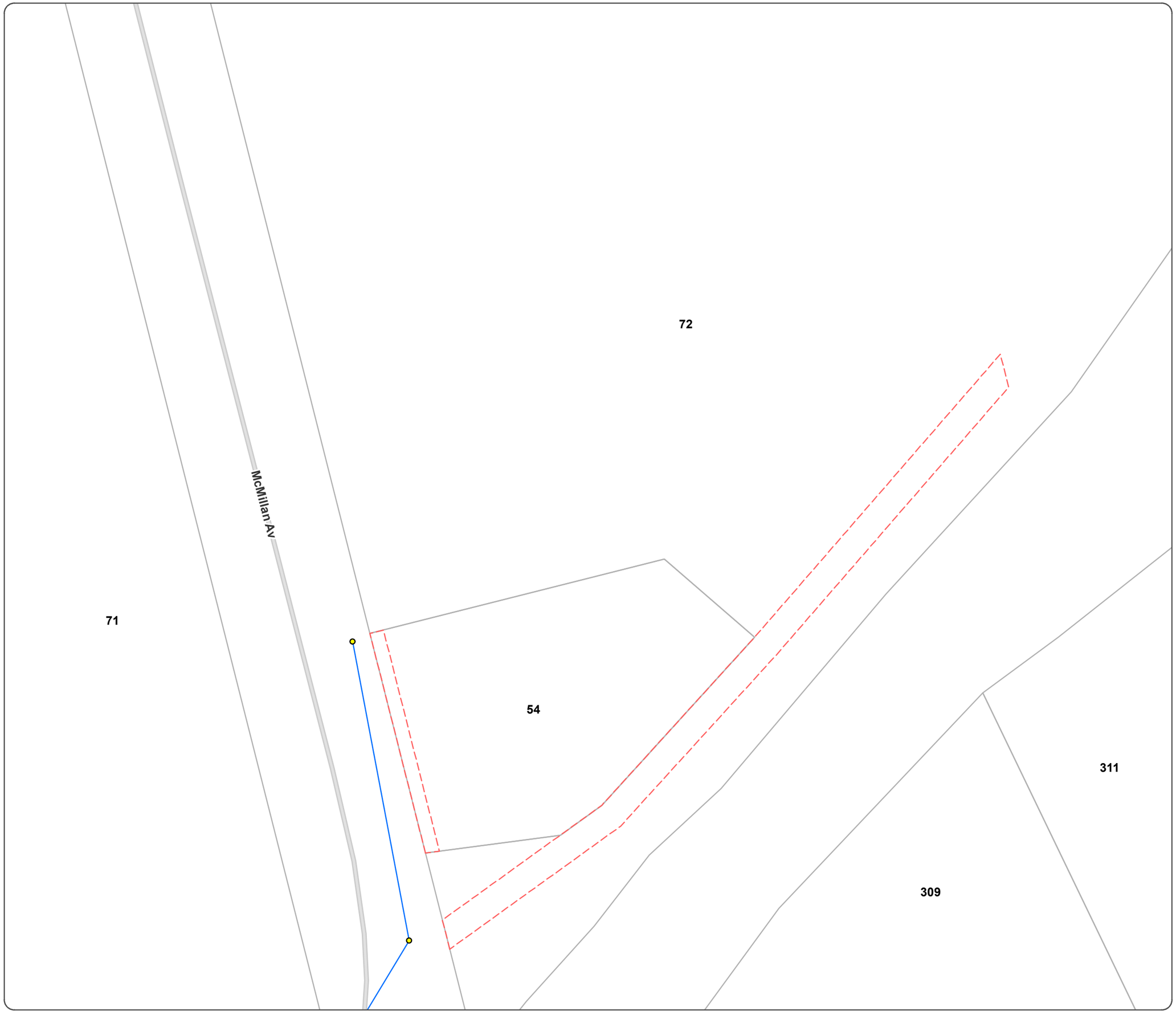
Scale:
1:500 at A3

0 5 10 20 m



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Scale:
1:500 at A3

0 5 10 20 m

870-886

870-886

300ø UPVC
USIL 24.314
DSIL 23.927

L 520

100ø UPVC

33

31

29

27

25

23

21

19

150ø PVC
USIL 26.031
DSIL 25.288

525 RCP
USIL 25.138
DSIL 23.849

450 RCP
USIL 25.599
DSIL 25.169

100ø UPVC

375 RCP
USIL 25.809
DSIL 25.259

300ø UPVC
USIL 23.904
DSIL 23.803

375 RCP
USIL 27.099
DSIL 26.088

150ø PVC
USIL 25.72
DSIL 25.413

375 RCP
USIL 25.049
DSIL 25.689

150ø PVC
USIL 26.328
DSIL 25.732

100ø UPVC

Bondeson Dr

Percy St

300ø UPVC
USIL 23.767
DSIL 23.489

Percy St

100ø UPVC

69

John
Hegvold
Park

20

28

26

22

11

67

150ø PVC
USIL 25.17
DSIL 24.941

150ø PVC
USIL 24.913
DSIL 24.038

Water
- Gate, Sluice, Butterfly
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Scale:
1:500 at A3

0 5 10 20 m

600ø DICL
150ø uPVC MPVC
110ø PE
870-886
930-960
949
84
947
82
945
80
943
78
941
1
33
31
69
67
20
John Hegvold Park
Bondeson Dr
Bean Av
Norman Rd
L 520
100ø UPVC
1950 RCP USIL 22.948 DSIL 22.978
150ø PVC USIL 26.031 DSIL 25.288
525 RCP USIL 25.138 DSIL 23.849
150ø PVC USIL 25.851 DSIL 25.524
150ø PVC USIL 25.515 DSIL 25.315
1950 RCP USIL 22.858 DSIL 22.678
150ø PVC USIL 25.309 DSIL 25.17
150ø PVC USIL 25.691 DSIL 25.535
150ø PVC USIL 25.17 DSIL 24.941
150ø PVC USIL 24.913 DSIL 24.038

Water
- Gate, Sluice, Butterfly
- Air Valve
- Ball Cock, Stop Cock
- Ball Valve
- Motor Sluice Valve
- Non Return Valve
- Pressure Reducing Valve
- RPZ Valve
- Reflux Valve
- Scour Valve
- Sluice Bypass Valve
- Tap
- Other Valve Type
- Open - Dialysis
- Closed - Zone
- Valve Normally Open
- Valve Normally Closed
- Trunk Main
- Reticulation Main
- Raw Water Main
- Scour Line
- Other Main Type
- Water Service
- Hydrants
- Reservoirs
- Intake
- Pump Station
- Treatment Plant
- Unknown
- Abandoned Mains

Private Water
- Private Water Hydrants
- Private Water Valves
- Private Water Mains
- Private Water Abandoned Mains

Stormwater
- Flood Mitigation Devices
- Culverts
- Headwalls
- Stormwater Junctions
- Pollution Trap
- Subsoil Clean-Out pit
- Stormwater Jump ups
- Connector; Reticulation Main
- Culvert Pipe; LinkSlab
- Inter-Allotment
- Low Flow Pipe
- Other
- Stormwater Drop Structures
- Batter Chute; Open Channel
- Bio-Retention Swale
- Subsoil Drain
- Weirs
- Bio-Retention
- Detention/Retention
- Abandoned Mains
- Abandoned Headwalls
- Abandoned Culverts
- Abandoned Junctions

Private Stormwater
- Culverts Private
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- Stormwater Junctions Private
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- Open Channel Private
- Subsoil Drain Private
- Retention Basins Private

Effluent
- Effluent Structures
- Effluent Valves
- Effluent Mains

Sewer
- Pump Station
- Treatment Plant
- Sewer Gravity Mains
- Sewer Rising Mains
- Roll Over
- Lamp Hole | Inspection Opening
- Overflow Chamber
- Access Chambers
- Sewer Valves
- Sewer Jump Ups
- Sewer Access Chambers Abandoned
- Sewer Mains Abandoned

Private Sewer
- Pump Station
- Treatment Plant
- Sewer Access Chambers Private
- Sewer Joints Private
- Sewer Valves Private
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- Sewer Mains Abandoned Private
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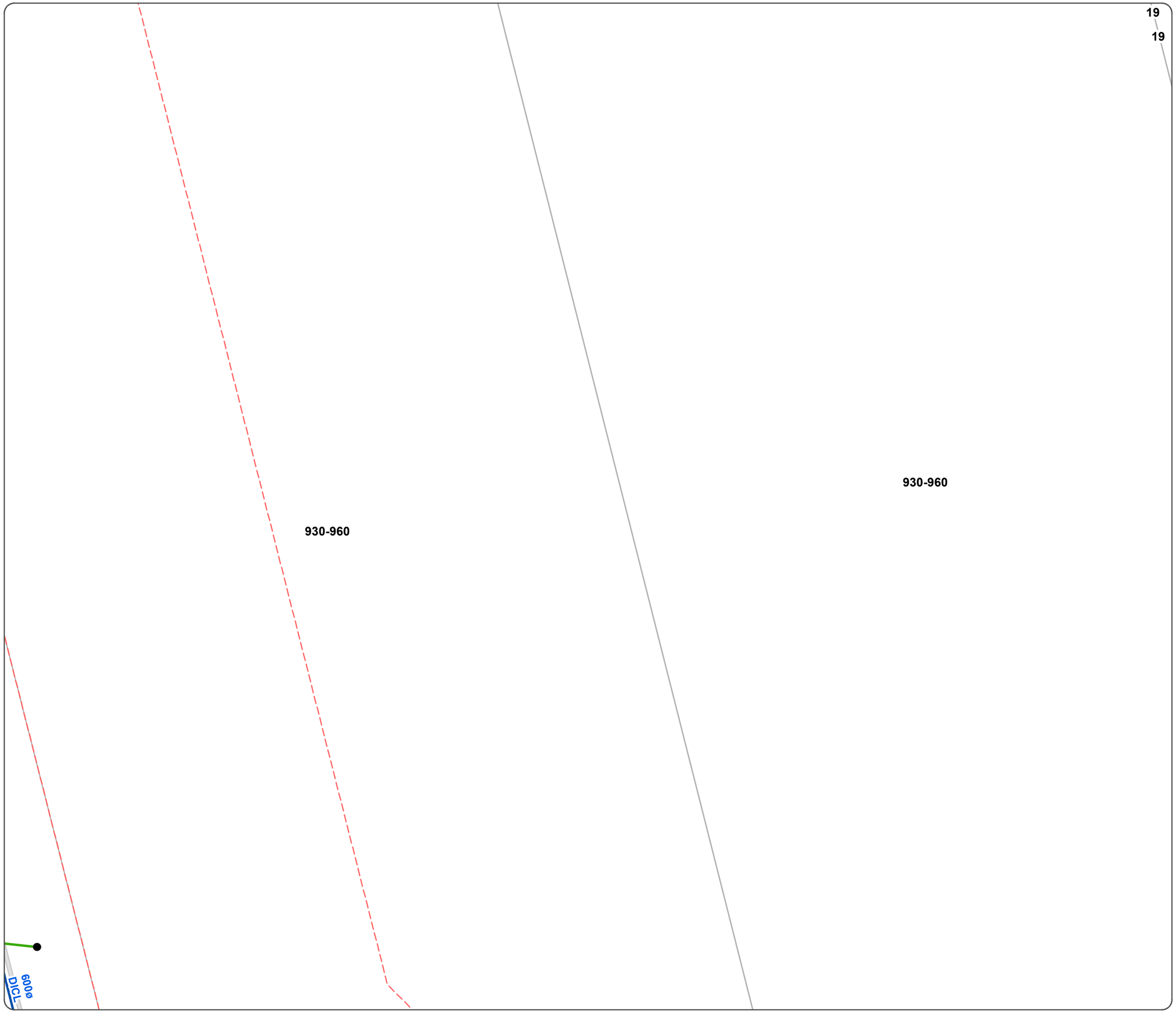

DBYD JOB:35529594
SEQ:232483006
19 McMillan Avenue
Parkhurst, QLD, 4702
User Ref = 19 McMillan Avenue

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Scale: 1:500 at A3

0 5 10 20 m

Water
- Gate, Sluice, Butterfly
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19 McMillan Avenue
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Scale: 1:500 at A3

0 5 10 20 m

29

19

19

930-960

Water
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- Air Valve
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- Ball Valve
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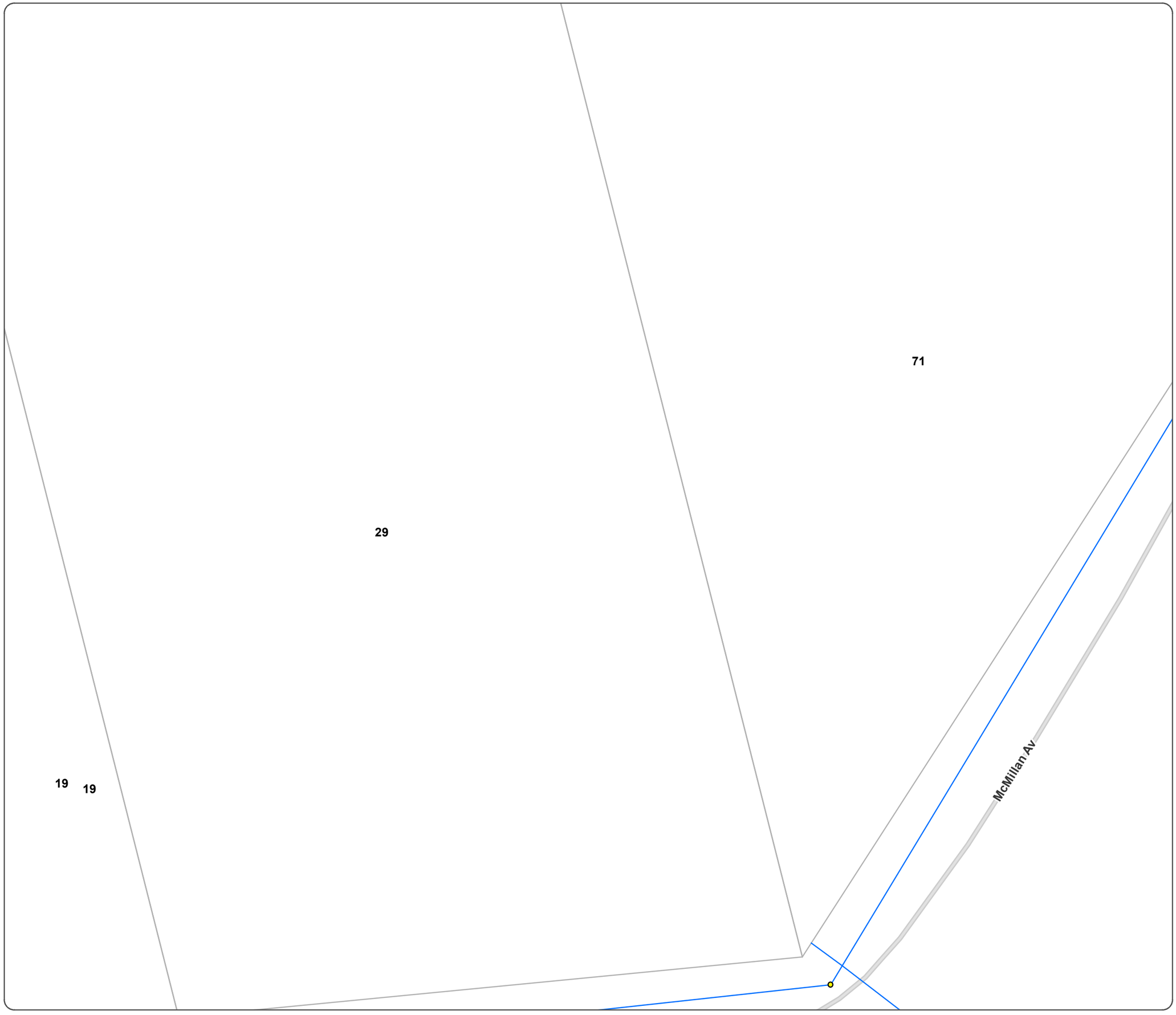
Scale: 1:500 at A3

0 5 10 20 m



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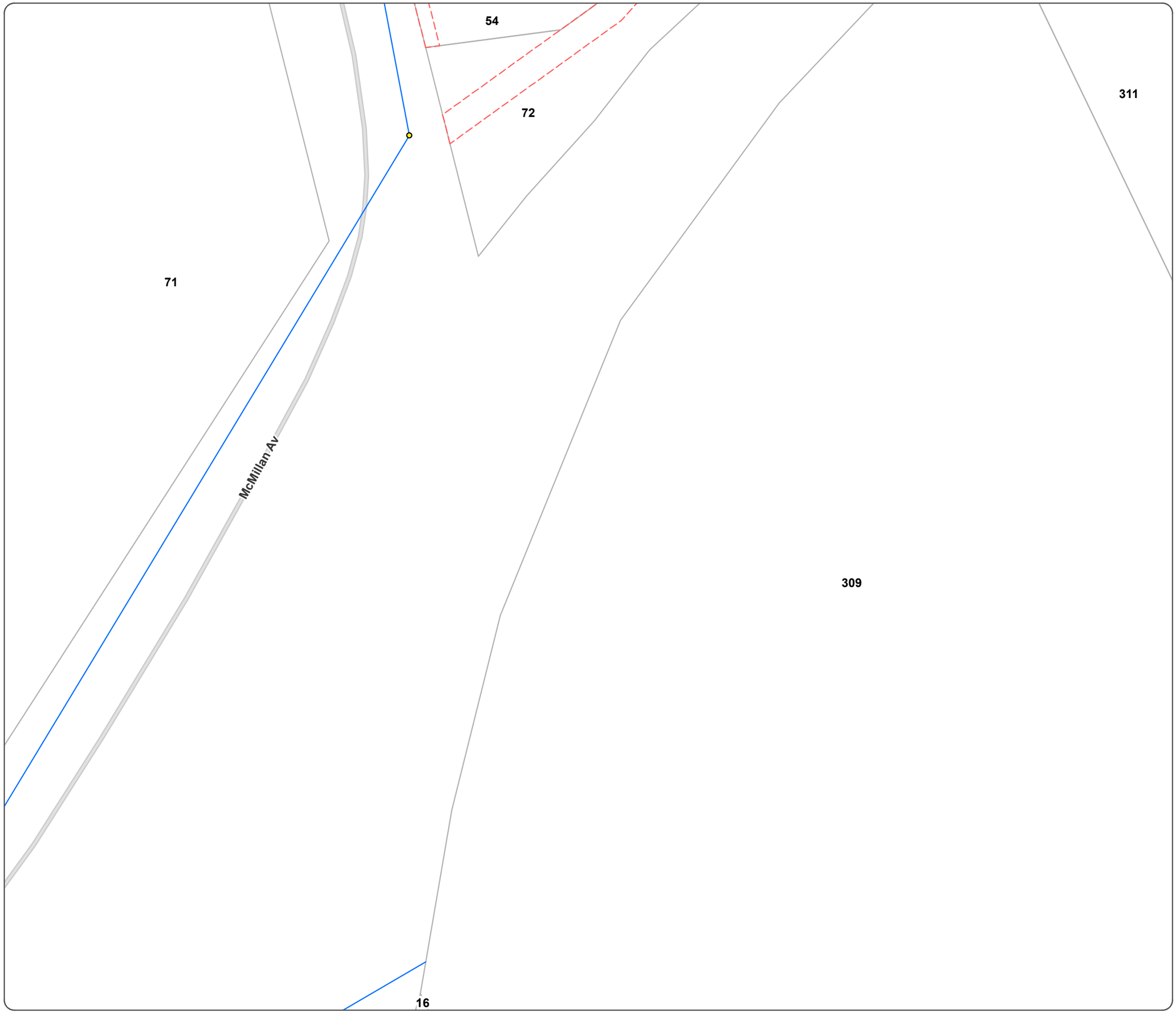

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19 McMillan Avenue
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Scale:
1:500 at A3

0 5 10 20 m

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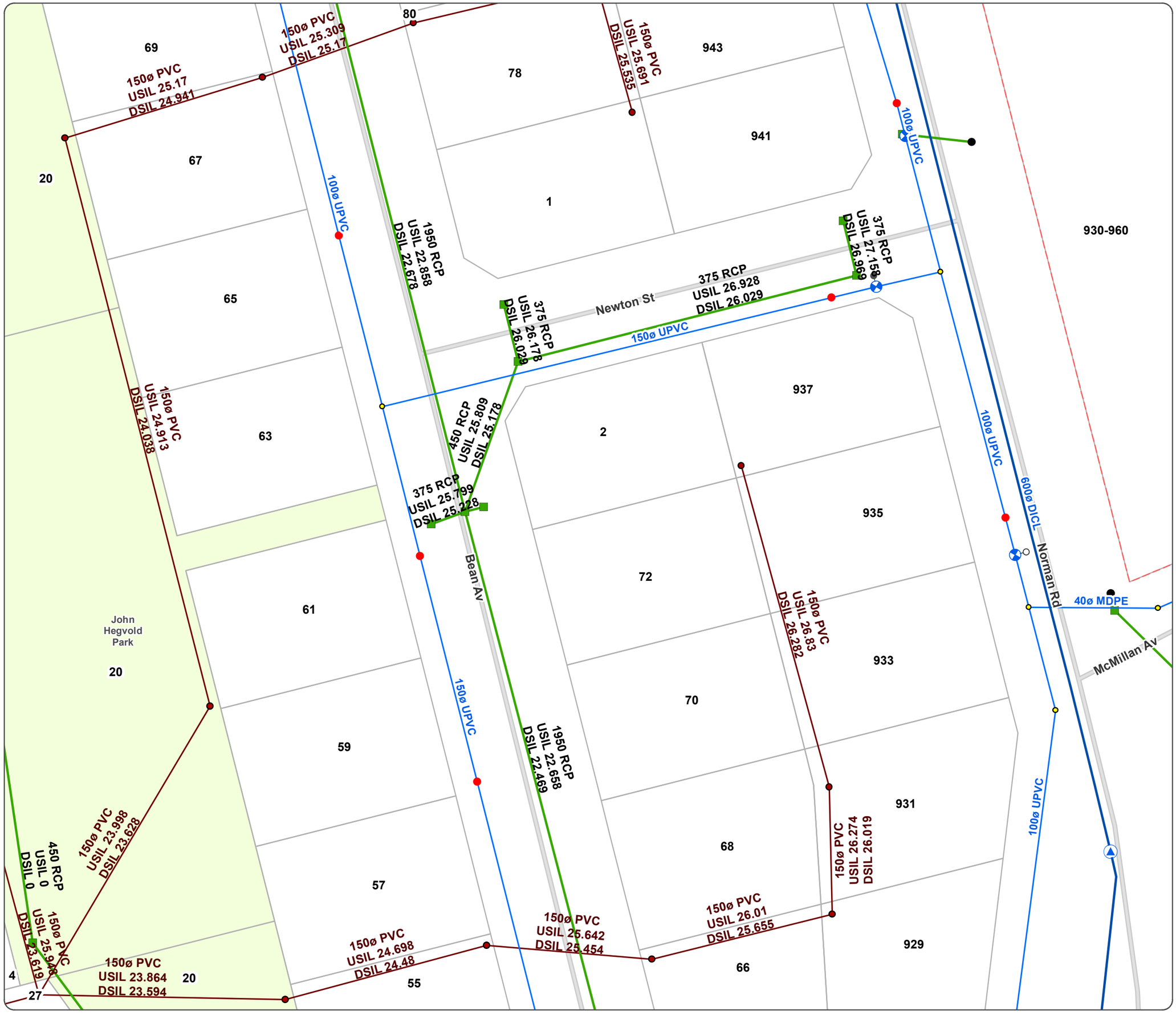
Scale:
1:500 at A3

0 5 10 20 m



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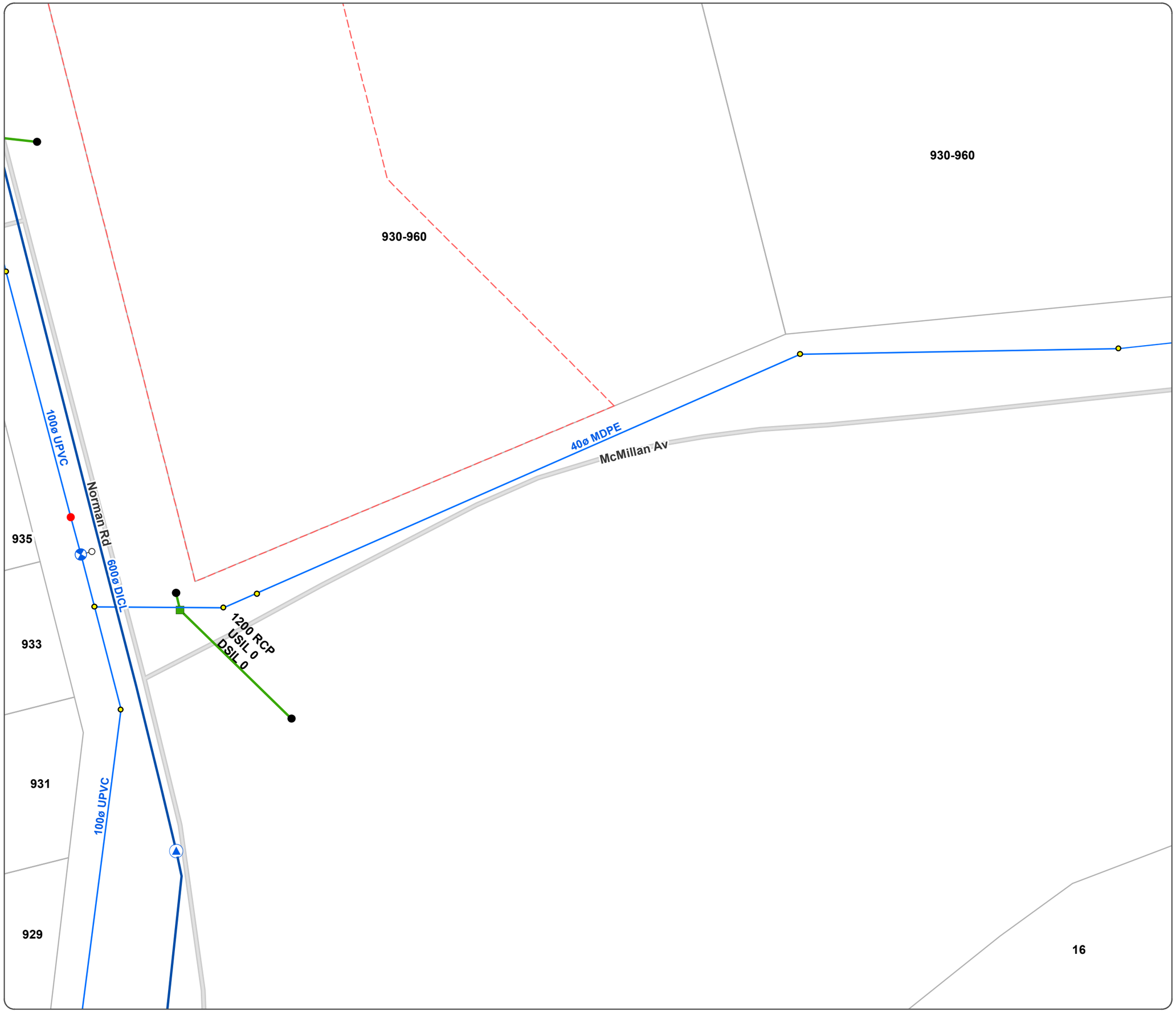
0 5 10 20 m



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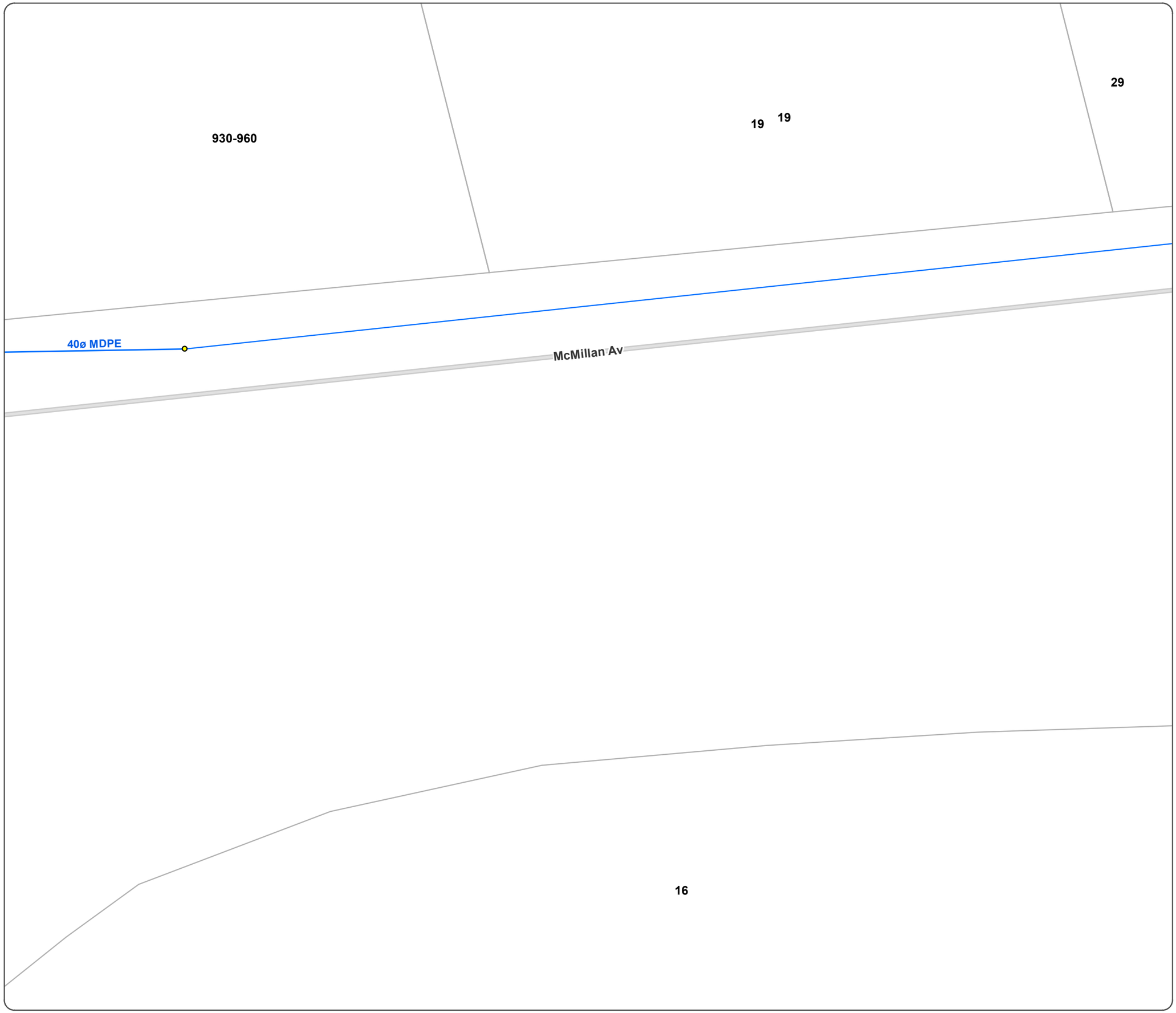
0 5 10 20 m



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- Pump Station
- Treatment Plant
- Sewer Gravity Mains
- Sewer Rising Mains
- Roll Over
- Lamp Hole | Inspection Opening
- Overflow Chamber
- Access Chambers
- Sewer Valves
- Sewer Jump Ups
- Sewer Access Chambers Abandoned
- Sewer Mains Abandoned

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- Sewer Valves Private
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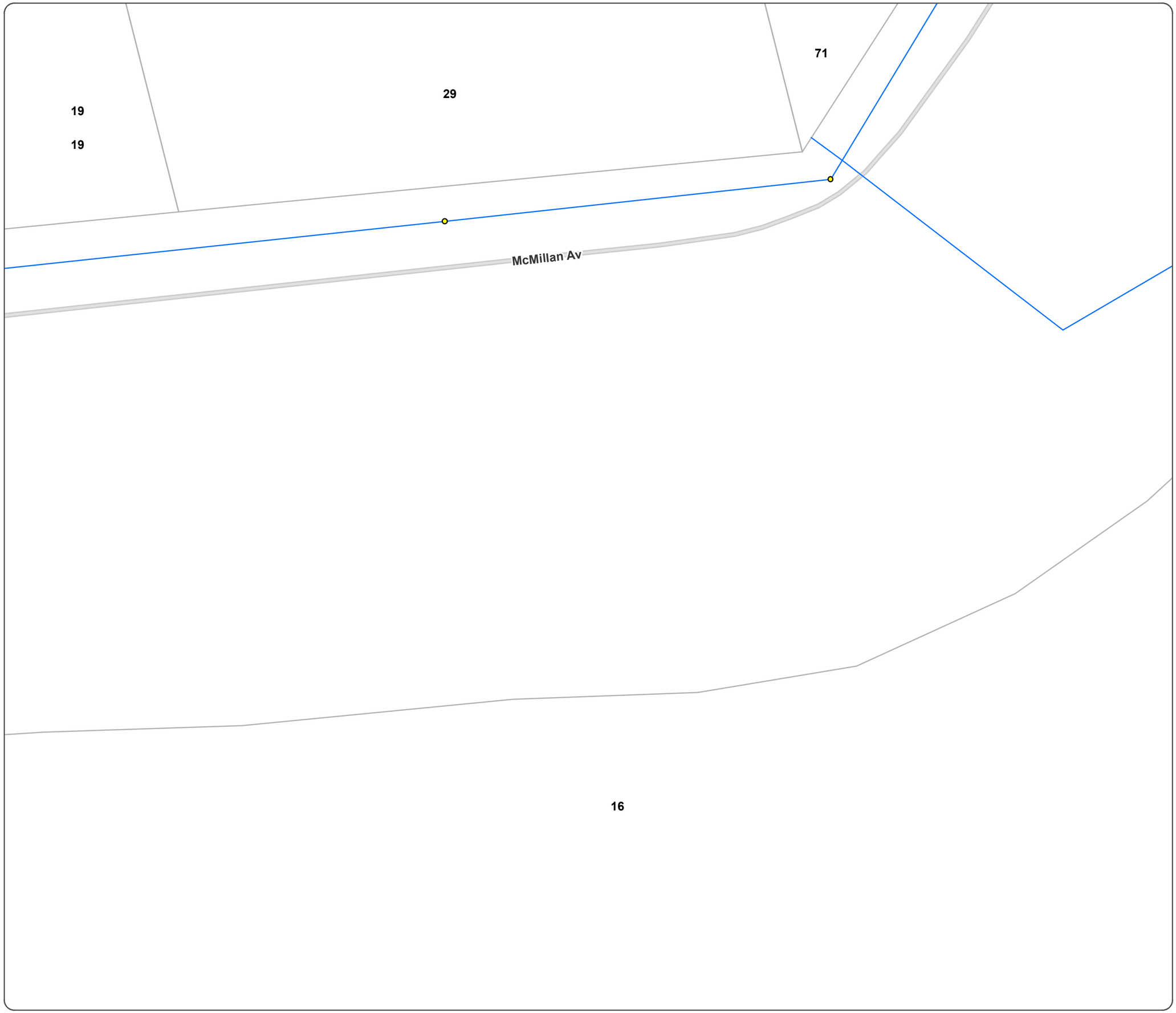

DBYD JOB:35529594
SEQ:232483006
19 McMillan Avenue
Parkhurst, QLD, 4702
User Ref = 19 McMillan Avenue

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Scale:
1:500 at A3

0 5 10 20 m

Water
- Gate, Sluice, Butterfly
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- Ball Cock, Stop Cock
- Ball Valve
- Motor Sluice Valve
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- Hydrants
- Reservoirs
- Intake
- Pump Station
- Treatment Plant
- Unknown
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- Private Water Hydrants
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- Culverts
- Headwalls
- Stormwater Junctions
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- Subsoil Clean-Out pit
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- Connector; Reticulation Main
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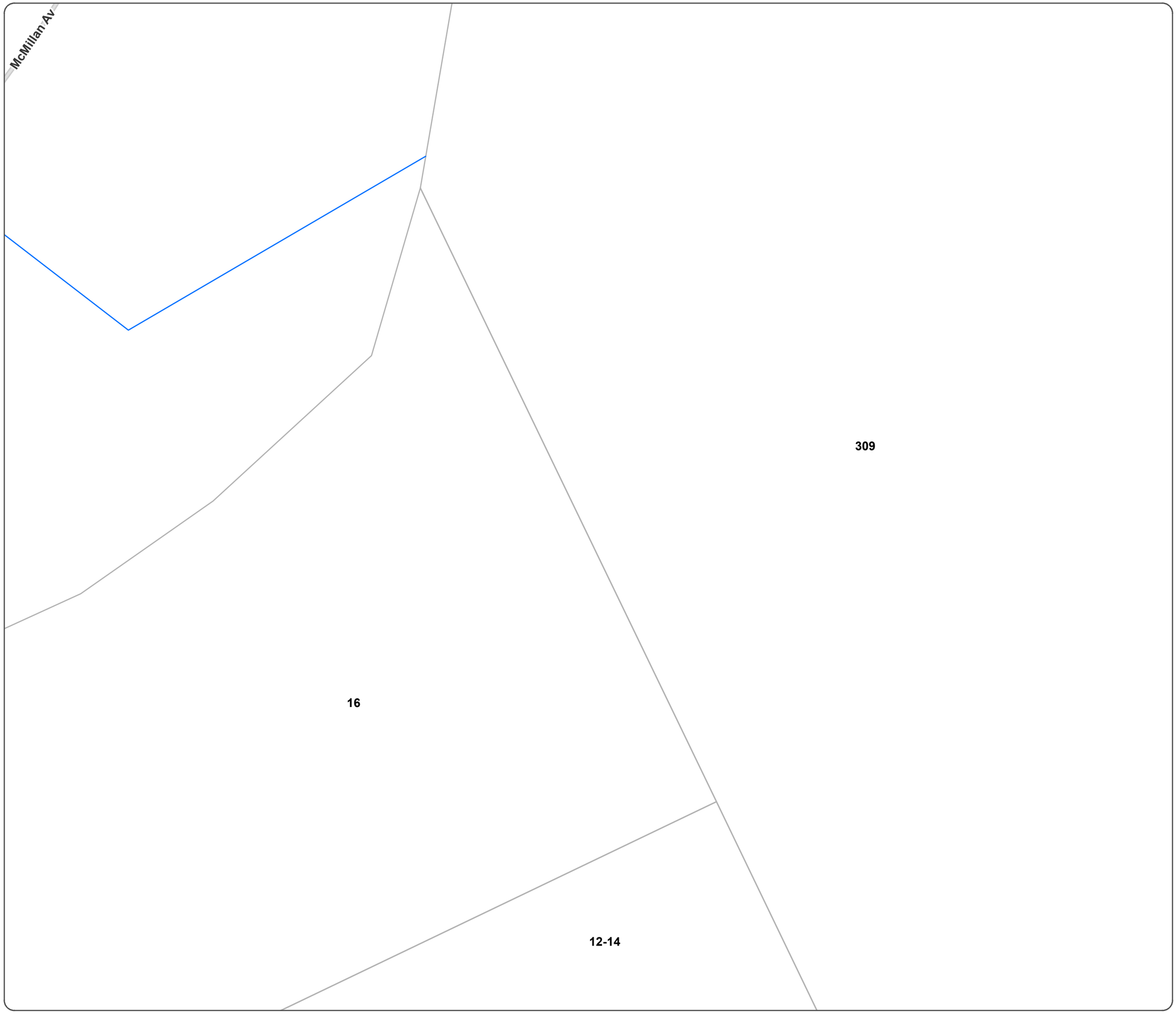

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1:500 at A3

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Scale:
1:500 at A3

0 5 10 20 m

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Scale:
1:500 at A3

0 5 10 20 m

150ø PVC USIL 23.998 DSIL 23.628
150ø PVC USIL 25.948 DSIL 23.619
150ø PVC USIL 23.864 DSIL 23.594
450 RCP USIL 0 DSIL 0
150ø PVC USIL 24.698 DSIL 24.48
150ø PVC USIL 25.642 DSIL 25.454
150ø PVC USIL 26.01 DSIL 25.655
150ø PVC USIL 26.274 DSIL 26.019
150ø UPVC
1950 RCP USIL 22.658 DSIL 22.469
1950 RCP USIL 22.559 DSIL 22.239
1950 RCP USIL 22.239 DSIL 22.088
1050 RCP USIL 23.978 DSIL 22.559
900 RCP USIL 24.279 DSIL 23.978
150ø UPVC
100ø UPVC
600ø DICL
150ø PVC USIL 26.724 DSIL 25.91
150ø PVC USIL 26.369 DSIL 25.755
150ø PVC USIL 25.724 DSIL 25.098
150ø PVC USIL 25.357 DSIL 25.198
150ø PVC USIL 25.356 DSIL 25.052

Rachel Dr
Bean Av
Norman Rd Service Rd
Norman Rd
John Hegvold Park
Bill Neven Park
L 216
L 412

4 16 18 20 27 34 36 43 45 51 52 53 54 55 56 57 59 62 64 66 68 925 927 929 931

Water
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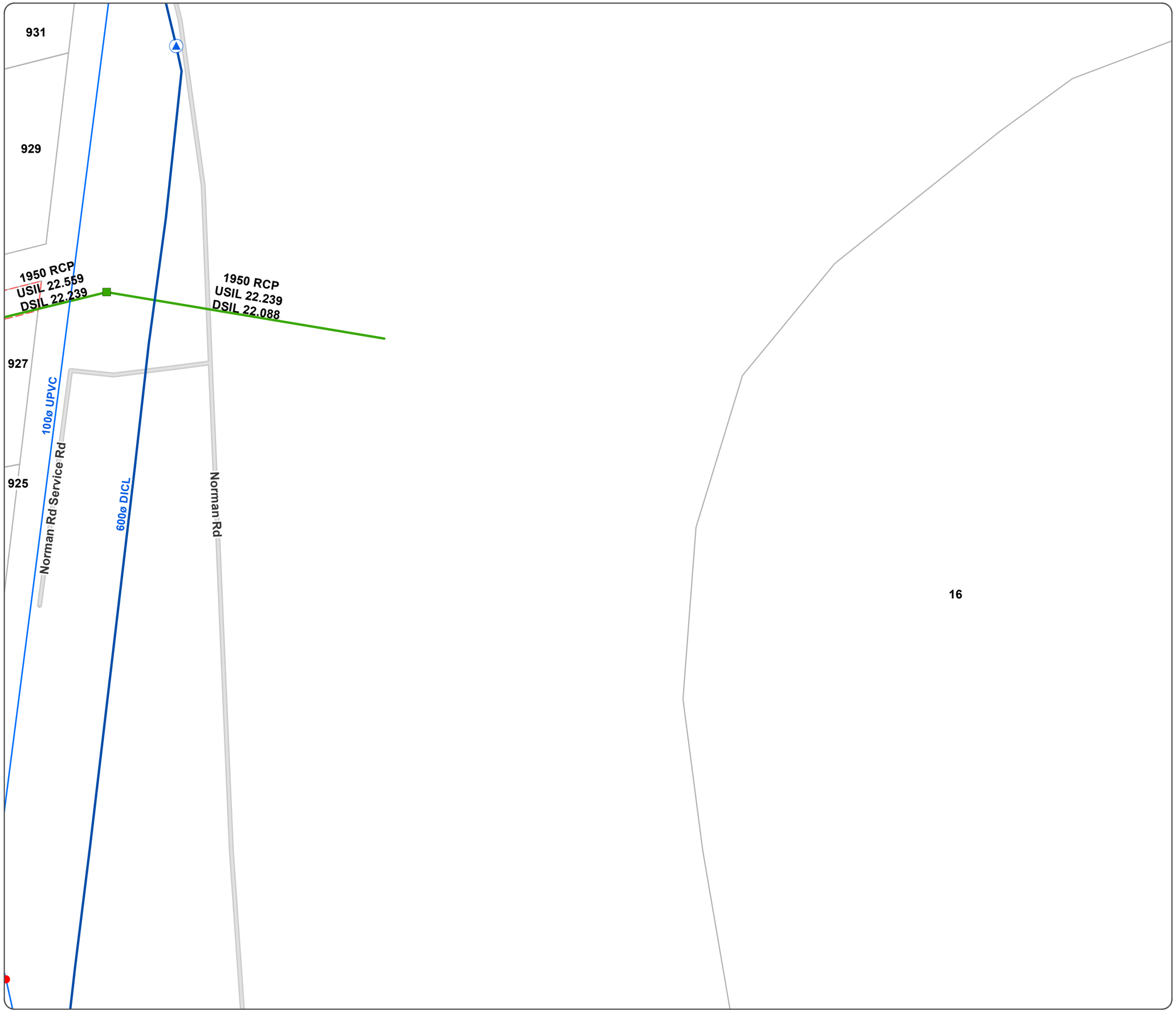

DBYD JOB:35529594
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19 McMillan Avenue
Parkhurst, QLD, 4702
User Ref = 19 McMillan Avenue

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Scale:
1:500 at A3

0 5 10 20 m

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Scale: 1:500 at A3

0 5 10 20 m

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12-14

Water
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Scale:
1:500 at A3

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Appendix B – Engineering Plans

PROPOSED RETIREMENT LIVING DEVELOPMENT

930 - 960 NORMAN ROAD, PARKHUST

RUBY DEVELOPMENTS PTY LTD

Project Number: S25-028

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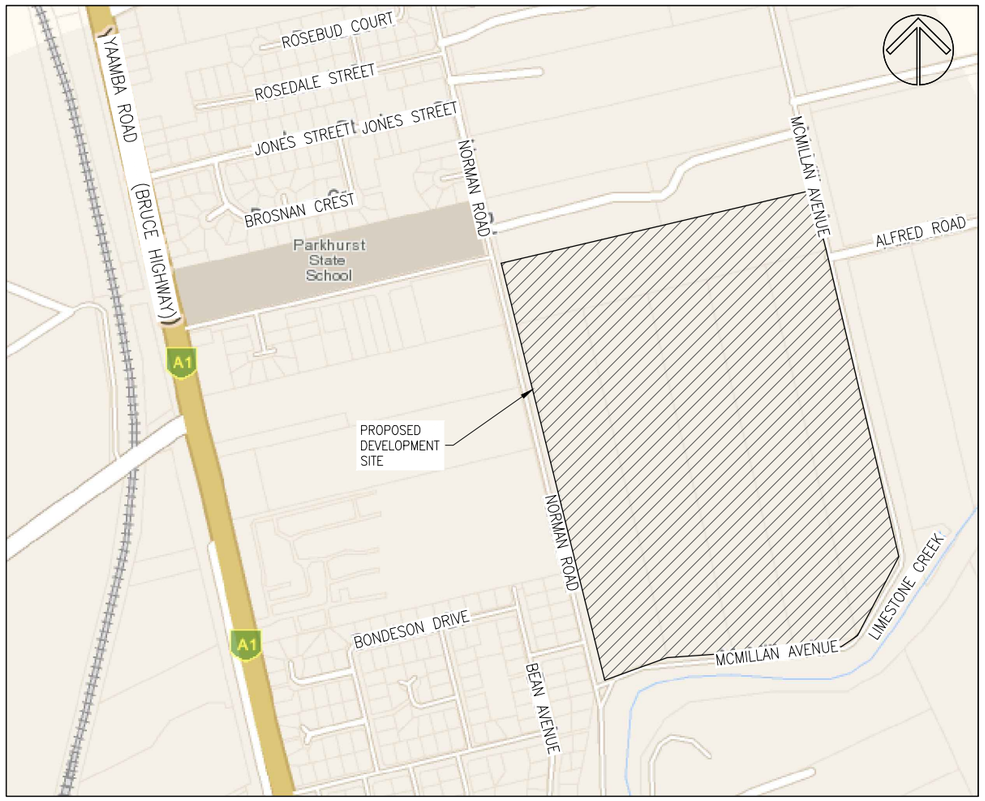
S25-028-PC03 PRELIMINARY CATCHMENTS PLAN
S25-028-PC04 PRELIMINARY CIVIL WORKS PLAN 1 of 4
S25-028-PC05 PRELIMINARY CIVIL WORKS PLAN 2 of 4
S25-028-PC06 PRELIMINARY CIVIL WORKS PLAN 3 of 4
S25-028-PC07 PRELIMINARY CIVIL WORKS PLAN 4 of 4
S25-028-PC08 PRELIMINARY CHANNEL SECTIONS
S25-028-PC09 PRELIMINARY STORMWATER TANK DETAILS 1 of 5
S25-028-PC10 PRELIMINARY STORMWATER TANK DETAILS 2 of 5
S25-028-PC11 PRELIMINARY STORMWATER TANK DETAILS 3 of 5
S25-028-PC12 PRELIMINARY STORMWATER TANK DETAILS 4 of 5
S25-028-PC13 PRELIMINARY STORMWATER TANK DETAILS 5 of 5



LOCALITY PLAN
NOT TO SCALE

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of
WESTERA PARTNERS PTY. LTD.
APPROVED

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SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199

DATUM A.H.D.
P.M. 202931
R.L. 32.447

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE COVER SHEET
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25-028-G01
SHEET NUMBER 01 OF 01
REVISION

S25-028-G_Coversheet.dwg

GENERAL NOTES

G1 WESTERA PARTNERS HAS LIMITED CONTROL OR INPUT TO LOCAL GOVERNMENT OR OTHER LEGISLATED APPROVALS UNLESS SPECIFICALLY ENGAGED BY IT'S CLIENT. ANY CHANGES TO APPROVAL REQUIREMENTS (INCLUDING ORDERS FOR SUSPENSION OF WORKS ETC) SHOULD BE COMMUNICATED TO WESTERA PARTNERS AND ALL OTHER RELEVANT DESIGNERS TO ALLOW ASSESSMENT OF POTENTIAL RISKS AND ENSURE DESIGN AND SAFETY COMPLIANCE.

G2 ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LOCAL AUTHORITIES STANDARD DRAWINGS & SPECIFICATIONS AND COMPLETED TO THE SATISFACTION OF THE SUPERINTENDENT AND LOCAL AUTHORITY.

G3 UNLESS SPECIFIED OTHERWISE ALL MATERIALS AND WORK SHALL COMPLY WITH THE RELEVANT AUSTRALIAN STANDARDS.

G4 PRIOR TO THE COMMENCEMENT OF CONSTRUCTION THE CONTRACTOR MUST LOCATE ALL EXISTING SERVICES AND PROMPTLY PROVIDE THE LOCATION DATA TO THE DESIGN ENGINEER TO ASSESS IMPACTS ON THE DESIGN.

G5 ALL CONNECTIONS TO EXISTING SEWERS AND WATER MAINS ARE TO BE CONSTRUCTED BY THE LOCAL AUTHORITY OR AN APPROVED CONTRACTOR. THE CONTRACTOR IS TO ALLOW IN HIS CONTRACT SUM FOR THE COST OF ANY PROPOSED CONNECTIONS.

G6 ALL SEWERS ARE TO BE 150MM DIA. U.P.V.C. CLASS SN8 RUBBER RING JOINTED AND PROPERTY CONNECTIONS ARE TO BE 100MM DIA. U.P.V.C CLASS SN6 UNLESS NOTED OTHERWISE

G7 THE PAVEMENT DEPTHS SHOWN ARE PRELIMINARY ONLY AND ARE TO BE VERIFIED FOLLOWING SUB-SOIL TESTS OF THE SUB-GRADE MATERIAL.

G8 ALL ROOFWATER CONNECTIONS FROM KERB ADAPTERS ARE TO BE 100MM DIA CLASS SN10 AT A MIN GRADE OF 1.0% UNLESS SHOWN OTHERWISE. ROOFWATER CONNECTIONS FROM FIELD INLETS OR GULLY PITS ARE TO BE 150MM DIA CLASS SN8 AT A MIN GRADE OF 1.0% UNLESS NOTED OTHERWISE.

G9 ALL U.P.V.C. STORMWATER DRAINAGE PIPES ARE TO BE CLASS SN8 (U.N.O.)

ALL R.C. PIPES ARE TO BE CLASS 3 (U.N.O.)
< 900ø = USE SPIGOT AND SOCKET PIPES WITH RUBBER RING JOINTS
900ø < PIPES < 1050ø = USE FLUSH JOINTED PIPES WITH EXTERNAL ELASTOMERIC BAND
1050ø < PIPES = USE FLUSH JOINTED PIPES WITH EXTERNAL ELASTOMERIC BAND AND INTERNAL CEMENT MORTAR JOINT

ALL F.R.C. PIPES ARE TO BE FRCPIPE+ CLASS 4 (U.N.O.) AND SHALL BE DUAL RUBBER RING JOINT WITH COLLAR. PIPES SHALL BE FROM 225ø TO 600ø ONLY.

POLYPROPYLENE/POLYETHYLENE STORMWATER PIPE MINIMUM CLASS SN8 (U.N.O.) SUBJECT TO ACCEPTANCE BY CERTIFYING ENGINEER AND LOCAL AUTHORITY. CONSTRUCTION AND EMBEDMENT TO BE IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.

G10 WATER PIPES SHALL BE;
- P.V.C.–M WATER PIPES ARE TO BE SERIES 2 PN16 SN10 R.R.J.
- D.I.C.L. WATER PIPES ARE TO BE PN35 WITH ALL FITTINGS TO BE FUSION BONDED POLYMERIC COATED.
- PE WATER PIPES ARE TO BE PN16 SDR11 PE100. DN25 AND DN32 WATER SERVICES SHALL BE PE80B.

G11 ALL "AS CONSTRUCTED" INFORMATION IS TO BE RECORDED AS REQUIRED BY THE LOCAL AUTHORITY AND SUBMITTED TO THE SUPERINTENDENT IMMEDIATELY AFTER COMPLETION OF THE WORKS.

G12 ALL ALLOTMENTS ARE TO BE GRADED AT A MINIMUM GRADE OF 1 IN 200.

CONCRETE NOTES

C1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3600 CONCRETE STRUCTURES CODE AND THE REFERENCED STANDARDS THEREIN.

C2 THE CONCRETE STRENGTH GRADE AND THE COVER TO REINFORCEMENT FOR THE VARIOUS CONCRETE ELEMENTS SHALL BE AS LISTED BELOW:
- CLIMATE ZONE: TROPICAL / TEMPERATE / ARID
- LOCATION: COASTAL / NEAR COASTAL / INLAND

ELEMENT	EXPOSURE CLASSIFICATION	STRENGTH GRADE	MINIMUM COVER
MANHOLES	B1	N32	40
	C2	S50	65
FIELD INLET PITS	B1	N32	40
	C2	S50	65
HEADWALLS	B1	N32	40
	C2	S50	65
INTERNAL ROADS	B1	N32	40
KERB/CHANNEL	B1	N32	–
FOOTPATHS	B1	N32	40
RETAINING WALL PANELS	B1	N32	30*
	C2	S50	60*
BORED PIERS	B1	N32	40
	C2	S50	65

*RIGID FORMWORK & INTENSE COMPACTION

C3 CONCRETE TO HAVE A MAXIMUM AGGREGATE SIZE OF 20mm WITH 80mm MAXIMUM SLUMP, A WATER/CEMENT RATIO OF NOT GREATER THAN 0.65 AND A MAXIMUM FINAL BASIC DRYING SHRINKAGE STRAIN OF 800 x 10^{-6}, UNLESS APPROVED OTHERWISE.

C4 NO ADDITIVES SHALL BE ADDED OF APPLIED TO THE CONCRETE MIX WITHOUT THE APPROVAL OF THE ENGINEER.

C5 THE MAXIMUM PERMISSIBLE TRANSPORT TIME FOR CONCRETE BETWEEN BATCHING AND PLACEMENT ON SITE SHALL BE IN ACCORDANCE WITH THE FOLLOWING TABLE.

AMBIENT AIR TEMPERATURE	MAX. BATCHING TO PLACEMENT TIME
10° – 24°C	120 MINUTES
25° – 27°C	90 MINUTES
28° – 30°C	60 MINUTES
31° – 33°C	45 MINUTES
34° – 36°C	30 MINUTES
37°C+	NO PLACEMENT OF CONCRETE UNLESS CHILLED WATER OR ICE IN MIX

C6 ALL CONCRETE SHALL BE MECHANICALLY VIBRATED. VIBRATORS SHALL NOT BE USED TO SPREAD CONCRETE.

C7 ALL CONCRETE SHALL BE SAMPLED AND TESTED IN ACCORDANCE WITH AS1379 ADOPTING THE PROJECT ASSESSMENT METHOD FOR COMPRESSIVE STRENGTH AND SLUMP COMPLIANCE. THE RESULTS OF ALL TESTS SHALL BE PROMPTLY SUBMITTED TO THE ENGINEER FOR REVIEW.

C8 WHEN THE AIR TEMPERATURE EXCEEDS 30°C, ALIPHATIC ALCOHOL SHALL BE APPLIED TO THE CONCRETE SURFACE OF SLABS IMMEDIATELY AFTER THE INITIAL SCREED AND AGAIN AFTER BULL FLOATING.

C9 CURING OF ALL CONCRETE SURFACES SHALL COMMENCE IMMEDIATELY AFTER COMPLETING CONCRETE FINISHING AND SHALL CONTINUE FOR 7 DAYS. CONTRACTOR TO CONFIRM METHOD OF CURING WITH ENGINEER PRIOR TO USE.

C10 SIZES OF CONCRETE ELEMENTS DO NOT INCLUDE THICKNESS OF APPLIED FINISHES.

C11 BEAM DEPTHS ARE WRITTEN FIRST AND INCLUDE SLAB THICKNESS, IF ANY.

C12 NO HOLES, CHASES OR EMBEDDED ITEMS OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT PRIOR APPROVAL OF THE ENGINEER. CONDUITS, PIPES ETC. SHALL NOT BE PLACED IN THE COVER THICKNESS OF THE CONCRETE.

C13 WHERE SERVICE PIPES PENETRATE CONCRETE ELEMENTS, PROVISION SHOULD BE MADE TO ALLOW FOR MOVEMENT OF THE ELEMENT.

C14 FORMWORK SHALL BE DESIGNED, CONSTRUCTED AND STRIPPED IN ACCORDANCE WITH AS3610 FORMWORK CODE, UNLESS NOTED OTHERWISE ON THE DRAWINGS.

C15 REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND NOT NECESSARILY SHOWN IN TRUE PROJECTION OR SCALE.

C16 ALL REINFORCEMENT SHALL BE SECURELY SUPPORTED IN ITS CORRECT POSITION ON PLASTIC BAR CHAIRS, GENERALLY AT NOT GREATER THAN 800mm CENTRES IN BOTH DIRECTIONS.

C17 WELDING AND HEATING OF REINFORCEMENT SHALL NOT BE PERMITTED WITHOUT APPROVAL OF THE ENGINEER.

C18 ALL STEEL REINFORCEMENT IN CONCRETE ELEMENTS SHALL BE INSPECTED BY THE ENGINEER AND PASSED PRIOR TO POURING OF ANY CONCRETE.

C19 LAP REINFORCEMENT ONLY AT LOCATIONS SHOWN ON THE DRAWINGS OR AS APPROVED BY THE ENGINEER.

C20 SLAB FABRIC SHALL BE LAPPED ONE FULL PANEL OF FABRIC PLUS 50mm SO THAT THE TWO OUTERMOST TRANSVERSE WIRES OF ONE SHEET OVERLAP THE TWO OUTERMOST TRANSVERSE WIRES OF THE SHEET BEING LAPPED BY 50mm.

C21 BAR REINFORCEMENT SHALL BE LAPPED IN ACCORDANCE WITH THE FOLLOWING TABLE.

TYPICAL BAR REINFORCEMENT LAP LENGTHS		
BAR	LAP LENGTH UNO	HORIZONTAL BARS WITH GREATER THAN 300mm OF CONCRETE CAST BELOW THEM
N12	550	750
N16	800	1100
N20	1100	1400
N24	1250	1600
N28	1400	1800
N32	1600	2100
N36	2000	2500

WHERE LAPS ARE SHOWN ON THE DRAWINGS THE ABOVE LAP LENGTHS SHALL BE ADOPTED UNLESS NOTED OTHERWISE. WHERE BARS OF DIFFERENT DIAMETER ARE SHOWN LAPPED, ADOPT THE LAP LENGTH APPROPRIATE TO THE SMALLER DIAMETER BAR.

C22 A VAPOUR BARRIER OF 0.2mm (200um) MINIMUM THICK POLYTHENE SHEETING SHALL BE PLACED BENEATH SLABS ON GROUND UNLESS NOTED OTHERWISE.

LEGEND

GENERAL

ASPHALTIC CONCRETE PAVEMENT
REINFORCED CONCRETE PAVEMENT
REINFORCED CONCRETE PATHWAY/CROSSOVER
TURF
STONE PITCHING
CEMENT GROUTED STONE PITCHING
TELECOMMUNICATION (T)
GAS MAIN (G)
ELECTRICITY OVERHEAD (V)
ELECTRICITY UNDERGROUND (E)
LIGHT POLE (LP)
POWER POLE (PP)
PIT (TELSTRA/ELEC)
EDGE OF BITUMEN
FENCE
EXISTING SURFACE LEVEL (× 2.53)
EXISTING CONTOUR MINOR (33.75)
EXISTING CONTOUR MAJOR (34.00)
DESIGN SURFACE LEVEL (× 2.53)
DESIGN CONTOUR MINOR (33.75)
DESIGN CONTOUR MAJOR (34.00)
RETAINING WALL
STAGE BOUNDARY

STORMWATER DRAINAGE

	NEW	EXISTING
STORMWATER PIPE		
SAG GULLY PIT		
ON GRADE GULLY PIT		
MANHOLE		
600 x 600 FIELD INLET		
900 x 600 FIELD INLET		
1050 DIA FIELD INLET		
HEADWALL		

KERB ADAPTER WITH ROOFWATER PIPE (SWO)
STORMWATER STRUCTURE LABEL (2A)

WATER

	NEW	EXISTING	DISUSED
WATER MAIN	W W	W W	W W
FIRE HYDRANT	W FH W	W FH W	W FH W
DUAL OUTLET FIRE HYDRANT	DFH	DFH	DFH
SWABBING DUAL OUTLET FIRE HYDRANT	SDFH		
SWABBING FIRE HYDRANT	W SFH W	W SFH W	W SFH W
ISOLATION VALVE	W V W	W V W	W V W
SCOUR VALVE	W W	W W	W W
AIR VALVE	W AV W	W AV W	W AV W
DEAD END	W W	W W	W W
TEST/CHLORINATION POINT	W W		
REDUCER	150 W 100 W	150 W 100 W	150 W 100 W
PIPE MATERIAL CHANGE	PVC W DICL W	PVC W DICL W	PVC W DICL W
WATER SERVICE PRE-TAPPED TEE			
WATER SERVICE PIPE & CONDUIT	DN25ø		
FLOW METER	WM		
FLUSHING POINT	F W		

SEWERAGE

	NEW	EXISTING	DISUSED
GRAVITY SEWER MAIN	S S	S S	S S
SEWER RISING MAIN	RM	RM RM	
SEWER VACUUM MAIN	VM	VM VM	
MAINTENANCE HOLE & END OF LINE	1/1 S S	1/1 S S	1/1 S S
END OF LINE	1/1 E 1 S S	1/1 E 1 S S	1/1 E 1 S S
MAINTENANCE SHAFT	1/1 S S	1/1 S S	1/1 S S
HORIZONTAL/VERTICAL BEND	VB1 1 HB1 1 S S	VB1 1 HB1 1 S S	VB1 1 HB1 1 S S
COMPOUND BEND	CB1 1 S S	CB1 1 S S	CB1 1 S S
STUB / TEMPORARY END	S		
RODDING END	S RE 1		
PROPERTY CONNECTION	S S		
OVERFLOW MAINTENANCE HOLE	OFMH S S		
ISOLATION VALVE	RM RM		
SCOUR VALVE AND CHAMBER	RM RM		
GAS RELEASE VALVE	GRV RM RM		
FLUSHING POINT	FP RM RM		
DISCHARGE MAINTENANCE HOLE	DMH RM S		
NON-RETURN/REFLUX VALVE	RM RM		
VENT POLE / ODOUR CONTROL UNIT	V		

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199
DATUM A.H.D.
P.M. 202931
R.L. 32.447

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE CIVIL NOTES AND LEGEND
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25-028-PC01
SHEET NUMBER 01 OF 13
REVISION

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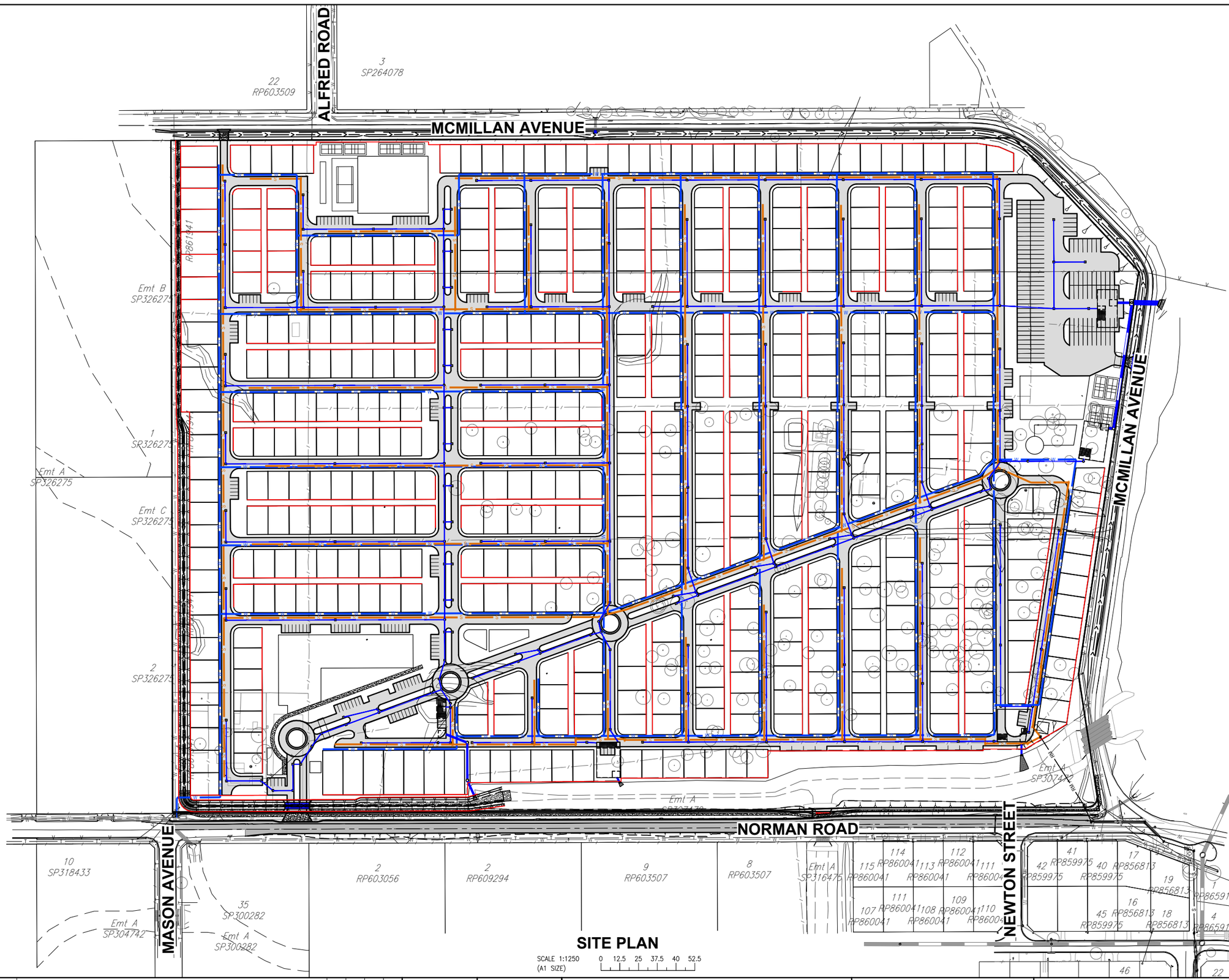

SITE PLAN

SCALE 1:1250 (A1 SIZE)

0 12.5 25 37.5 40 52.5

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE SITE PLAN
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25-028-PC02
SHEET NUMBER 02 OF 13
REVISION

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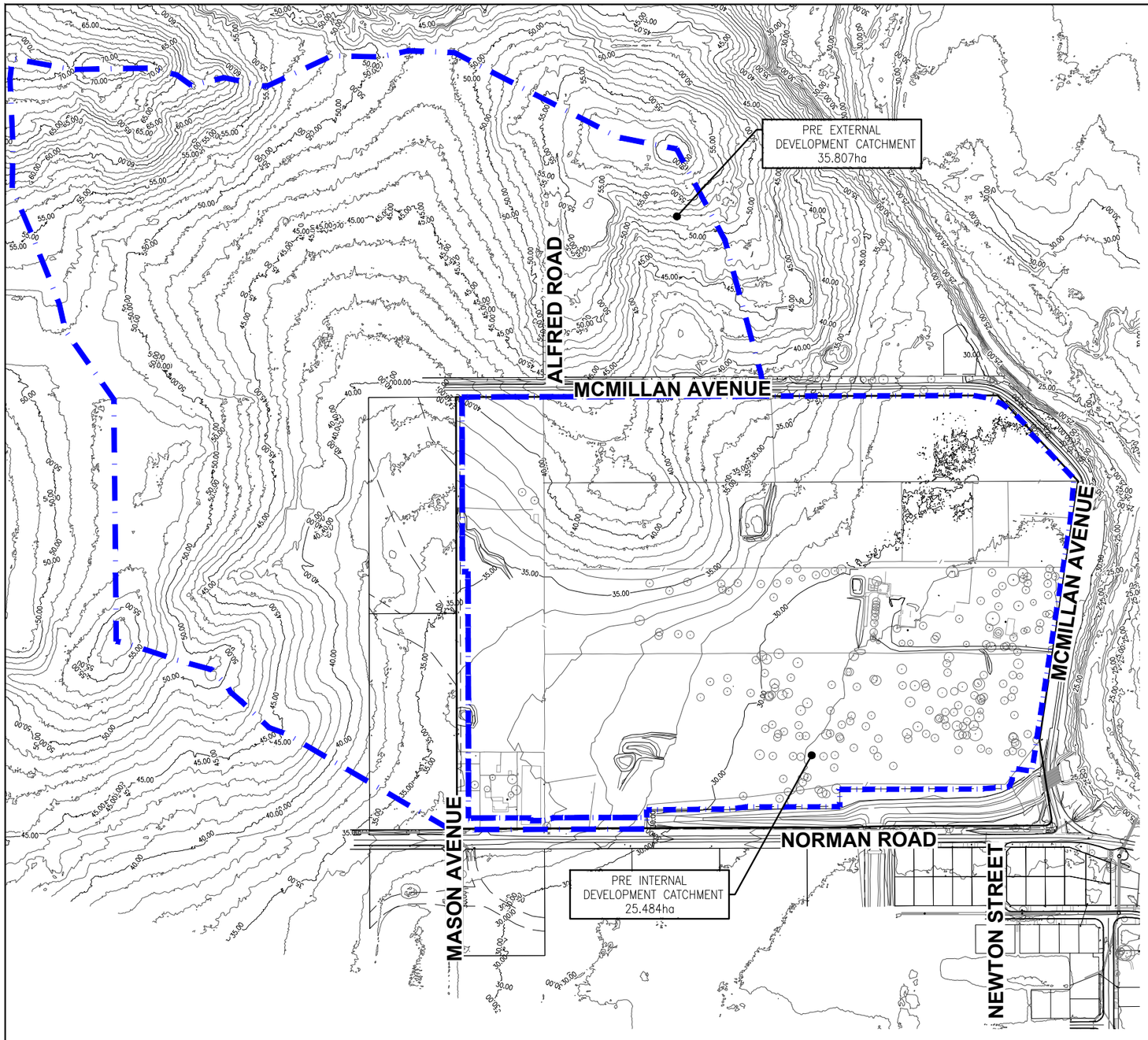
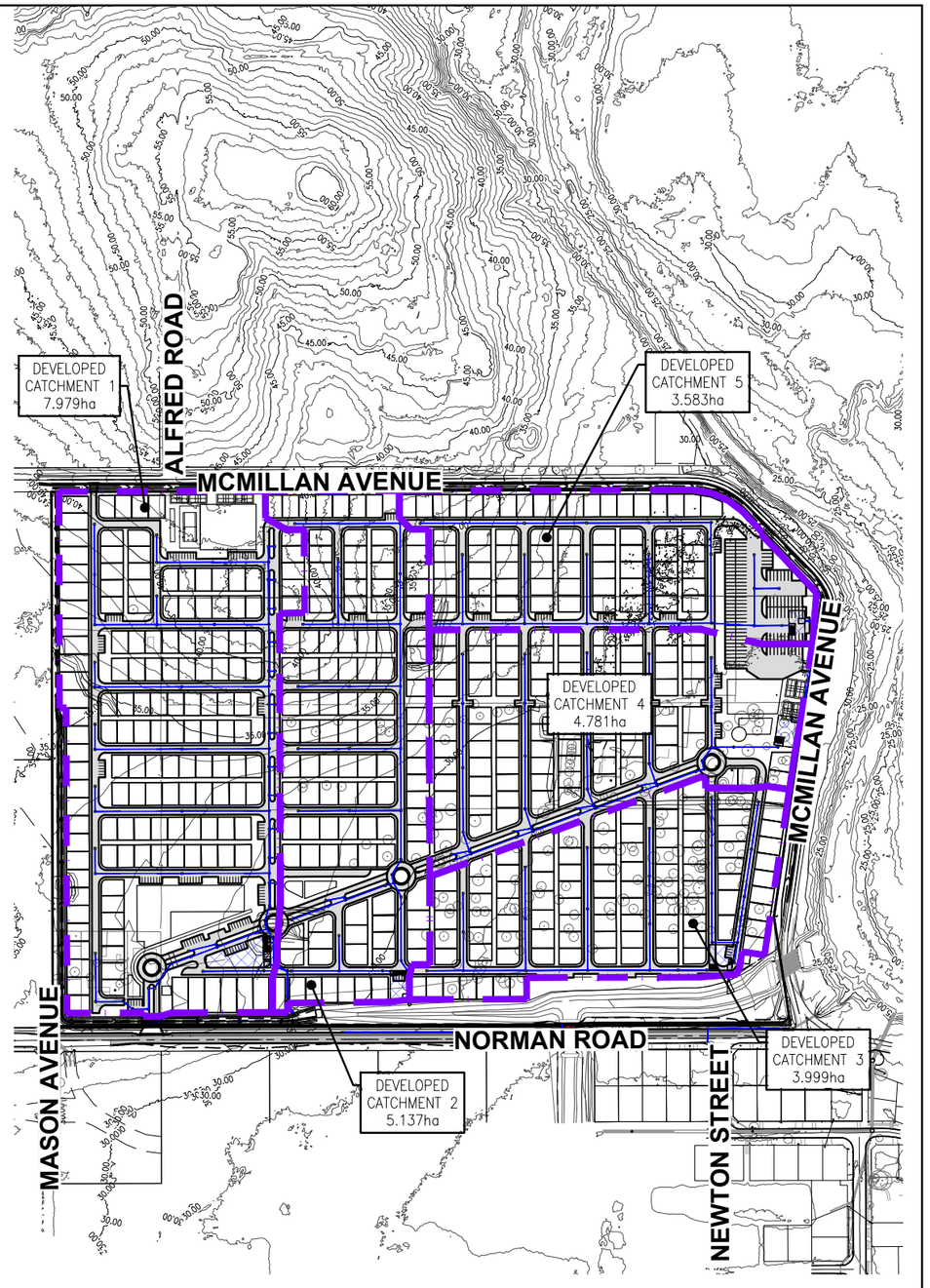


EXISTING CATCHMENT PLAN

SCALE 1:2500 (A1 SIZE) 0 25 50 75 100 125



NOTE:
DEVELOPMENT CATCHMENTS EXCLUDE PERIMETER OPEN CHANNELS.

DEVELOPED CATCHMENT PLAN

SCALE 1:2500 (A1 SIZE) 0 25 50 75 100 125

No.	DATE	REVISIONS	DES	DRN	CHK	APD

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DRAWN J.J.D
CHECKED J.M.H.
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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY CATCHMENT PLANS
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS
PRELIMINARY N.F.C.
DRAWING NUMBER
S25–028–PC03
SHEET NUMBER 03 of #REF!
REVISION

S25–028–PC_Pre_Stm_Catch.dwg

REFER DWG. PC07 FOR CONTINUATION

REFER DWG. PC05 FOR CONTINUATION

Emt C SP326275

2 SP326275
EXISTING WATER MAIN TO BE PRESERVED.

PROVIDE CONCRETE LINED INVERT CUT OFF DRAIN FOR RUNOFF FROM UPSTREAM CATCHMENT.

PROVIDE GROUTED STONE PITCHING TO CHANNEL BASE AROUND 90° BEND.

PROVIDE NEW WATER SERVICE & METER ASSEMBLY

A PC8

B PC8

COUNTRY CLUB

DETENTION TANK A

TOTAL AREA	= 1,025m²
INTERNAL HEIGHT	= 1.90m
TREATMENT AREA	= 78m²
TOTAL TANK VOLUME	= 1,947.5m³
DETENTION VOLUME	= 1,877.3m³

DETENTION TANK B

TOTAL AREA	= 355m²
INTERNAL HEIGHT	= 2.90m
TREATMENT AREA	= 56m²
TOTAL TANK VOLUME	= 1,029.5m³
DETENTION VOLUME	= 979.1m³

PROVIDE STORMWATER OUTLET & SCOUR PROTECTION TO PROPOSED CUT OFF DRAIN.

CONNECT PROPOSED CUT OFF DRAIN TO EXISTING OPEN CHANNEL.

PROVIDE STORMWATER OUTLET & SCOUR PROTECTION TO EXISTING OPEN CHANNEL DRAIN.

NORMAN ROAD

PRELIMINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE) 0 5 10 15 20 25

No.	DATE	REVISIONS	DES	DRN	CHK	APD

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY CIVIL WORKS PLAN 1 of 4
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25–028–PC04
SHEET NUMBER 04 OF 13
REVISION

S25–028–PC_Pre_Civilwks.dwg

REFER DWG. PC06 FOR CONTINUATION

REFER DWG. PC04 FOR CONTINUATION

MCMILLAN AVENUE

NORMAN ROAD

PRELIMINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE)

0 5 10 15 20 25

DETENTION TANK C
TOTAL AREA = 429m²
INTERNAL HEIGHT = 2.10m
TREATMENT AREA = 42m²
TOTAL TANK VOLUME = 900m³
DETENTION VOLUME = 862.2m³

EXISTING 6x2400x1200 RCBC
USIL = 25.22
DSIL = 25.11
LENGTH = 20.93
GRADE = 0.53%

EXISTING 6x1200x900 RCBC
USIL = 26.49
DSIL = 26.25
LENGTH = 19.44
GRADE = 1.23%

PROVIDE STORMWATER OUTLET & SCOUR PROTECTION TO EXISTING OPEN CHANNEL DRAIN.

REFER TO S24-148-S SET FOR EXTERNAL SEWER DETAILS.

Emt A SP307472

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199

DATUM A.H.D.
P.M. 202931
R.L. 32.447

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY CIVIL WORKS PLAN 2 of 4
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25-028-PC05
SHEET NUMBER 05 OF 13
REVISION

S25-028-PC_Pre_Civilwks.dwg

PRELIMINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE)

0 5 10 15 20 25

MCMILLAN AVENUE

RV COMPOUND

LIFESTYLE PAVILION

MCMILLAN AVENUE

DETENTION TANK E

TOTAL AREA	= 325m²
INTERNAL HEIGHT	= 3.00m
TREATMENT AREA	= 45.5m²
TOTAL TANK VOLUME	= 975m³
DETENTION VOLUME	= 934.05m³

DETENTION TANK D

TOTAL AREA	= 410m²
INTERNAL HEIGHT	= 3.00m
TREATMENT AREA	= 49m²
TOTAL TANK VOLUME	= 1,230m³
DETENTION VOLUME	= 1,185.9m³

PROVIDE 2x1200 RCBC. RESTORE EXISTING ROAD PAVEMENT.

PROVIDE STORMWATER OUTLET & SCOUR PROTECTION TO LIMESTRONE CREEK.

PROVIDE STORMWATER OUTLET & SCOUR PROTECTION TO LIMESTRONE CREEK.

REFER DWG. PC07 FOR CONTINUATION

REFER DWG. PC05 FORCONTINUATION

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

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SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199

DATUM A.H.D.
P.M. 202931
R.L. 32.447

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PROJECT	PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION	LOTS 7–12 SP603508 930 – 960 NORMAN ROAD, PARKHUST
TITLE	PRELIMINARY CIVIL WORKS PLAN 3 of 4
CLIENT	RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS: PRELIMINARY N.F.C.
DRAWING NUMBER: S25-028-PC06
SHEET NUMBER: 06 OF 13
REVISION:

S25-028-PC_Pre_Civilwks.dwg

PRELIMINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE)

0 5 10 15 20 25

ALFRED ROAD

MCMILLAN AVENUE

SPORTS PRECINT

Emt B SP326275

1 SP326275

PROVIDE CONCRETE CUT OFF DRAIN FOR RUNOFF FROM UPSTREAM CATCHMENT.

PROVIDE VEGETATED CUT OFF DRAIN FOR RUNOFF FROM UPSTREAM CATCHMENT.

C PC8

REFER DWG. PC06 FOR CONTINUATION

REFER DWG. PC04 FOR CONTINUATION

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

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PROJECT	PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION	LOTS 7–12 SP603508 930 – 960 NORMAN ROAD, PARKHUST
TITLE	PRELIMINARY CIVIL WORKS PLAN 4 of 4
CLIENT	RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS: PRELIMINARY N.F.C.
DRAWING NUMBER: S25–028–PC07
SHEET NUMBER: 07 OF 13
REVISION:

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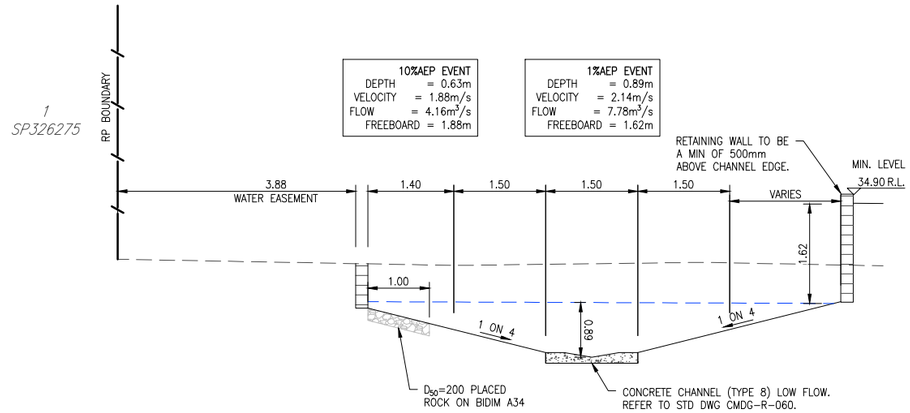
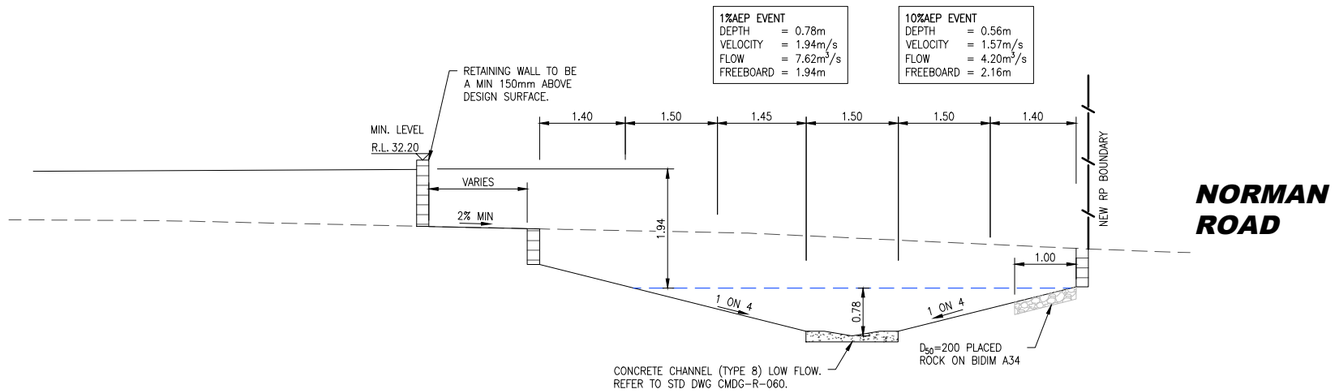
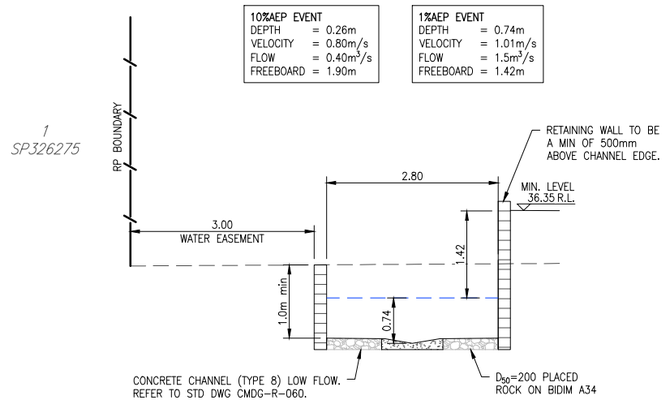


SECTION A
SCALE A1 – 1 : 50
A3 – 1 : 100
PC06



SECTION B
SCALE A1 – 1 : 50
A3 – 1 : 100
PC06



SECTION C
SCALE A1 – 1 : 50
A3 – 1 : 100
PC06

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
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SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199
DATUM A.H.D.
P.M. 202931
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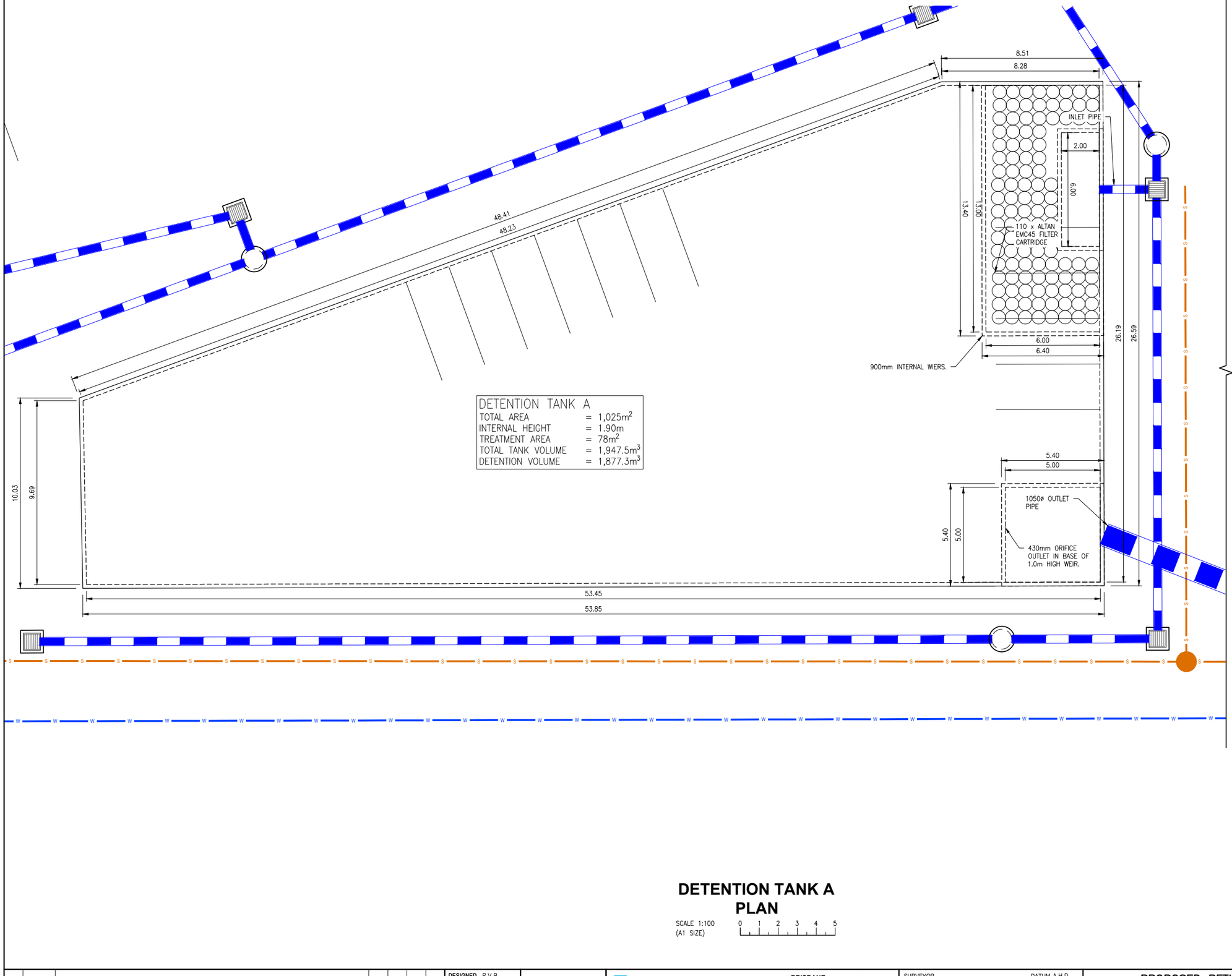
PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY CHANNEL SECTIONS
CLIENT RUBY DEVELOPMENTS PTY LTD

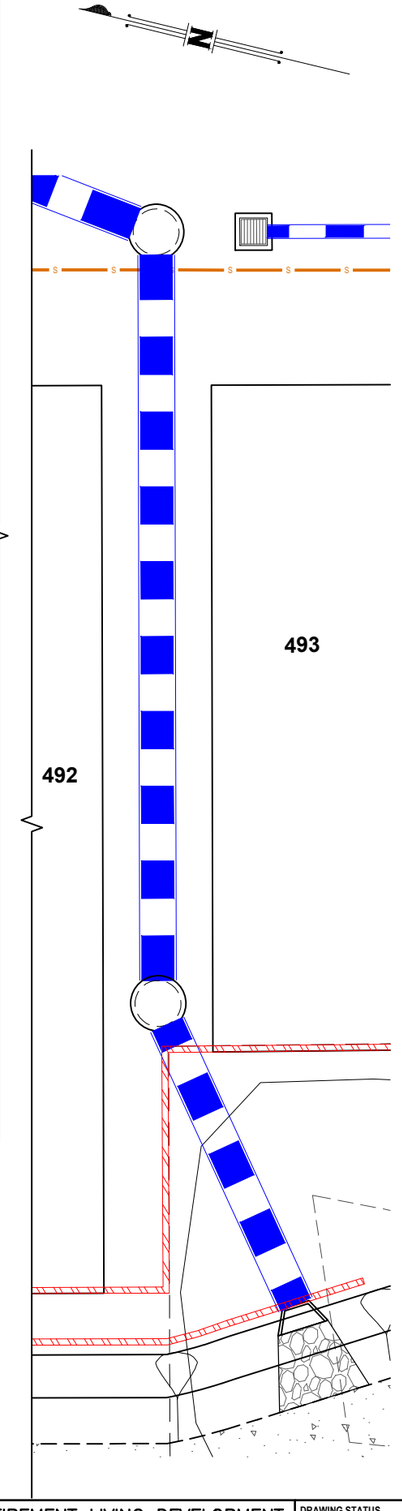
DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25-028-PC08
SHEET NUMBER 08 OF 13
REVISION

S25-028-PC_Pre_Civilwks.dwg



DETENTION TANK A

TOTAL AREA	=	1,025m^2
INTERNAL HEIGHT	=	1.90m
TREATMENT AREA	=	78m^2
TOTAL TANK VOLUME	=	1,947.5m^3
DETENTION VOLUME	=	1,877.3m^3



DETENTION TANK A
PLAN

SCALE 1:100
(A1 SIZE)

0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

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APPROVED

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SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199

DATUM A.H.D.
P.M. 202931
R.L. 32.447

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY STORMWATER TANK 1 of 5
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS
PRELIMINARY N.F.C.
DRAWING NUMBER
S25–028–PC09
SHEET NUMBER
09 OF 13
REVISION

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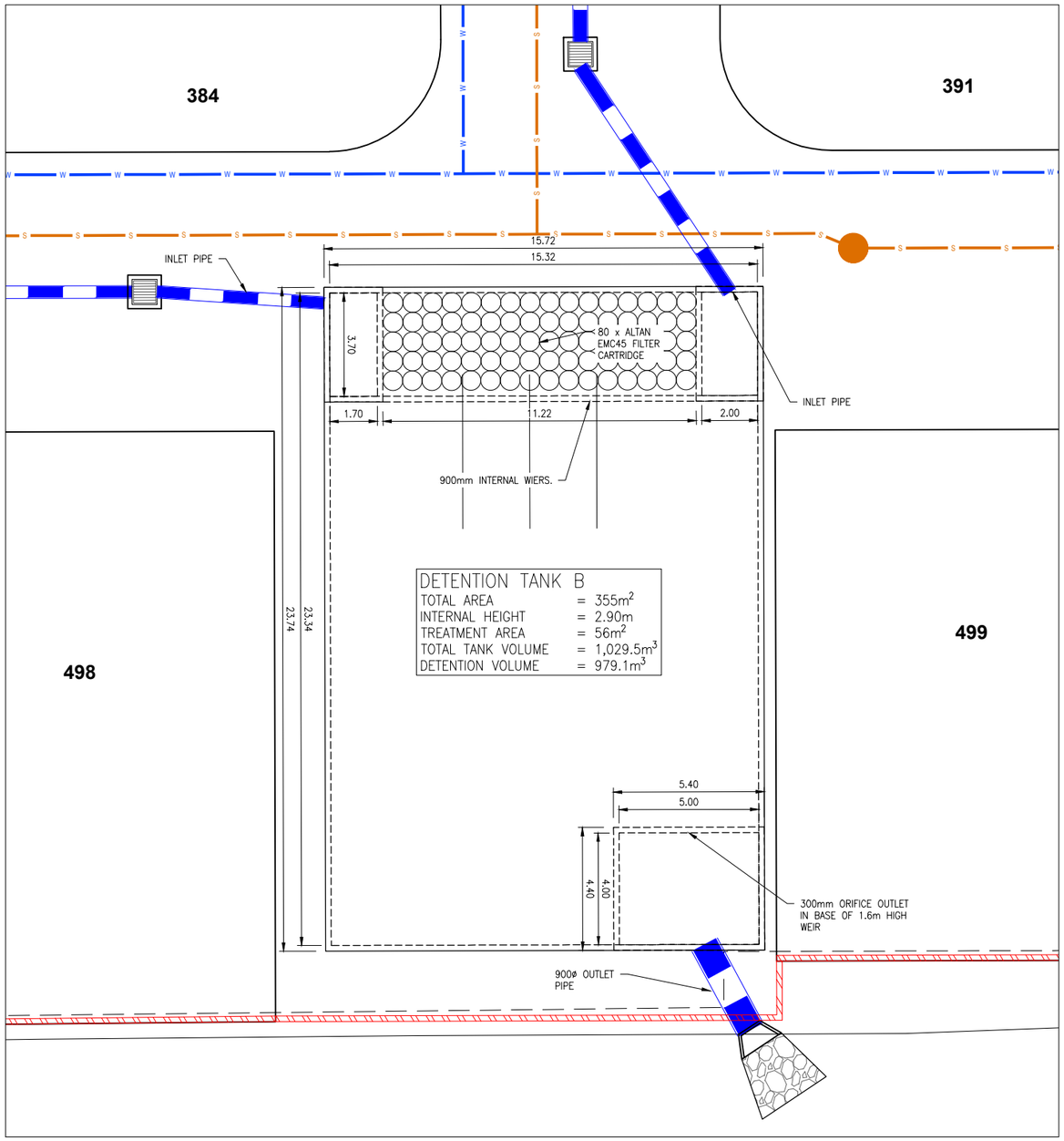

DETENTION TANK B
PLAN

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

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SURVEYOR CAPRICON SURVEY GROUP CQ PHONE 07 4627 5199
DATUM A.H.D. P.M. 202931 R.L. 32.447

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY STORMWATER TANK 2 of 5
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25–028–PC10
SHEET NUMBER 10 OF 13
REVISION

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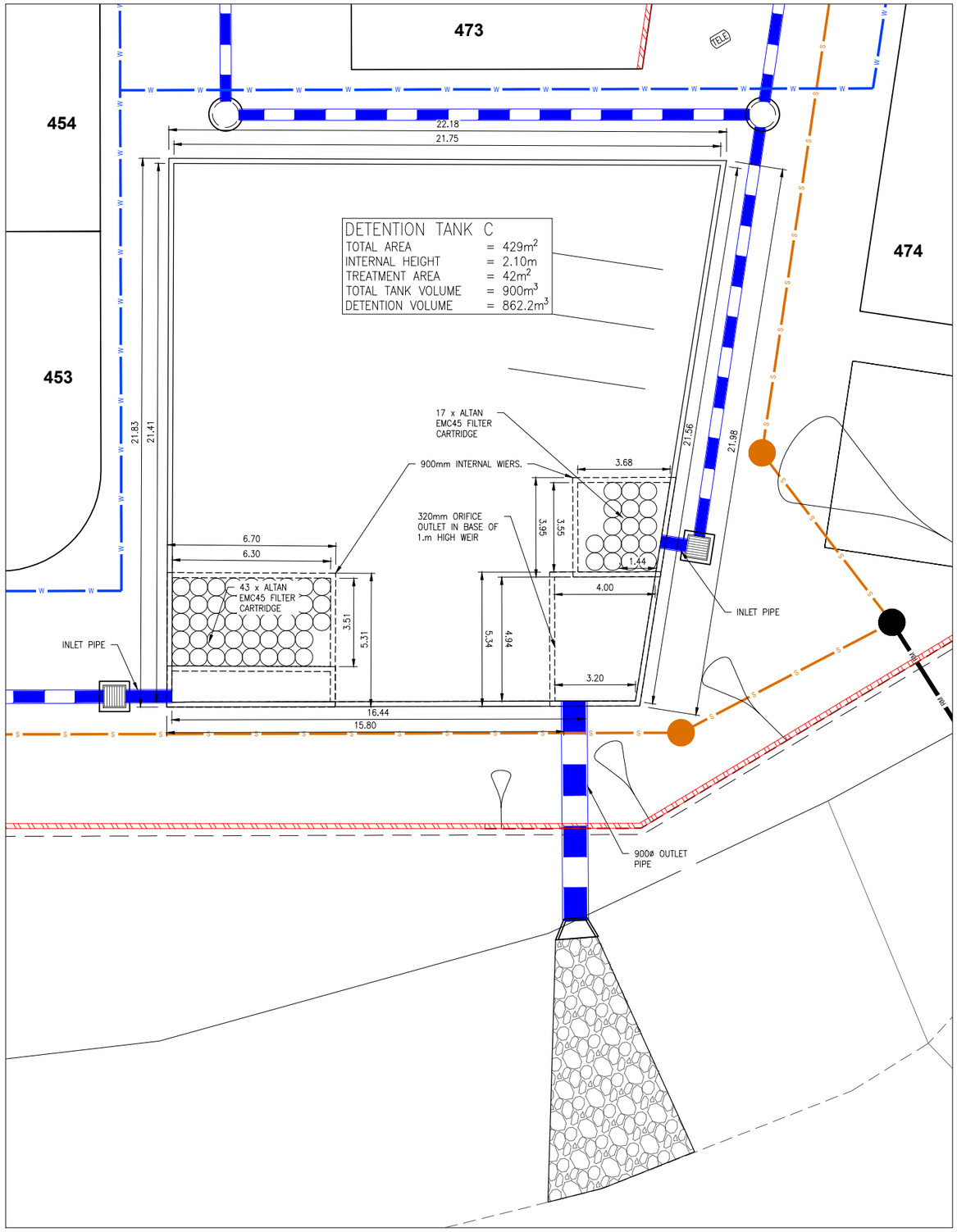

DETENTION TANK C
PLAN

SCALE 1:100 (A1 SIZE)

0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of
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DATUM A.H.D. P.M. 202931 R.L. 32.447

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508 930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY STORMWATER TANK 3 of 5
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25–028–PC11
SHEET NUMBER 11 OF 13
REVISION

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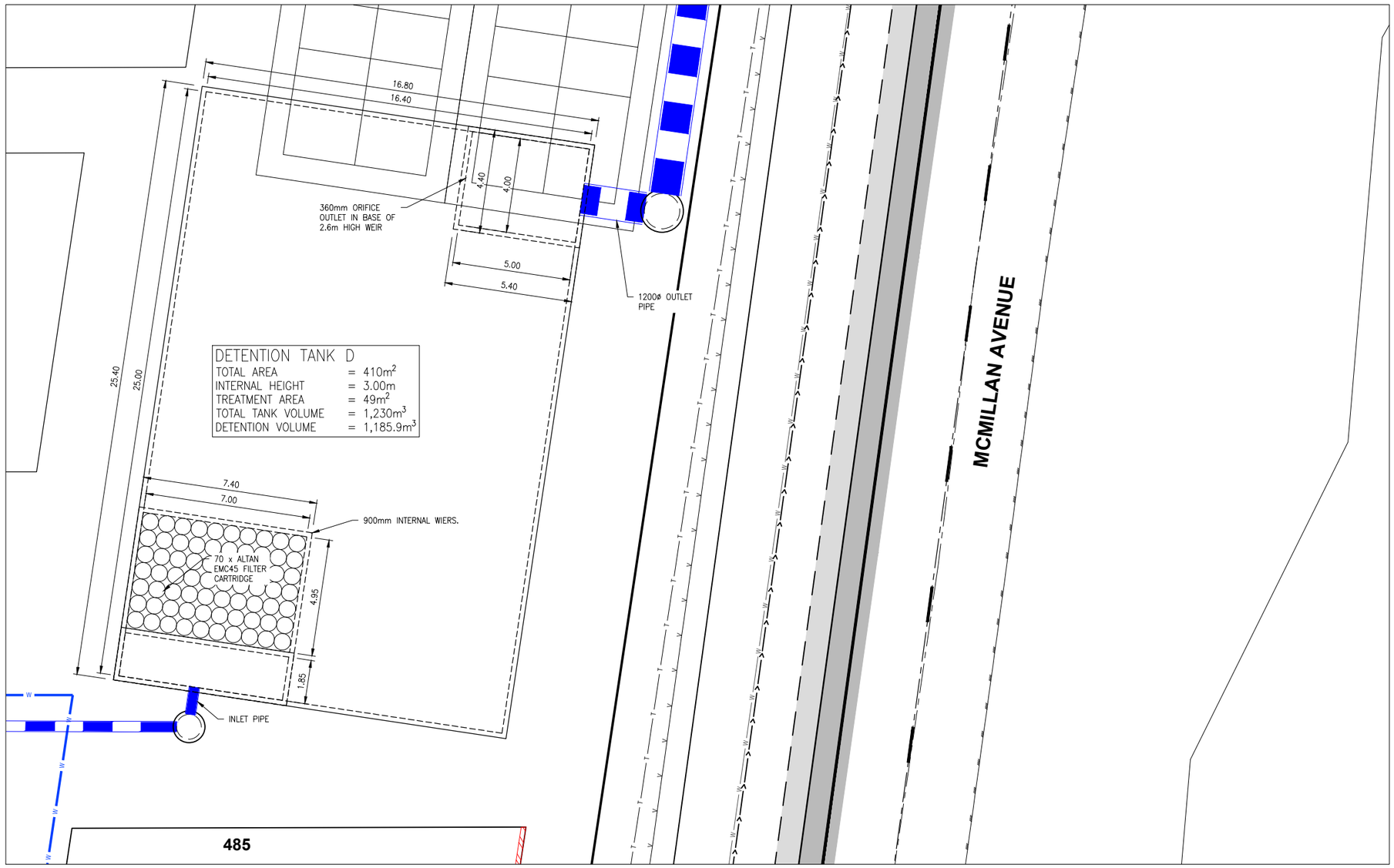

DETENTION TANK D
PLAN

SCALE 1:100
(A1 SIZE)

0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of
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SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199
DATUM A.H.D.
P.M. 202931
R.L. 32.447

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY STORMWATER TANK 4 of 5
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS
PRELIMINARY N.F.C.
DRAWING NUMBER
S25–028–PC12
SHEET NUMBER 12 OF 13
REVISION

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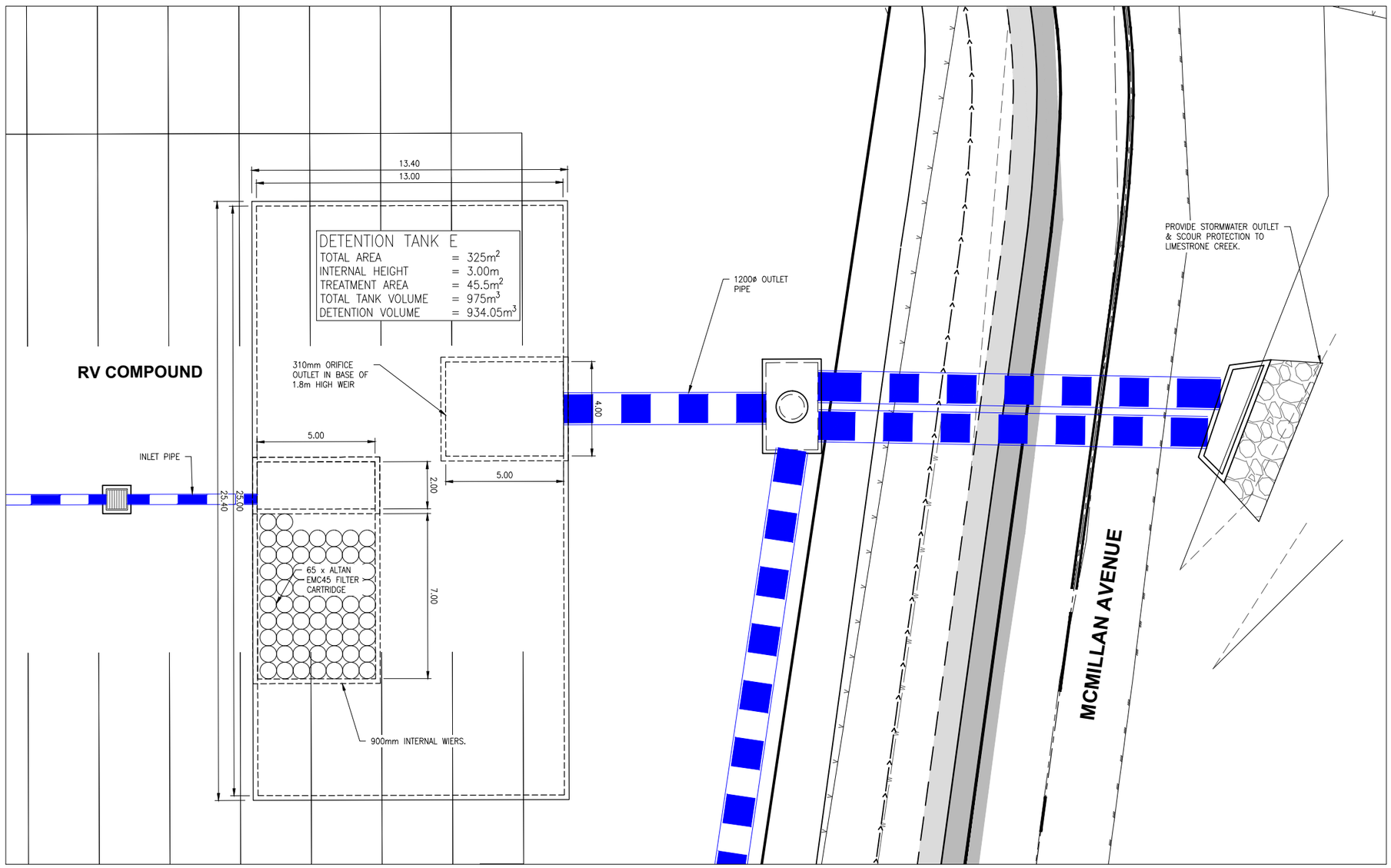

DETENTION TANK E
PLAN

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
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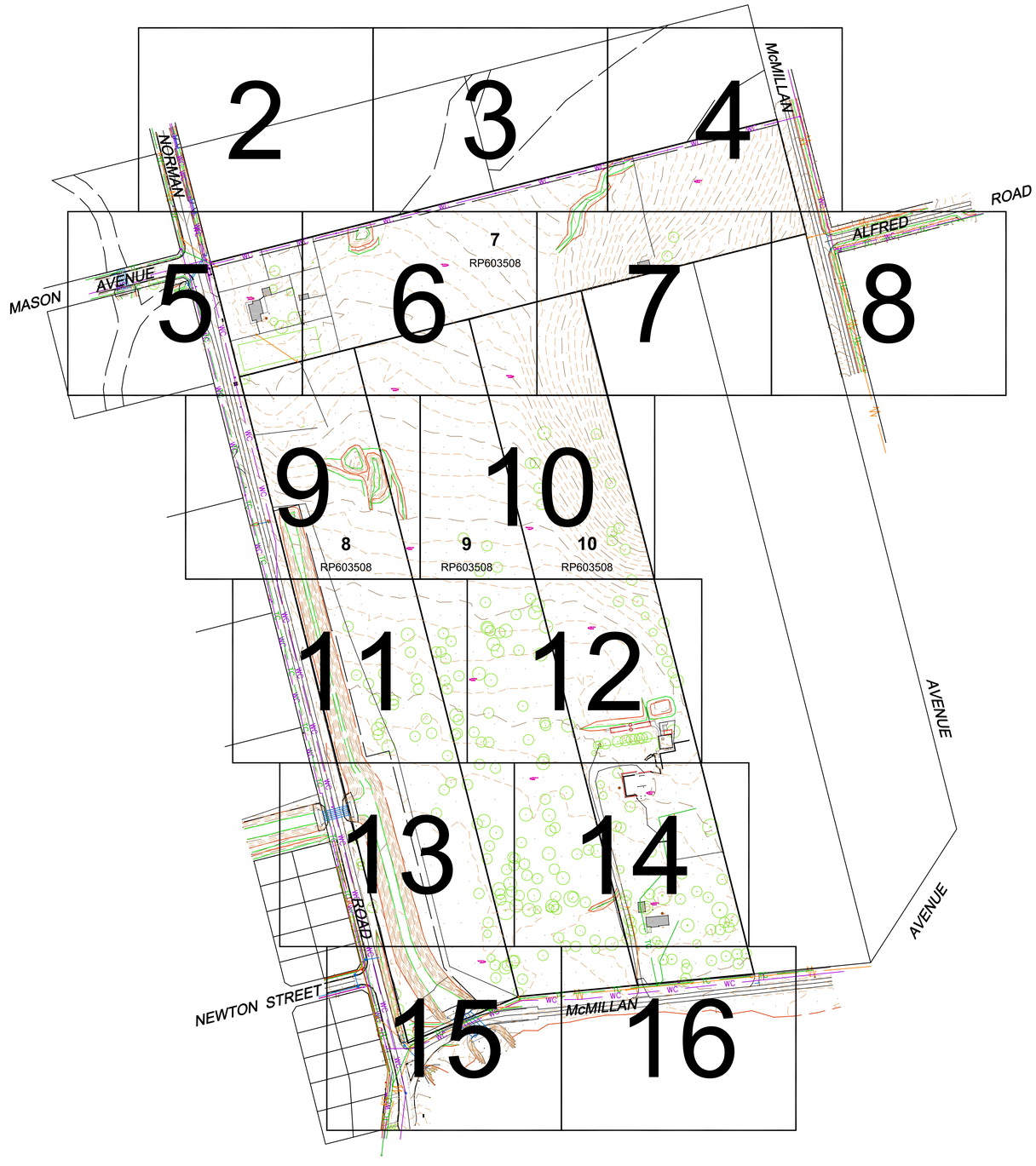
PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY STORMWATER TANK 5 of 5
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25-028-PC13
SHEET NUMBER 13 OF 13
REVISION

S25-028-PC_Pre_Stm_Tanks.dwg

Appendix C – Site Survey & Architectural Drawings



KEY DIAGRAM

SERVICES DISCLAIMER

While every effort has been made to locate, identify, and where appropriate, indicate the extent & connectivity of all relevant visible and underground infrastructure within the survey area, no guarantee, either explicit or implied, can be given as to the correctness and completeness of such infrastructure shown hereon.

Due to the intrusive, high impact and potentially dangerous nature of exposing underground infrastructure, the risk of serious injury and damage to infrastructure is very high, therefore further investigation by suitably qualified personnel with the relevant skills, techniques and equipment will be required to comprehensively establish and qualify the true state of all infrastructure on site.

Please refer to each of the relevant service providers rules, procedures, guidelines, rights and responsibilities when designing or working in the vicinity of each respective plant or service.

This note is an integral part of this plan, being 16 sheets in total, and all subsequent iterations of this plan. ©

0m 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300m

PRINCIPAL

RUBY DEVELOPMENTS PTY LTD

DESCRIPTION

DETAIL SURVEY OF LOTS 7-10 ON RP603508

930-960 NORMAN ROAD & 19 McMILLAN AVE, PARKHURST

REAL PROPERTY DESCRIPTION

Lot/Plan :	Lots 7-10 on RP603508
Area :	4.047 ha, 4.704 ha, 4.704 ha, 4.722 ha (Deed)
Locality :	Parkhurst
Local Authority :	Rockhampton Regional Council

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- Edge of Bitumen
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- Eaves

CONTOUR LEGEND

- 0.25m Interval
- 1.00m Interval

GENERAL SYMBOL LEGEND

Comms Conduit Marker	Stormwater M/H
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Gas Hot Water System	Guide Sign
Sewerage M/H	Flag Pole
Sewerage Vent	Australia Post Box
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REVISION

Issue	Date	Details	Authorised
A	26-10-2023	Initial Issue	RJKF
-	-	-	-

CREATED

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SCALE

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DRAWING NUMBER	ISSUE
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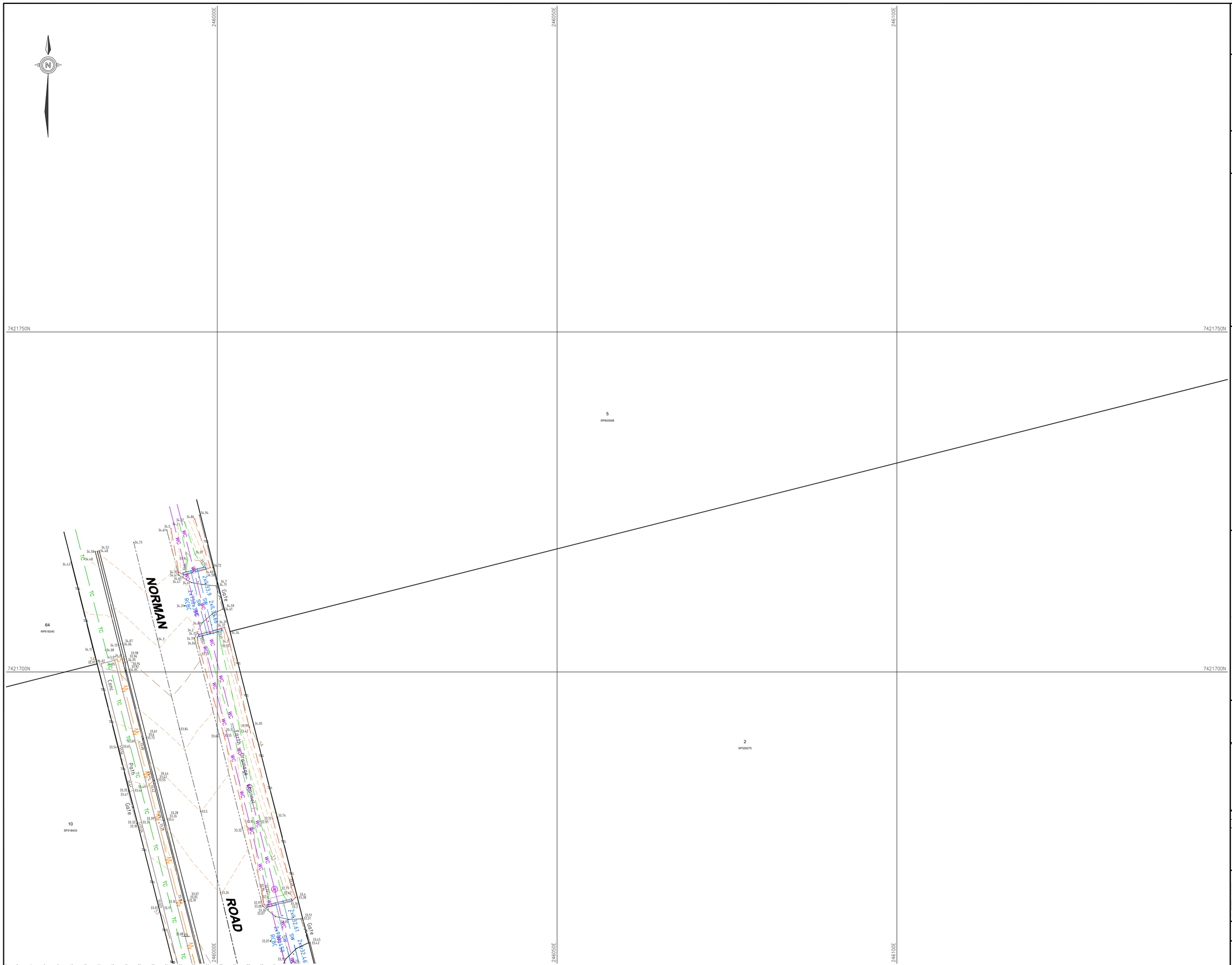

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SCALE

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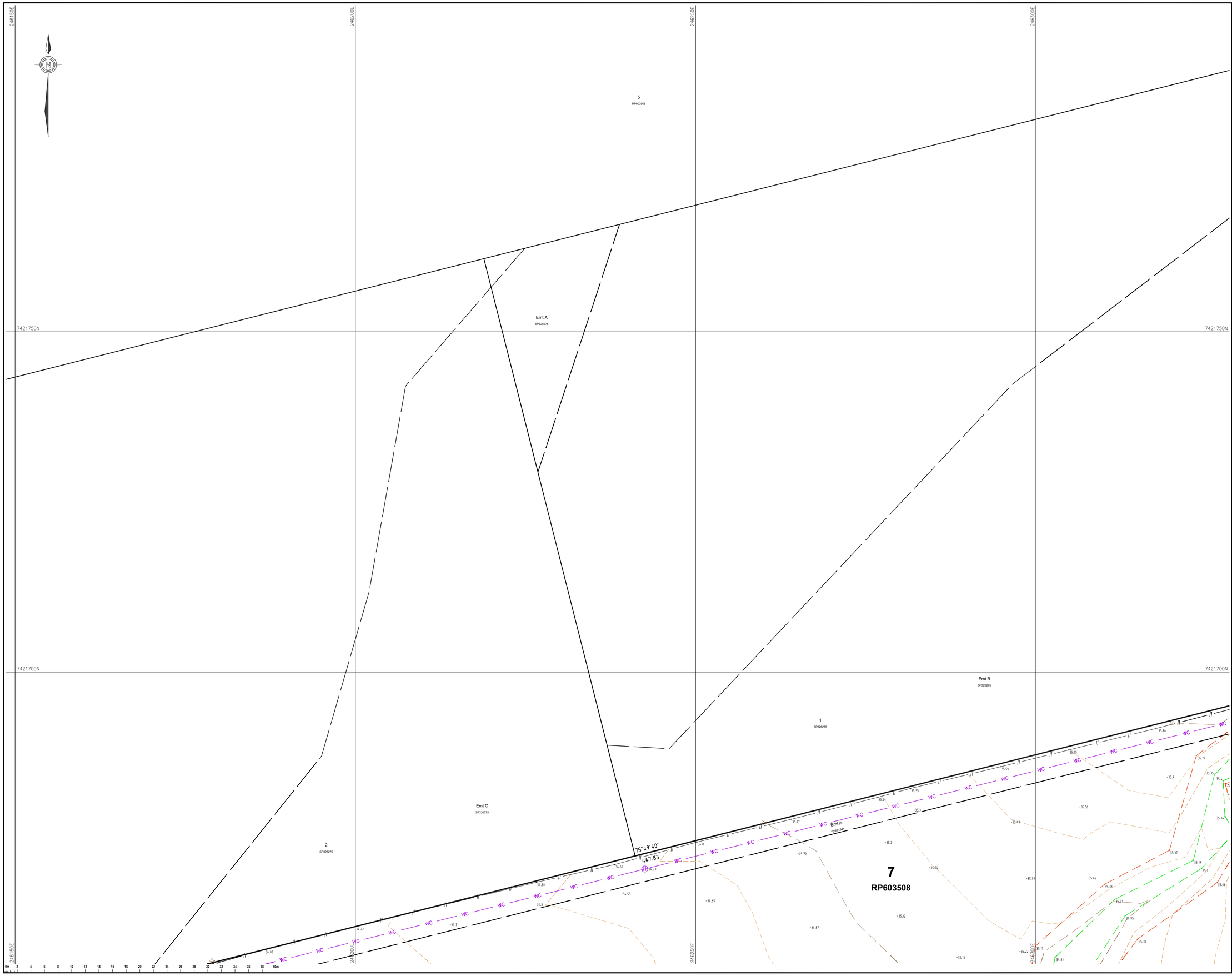

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9043-20-DTL (3/16)

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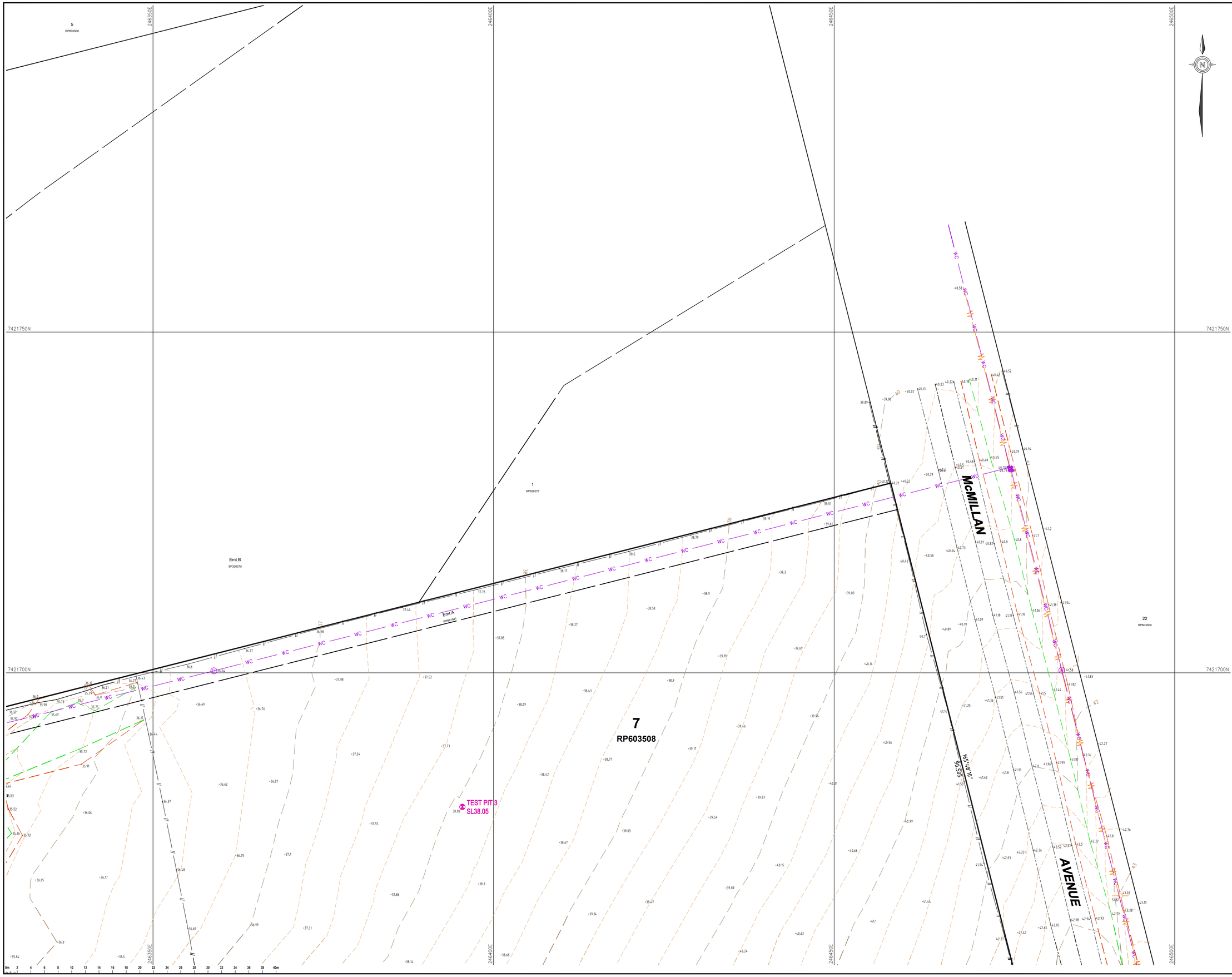

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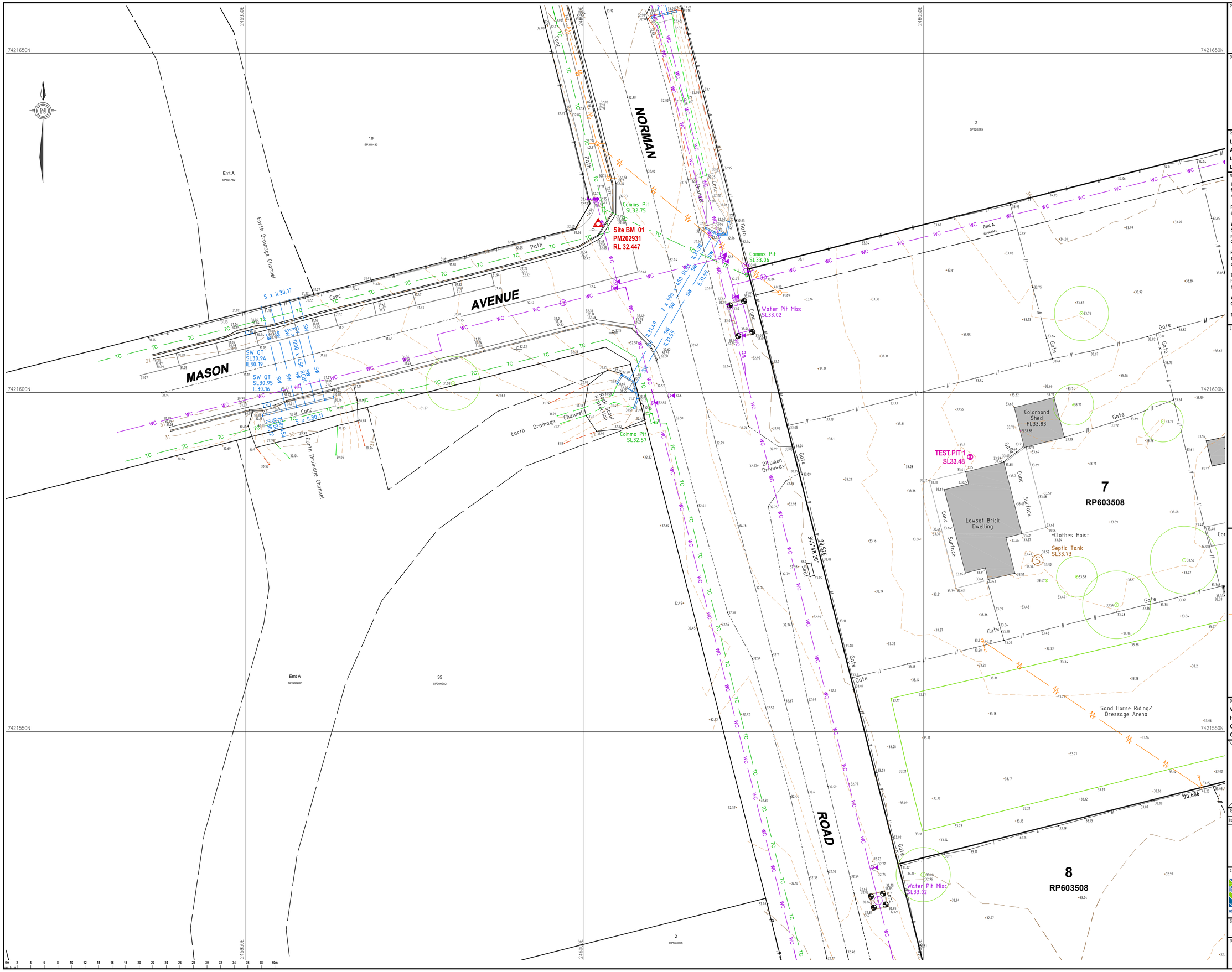

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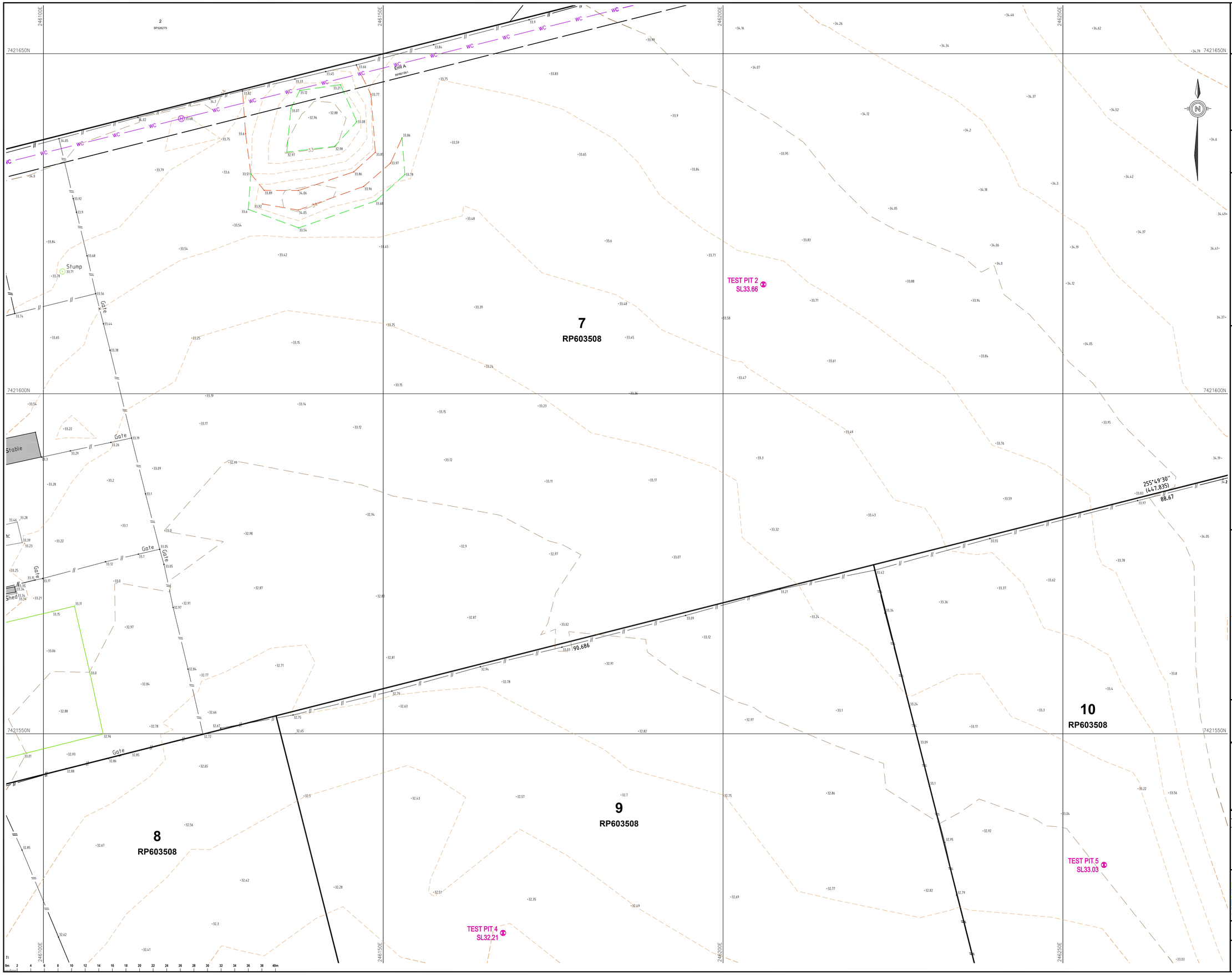

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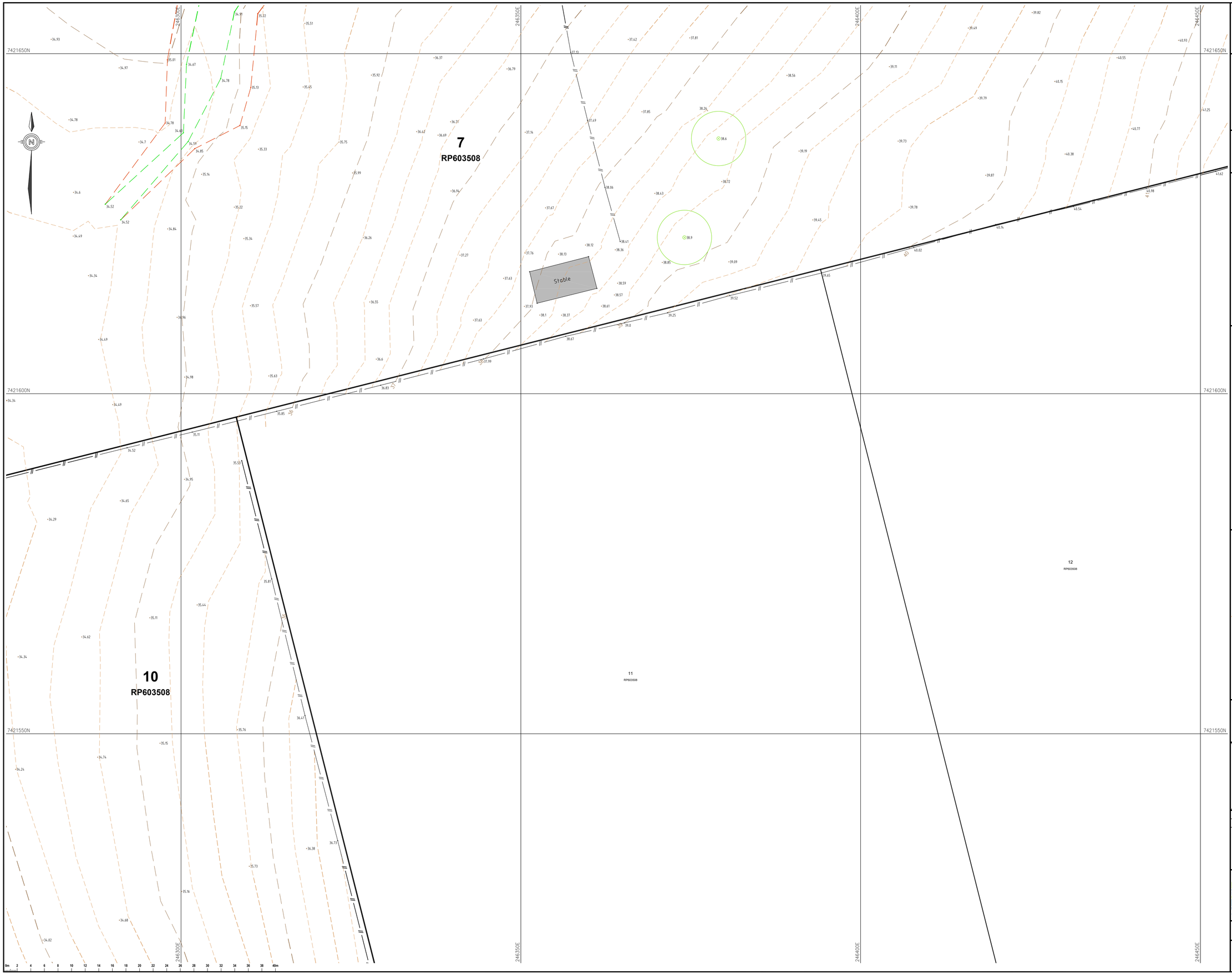

PRINCIPAL

RUBY DEVELOPMENTS PTY LTD

DESCRIPTION

DETAIL SURVEY OF LOTS 7-10 ON RP603508

930-960 NORMAN ROAD & 19 McMILLAN AVE, PARKHURST

REAL PROPERTY DESCRIPTION

Lot/Plan :	**Lots 7-10 on RP603508**
Area :	**4.047 ha, 4.704 ha, 4.704 ha, 4.722 ha (Deed)**
Locality :	**Parkhurst**
Local Authority :	**Rockhampton Regional Council**

NOTES

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- Eaves

CONTOUR LEGEND

- 0.25m Interval
- 1.00m Interval

GENERAL SYMBOL LEGEND

- Comms Conduit Marker
- Comms Pit
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- Elec Turret
- Elec Pit
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- Water Control Tap
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- Water Conduit Marker
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- Guide Sign
- Flag Pole
- Australia Post Box
- Shrub

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Vertical Datum :	**AHD Vide PM202931 RL 32.447**
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Issue	Date	Details	Authorised
A	26-10-2023	Initial Issue	RJKF
-	-	-	-

CREATED

capricornsurveygroupcq
SURVEYING & PLANNING SOLUTIONS
07 4927 5199 | reception@cagcq.com.au | 132 Victoria Parade, Rockhampton QLD 4700

SCALE

1:250 @ A1

DRAWING NUMBER

9043-20-DTL (7/16)

ISSUE

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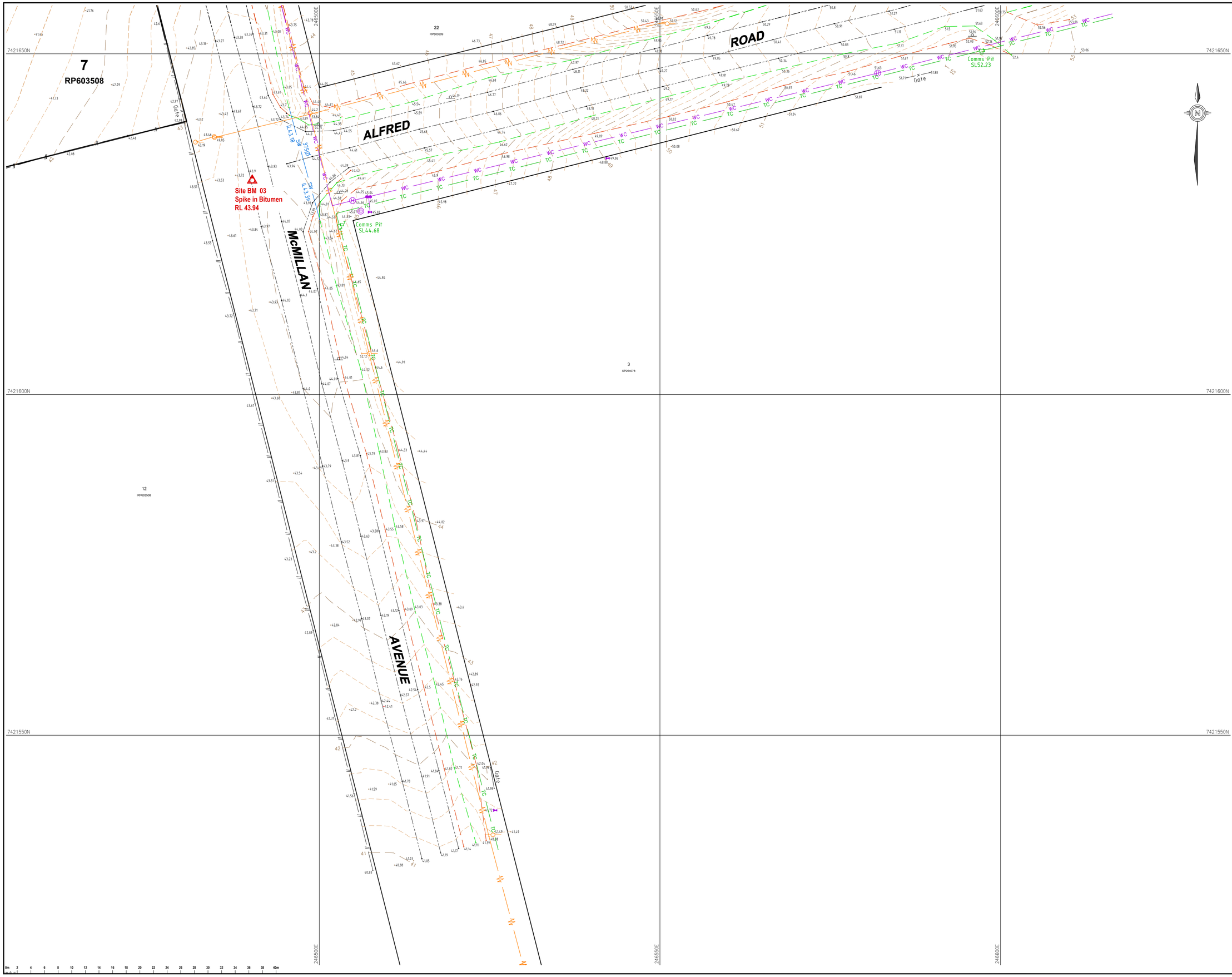

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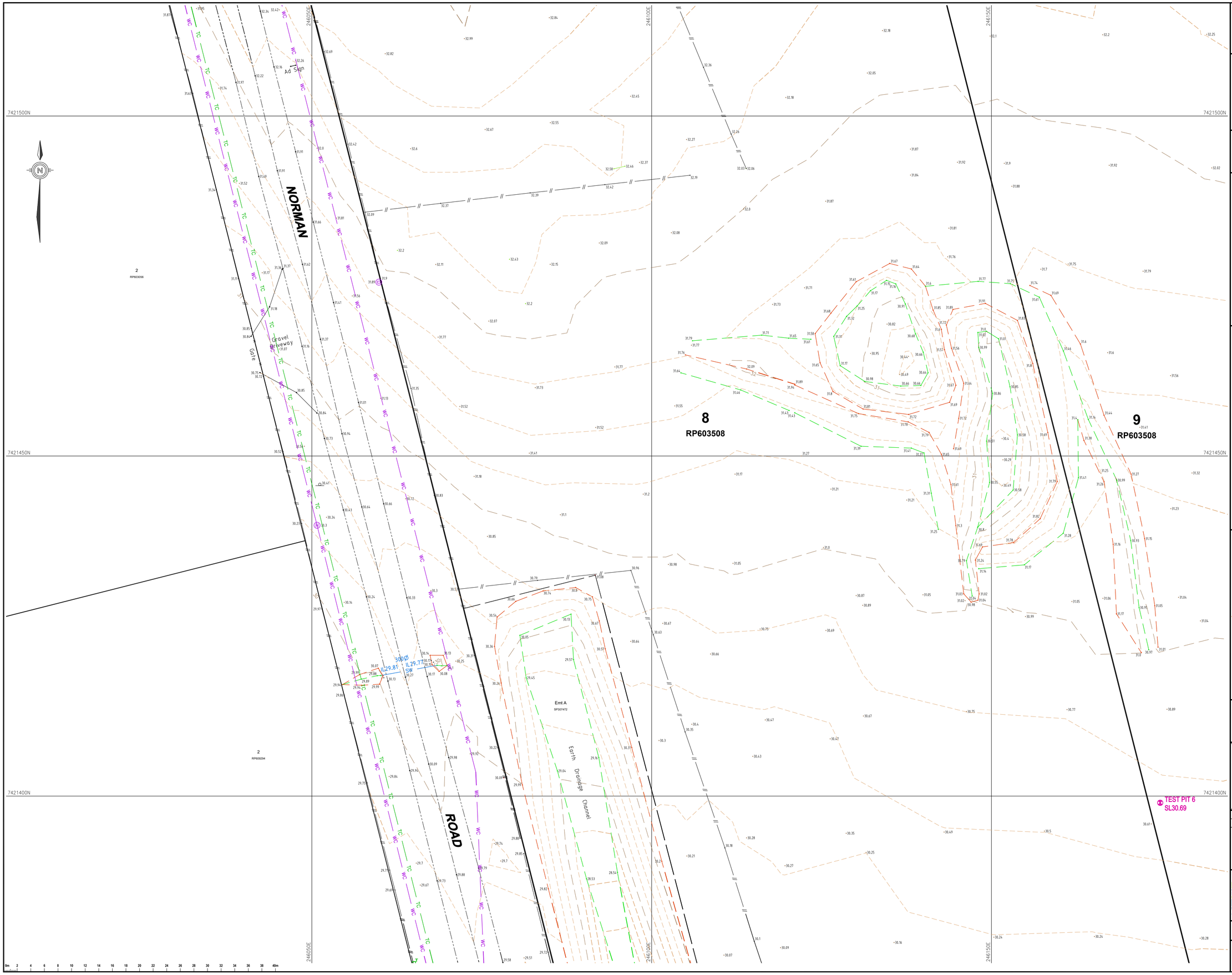

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7421400N

9
RP603508

10
RP603508

11
RP603508

TEST PIT 7
SL30.9

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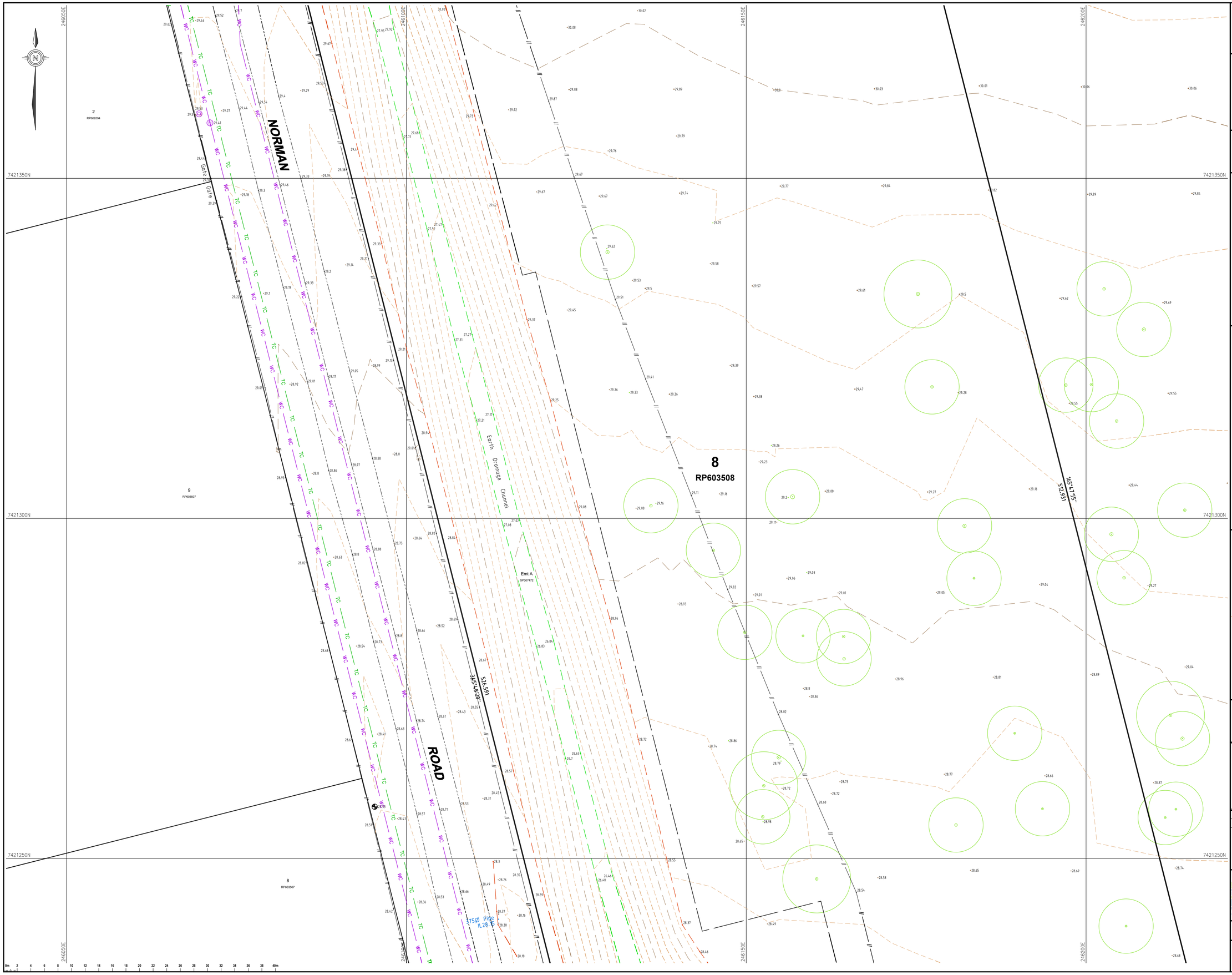

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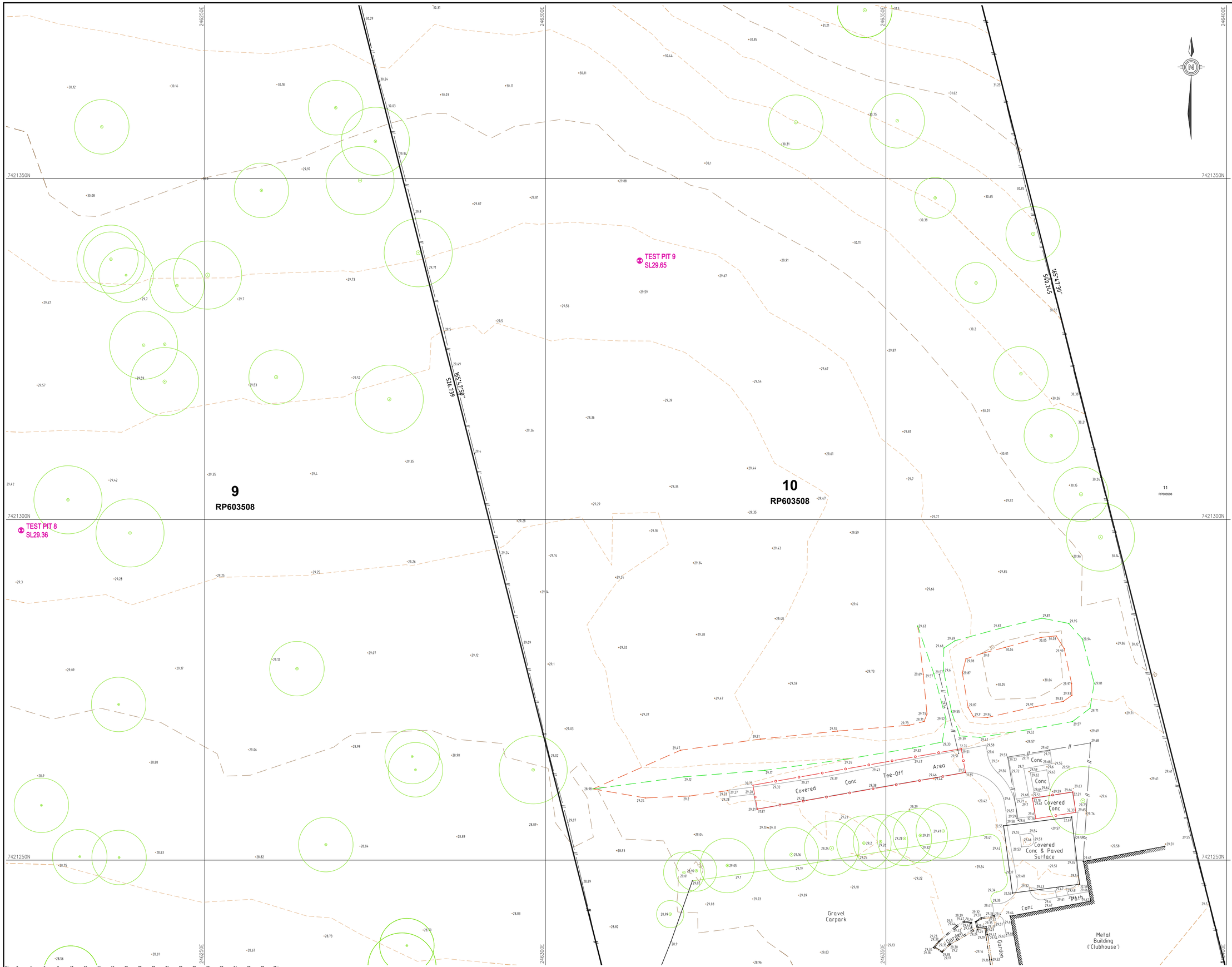

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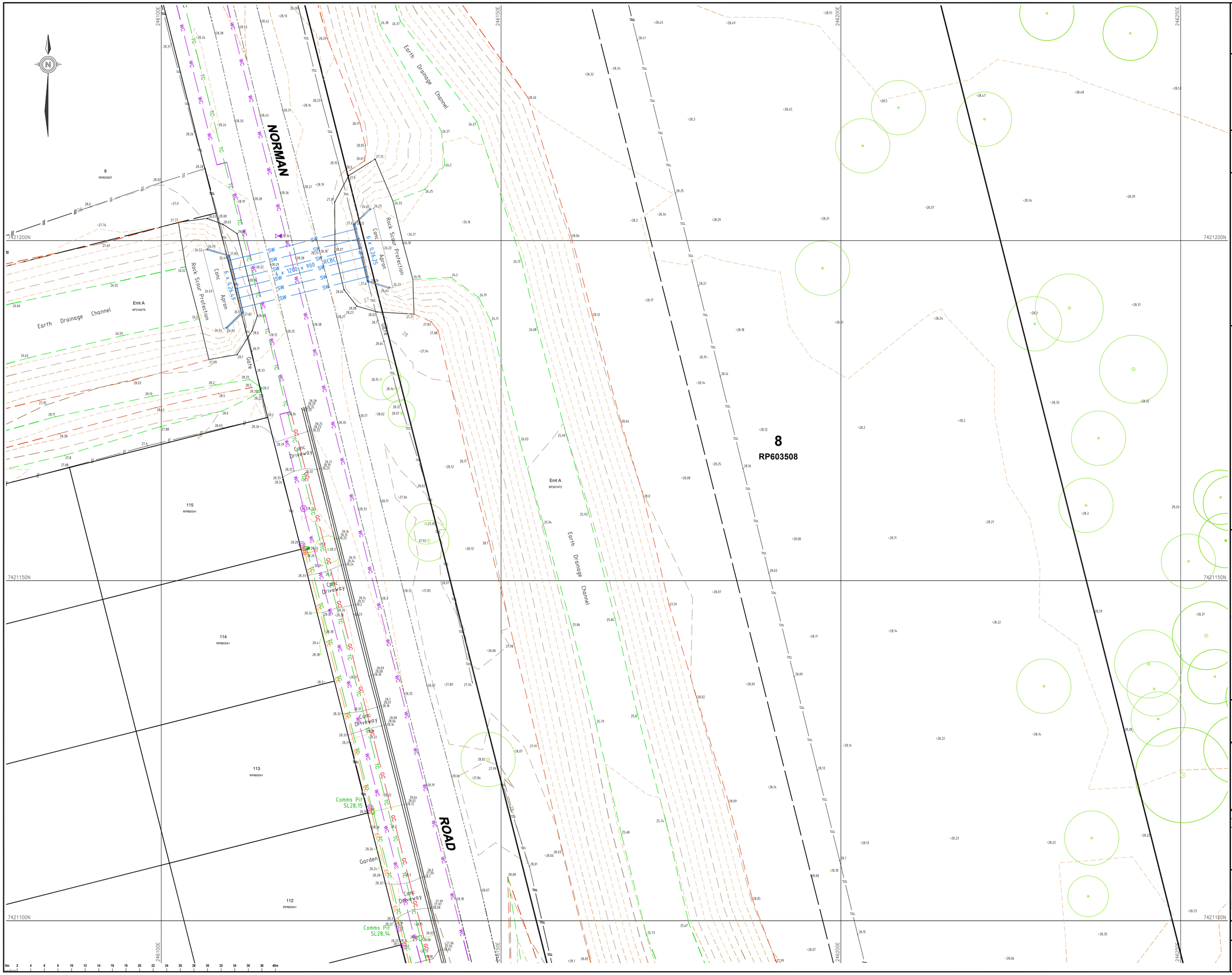

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- Top of Bank
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- C/L of Bitumen
- Edge of Bitumen
- Retaining Wall
- Line Marking
- Fence Line
- Roof / Guttering
- Eaves

CONTOUR LEGEND

- 0.25m Interval
- 1.00m Interval

GENERAL SYMBOL LEGEND

- Comms Conduit Marker
- Comms Pit
- Elec Conduit Marker
- Elec Turret
- Elec Pit
- Elec Light Bollard
- Elec Light Pole
- Elec Power Pole
- Elec Power Pole + Light
- Elec Power Pole + Transformer
- Elec Stay Point
- Traffic Lights
- Gas Marker
- Gas Valve
- Gas Hot Water System
- Sewerage M/H
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REVISION

Issue	Date	Details	Authorised
A	26-10-2023	Initial Issue	RJKF
-	-	-	-

CREATED

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07 4927 5199 | reception@cagcq.com.au | 132 Victoria Parade, Rockhampton QLD 4700

SCALE

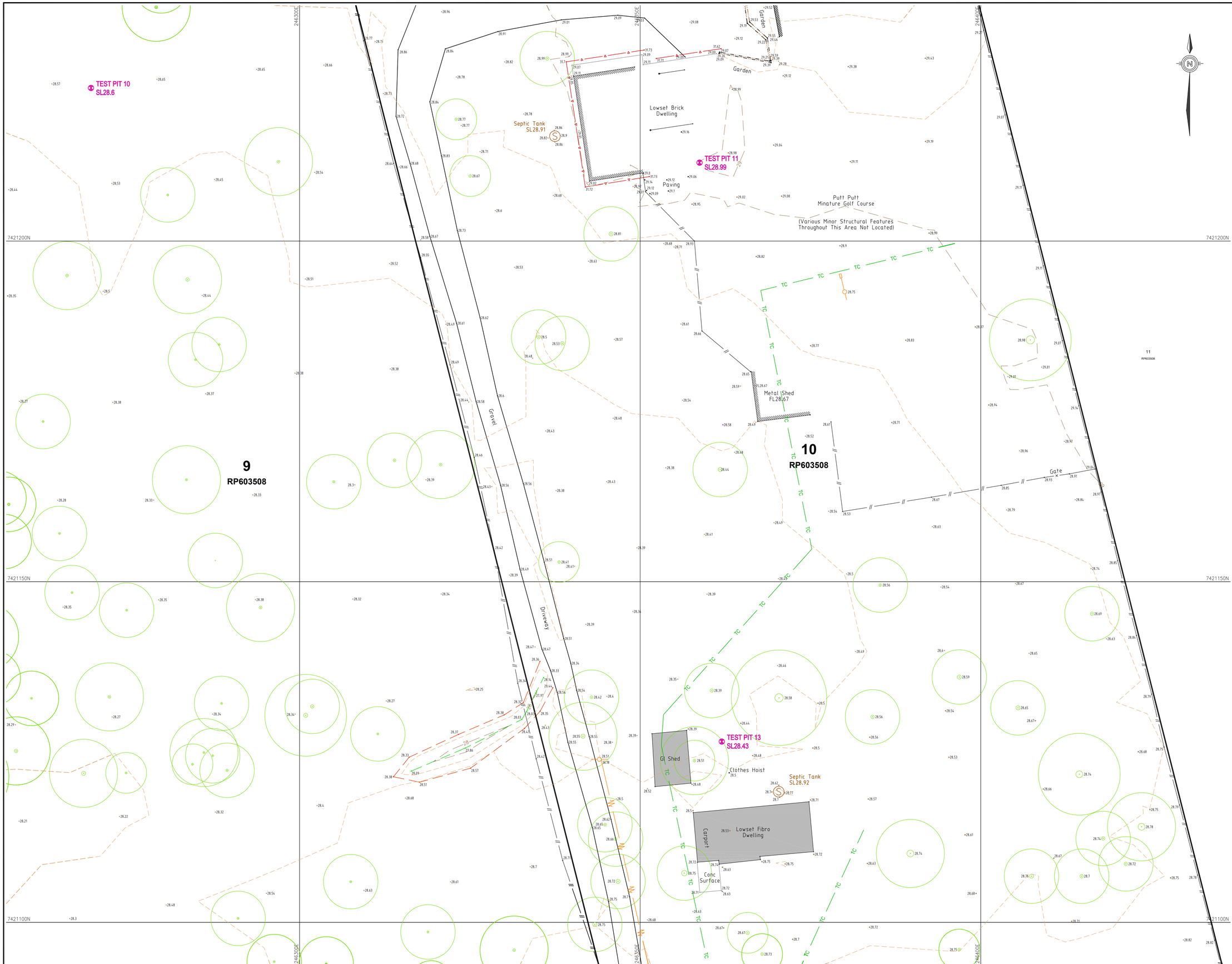
1:250 @ A1

DRAWING NUMBER

9043-20-DTL (13/16)

ISSUE

A



PRINCIPAL

RUBY DEVELOPMENTS PTY LTD

DESCRIPTION

DETAIL SURVEY OF LOTS 7-10 ON RP603508

930-960 NORMAN ROAD & 19 McMILLAN AVE, PARKHURST

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Lot/Plan :	**Lots 7-10 on RP603508**
Area :	**4.047 ha, 4.704 ha, 4.704 ha, 4.722 ha (Deed)**
Locality :	**Parkhurst**
Local Authority :	**Rockhampton Regional Council**

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SCALE

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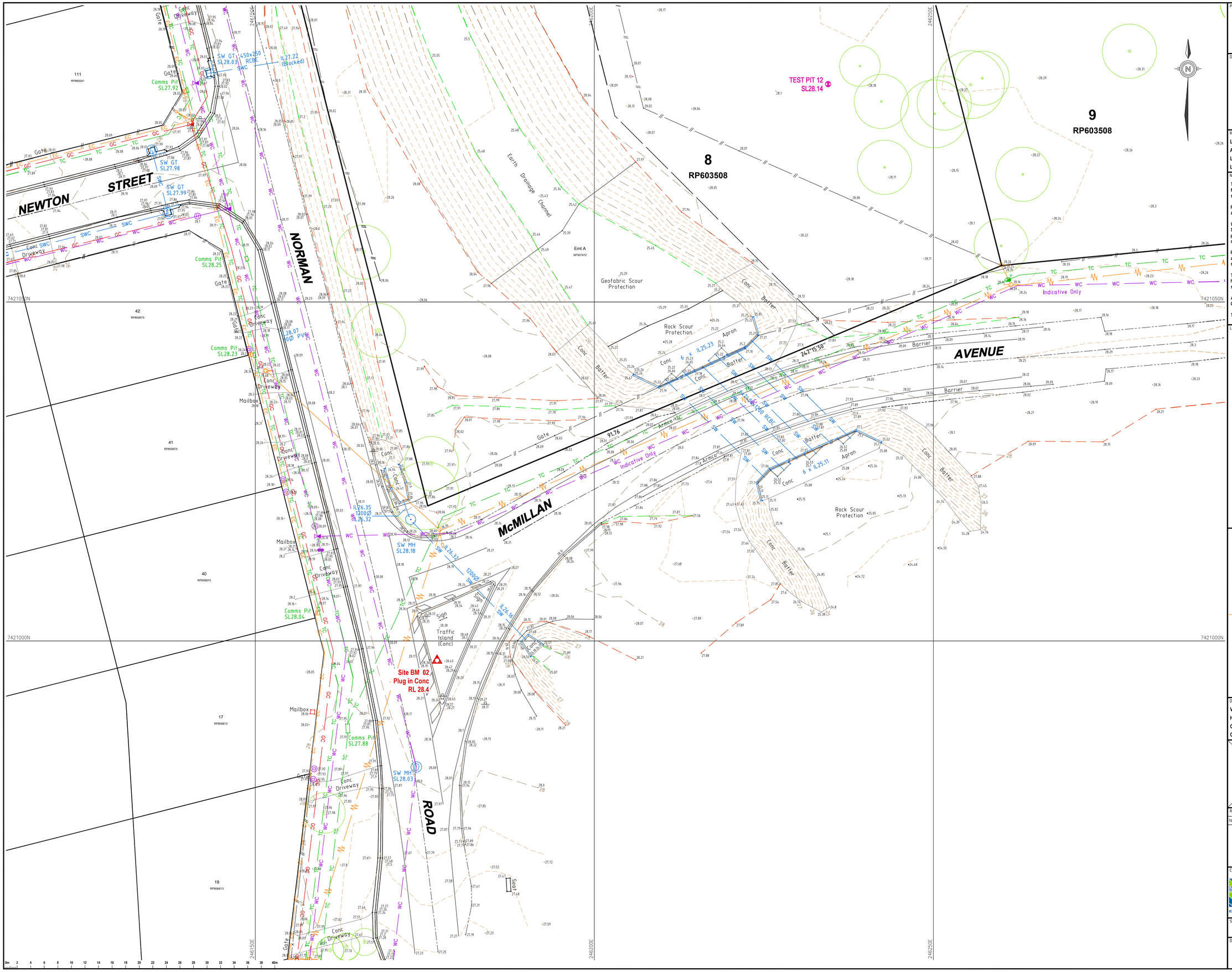

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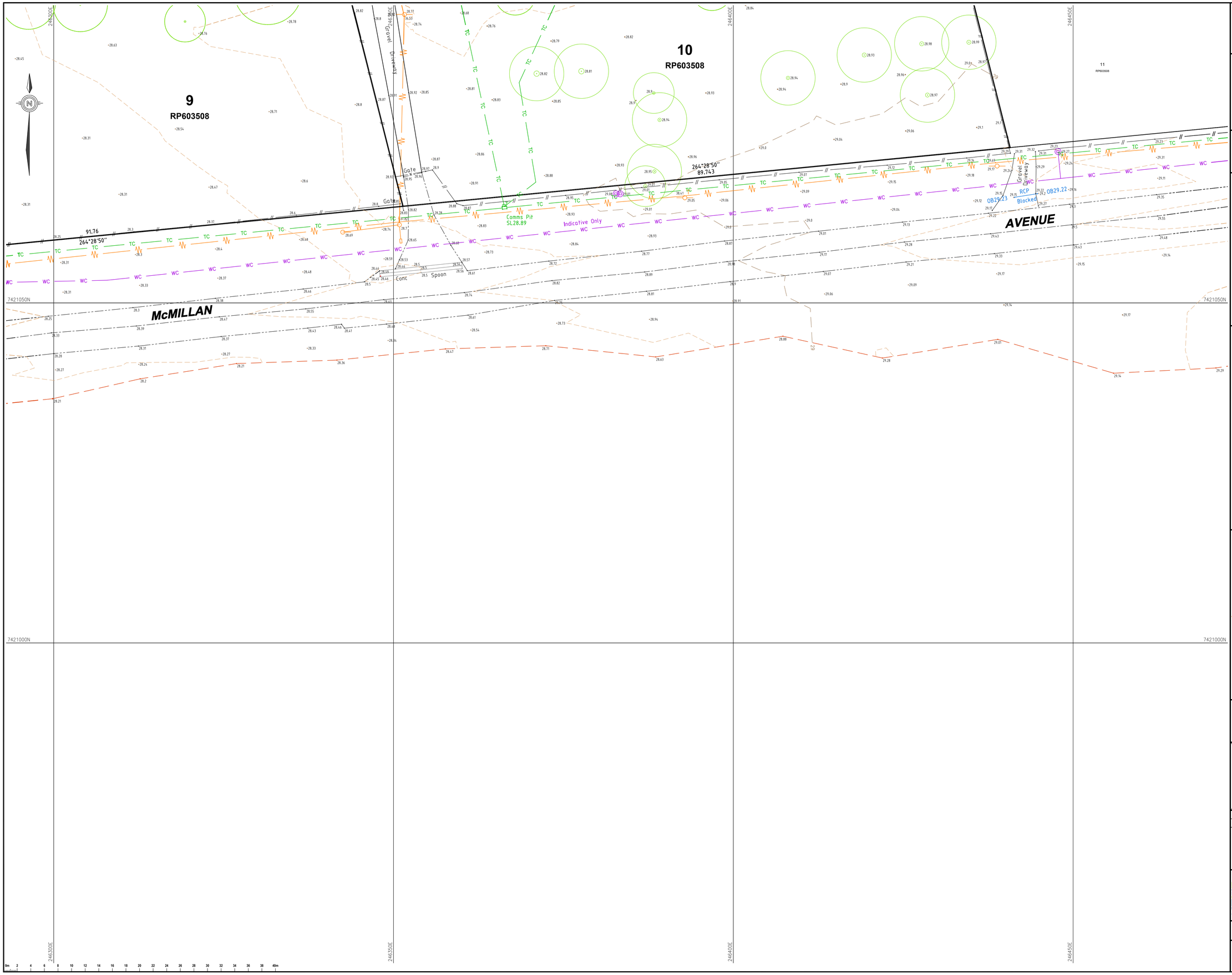

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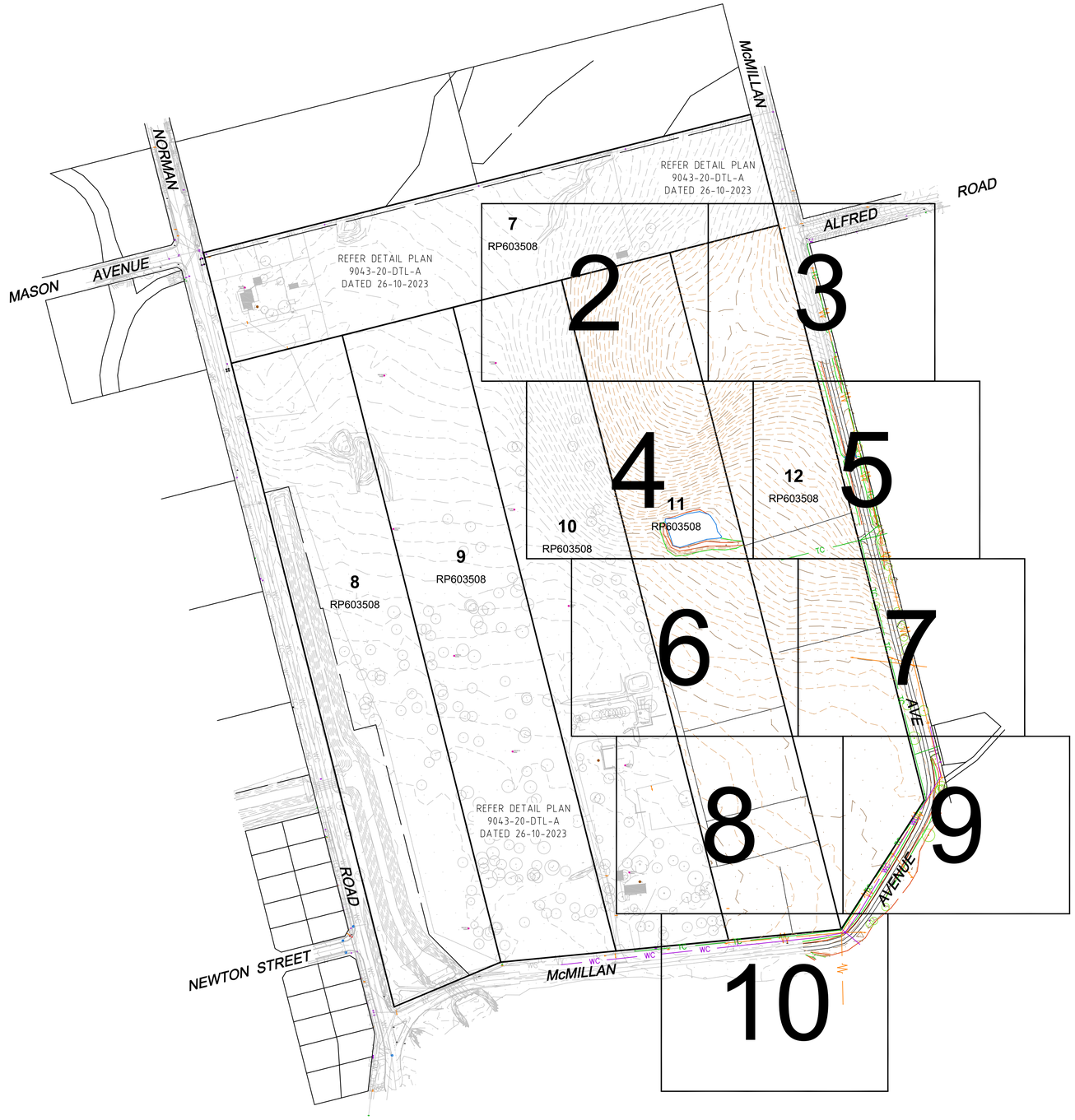

KEY DIAGRAM

SERVICES DISCLAIMER

While every effort has been made to locate, identify, and where appropriate, indicate the extent & connectivity of all relevant visible and underground infrastructure within the survey area, no guarantee, either explicit or implied, can be given as to the correctness and completeness of such infrastructure shown hereon.

Due to the intrusive, high impact and potentially dangerous nature of exposing underground infrastructure, the risk of serious injury and damage to infrastructure is very high, therefore further investigation by suitably qualified personnel with the relevant skills, techniques and equipment will be required to comprehensively establish and qualify the true state of all infrastructure on site.

Please refer to each of the relevant service providers rules, procedures, guidelines, rights and responsibilities when designing or working in the vicinity of each respective plant or service.

This note is an integral part of this plan, being 10 sheets in total, and all subsequent iterations of this plan. ©

0m 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300m

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DETAIL SURVEY OF LOTS 11 & 12 ON RP603508

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A	26-08-2024	Initial Issue	RJKF
-	-	-	-

CREATED

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SCALE **1:2000 @ A1**

DRAWING NUMBER **9043-40-DTL (1/10)** ISSUE **A**

246250E
246300E
246350E
246400E
7421650N
7421600N
7421550N

REFER DETAIL PLAN
9043-20-DTL-A
DATED 26-10-2023

7
RP603508

11
RP603508

12
RP603508

10
RP603508

88.707
255°49'40"
(447.83)
88.729

TEST PIT 5
SL33.03

0m 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40m

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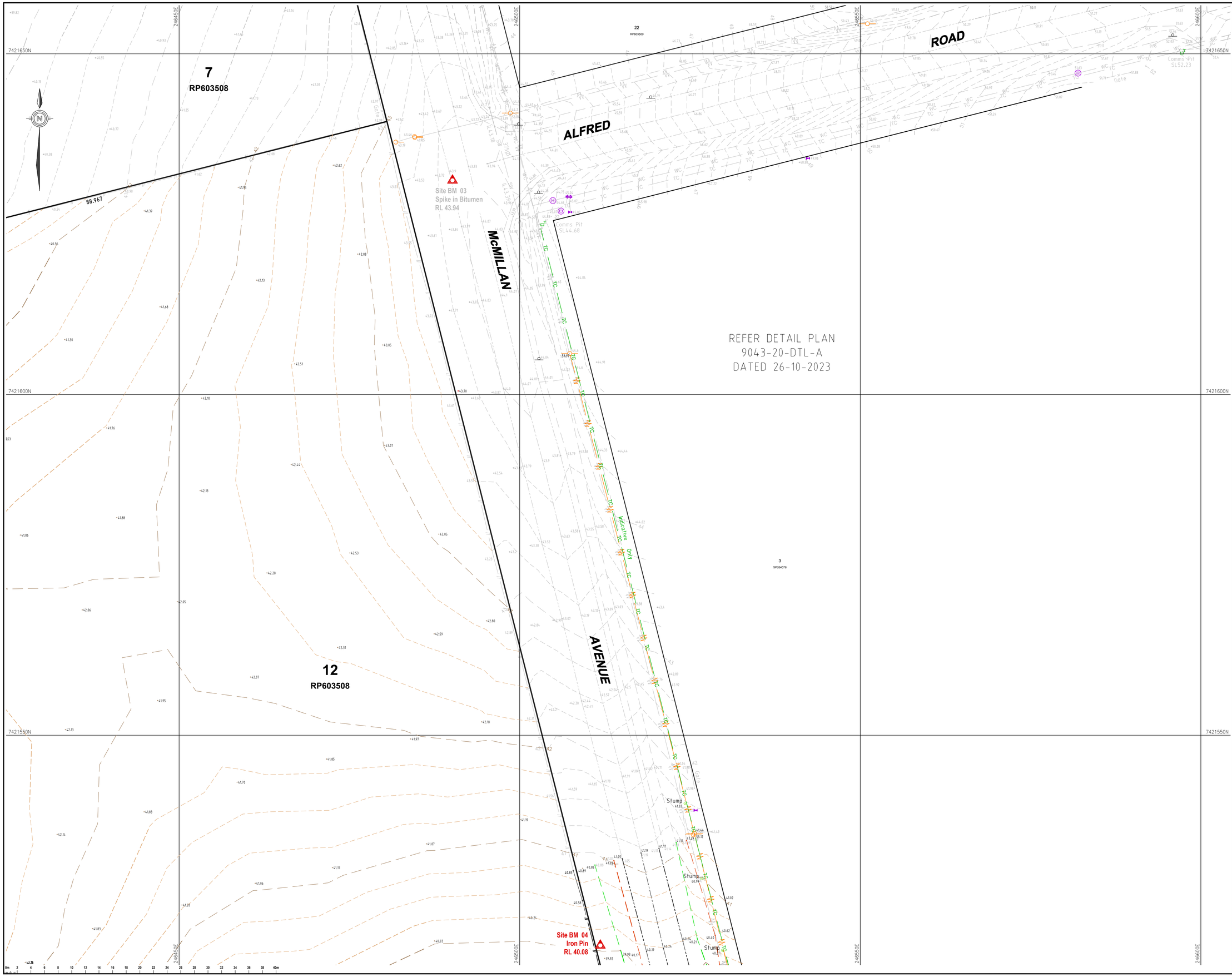
9043-40-DTL (2/10)	A



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- Edge of Bitumen
- Retaining Wall
- Line Marking
- Fence Line
- Roof / Guttering
- Eaves

CONTOUR LEGEND

- 0.25m Interval
- 1.00m Interval

GENERAL SYMBOL LEGEND

Comms Conduit Marker	Stormwater M/H
Comms Pit	Stormwater Pit
Elec Conduit Marker	Stormwater Kerb Outlet
Elec Turret	Stormwater IO
Elec Pit	Water Fire Hydrant
Elec Light Bollard	Water Meter
Elec Light Pole	Water Valve
Elec Power Pole	Water Tap
Elec Power Pole + Light	Water Control Tap
Elec Power Pole + Transformer	Water Tee
Elec Stay Point	Water Conduit Marker
Traffic Lights	Water Tapping Band
Gas Marker	Post
Gas Valve	Bollard
Gas Hot Water System	Guide Sign
Sewerage M/H	Flag Pole
Sewerage Vent	Australia Post Box
Sewerage IO	Shrub

DATUM

Vertical Datum :	AHD Vide PM202931 RL 32.447
Horizontal Datum :	MGA2020 Vide PM105094
Contour Interval :	0.25m, 1.0m Index
Co-ord System :	MGA2020 Vide PM105094

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REVISION

Issue	Date	Details	Authorised
A	26-08-2024	Initial Issue	RJKF
-	-	-	-

CREATED

capricornsurveygroupcq
SURVEYING & PLANNING SOLUTIONS
07 4927 5199 | reception@cagcq.com.au | 132 Victoria Parade, Rockhampton QLD 4700

SCALE

1:250 @ A1

DRAWING NUMBER	ISSUE
9043-40-DTL (3/10)	A

246300E
246350E
246400E
246450E
7421500N
7421450N
7421400N

REFER DETAIL PLAN
9043-20-DTL-A
DATED 26-10-2023

10
RP603508

11
RP603508

12
RP603508

Dam

0m 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40m

PRINCIPAL

RUBY DEVELOPMENTS PTY LTD

DESCRIPTION

DETAIL SURVEY OF LOTS 11 & 12 ON RP603508

29 & 71 McMILLAN AVENUE, PARKHURST

REAL PROPERTY DESCRIPTION

Lot/Plan :	Lots 11 & 12 on RP603508
Area :	4.841 ha & 4.555 ha (Deed)
Locality :	Parkhurst
Local Authority :	Rockhampton Regional Council

NOTES

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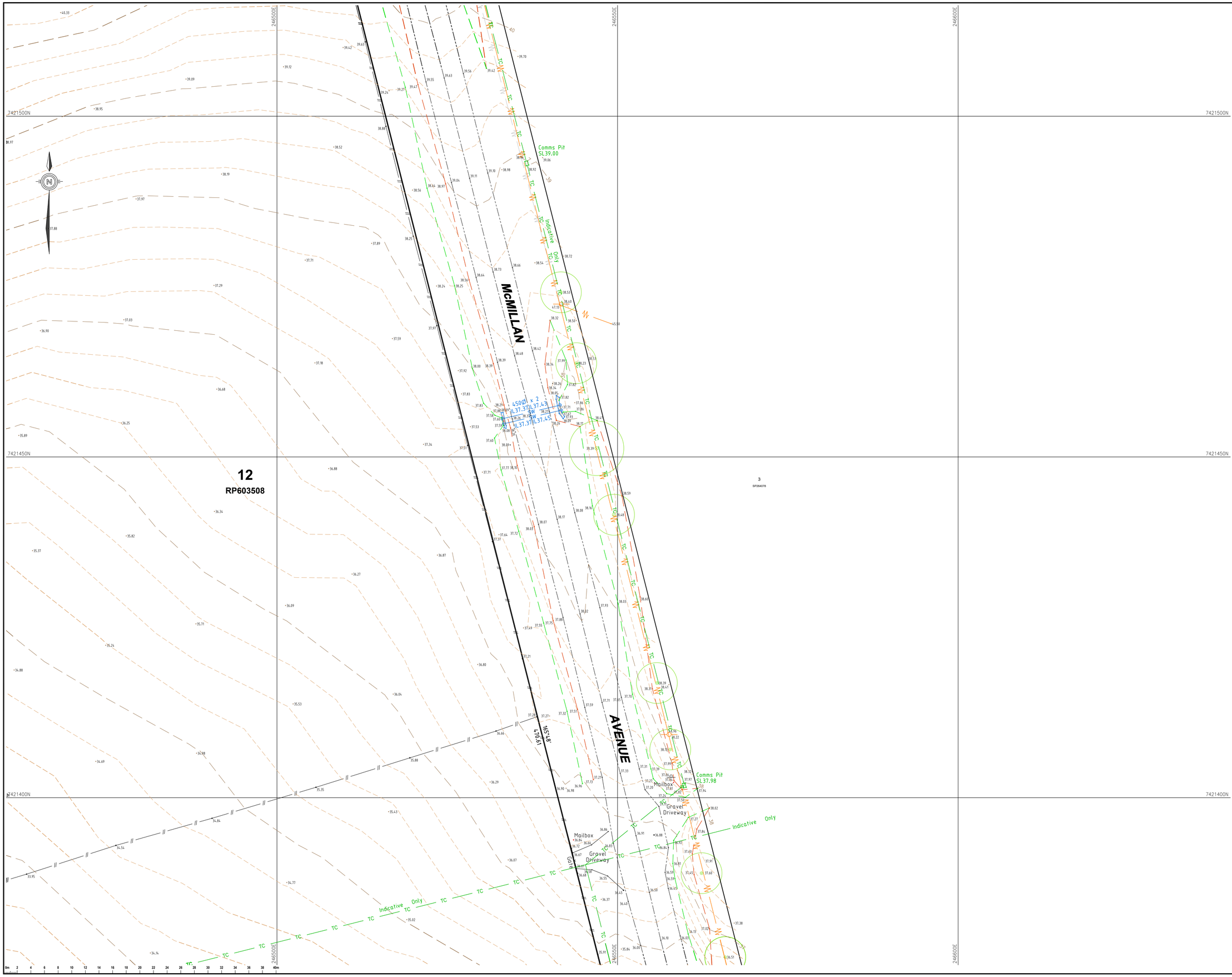
07 4927 5199 | reception@csgcq.com.au | 132 Victoria Parade, Rockhampton QLD 4700

SCALE **1:250 @ A1**

DRAWING NUMBER **9043-40-DTL (4/10)**

ISSUE **A**



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SURVEYING & PLANNING SOLUTIONS
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SCALE

1:250 @ A1

DRAWING NUMBER

9043-40-DTL (5/10)

ISSUE

A

246350E
246400E
246450E
7421350N
7421300N
7421250N

REFER DETAIL PLAN
9043-20-DTL-A
DATED 26-10-2023

PIT 9
65

165°14'10"
540.205

165°14'10"
553.697

10
RP603508

11
RP603508

12
RP603508

Tee-Off Area
Covered Conc
Covered Conc
Covered Conc
Covered Conc & Paved Surface
Gravel Carpark
Metal Building ('Clubhouse')

0m 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40m

PRINCIPAL

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A	26-08-2024	Initial Issue	RJKF
-	-	-	-

CREATED

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SURVEYING & PLANNING SOLUTIONS
07 4927 5199 | reception@csgcq.com.au | 132 Victoria Parade, Rockhampton QLD 4700

SCALE

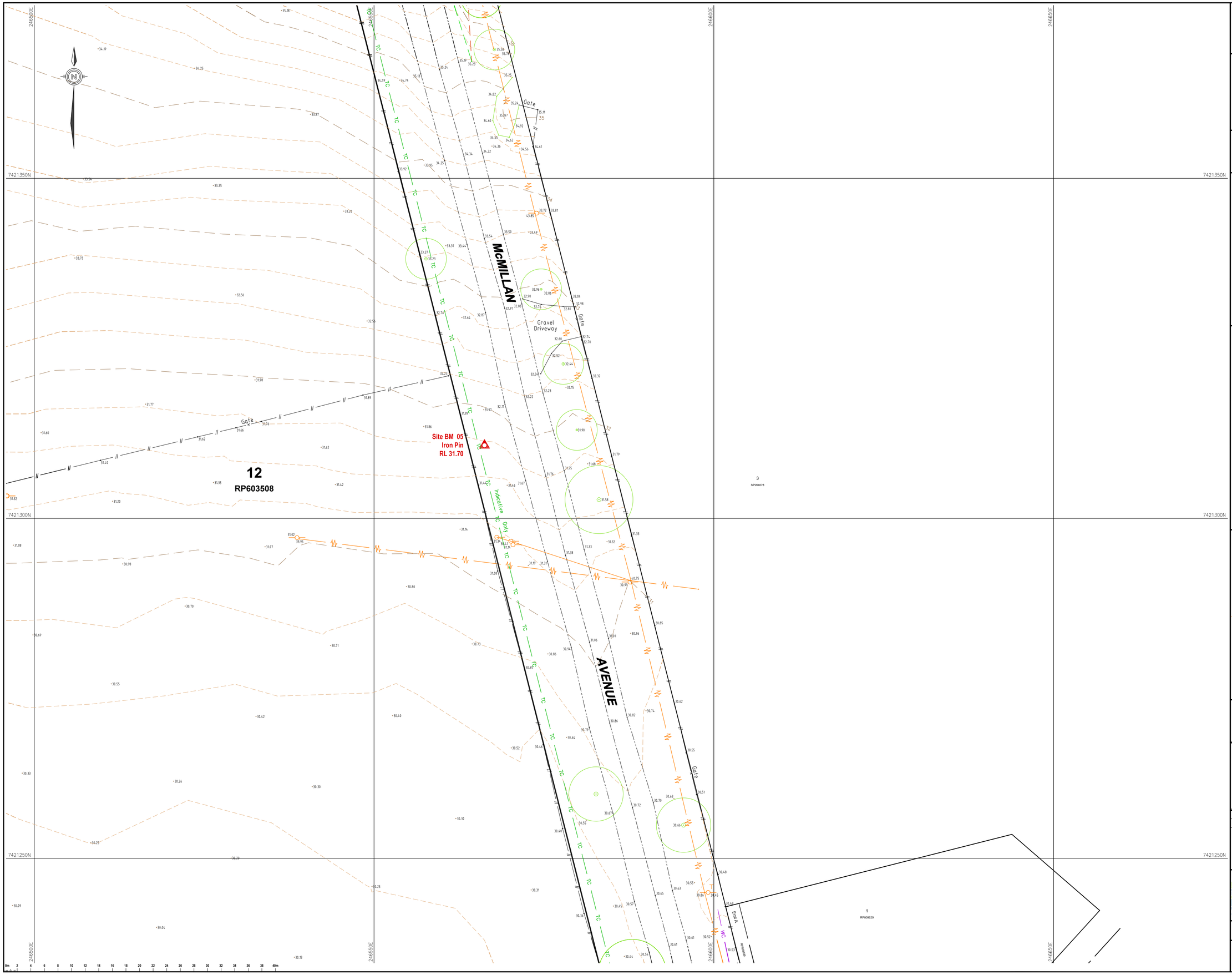
1:250 @ A1

DRAWING NUMBER

9043-40-DTL (6/10)

ISSUE

A



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SCALE

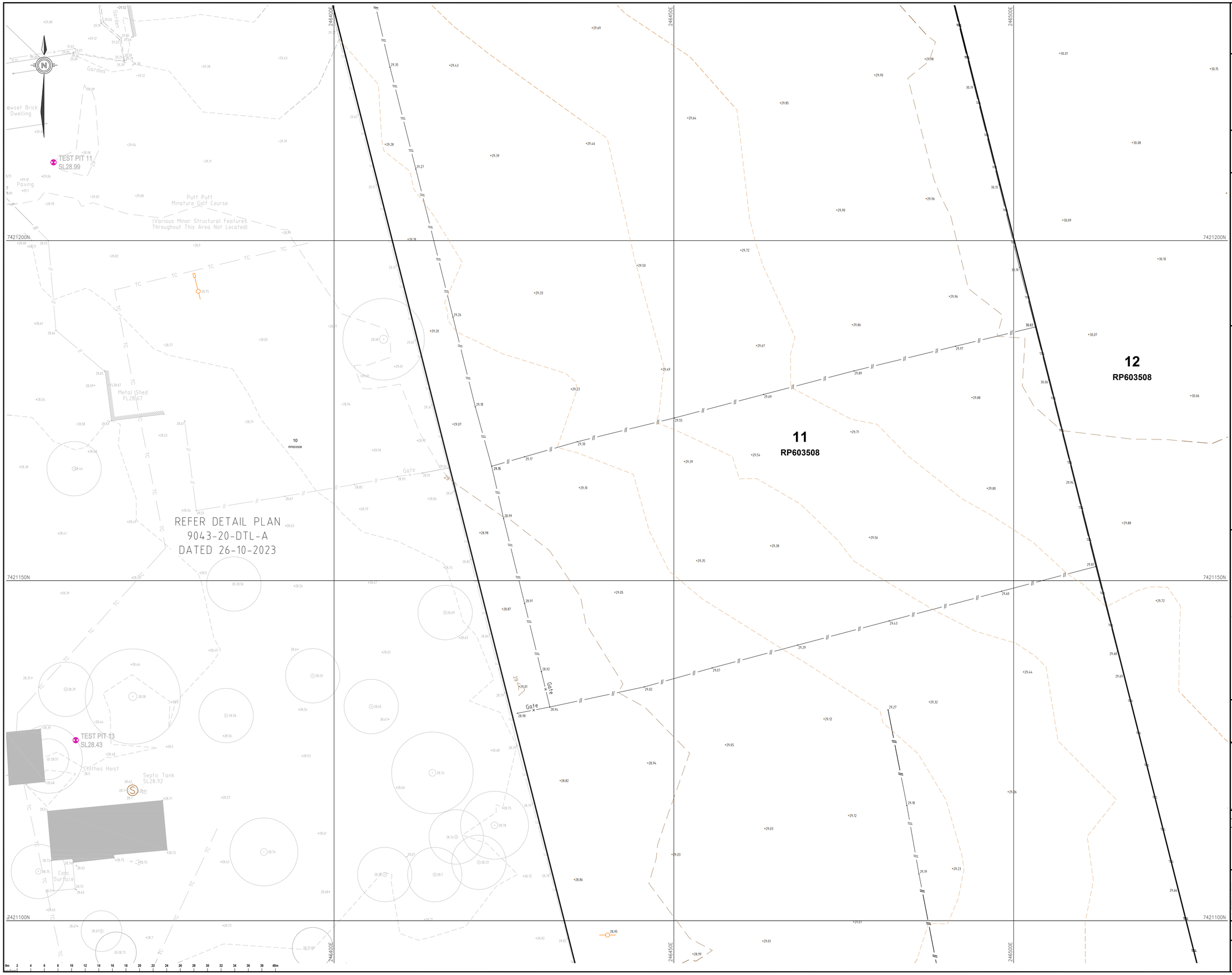
1:250 @ A1

DRAWING NUMBER

9043-40-DTL (7/10)

ISSUE

A



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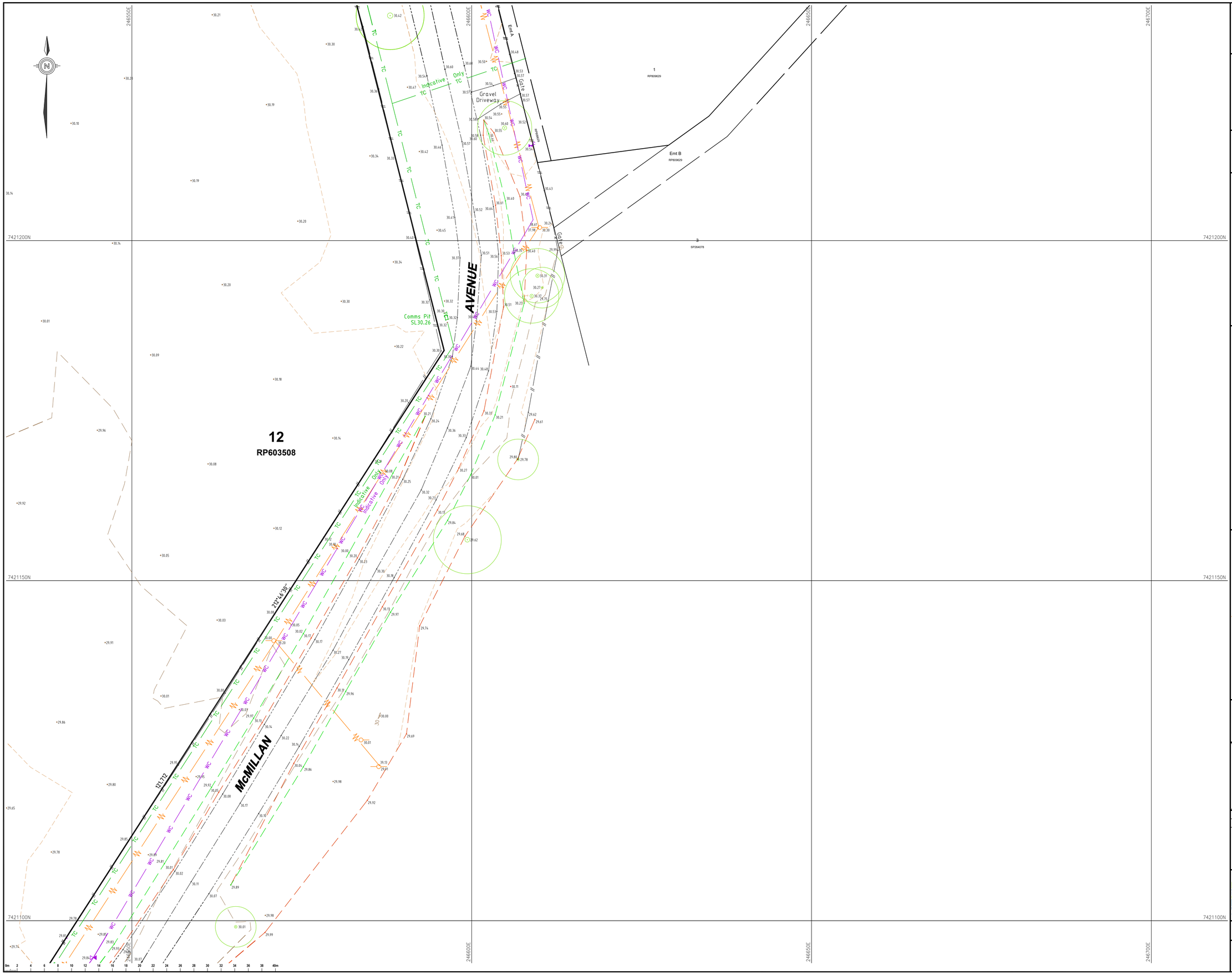
SCALE **1:250 @ A1**

DRAWING NUMBER **9043-40-DTL (8/10)**

ISSUE **A**



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Co-ord System :	**MGA2020 Vide PM105094**

WARNING

LOCATION AND CONNECTIVITY OF U/G SERVICES SHOWN HEREON HAVE BEEN DETERMINED BY DIRECT ACCESS OR COMPILED FROM LOCAL AUTHORITY AND SERVICE PROVIDER PLANS ONLY. FURTHER INVESTIGATION MAY BE REQUIRED TO DETERMINE LOCATIONS OF ALL INACCESSIBLE SERVICES.

REVISION

Issue	Date	Details	Authorised
A	26-08-2024	Initial Issue	RJKF
-	-	-	-

CREATED

capricornsurveygroupcq
SURVEYING & PLANNING SOLUTIONS
07 4927 5199 | reception@csgcq.com.au | 132 Victoria Parade, Rockhampton QLD 4700

SCALE

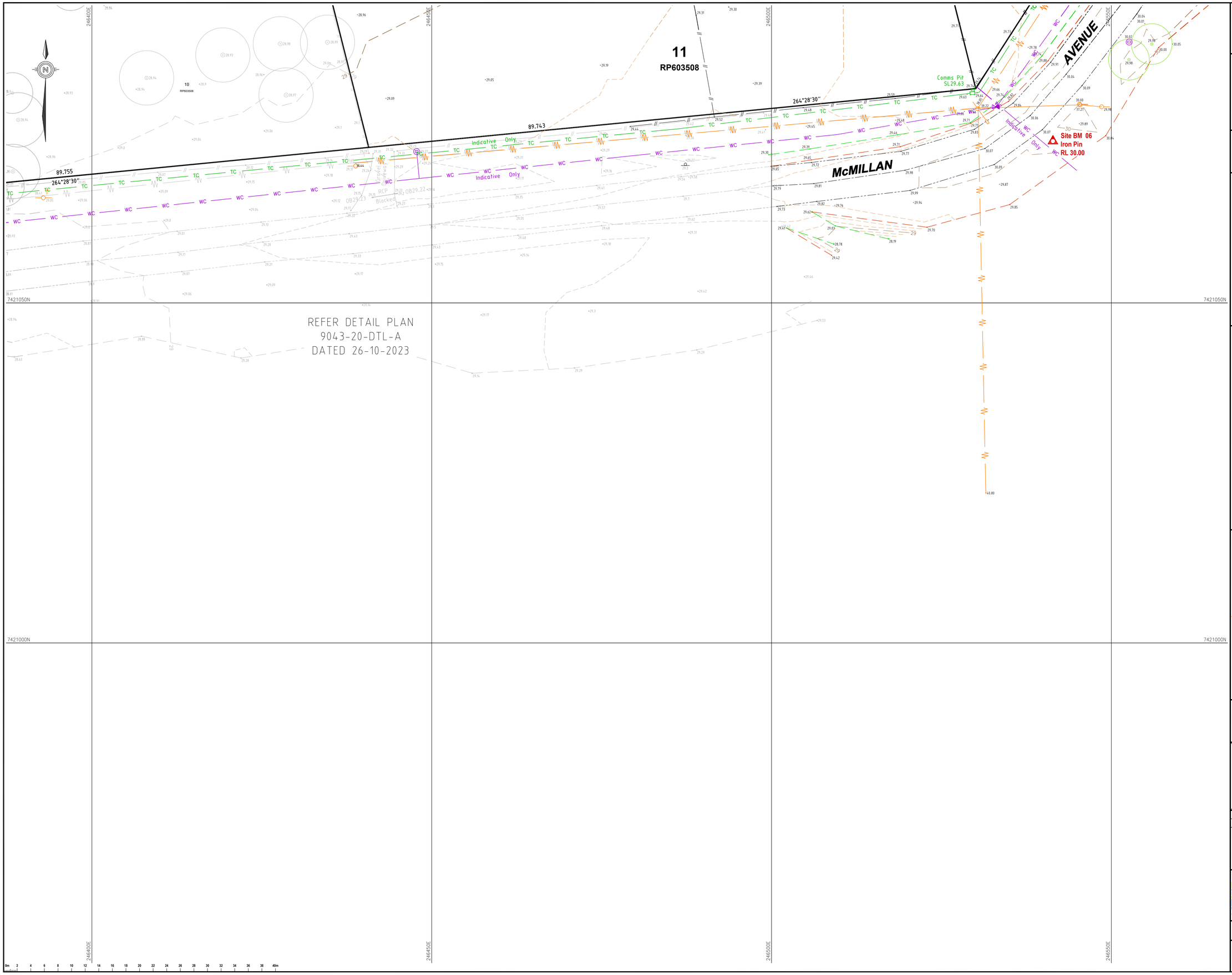
1:250 @ A1

DRAWING NUMBER

9043-40-DTL (9/10)

ISSUE

A



PRINCIPAL

RUBY DEVELOPMENTS PTY LTD

DESCRIPTION

DETAIL SURVEY OF LOTS 11 & 12 ON RP603508

29 & 71 McMILLAN AVENUE, PARKHURST

REAL PROPERTY DESCRIPTION

Lot/Plan :	Lots 11 & 12 on RP603508
Area :	4.841 ha & 4.555 ha (Deed)
Locality :	Parkhurst
Local Authority :	Rockhampton Regional Council

NOTES

This plan was prepared for RUBY DEVELOPMENTS PTY LTD from field survey for the purpose of designing new constructions on the subject land and should not be used by any other persons for any other purpose.

Property boundaries have not been reinstated or marked at the time of survey and are approximate only, based on appropriate boundary connections.

Where possible underground services have been located by field survey. Some services shown hereon are compiled from local authority and service provider plans and/or plans provided by the client and are noted accordingly on the plan.

Prior to any design, excavation or construction on site, the relevant authorities, and a qualified service locator should be engaged to ensure all services that may be affected by any future works have been located.

These plans have been prepared as verification plots only. Some text RL's have been omitted for clarity. Please refer to the relevant 3D data files for any spatial interrogation requirements.

Any discrepancies should be verified in writing with Capricorn Survey Group (CQ) Pty Ltd.

This note is an integral part of this plan.

LEGEND

LINETYPE LEGEND

- S — UG Sewerage Line
- SC — UG Sewerage Line (Compiled)
- SW — UG Stormwater Line
- SWC — UG Stormwater Line (Compiled)
- Overland Flow/Direction
- E — UG Electrical Line
- EC — UG Electrical Line (Compiled)
- OH Electrical Line
- T — UG Communication Line
- TC — UG Communication Line (Compiled)
- W — UG Water Line
- WC — UG Water Line (Compiled)
- W — AG Water Line
- G — UG Gas Line
- GC — UG Gas Line (Compiled)
- Top of Bank
- Toe of Bank
- C/L of Bitumen
- Edge of Bitumen
- Retaining Wall
- Line Marking
- Fence Line
- Roof / Guttering
- Eaves

CONTOUR LEGEND

- 0.25m Interval
- 1.00m Interval

GENERAL SYMBOL LEGEND

Comms Conduit Marker	Stormwater M/H
Comms Pit	Stormwater Pit
Elec Conduit Marker	Stormwater Kerb Outlet
Elec Turret	Stormwater IO
Elec Pit	Water Fire Hydrant
Elec Light Bollard	Water Meter
Elec Light Pole	Water Valve
Elec Power Pole	Water Tap
Elec Power Pole + Light	Water Control Tap
Elec Power Pole + Transformer	Water Tee
Elec Stay Point	Water Conduit Marker
Traffic Lights	Water Tapping Band
Gas Marker	Post
Gas Valve	Bollard
Gas Hot Water System	Guide Sign
Sewerage M/H	Flag Pole
Sewerage Vent	Australia Post Box
Sewerage IO	Shrub

DATUM

Vertical Datum :	AHD Vide PM202931 RL 32.447
Horizontal Datum :	MGA2020 Vide PM105094
Contour Interval :	0.25m, 1.0m Index
Co-ord System :	MGA2020 Vide PM105094

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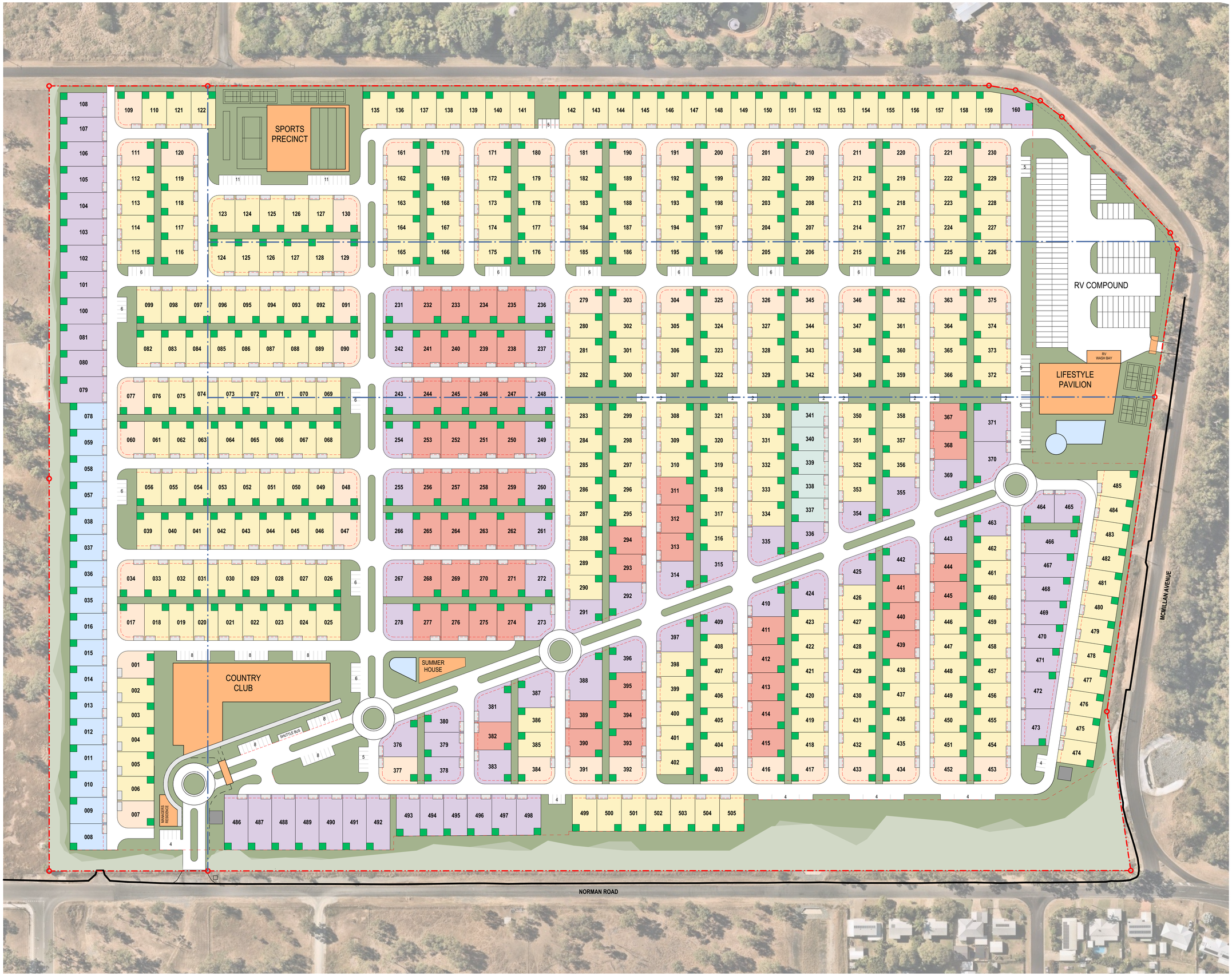

1 Master Plan
1:1000

Living Gems

120 SIGANTO DRIVE, HELENSVALE, QLD, 4212
INFO@LIVINGGEMS.COM.AU
WWW.LIVINGGEMS.COM.AU

REGISTERED ARCHITECT - PHILLIP NIELSEN
QLD 5331 - NSW 10322

DO NOT SCALE FROM PLAN - VERIFY ALL DIMENSIONS PRIOR TO ORDERING OR SHOP FABRICATION. IF IN DOUBT ASK.

ALL WORK TO COMPLY WITH THE POSITIONS OF THE BCA AND NCC OF AUSTRALIA, AUSTRALIAN STANDARDS AND ANY BYLAWS OR REQUIREMENTS OF THE LOCAL AUTHORITY.

PLEASE READ CAREFULLY

THIS PLAN CERTIFIED CORRECT IS THE ONE REFERRED TO IN THE CONTRACT & SPECIFICATIONS AND I UNDERSTAND CHANGES HEREAFTER MAY NOT BE POSSIBLE. THESE SUPERSEDE ALL OTHER PREVIOUS PLANS OR SKETCHES.

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REV	DESCRIPTION	DATE
AA	Master Plan Concept	26/09/2024
AB	Master Plan Updated	30/09/2024
AD	Master Plan Updated	8/10/2024
AE	Master Plan Updated	24/10/2024
AF	Master Plan Updated	28/11/2024
AG	Master Plan Updated	20/12/2024
AH	Master Plan Updated	7/01/2025
AI	Master Plan Updated	13/01/2025
AJ	Master Plan Updated	7/02/2025
AK	Master Plan Updated	12/02/2025
AL	Master Plan Updated	17/02/2025

SITE INFO

SITE AREA:	276,156.35 m²
VISITOR PARKING:	220
RV PARKING:	126
SHUTTLE BUS PARKING:	001

OPEN SPACE CALCS

LANDSCAPING:	XXm²
RECREATIONAL SPACES:	XXm²
PEDESTRIAN SHAREWAY:	XXm²
TOTAL OPEN SPACE:	**XXm² / XX.XX%**

SITE COVERAGE

DESIGN AVERAGE (193m²):	XXm²
CLUBHOUSE UNDER ROOF AREA:	XXm²
LIFESTYLE PAVILION UNDER ROOF AREA:	XXm²
TOTAL SITE COVERAGE:	**XXm² / XX.XX%**

TOTAL YIELD	**505**
15.0 x 21.0m LARGE LOT (MIN.)	017
14.0 x 21.0m TYPICAL LOT (MIN.)	298
13.5 x 21.0m TYPICAL LOT (MIN.)	005
15.5 x 21.0m TYPICAL CORNER LOT (MIN.)	050
15.5 x 21.0m SPECIAL CORNER LOT (MIN.)	000
21.0 x 16.0m SPECIAL LARGE LOT (MIN.)	000
SPECIAL LOT	080
16 x 21.0m LARGE LOT (MIN.)	055

SCALE
1:1000 @ A1
PRINT AT 50% @ A3

0 50 m 100 m

PROJECT
LIVING GEMS ROCKHAMPTON
19 McMillan Avenue Parkhurst QLD 4702 Australia

BRANCH	SITE
LG	PRH
GATE	DOC TYPE
1	DWG
BUILDING CODE	DISCIPLINE
MP	A
DRAWING No	REVISION
A010	AL

DRAWN	CHECKED	APPROVED
PN	PN	PN

DRAWING TITLE
Master Plan

FILE NAME
LG-PRH-DWG-MP-A-A010

Flood Report

Proposed Retirement Living Facility

930-960 Norman Road & 19-71 McMillan Avenue, Parkhurst

For: Ruby Developments Pty Ltd

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/187-2023

Dated: 18 September 2024

13 March 2025

Ref: S25-028

A QUALITY ASSURED COMPANY

CERTIFIED QUALITY ASSURANCE – ISO AS/NZS 9001, 4801 & 14001

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DOCUMENT INFORMATION

Project Name: Proposed Retirement Living Facility

Westera Partners Ref: S25-028

Westera Partners Contact:

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Email: jaredh@westerapartners.com.au

Certified for Issue by:

Jared Hill RPEQ 19891

13 March 2025

Document Control:

Revision	Author	Checked	Approved for Issue	Date
Rev. A	J. Tunsted	B. Arthur	J. Hill RPEQ 19891	13.03.2025

This report has been prepared for Ruby Developments Pty Ltd for the purpose of accompanying a Development Application to Rockhampton Regional Council. This report must only be used by Ruby Developments Pty Ltd for this purpose and must not be used or relied upon by any other person for any other purpose.

The assessment, conclusions or recommendations in this report are based on conditions encountered and information received at the time of preparing the report and may not be relied upon as site conditions or operations vary over time.

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1 INTRODUCTION

Westera Partners Pty Ltd was commissioned by Ruby Developments Pty Ltd to prepare a Flood Report to accompany a development application for a proposed Retirement Living Facility.

The proposal involves 505 villas including associated internal access roads, carparking and ground level features. The primary access point will be provided from Norman Road.

This report documents how the development will address flooding in accordance with Rockhampton Regional Council's (RRC's) requirements.

2 SITE DESCRIPTION

2.1 Location and Land Use

The proposed development site is located at 930-960 Norman Road & 19-71 McMillan Avenue Parkhurst, also known as Lots 7-12 RP603508. The site area is approximately 27.628Ha and is currently mostly vacant rural land improved with a dwelling and a golf driving range. The site falls at varying grade to the south and west towards a recently constructed open drain and McMillan Avenue.

The site is bound by rural properties to the north and east, McMillan Ave to the south and east and Norman Road to the west. Refer to Figure 1 for an indicative site location and Appendix C for detail site survey information.

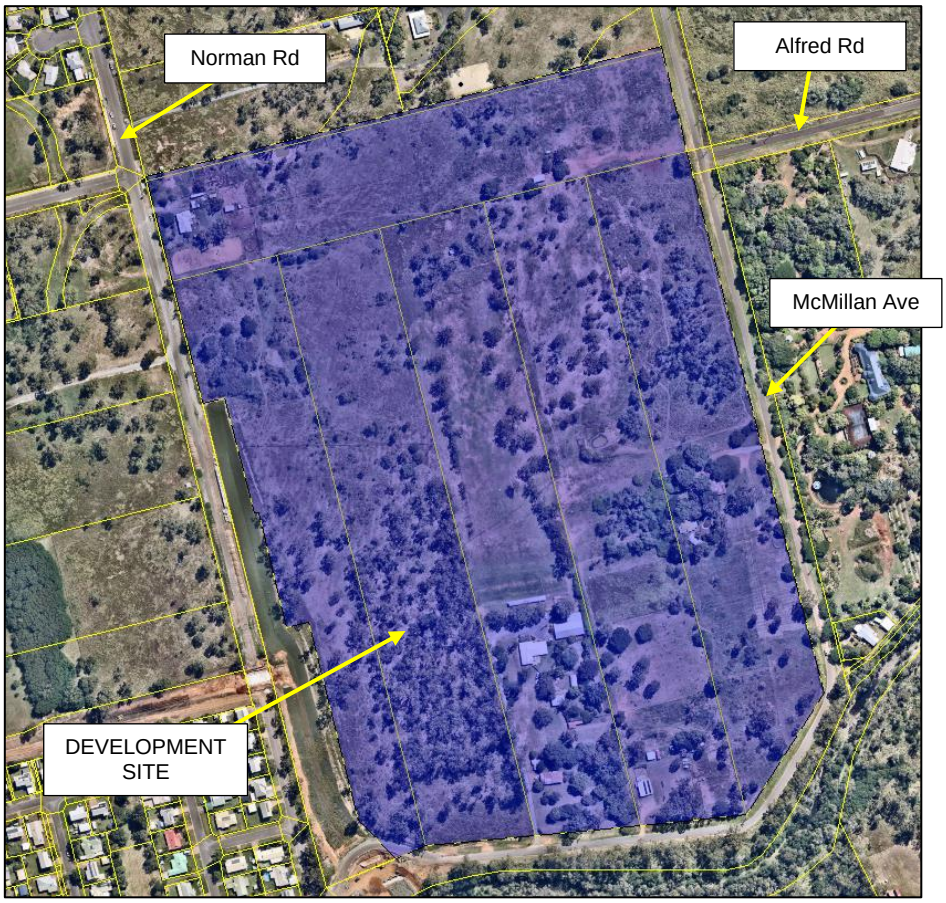

Figure 1 – Indicative Site Location (Nearmap, 2023)

3 EXISTING FLOOD RELATED INFORMATION

An upstream catchment analysis has identified some significant catchments immediately upstream of the proposed development site. This involved producing a Global Mapper model utilising Nearmaps areal imagery, Local Government Cadastral Boundaries, and LIDAR from ELVIS Spatial to produce contours and catchments. Refer to Figure 2 for an extract from Global mapper showing the existing catchment extents and critical existing features:

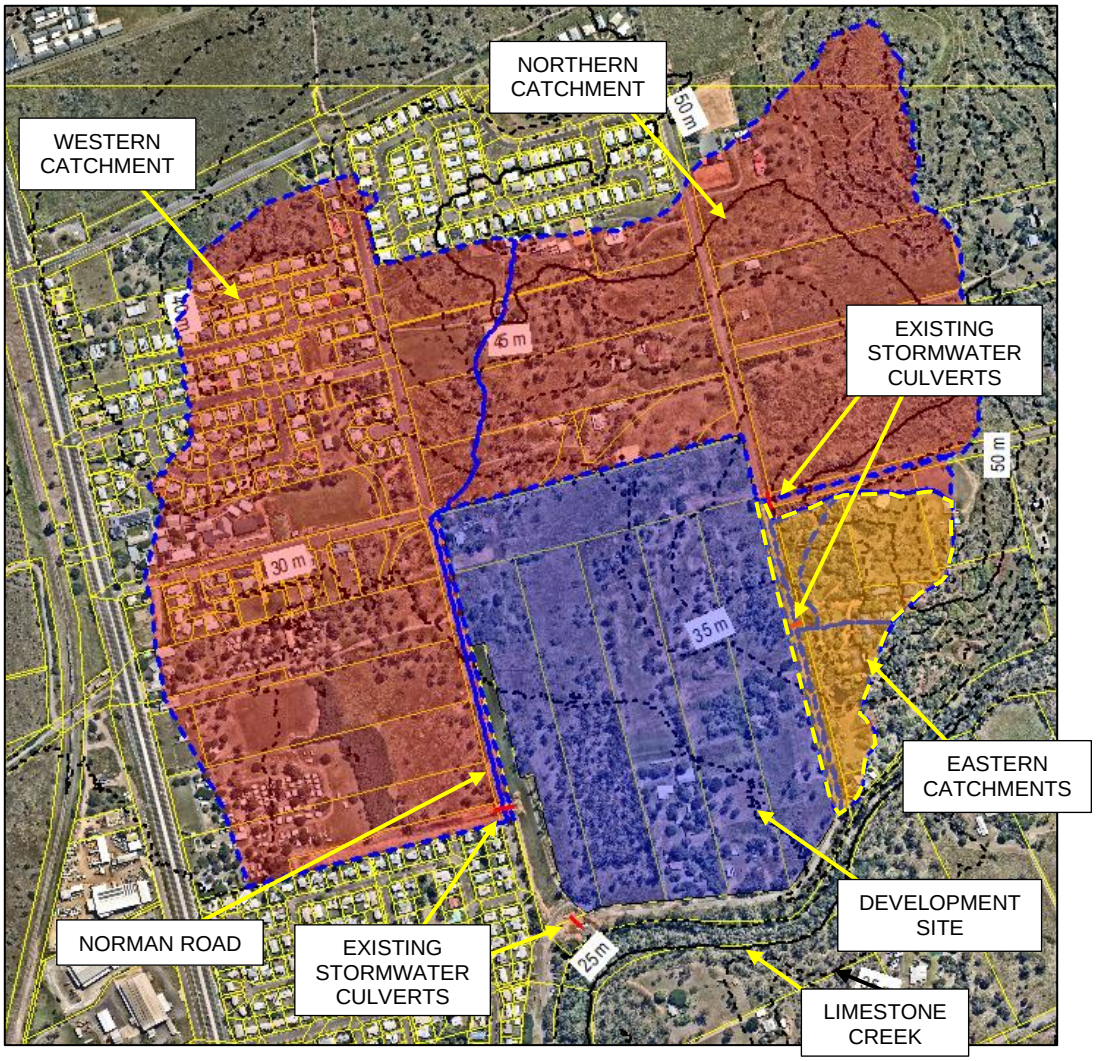

Figure 2 – Extract from Global Mapper

The development site is affected by two external catchments (referred to as the northern and eastern catchments). The northern and eastern catchments are approximately 31.39Ha (made up of two sub catchments) and 6.39Ha respectively (made up of four sub catchments on the eastern side of McMillan Ave). Both consist predominately of rural properties. A detailed catchment plan is included in Appendix D.

Stormwater runoff from the northern external catchment is to be conveyed around the site via a trapezoidal shaped diversion channel along the northern boundary of the site and down the western side of the site to discharge into the existing culverts under McMillan Avenue as per the existing conditions. The channel will include low-flow concrete channels with placed rock banks to enable some planting of the channels to maintain Council's requirement for vegetated channels. The proposed

Channels detailed in Appendix B are to be privately maintained with easements in favour of Rockhampton Regional Council.

Runoff from the eastern catchment is proposed to be captured on the eastern side of McMillan Avenue in a proposed swale and conveyed south to Limestone Creek via a proposed 'Reinforced Concrete Pipe' (RCP).

The existing channel on the western side of the development is affected by an external catchment originating from the west. The western catchment is 38.6Ha with an impervious percentage of 50.6%. The catchment is predominantly zoned low density residential with a central zone for runoff conveyance. The western catchment is conveyed underneath Norman Road to the existing overland flow path on western side of the development by 6 existing 1200mm x 900mm Rectangular Concrete Box Culverts (RCBC).

The proposed development will achieve immunity to the 1% AEP local overland flow flood event in accordance with Rockhampton Region Planning Scheme SC6.15.5.4. An overland flow investigation has been undertaken to determine the flow requirements of these aforementioned channels.

4 FLOOD MODELLING

The hydraulic and hydrologic modelling software package InfoWorks Integrated Catchment Modelling (ICM) was used to model the pre-developed and post-developed flow conditions for the site. ICM provides a simulation of the natural runoff processes and the hydraulic performance of stormwater infrastructure and accurately represents site-specific topography, defining flow paths, discharge, storage, and variation in flow direction in addition to modelling flood hazard. An integrated 1D/2D hydrologic and hydraulic model was developed using ICM to ensure there is no worsening in terms of flood level and flood hazard to properties downstream, upstream, or adjoining the site as a result of the development.

4.1 Hydrology

Hydrologic modelling was carried out in accordance with Australian Rainfall & Runoff (ARR) 2019 methodology. Data including temporal patterns, pre-burst ratios and initial/continuing losses were obtained via the ARR data hub for the development site location. The ARR Storm Generator tool was used to generate a range of design storms. Areal reduction factors were not used as the maximum catchment size did not exceed 1.0km^2 and the pre-burst rainfall was adopted over 1 time step.

The Laurenson method was used to calculate runoff with initial & continuing losses from the ARR Data Hub of;

- 35mm and 1.7mm for pervious areas and;
- 1mm and 0mm for impervious areas,

A manning's roughness of 0.013 was used for impervious areas and 0.045 for pervious areas. All catchments depicted in Figure 2 were modelled based on topographic information derived from LiDAR data, with consideration given to the layout of the existing stormwater network and the presumed location of major flow paths (i.e. road reserves). The ensemble of temporal patterns for durations from 10 minutes to 3 hours were modelled for the 63%, 39%, 18%, 10%, 5%, 2%, 1% AEP events and the 1 in 500 year event. The ensemble statistics utility was used to determine the pattern which exhibited the median peak flow for the critical storm duration, and the resultant event was considered to be the critical storm for the investigation. Refer Table 1 for the critical duration and temporal pattern for each design event. Figure 3 Shows the box and whisker plot used to determine the median design event for each duration. The parameters of the hydraulic modelling are discussed in the following section.

Table 1 – Design Events Critical Temporal Pattern

AEP (%)	Duration	Temporal Pattern (Number)
63	3 Hour	2
38	2 Hour	8
18	2 Hour	7
10	2 Hour	7
5	2 Hour	9
2	1.5 Hour	5
1	1.5 Hour	5
1 in 500 year	1.5 Hour	3

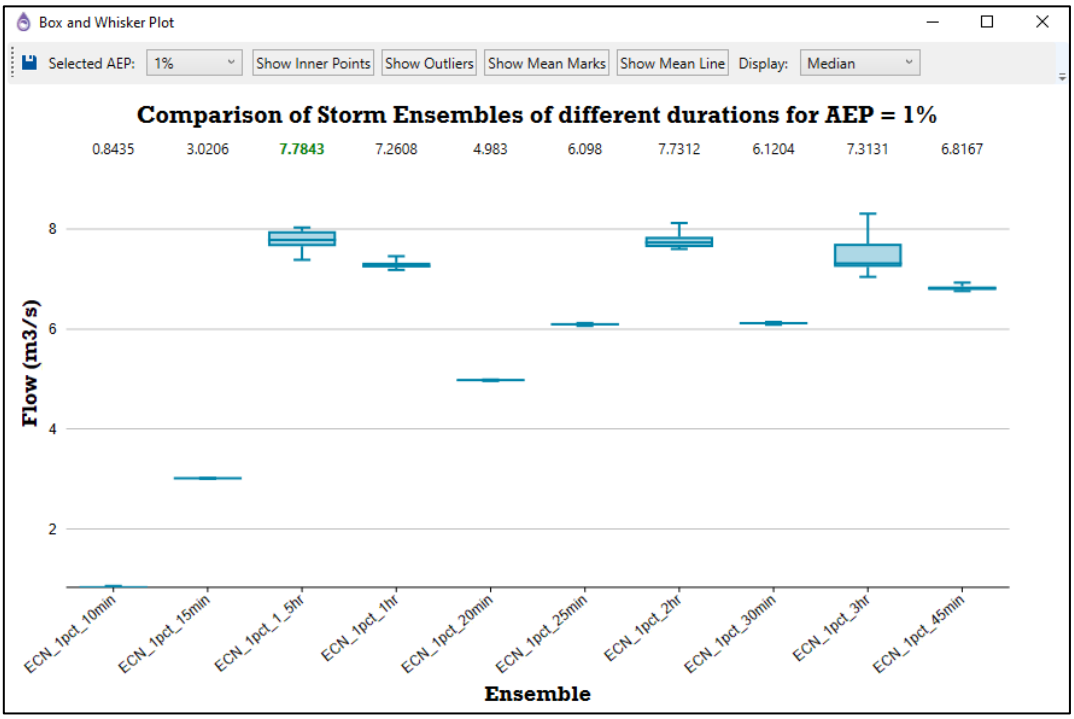

Figure 3 – Ensemble Statistics Output (Box and Whisker Plot – 1% AEP events)

4.2 Developed Hydrology

As stated in the 'Stormwater Management Report' (SWMR) prepared by Western Partners on-site detention is only proposed for the 63% AEP event to ensure compliance with waterway stability requirements in the state planning policy. Therefore, in the developed case the internal catchments have been divided and discharged as per the design plans in Appendix B. The impervious area of each developed internal catchment has been modified to match the separate SWMR. Refer Appendix D for developed catchment details.

4.3 Hydraulic Modelling

A 1D/2D model was developed to simulate the hydraulics of the overland flow discharging around the site and from the western catchment. The following parameters were utilised in developing the 2D network:

- The Digital Terrain Model (DTM) was derived from LIDAR, detailed site survey and the post developed design surface.
- A 2D zone comprising 0.1m^2 minimum element area and 20m^2 maximum triangle area (indicates mesh resolution) was modelled to encapsulate the entirety of the upstream catchments and the development site. The 2D zone downstream boundary was modelled to incorporate the possible downstream water level of Limestone Creek.
- Manning's roughness was modelled as a 2D roughness zone with values as described below.
    - 0.045 for the existing pastureland
    - 0.014 for concrete lined portion of channels
    - 0.020 for Asphalt roads
- The 1D catchment nodes outlet to the 2D surface via Outfall 2D nodes inside mesh zones to spread flow evenly to be more representative of the existing conditions.

4.4 Boundary Conditions

Some preliminary assumptions have been made during this initial assessment.

- There is a recently constructed culvert system running under McMillan Avenue from west to east. The western catchment (refer Figure 2) drains through the new culverts into the existing channel located on the western side of the development. The 2D boundary of the model has been extended west to model the capacity of culverts. It is noted that the extent of the detailed survey is only 57m from the upstream side of the culverts. It is noted that the channel that directs upstream catchment flow to the culverts extends approximately 275m in the upstream direction from the culverts (from aerial imagery). The Lidar information that is used for outside of the detailed survey does not reflect the channel. Therefore, it is noted that some of the results outside of the extent of the detailed survey will not be reflective of the current state of the site.
- The new proposed stormwater culverts on the south side of the development site discharge under McMillan Avenue to Limestone Creek.
- The existing culverts under Norman Road have been included in the 2D model and are reflective of detailed survey.
- The 2D downstream boundary condition is based on an assessment of the Limestone Creek catchment. The catchment for Limestone Creek has been determined using Lidar with a resolution of 1m. The total contributing catchment area is 2874Ha and is considered to have an effective impervious area of 0%. A rational method assessment has been conducted to determine the 1% and 5% AEP design flows. The 1% AEP flow calculated using the rational method is 306.5m^3/s with a time of concentration of 3.6 hours. Using the 1% AEP design flow and a cross section of Limestone Creek adjacent McMillan Ave a normal water depth in the creek was simulated. Figure 4 and Figure 5 depict the external catchment and Limestone Creek cross section. The water level in Limestone Creek with the 1% AEP flow is 26m AHD. Given the large increase in cross section above 26m AHD and the difference in critical duration between Limestone Creek and the external catchment (3.6 hours to 1.5 hours

respectively) a downstream boundary condition of 26m AHD has been adopted. The 26m AHD water level has been adopted for the 1% AEP and 1 in 500 year design events. A downstream water level of 25m AHD has been adopted for all other design events which is the calculated water level in Limestone Creek in the 5% AEP event.

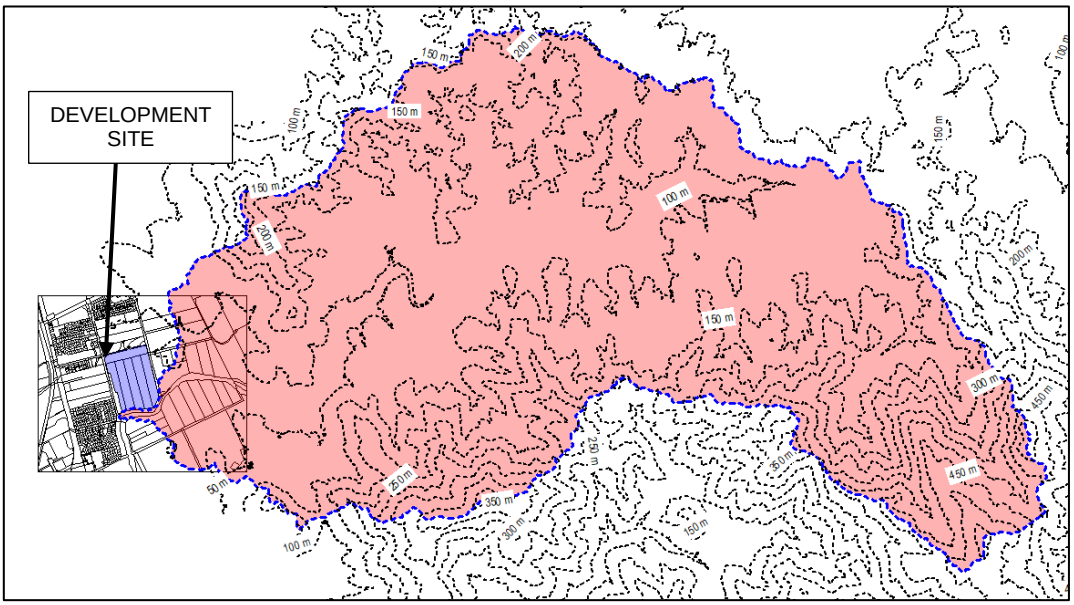

Figure 4 – Limestone Creek External Catchment

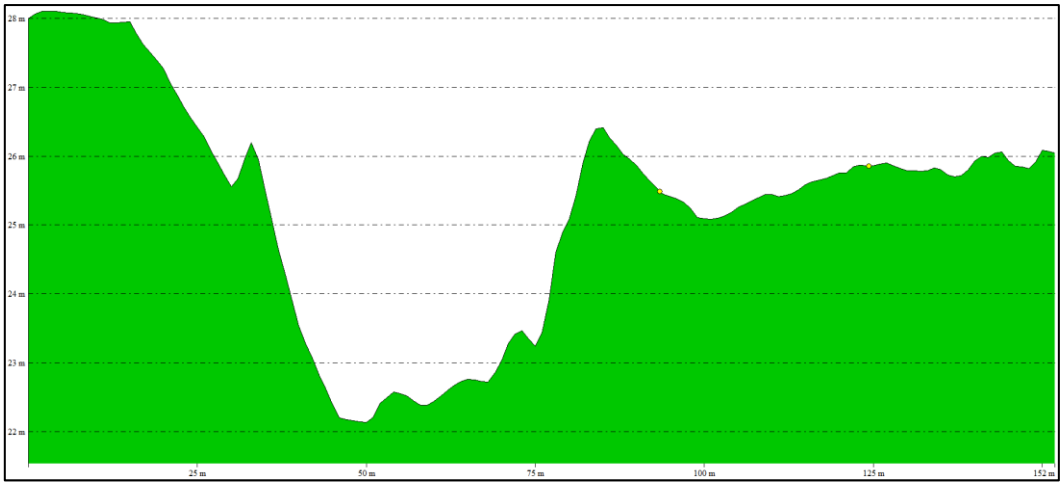

Figure 5 – Limestone Creek Cross Section

4.5 Modelling Results

The results of the hydraulic modelling is outlined in Appendix A. The results of the investigation demonstrate that there is no actionable worsening to flood level or flood velocity in adjoining properties in any of the design events up to the 1% AEP storm event. Overland flow runoff approaching the site from the upstream catchments are conveyed via the proposed diversion drain and culverts to the existing overland flow path downstream as per-existing conditions. The proposed swale on the eastern side of McMillan Avenue conveys external catchment flows south where it is captured in a proposed pit and pipe system discharging to Limestone Creek. The water level afflux depicted in the maps is contained to the existing/proposed drainage channel and does not affect any private property, or pedestrian areas.

The development shall provide overland flow diversion channels and culverts at the entrance of the site to allow for the passage of overland flow. These have all been designed to cater for the 1% AEP storm event. Refer to Appendix B for further details. This would result in a minimum requirement of two 2.1m x 1.2m RCBCs 2.1m link slab between and associated designed channels seen in the engineering drawings in Appendix B.

4.5.1 Sensitivity Analysis

The modelling results in Appendix A depict a sensitivity analysis of the proposed channel and stormwater culverts. A sensitivity analysis has been provided that varies the Manning's roughness in the channel from 0.014 to 0.15. This will simulate if the channel was not maintained or if a large blockage occurred. The blockage sensitivity event has adopted 50% inlet blockage to all existing and proposed stormwater culverts. Each of the sensitivity events presented make comment regarding the maximum variation in flooded extent from the design event and afflux is not presented. The sensitivity events are only presented for the 1% AEP design event. Refer Figure 6 below for the locations of the boundary channels and culverts.

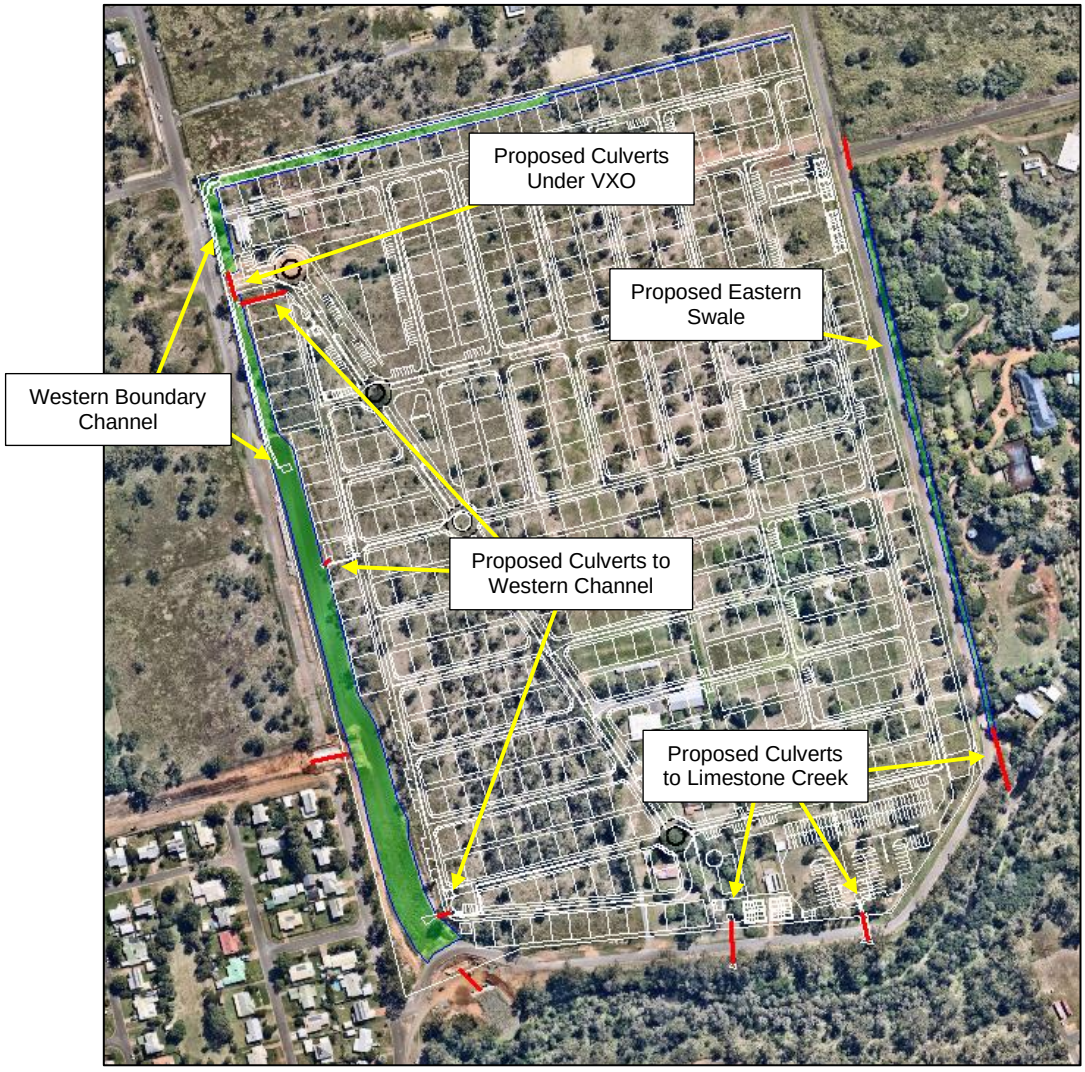

Figure 6 – Development Site Layout

Sensitivity Analysis – Channel Roughness

The roughness sensitivity results in a reduction of the flow velocities and an increase in the water levels in the proposed western channel. The variation in peak water level varies through the western channel with a maximum increase in water level of 710mm (at the upstream end on the north side of the development). Flows are contained to the proposed channels and do not overtop due to this increase in peak water level.

The peak water levels have been compared to the overtopping levels to determine the impact on the available freeboard. The minimum freeboard achieved in the western channel is 1.10m with most areas having much greater freeboard.

Sensitivity Analysis – Blockage Impact

The 50% blockage sensitivity results in varying increases in peak water level. The peak water level upstream of the culverts in the western channel increased by a maximum of 0.51m. The minimum freeboard in the western channel is 1.20m with most other areas achieving far more than this.

50% blockage was applied to the proposed 750mm RCP from the proposed field inlets to Limestone Creek on the eastern side of McMillan Ave (refer Figure 7). For the sensitivity case applying 50% blockage to the proposed RCP results in a maximum increase in peak water level on 54 McMillan Avenue of 31mm. It should be noted that in the 1% AEP design event 50% inlet blockage is applied to each proposed field inlet pit. In the design event flows and peak water level are reduced on 54 McMillan Ave (when compared to the existing case). The existing dwelling on 54 McMillan Avenue appears to be raised approximately 0.6m above the ground level (based on images found on google maps). The maximum water level on 54 McMillan Ave is 150mm (in the sensitivity case) with flows returning to sheet flow as they traverse the block. Given the difference in peak water level and the height of the dwelling the flows will not inundate the dwelling and greater than 300mm of freeboard shall be maintained.

This sensitivity case is presented to understand the impact of severe events. It is considered unlikely that a 750mm pipe would become 50% blocked. The increase in peak water level in this sensitivity event is considered minor. The results of the sensitivity case are considered acceptable given the event is a sensitivity case and that the existing dwelling will not be inundated.

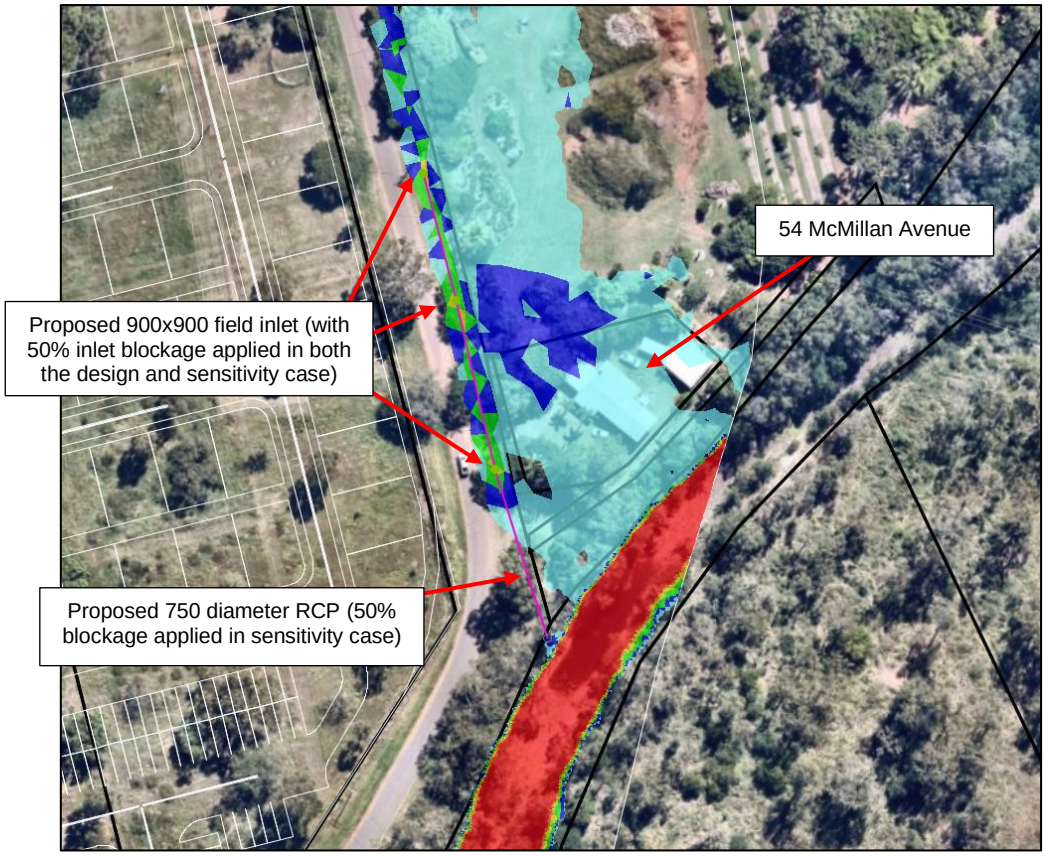

Figure 7 – 1% AEP Developed Case (with 50% pipe blockage)

4.5.2 Severe Storm Impact Statement (SSIS)

A severe storm impact statement (SSIS) is recommended by QUDM in response to the outcomes and recommendations of the Queensland Floods Commission of Inquiry (QFIC, 2012). The intention is for persons undertaking stormwater design to consider the potential risks from flood events greater than the major design event. It is also a tool to make residents and asset managers aware of flooding risks in rare situations rather than only in the nominated design events.

The proposed development is located upstream of Limestone Creek and sits adjacent to overland flow channels which convey external catchments around the development.

The rational Method has been used to determine the 1% AEP flow with a 1D model used to determine the likely normal flow depth in Limestone Creek. The 1% AEP water level in Limestone Creek adjacent the site is 26.00m AHD. The minimum finished surface level within the site is 28.85m AHD. Therefore, water level in Limestone creek would have to rise by at least 2.5m to enter the site. The cross-sectional area of Limestone Creek increases exponentially above 26.00m AHD. A 1D analysis has been completed for the 2000 year design flow in Limestone Creek and the peak water level was calculated to be 26.80m AHD. It is therefore unlikely that flows from Limestone Creek would pose a flooding risk to the development site.

A 1D/2D analysis of the development has been completed for a 1 in 500 year event (for the development site and adjacent/upstream external catchments). In the 1 in 500 year event flows approaching from the upstream external catchments from the north, east and west are contained to their respective overflow channels and do not inundate the development. This is also the case for the 1% AEP sensitivity events as detailed above in 4.5.1.

It should be noted that in the 1% AEP blockage sensitivity event and the 500 year developed case peak flows and peak water level increase on 54 McMillan Avenue. The increase in peak flows and maximum water level is due to an increase in flows bypassing from the proposed drainage on the eastern side of McMillan Avenue. The maximum increase in peak water level in the blockage sensitivity event and 500 year developed event are 31mm and 28mm respectively. In both events the peak flow depth is less than 150mm which is significantly less than the raised height of the dwelling (raised approximately 600mm above the natural surface level). The minor increase in peak water level will therefore not inundate the existing dwelling above the habitable floor level.

It is noted that the detailed internal drainage design for the site is to be completed during the detailed design phase including emergency overland flow paths.

In response to the descriptors in QUDM 2017 backgrounds notes BN7.2.5 the site has been assessed for situations that may result in undue risk to life or structures. The below comments provide a response to each outcome.

- Blockage of overland flow paths via the construction of barriers, walls, embankments or other structures.
    - *The development proposes the construction of a diversion drain designed to contain the design flows below the adjacent neighbouring properties surface levels. The channel has been designed to convey all external catchment flows in all design events and have been checked for the 1 in 500 year event without ponding into adjacent properties. No adverse outcomes have been found.*
    - *The proposed culvert crossing of the proposed channel has been assessed for blockage and sensitivity to channel roughness for the major design event. For each scenario flows are contained to the diversion drain. the blockage scenario and the sensitivity case achieve a minimum freeboard of more than 1m (in the western channel).*
    - *In a 100% blockage scenario flows approaching the driveway culverts in the western channel would overflow across the driveway and into the channel on the downstream side. It is noted due to the size of the box culverts blockage is not likely (3x 2100mm x1200mm RCBCs). The final shape of the overflow across the driveway shall be confirmed at the detailed design phase.*
    - *It has been noted that the proposed swale on the eastern side of McMillan Avenue results in a minor increase in peak water level on 54 McMillan Avenue in the 500 year Developed case (compared to the existing case). The minor increase is considered acceptable given the below.*
        - *the proposed swale and drainage infrastructure has been shown to capture all approaching flows in all events up to and including the design event.*
        - *The overland flow which occurs on the block (in the existing case) is reduced in all other events.*
        - *The overland flow through the block is shallow (less than 150mm maximum depth) while the existing dwelling is raised approximately 600mm above the natural surface level.*
- Development of land upstream of a road or railway embankment where severe blockage of culverts or events in excess of the design event could cause unacceptable flooding of the development.

- *If the existing culverts underneath McMillian Ave were to be 100% blocked flows ponding in the western overland flow channel would breach McMillian Ave at a level of approximately 28.00m AHD. The road would act as a weir with a total width in excess of 125m at a depth of 250mm. The weir flow capacity of the above is 26.5m^3/s. The 1% AEP flow approaching the culverts is 16.9m^3/s in the 1% AEP event. It is therefore unlikely that the blockage of the existing culverts would pose a flooding risk to the development site.*

5 CONCLUSION

Westera Partners Pty Ltd was commissioned by Ruby Developments Pty Ltd to prepare a Flood Report for a proposed Retirement Living Facility at 930-960 Norman Road & 19 McMillan Avenue, Parkhurst in order to accompany a development application to Rockhampton Council. The following conclusions have been determined from the results of the investigation.

- The major source of flooding impacting the development is overland flow flooding along the site's northern, western and eastern boundaries.
- The proposed channel and culvert systems divert this overland flow around the site to the existing/proposed downstream infrastructure under McMillan Avenue and ultimately to Limestone Creek as per the existing conditions.
- Overland flow runoff is proposed to be diverted around the proposed development site generally per existing conditions. 1D/2D flood modelling has demonstrated the development achieves no adverse impact to flood levels or velocities to upstream, downstream or adjoining the development site.

6 APPENDICES

6.1 Appendix A – Infoworks ICM Modelling Results

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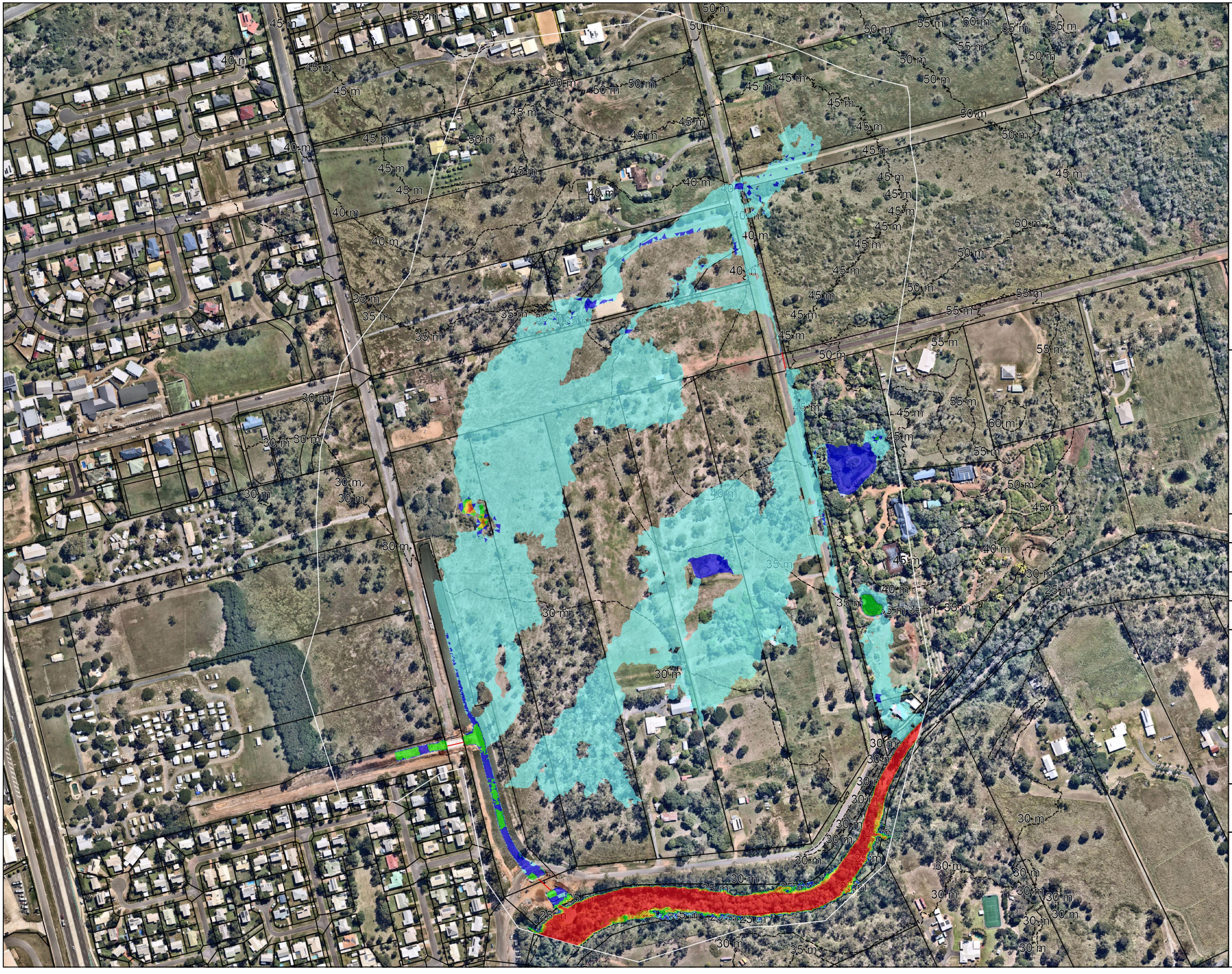

(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

63% AEP (EXISTING)

MAXIMUM FLOOD DEPTH APPENDIX A-1

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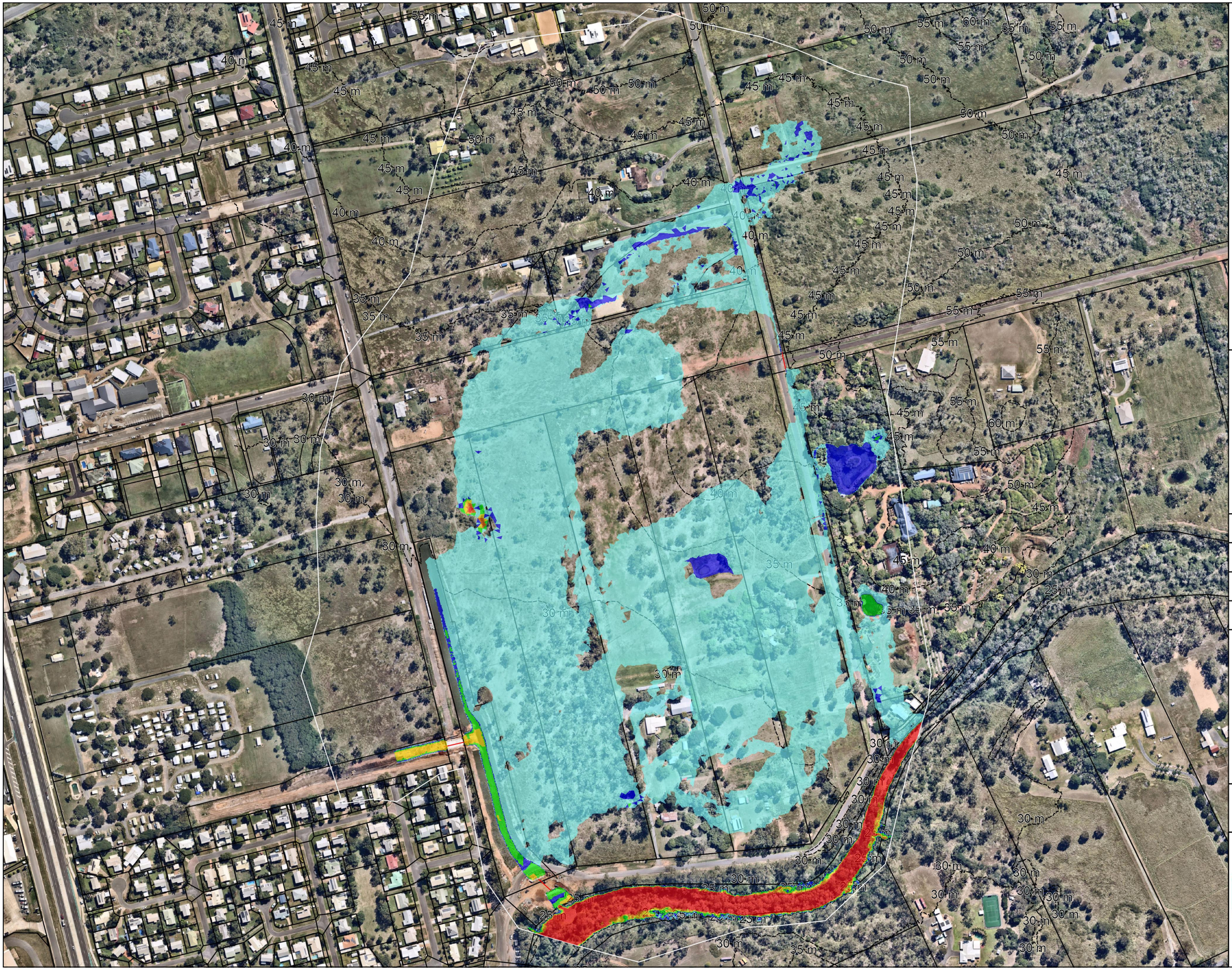

(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

39% AEP (EXISTING)

MAXIMUM FLOOD DEPTH APPENDIX A-2

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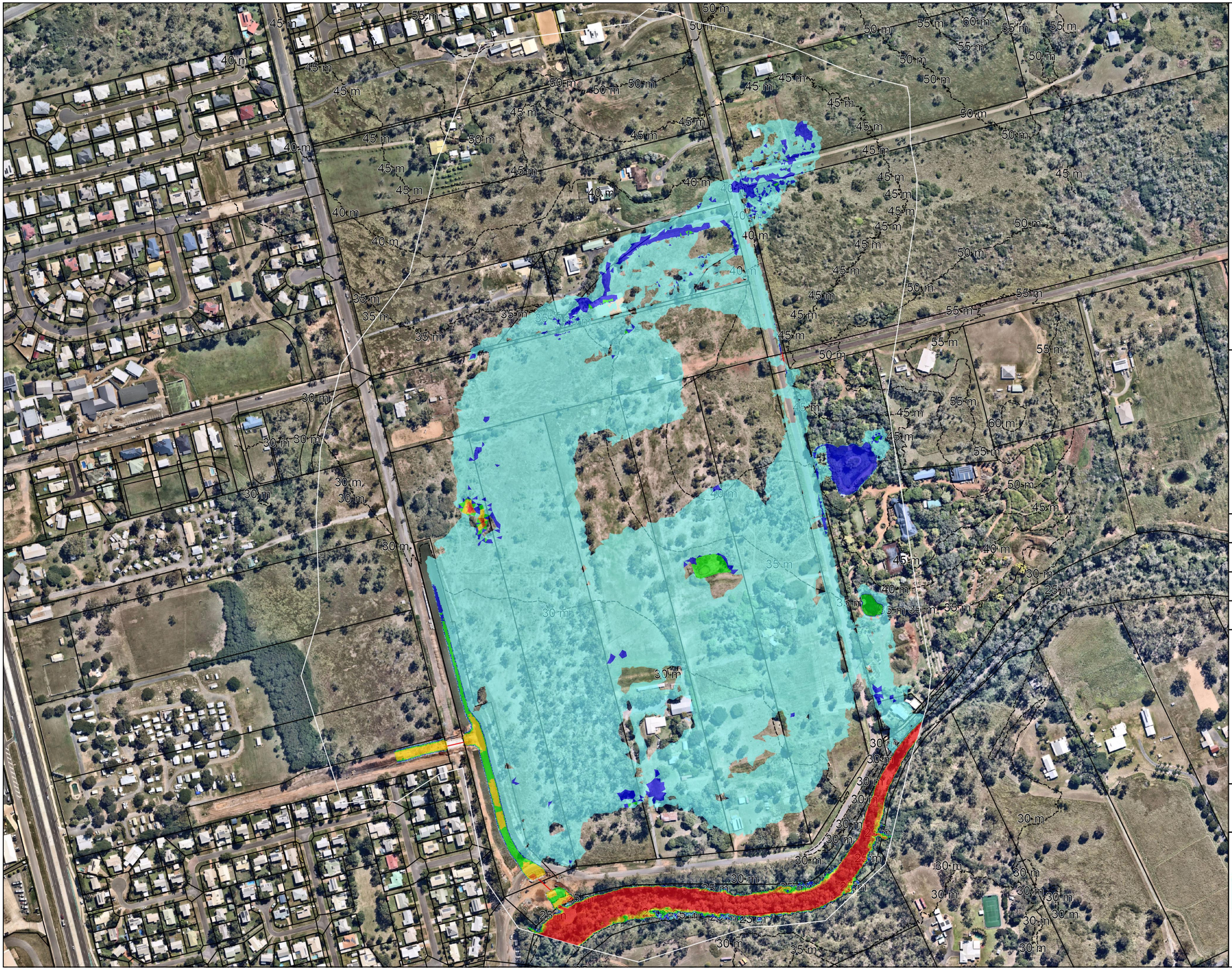

(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

18% AEP (EXISTING)

MAXIMUM FLOOD DEPTH APPENDIX A-3

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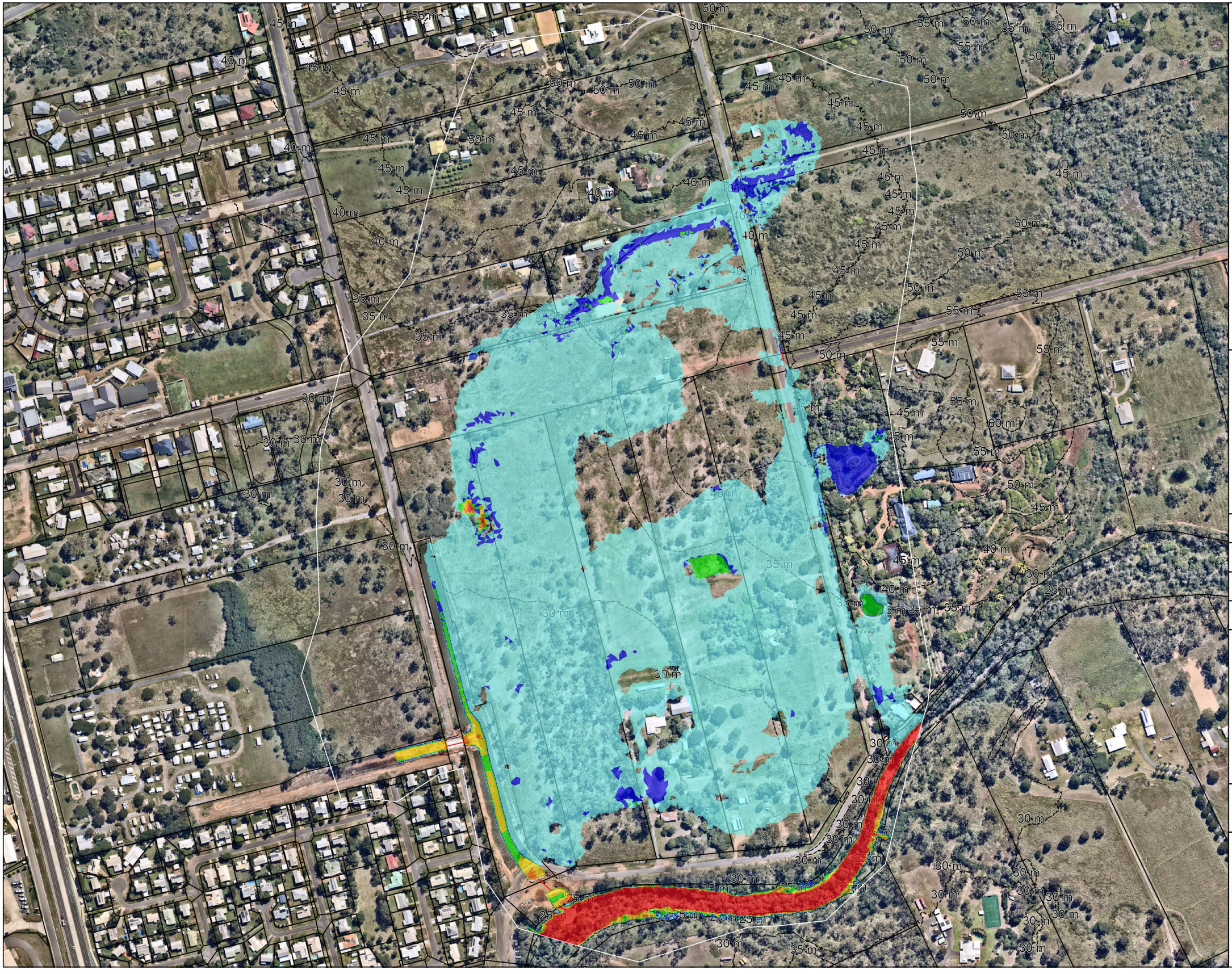

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

10% AEP (EXISTING)

MAXIMUM FLOOD DEPTH
APPENDIX A-4

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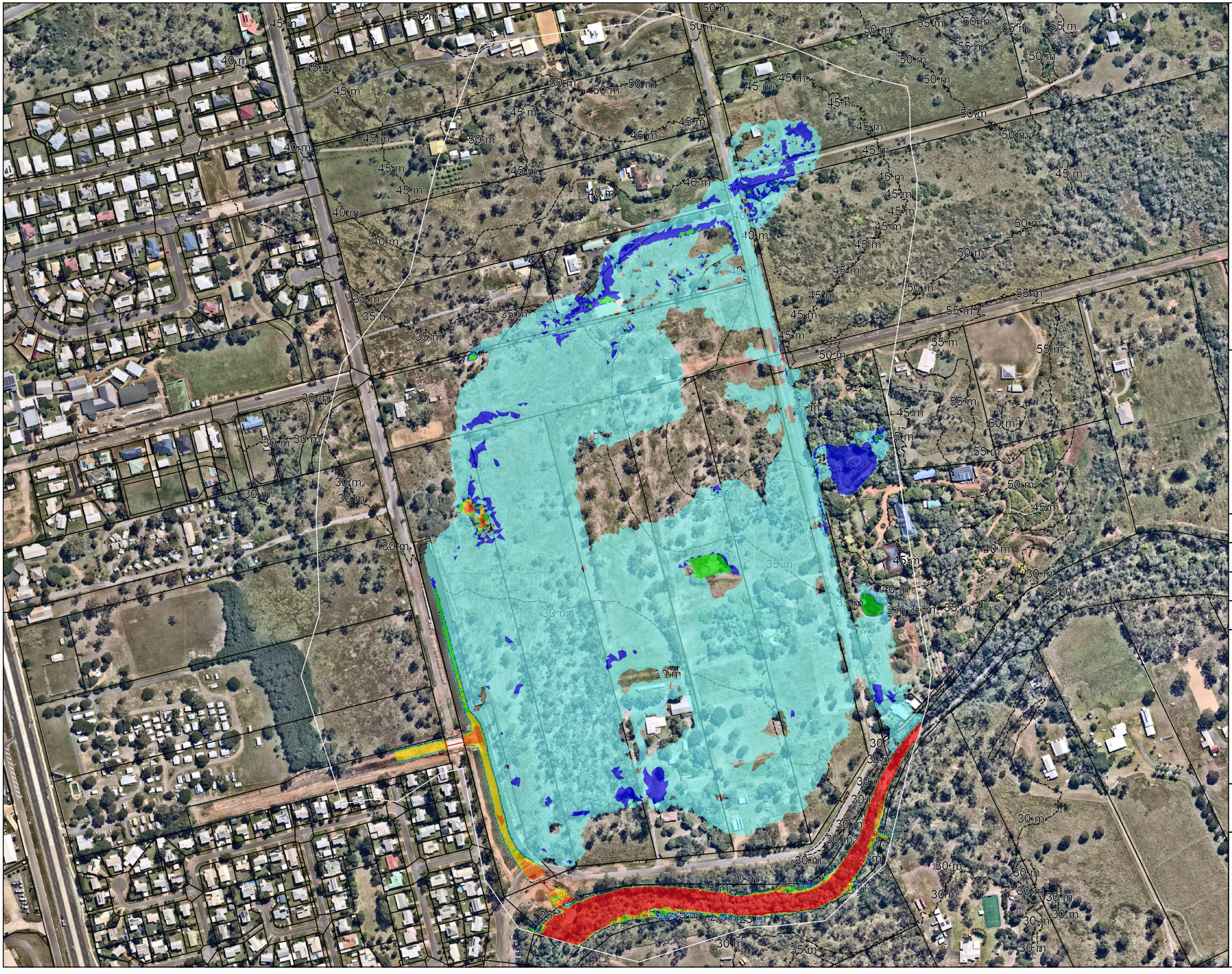

(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

5% AEP (EXISTING)

MAXIMUM FLOOD DEPTH APPENDIX A-5

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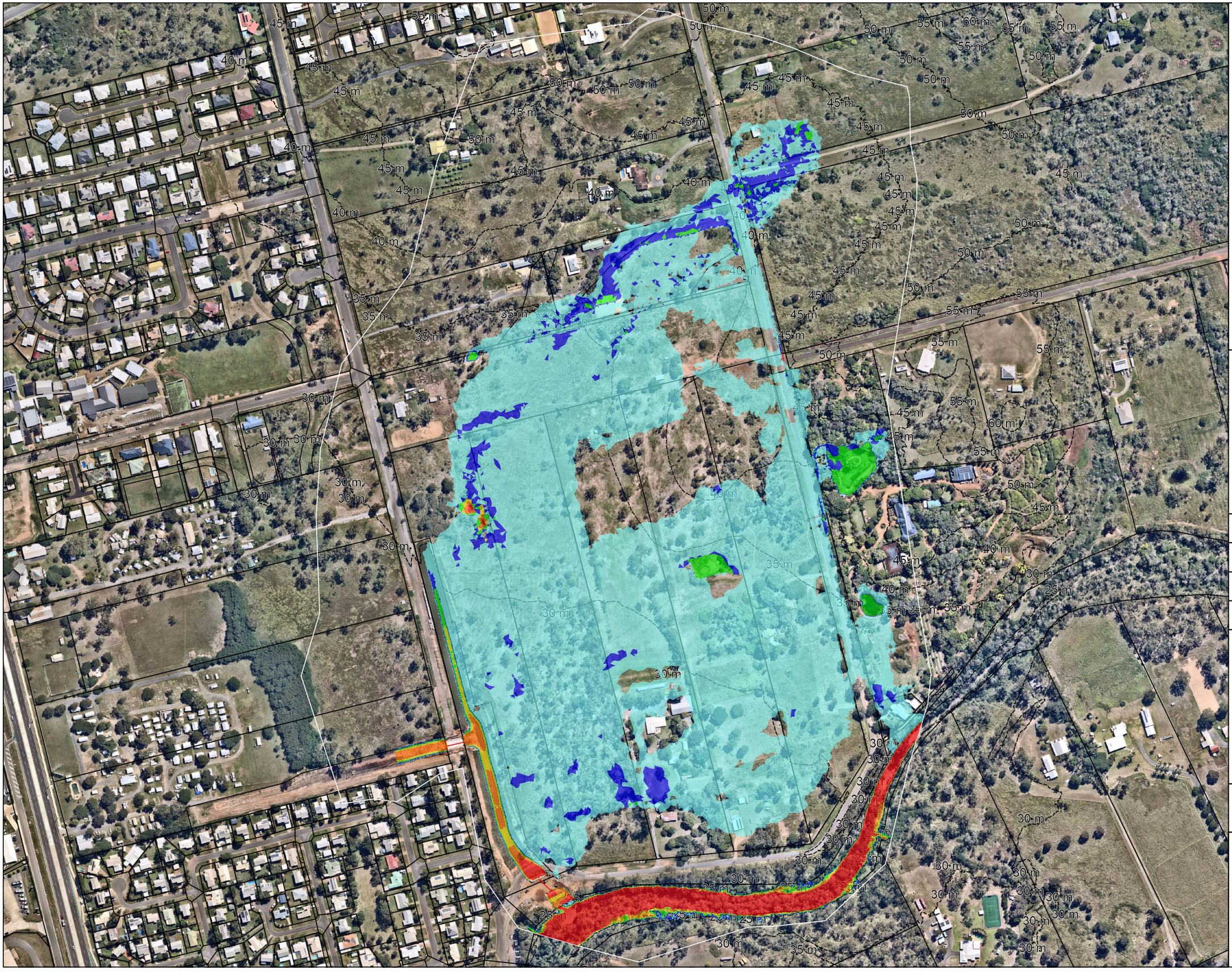

(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

2% AEP (EXISTING)

MAXIMUM FLOOD DEPTH APPENDIX A-6

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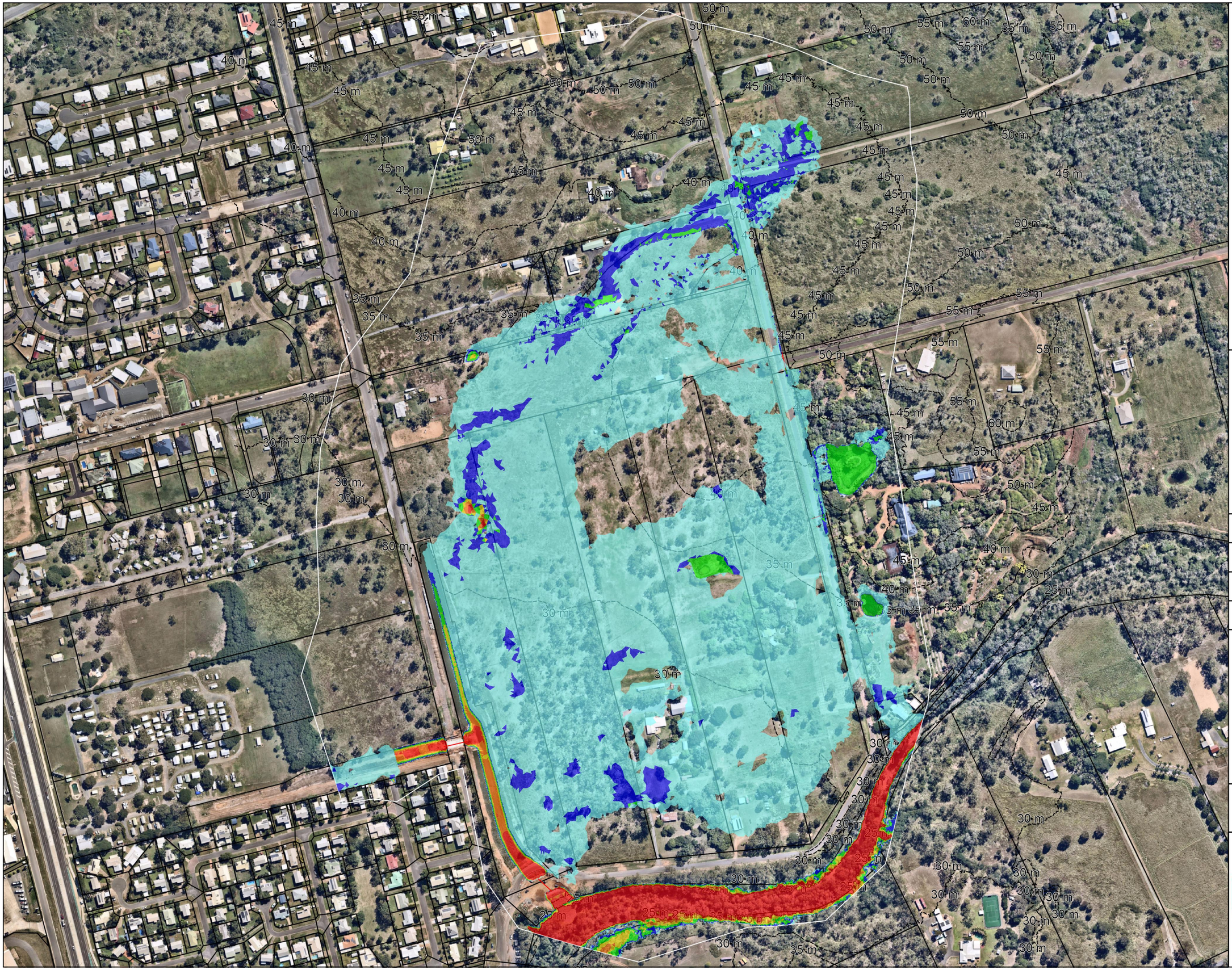

(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

1% AEP (EXISTING)

MAXIMUM FLOOD DEPTH APPENDIX A-7

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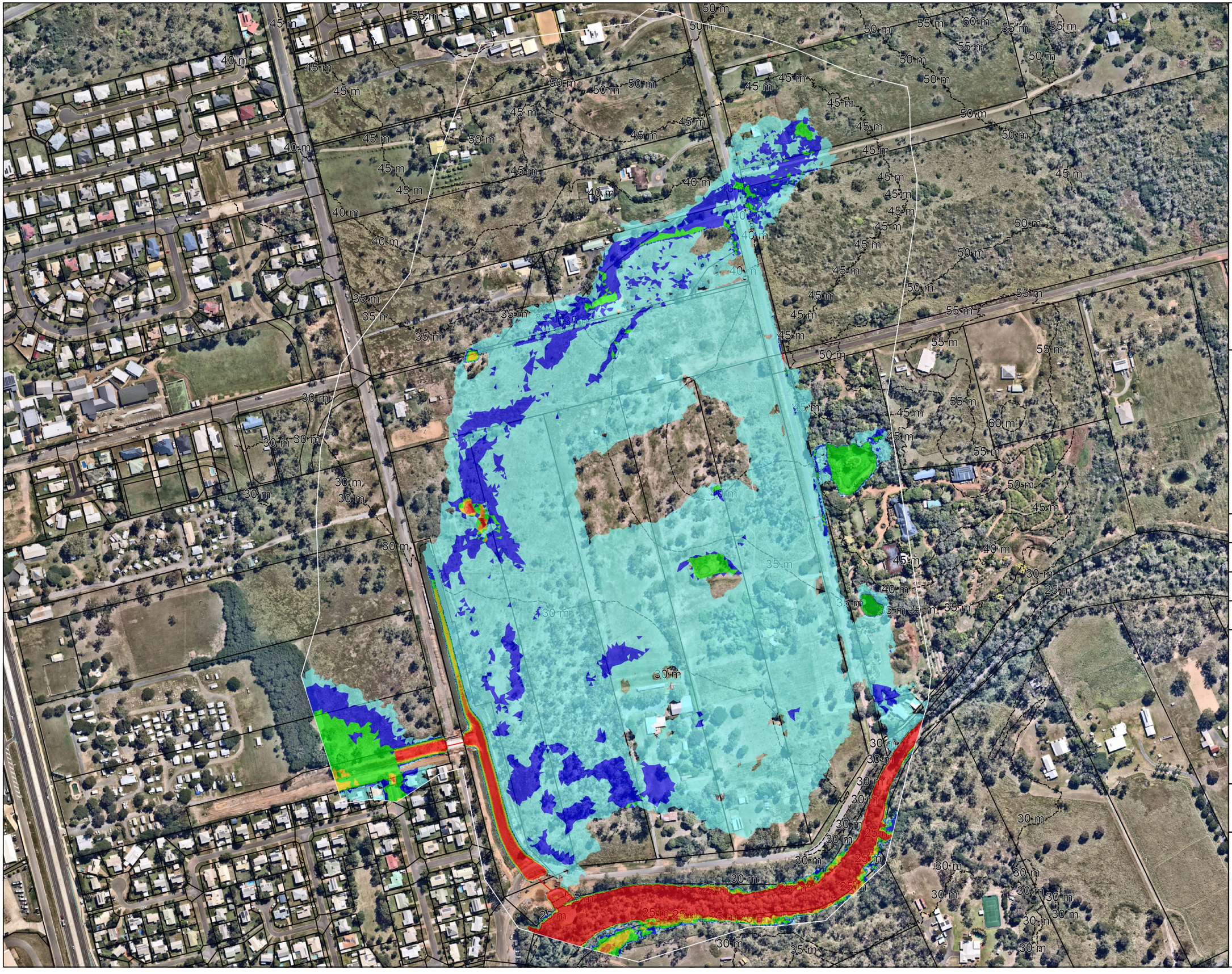

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

1 IN 500 YEAR (EXISTING)

MAXIMUM FLOOD DEPTH
APPENDIX A-8

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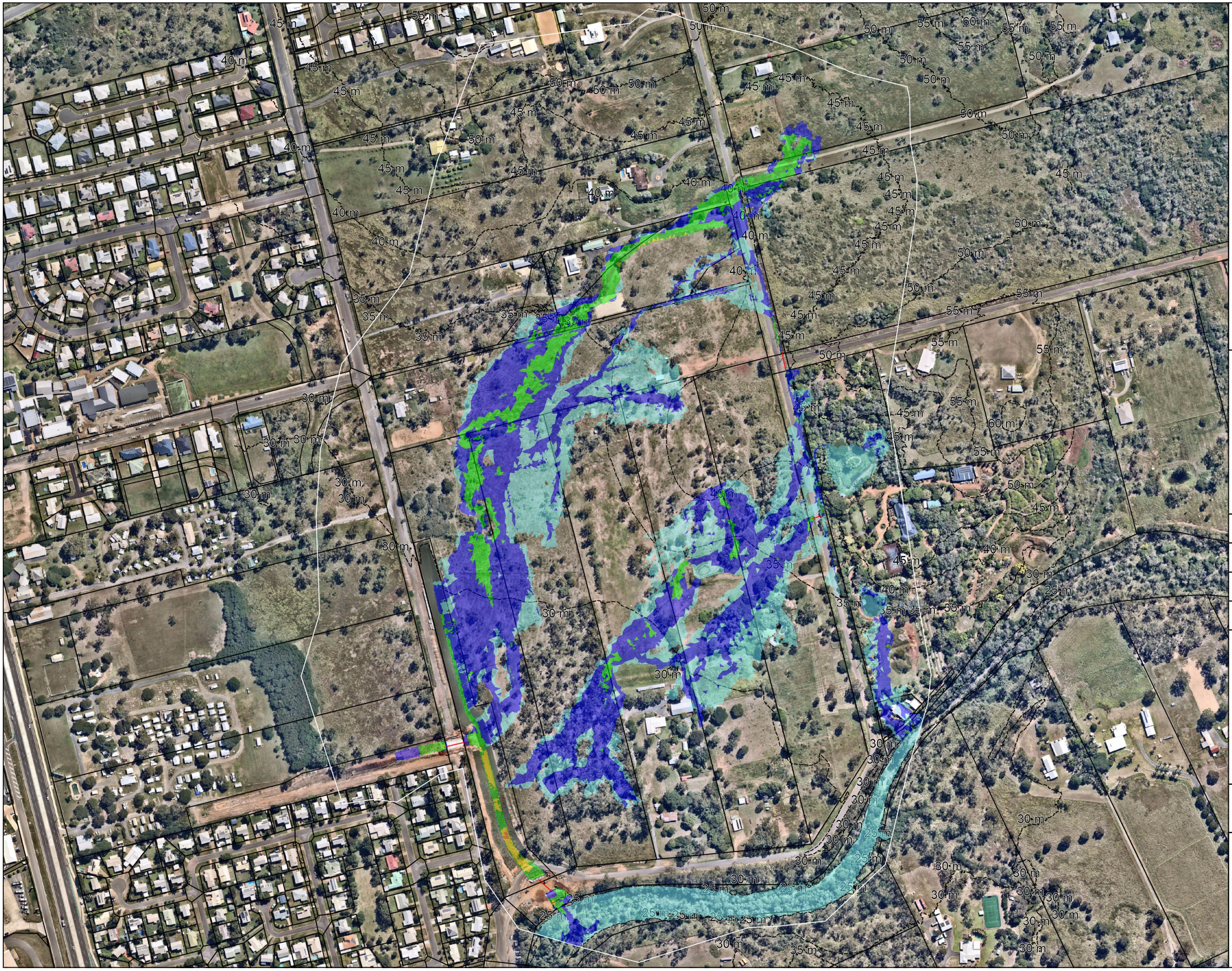

(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

63% AEP (EXISTING)

MAXIMUM FLOW VELOCITY
APPENDIX A-9

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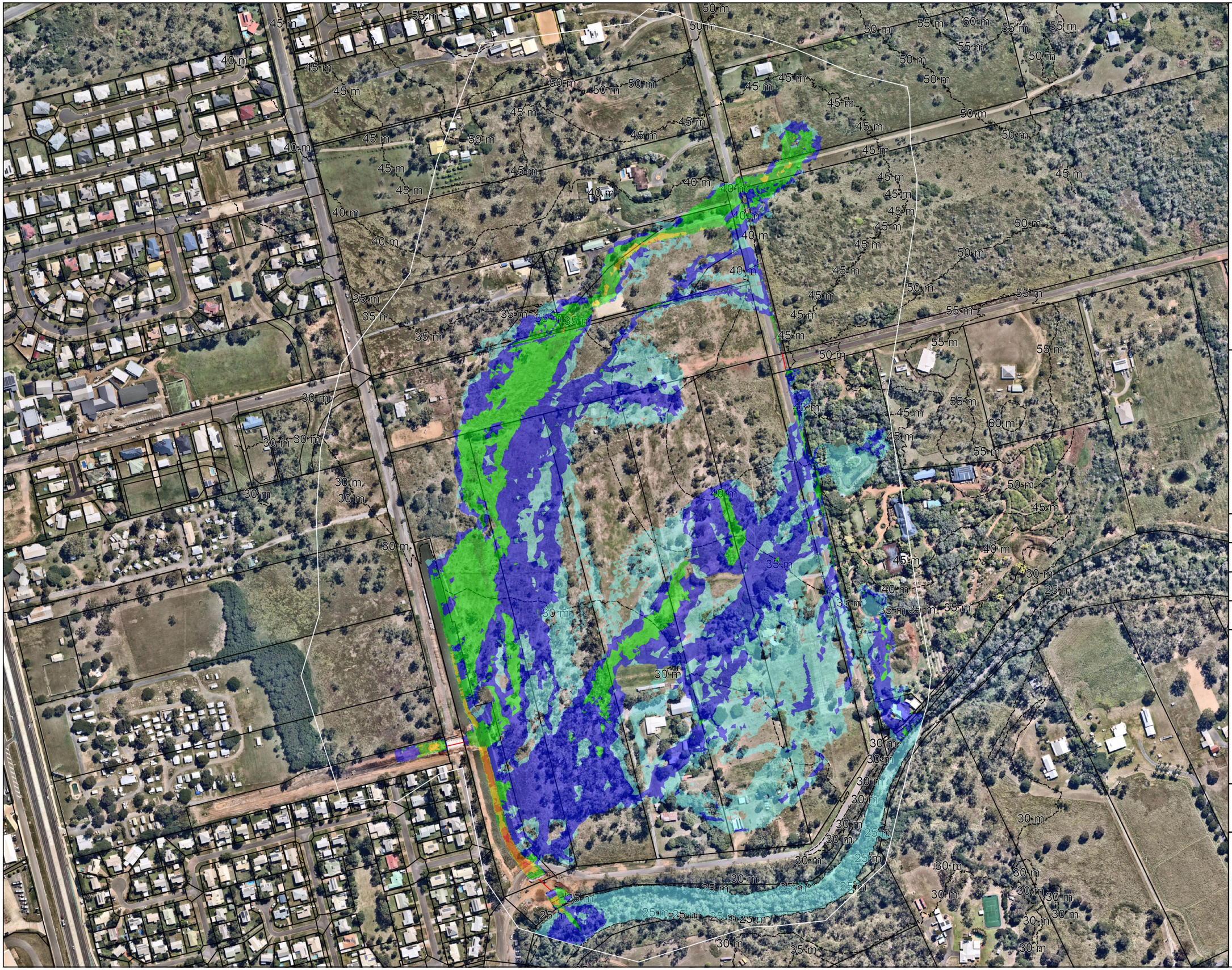

(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

39% AEP (EXISTING)

MAXIMUM FLOW VELOCITY APPENDIX A-10

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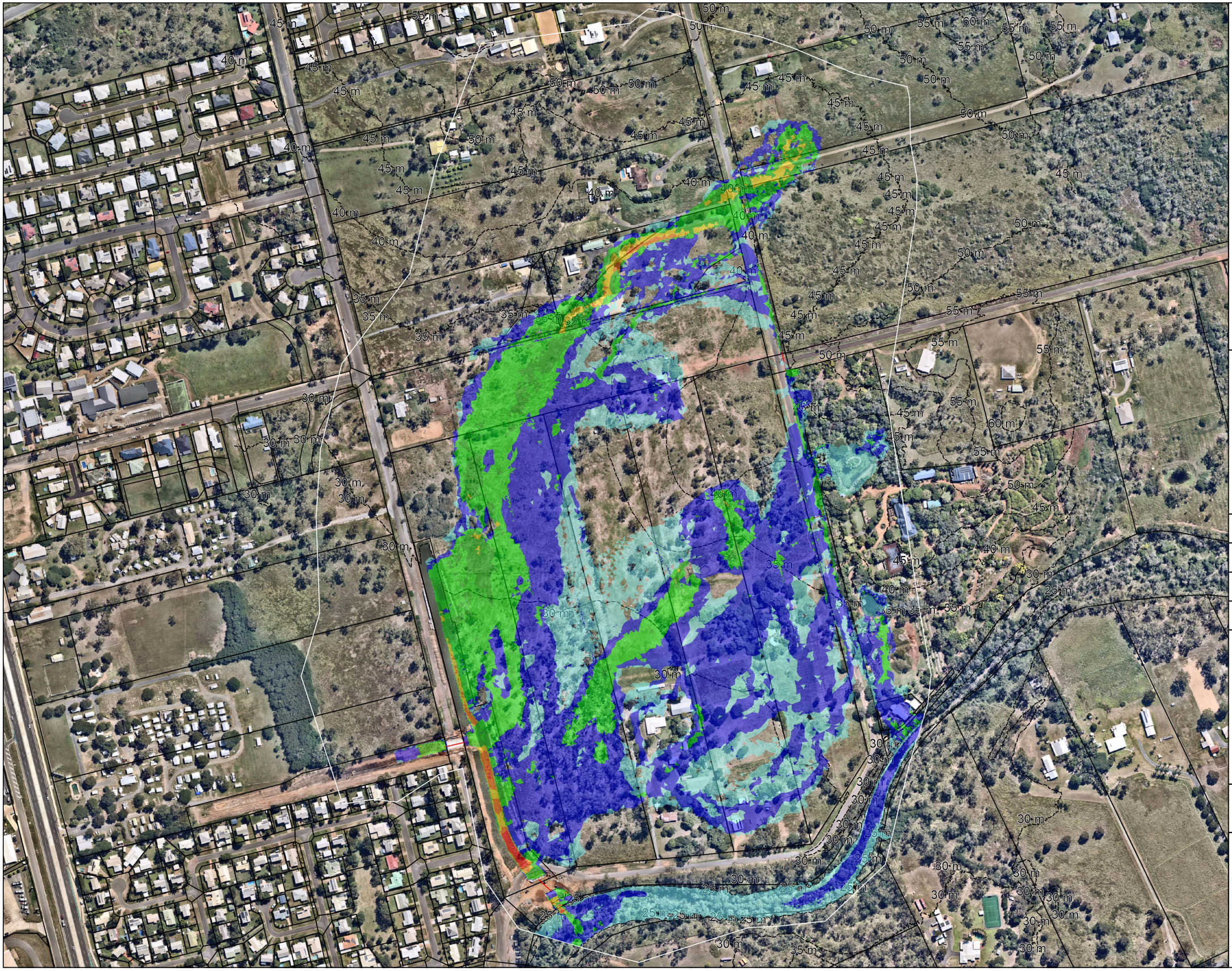

(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

18% AEP (EXISTING)

MAXIMUM FLOW VELOCITY
APPENDIX A-11

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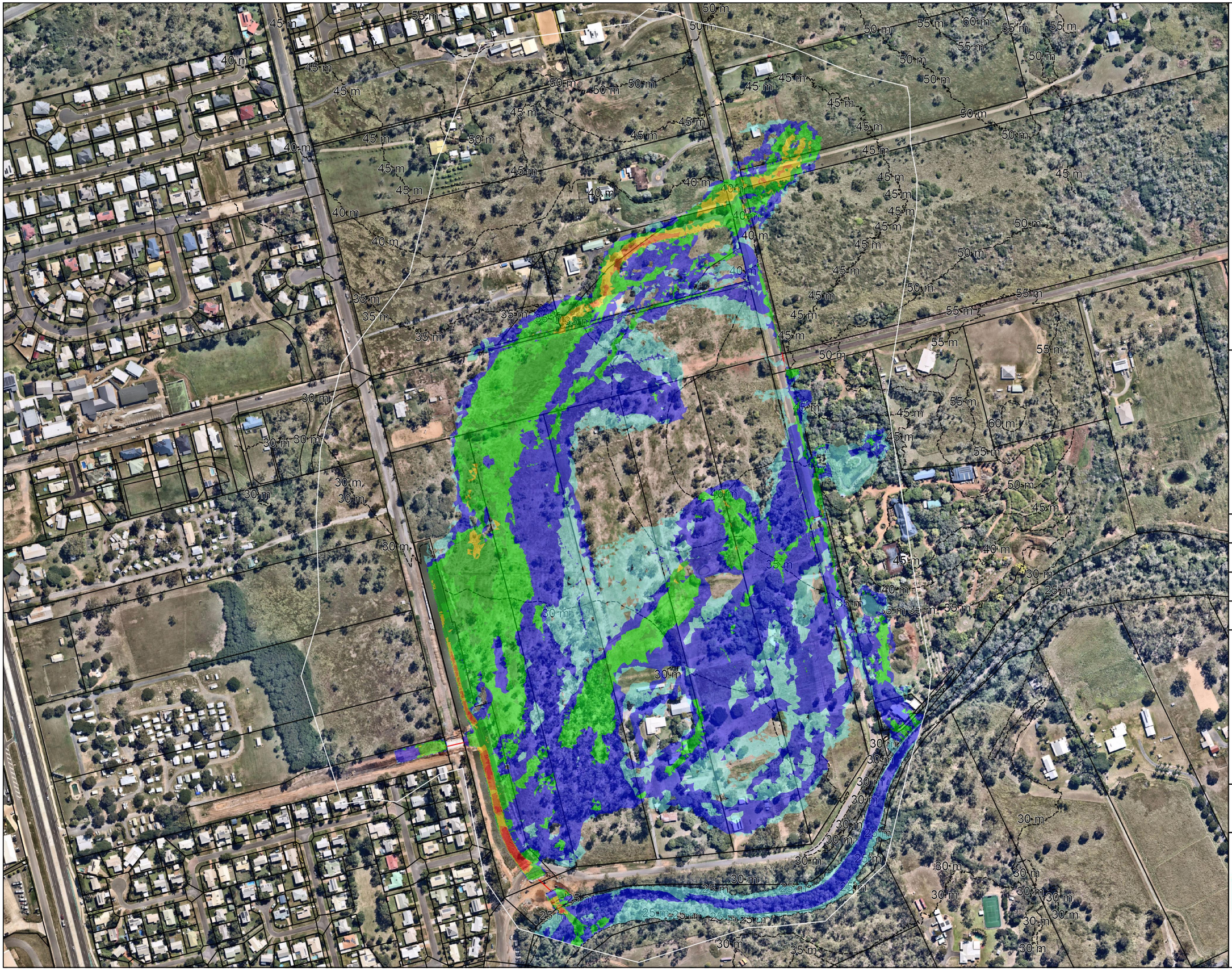

(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

10% AEP (EXISTING)

MAXIMUM FLOW VELOCITY
APPENDIX A-12

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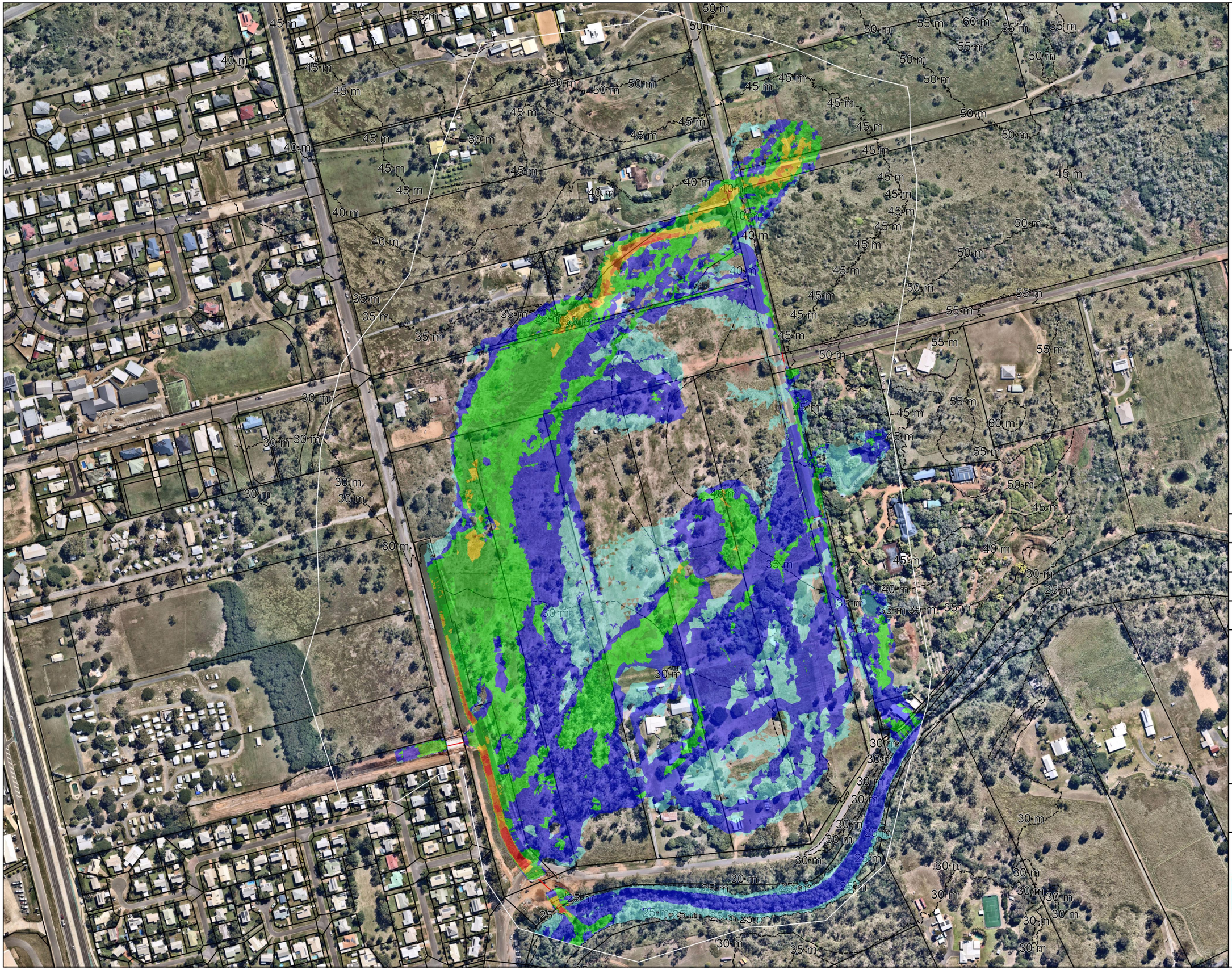

(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

5% AEP (EXISTING)

MAXIMUM FLOW VELOCITY
APPENDIX A-13

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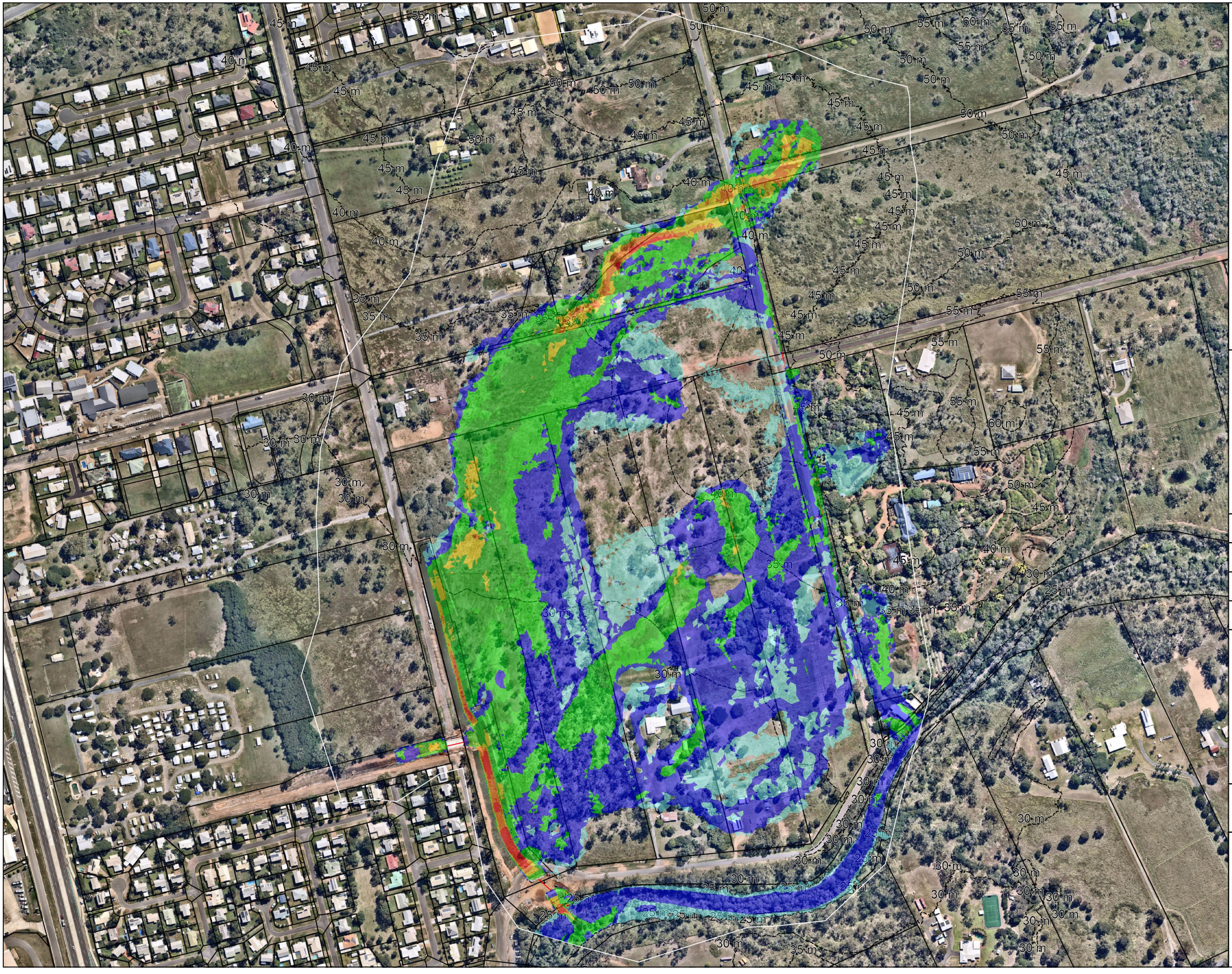

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

2% AEP (EXISTING)

MAXIMUM FLOW
VELOCITY
APPENDIX A-14

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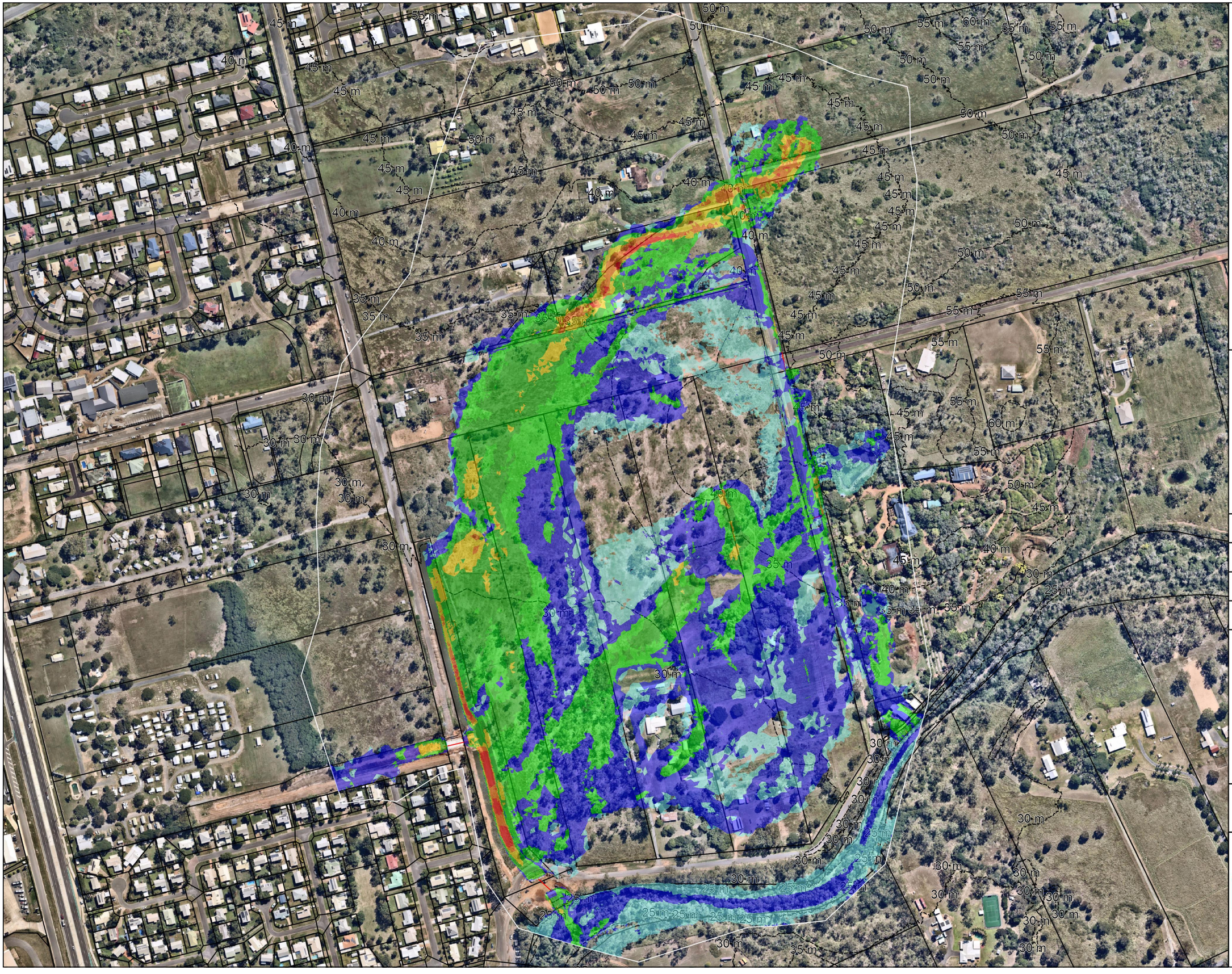

(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

1% AEP (EXISTING)

MAXIMUM FLOW VELOCITY APPENDIX A-15

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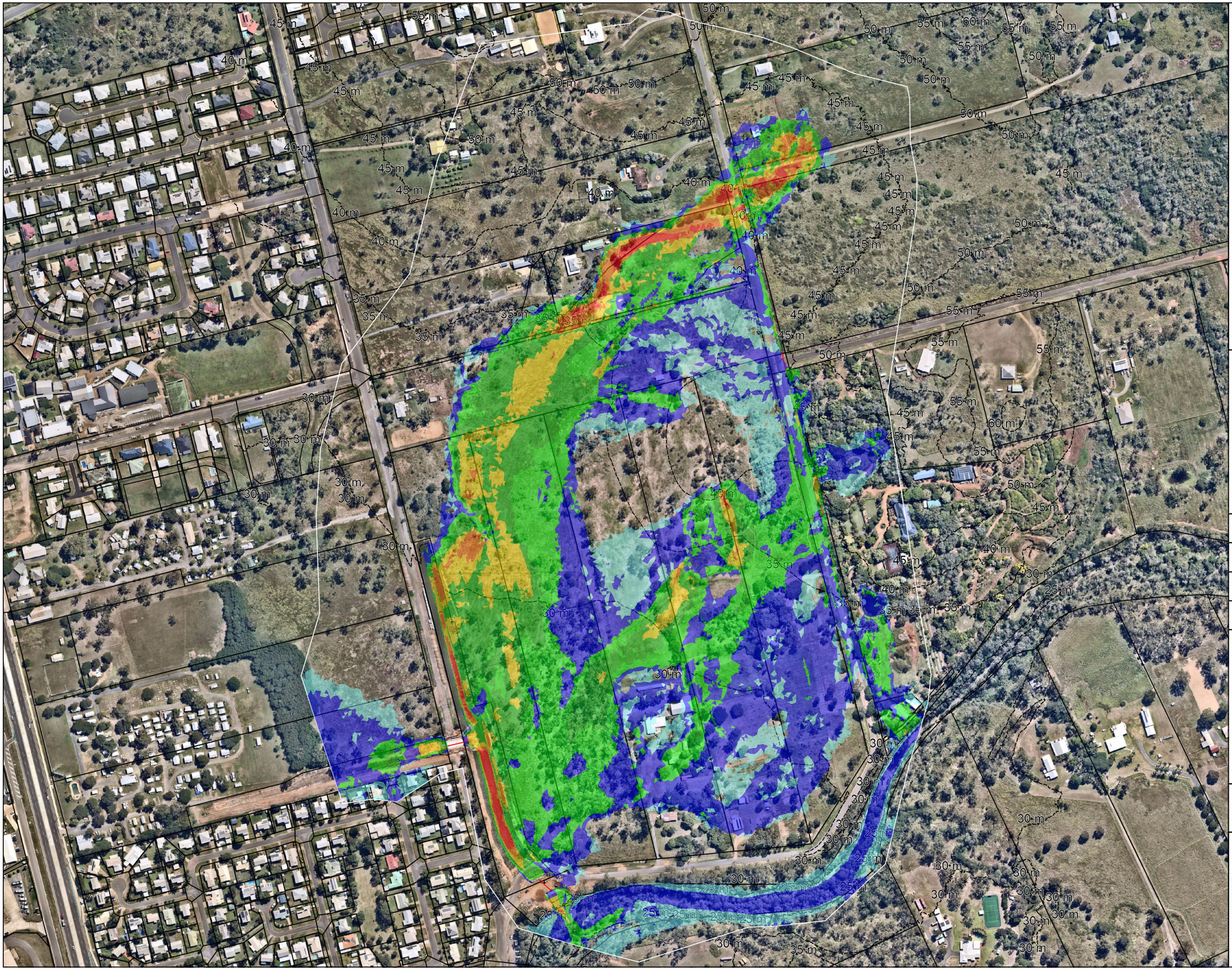

(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

1 IN 500 YEAR (EXISTING)

MAXIMUM FLOW VELOCITY APPENDIX A-16

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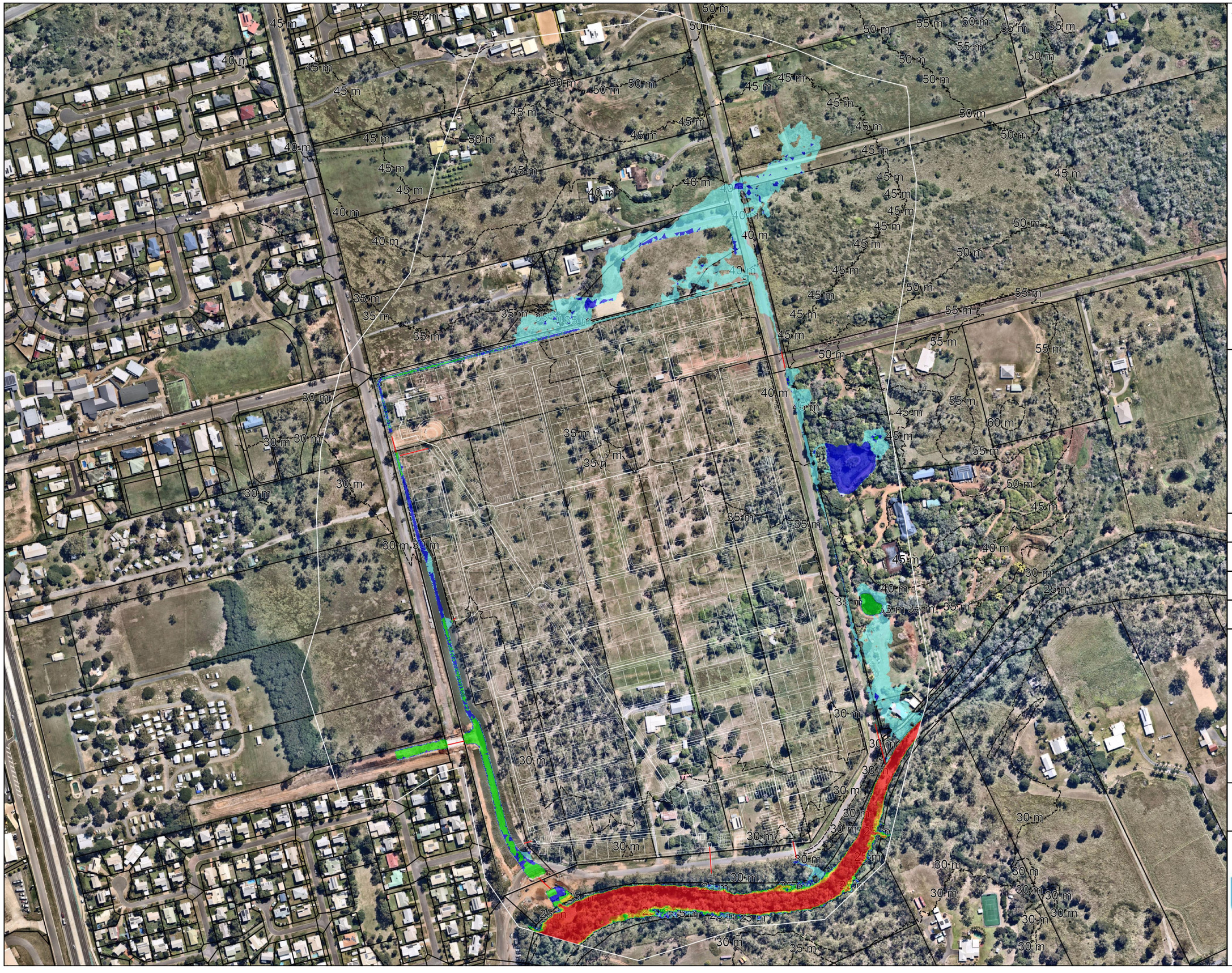

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

63% AEP (DEVELOPED)
MAXIMUM FLOOD DEPTH
APPENDIX A-17

REVISIONS

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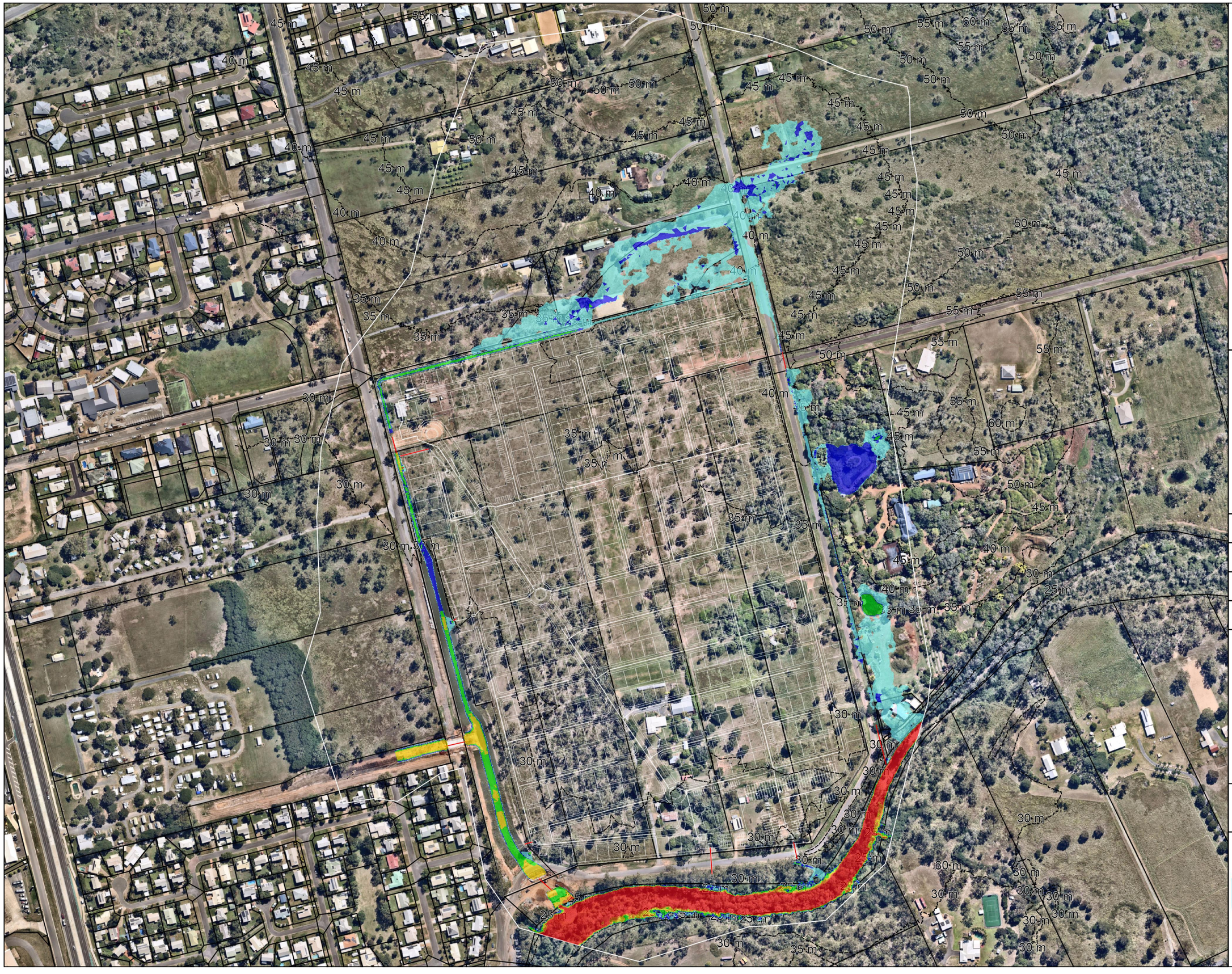

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

39% AEP (DEVELOPED)
MAXIMUM FLOOD DEPTH
APPENDIX A-18

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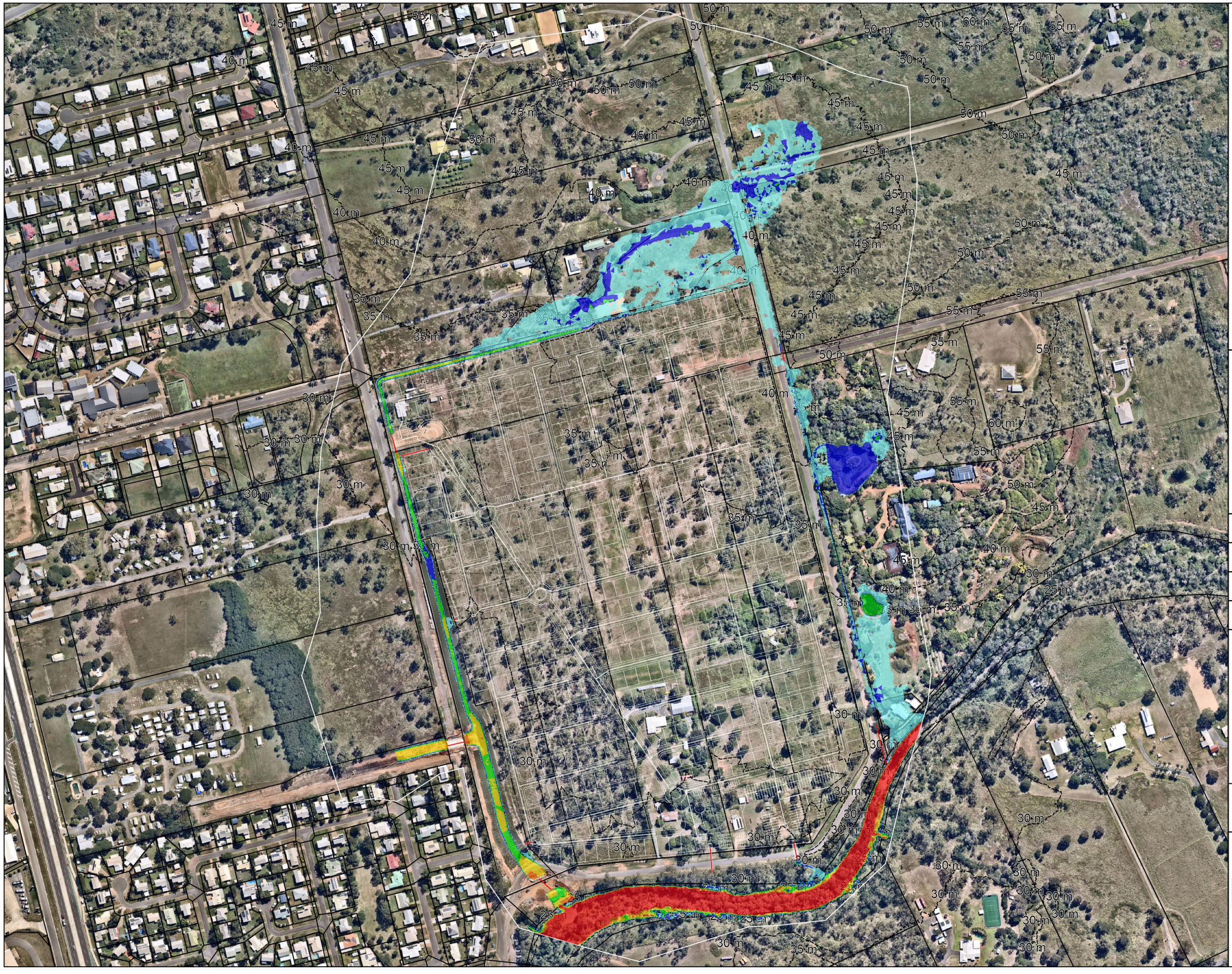

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

18% AEP (DEVELOPED)
MAXIMUM FLOOD DEPTH
APPENDIX A-19

REVISIONS

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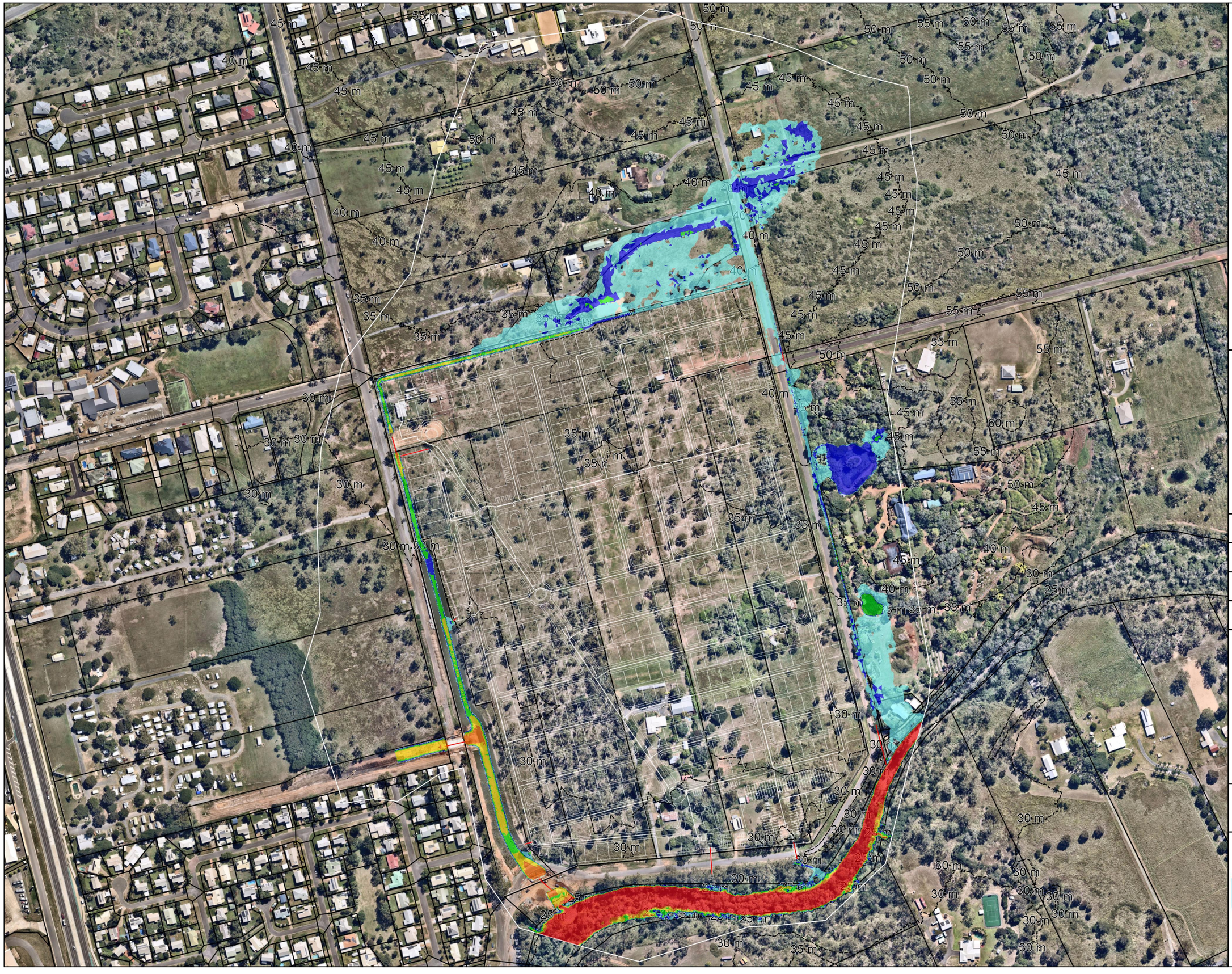

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

10% AEP (DEVELOPED)
MAXIMUM FLOOD DEPTH
APPENDIX A-20

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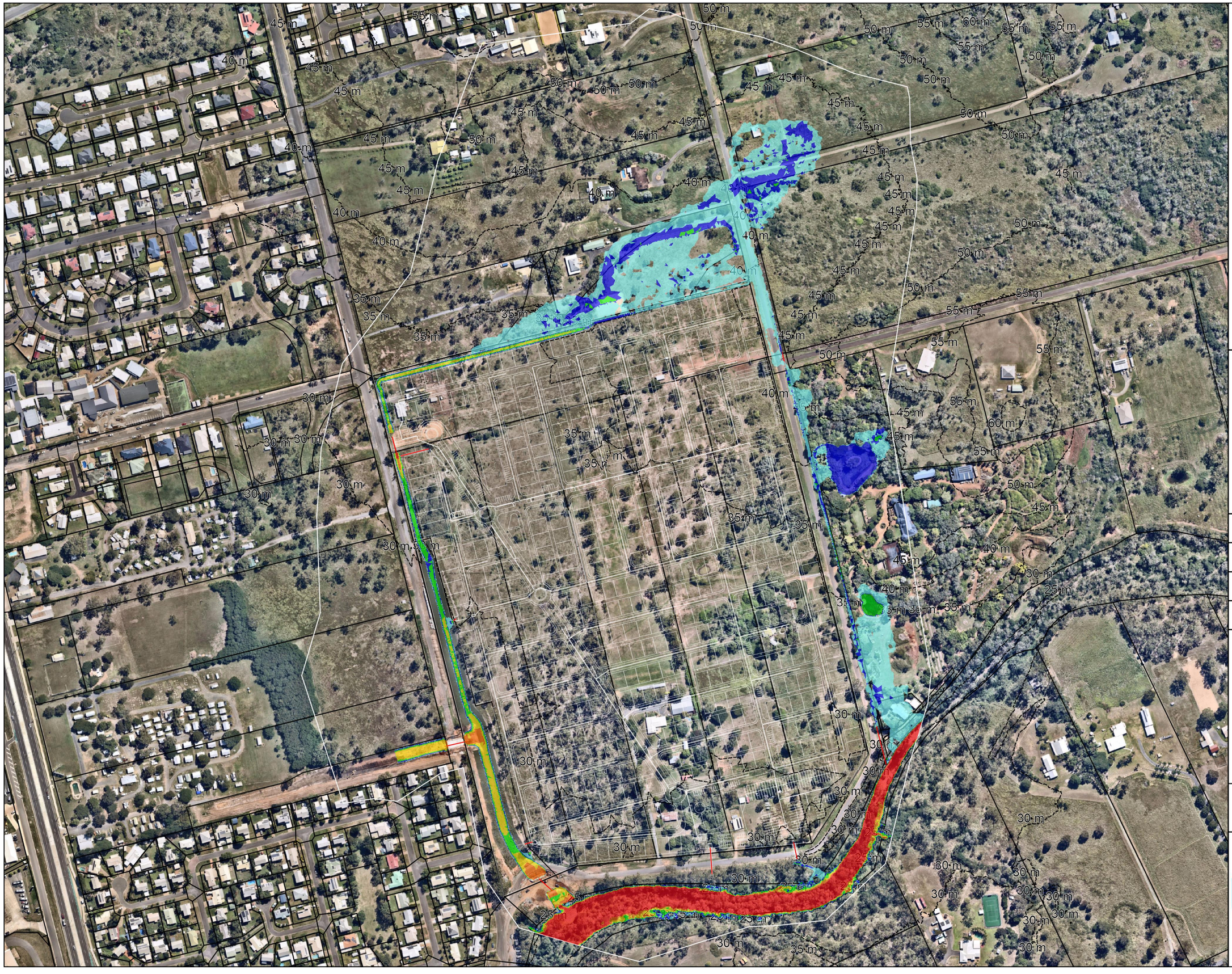

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

5% AEP (DEVELOPED)
MAXIMUM FLOOD DEPTH
APPENDIX A-21

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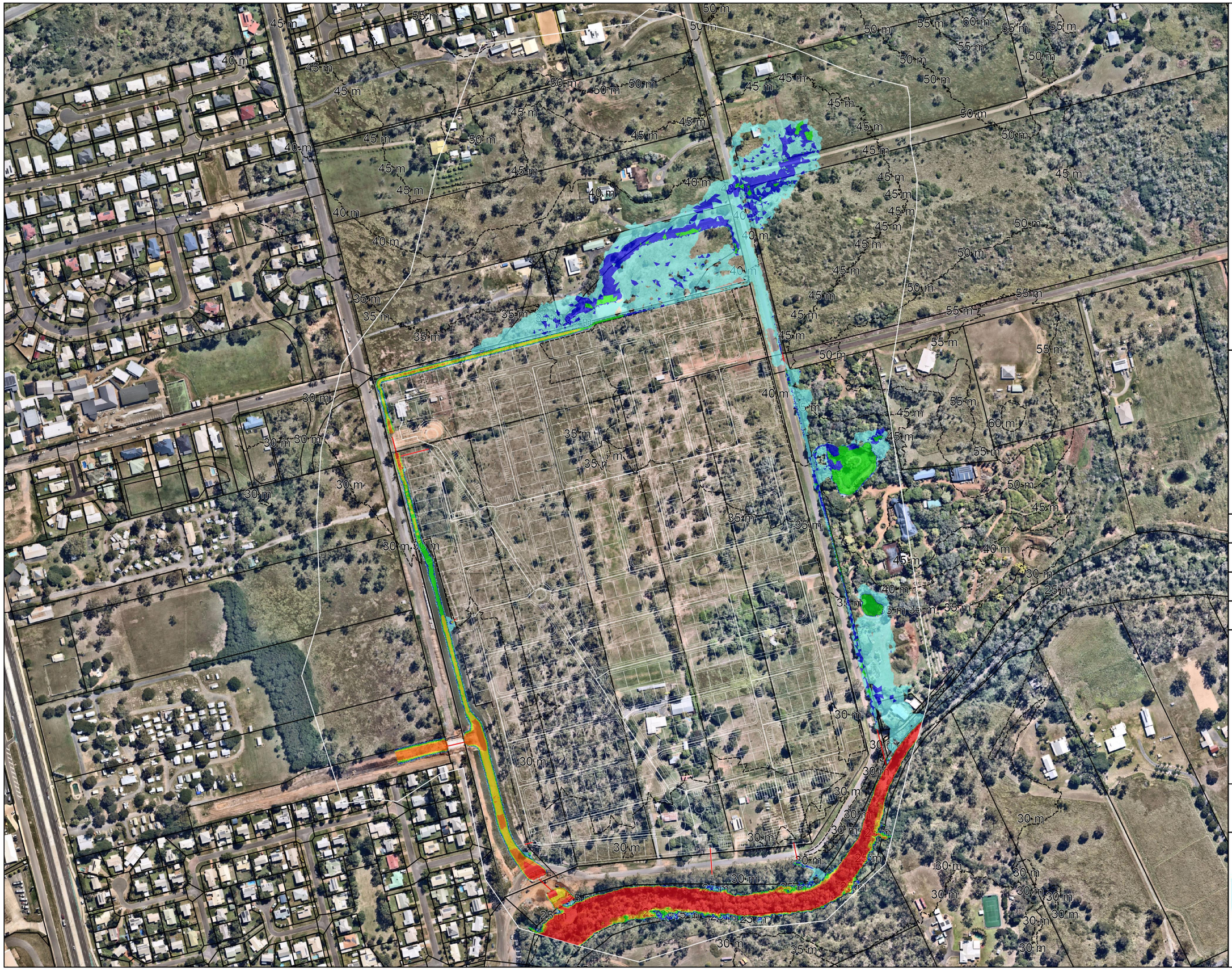

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

2% AEP (DEVELOPED)
MAXIMUM FLOOD DEPTH
APPENDIX A-22

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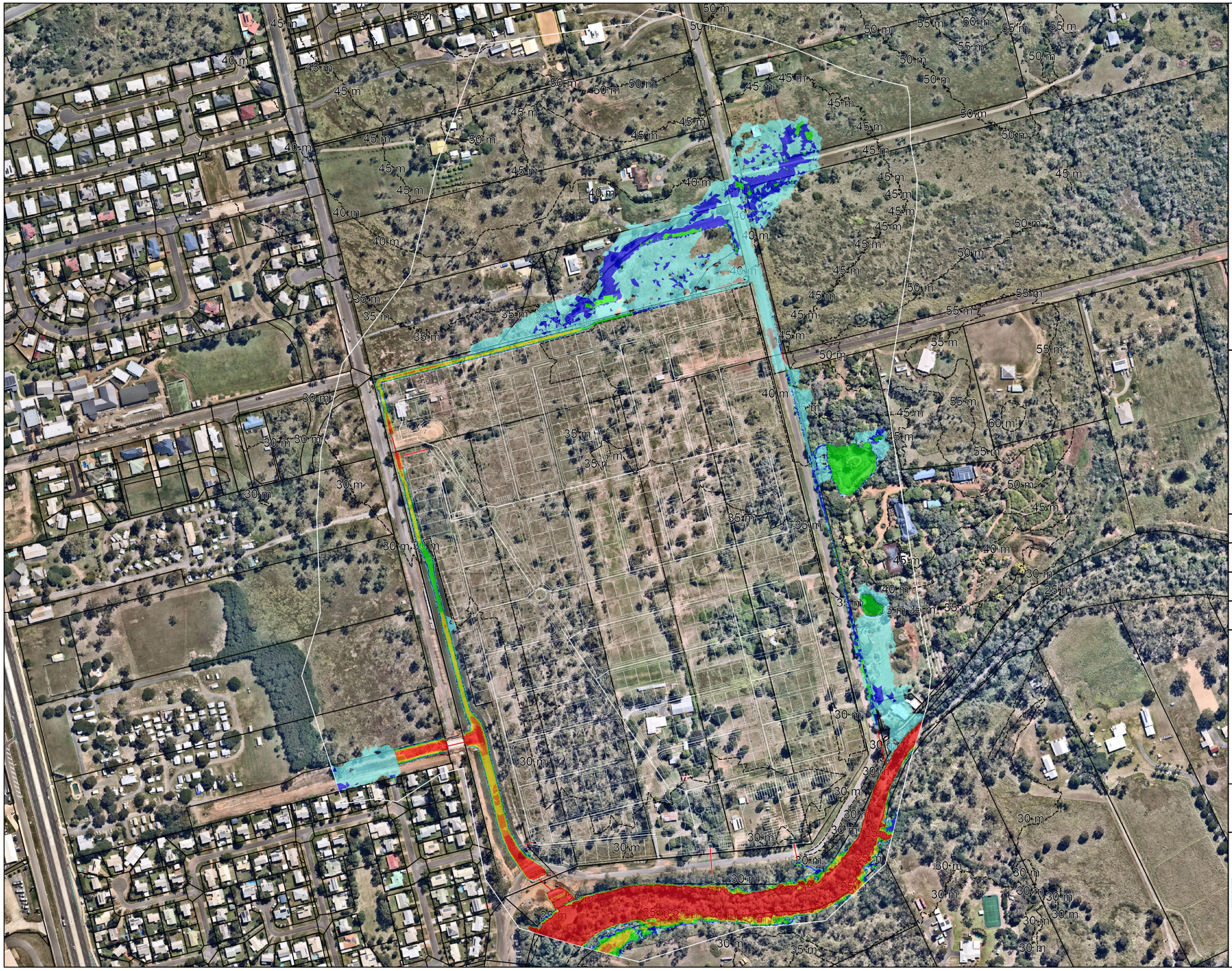

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

1% AEP (DEVELOPED)
MAXIMUM FLOOD DEPTH
APPENDIX A-23

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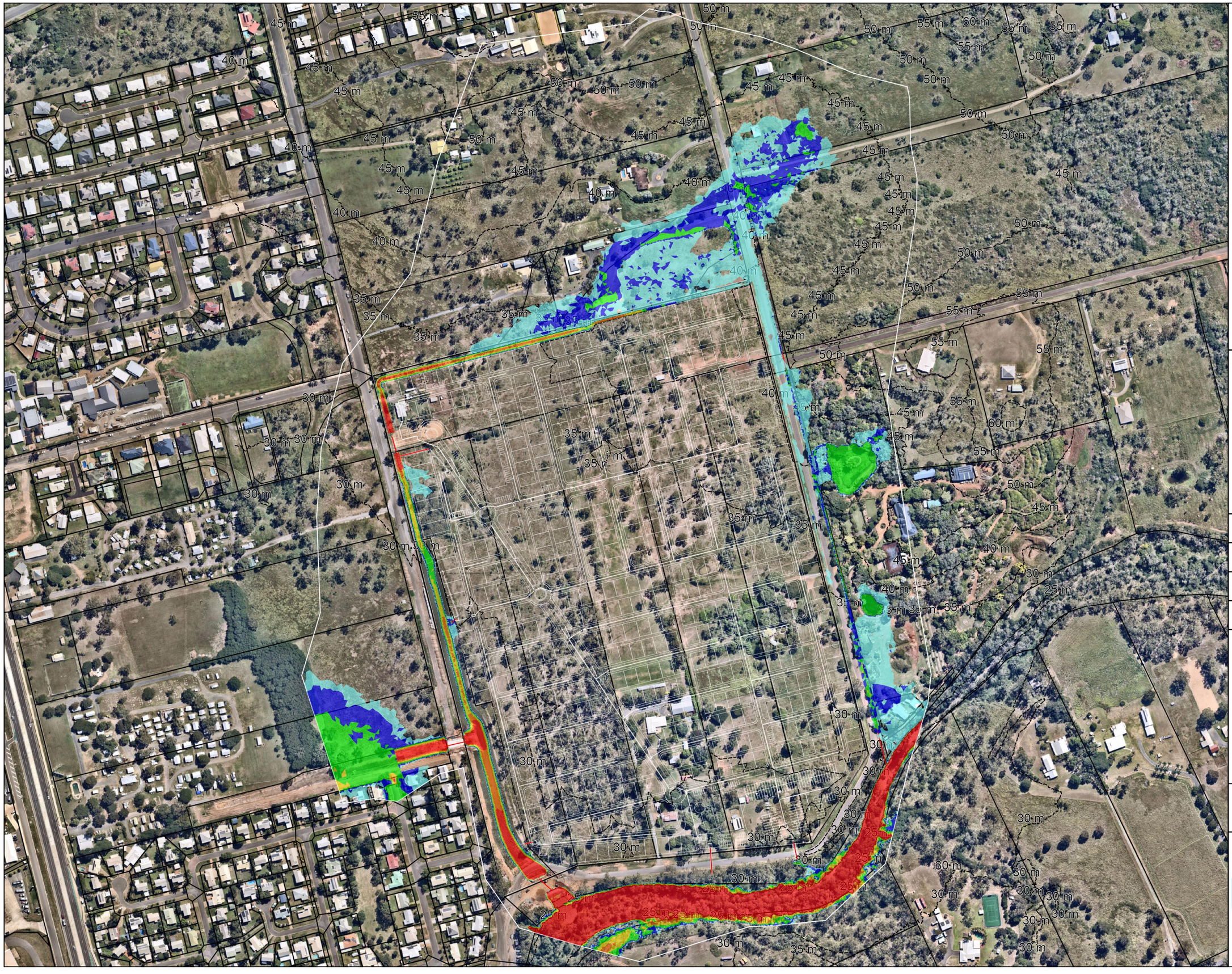

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

1 IN 500 YEAR
(DEVELOPED)
MAXIMUM FLOOD DEPTH
APPENDIX A-24

REVISIONS

APPROVED

J. HILL
RPEQ 19891
FOR AND ON BEHALF

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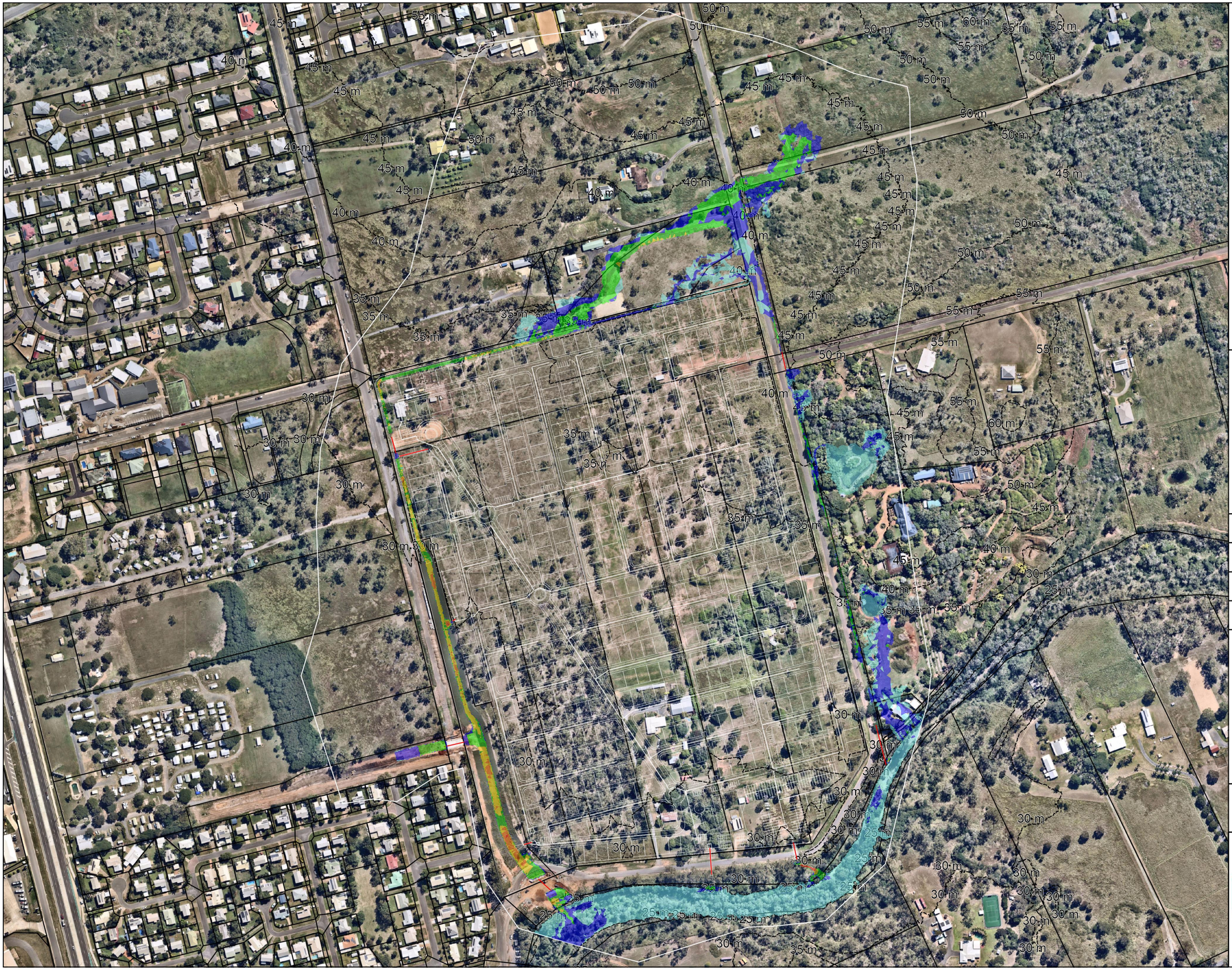

(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

63% AEP (DEVELOPED) MAXIMUM FLOW VELOCITY APPENDIX A-25

REVISIONS

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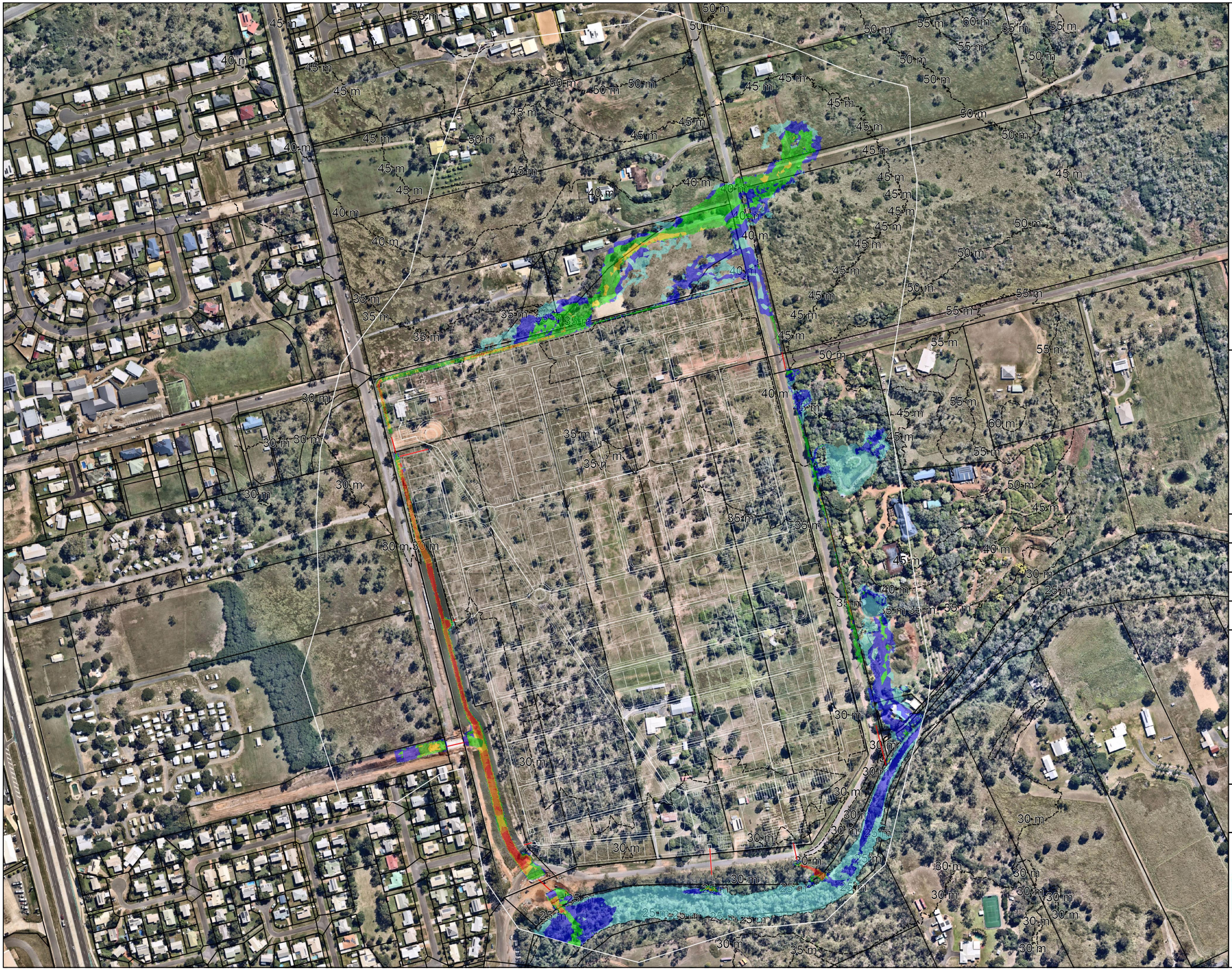

(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

39% AEP (DEVELOPED) MAXIMUM FLOW VELOCITY APPENDIX A-26

REVISIONS

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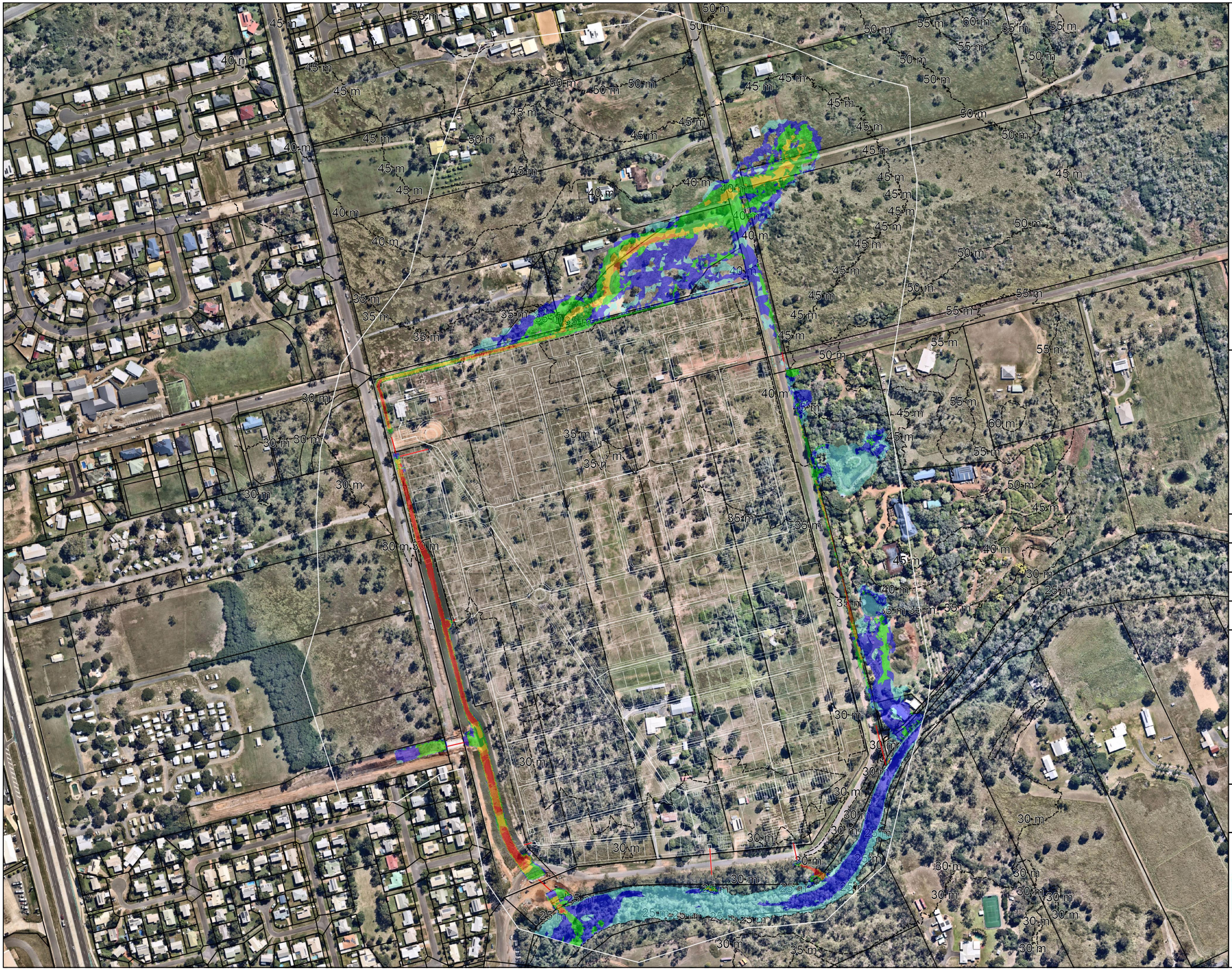

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

18% AEP (DEVELOPED)
MAXIMUM FLOW
VELOCITY
APPENDIX A-27

REVISIONS

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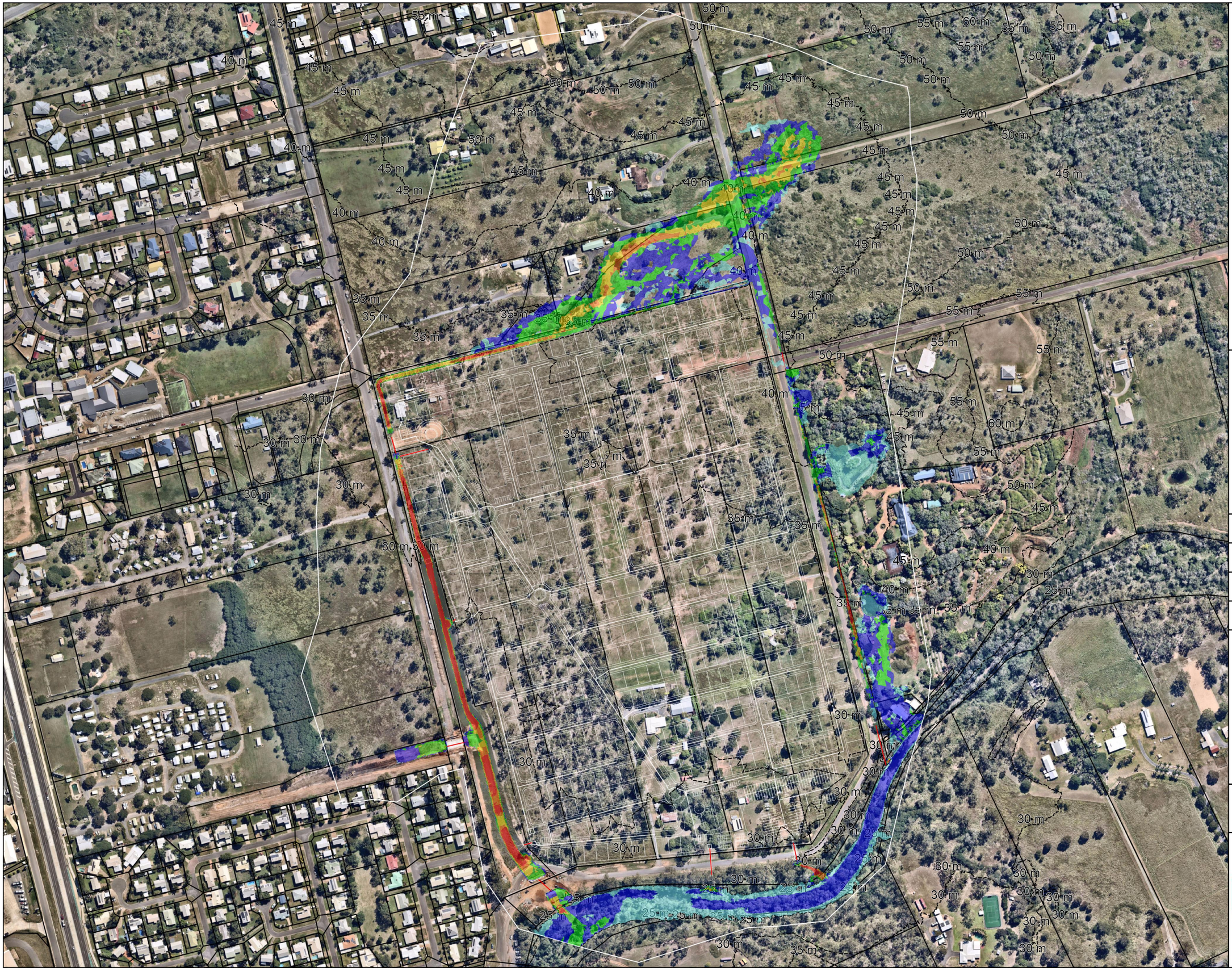

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

10% AEP (DEVELOPED)
MAXIMUM FLOW
VELOCITY
APPENDIX A-28

REVISIONS

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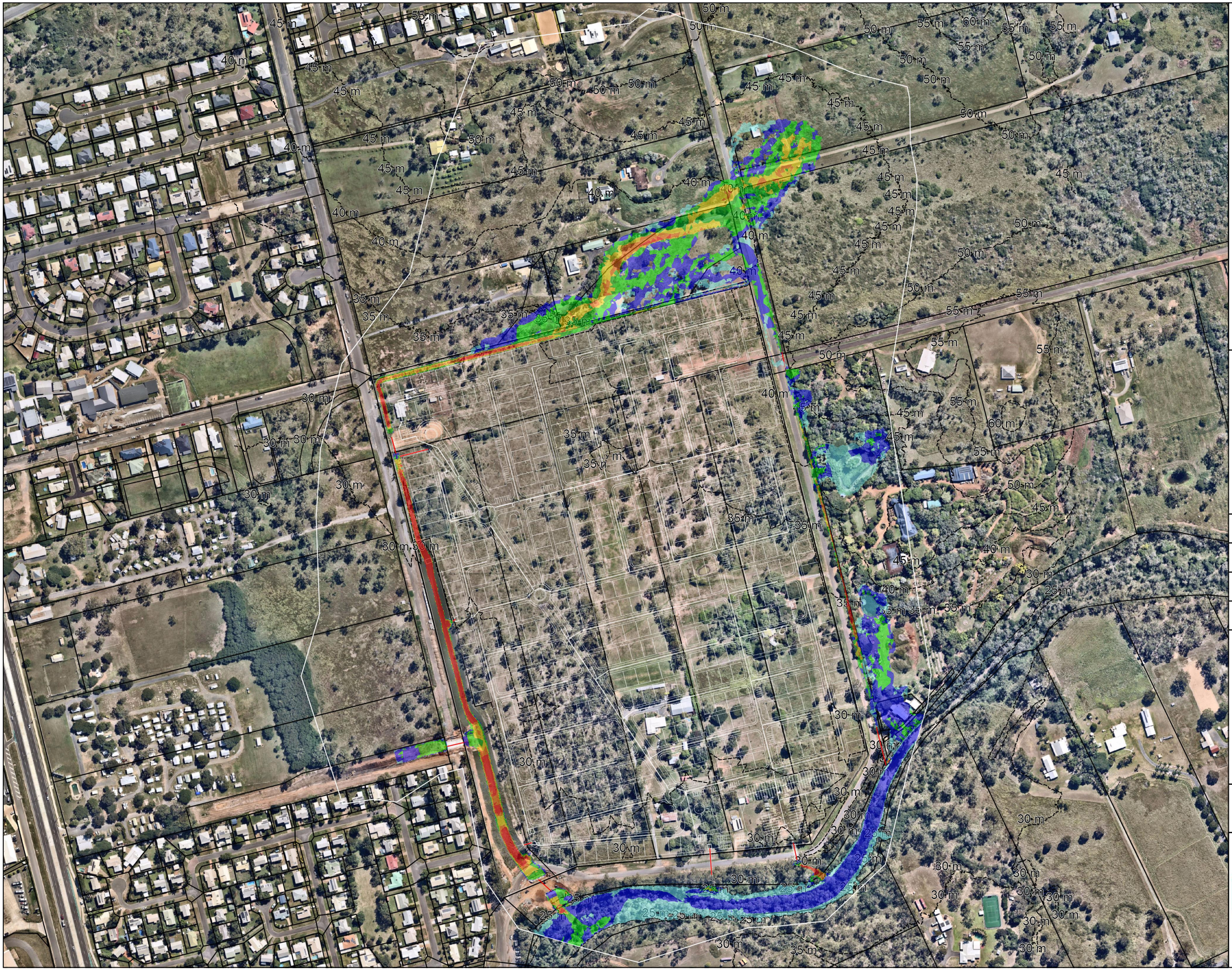

(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

5% AEP (DEVELOPED) MAXIMUM FLOW VELOCITY APPENDIX A-29

REVISIONS

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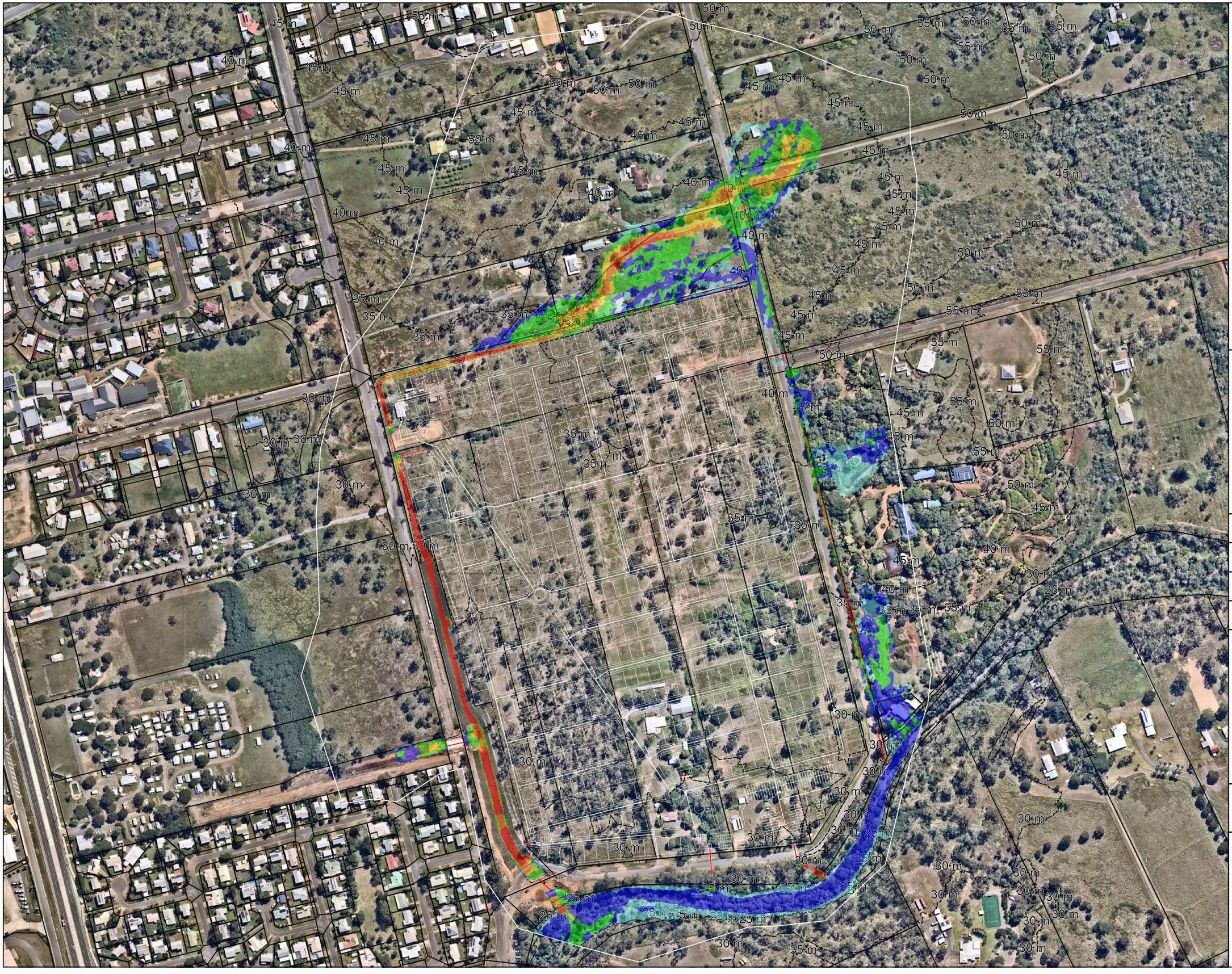

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

2% AEP (DEVELOPED)
MAXIMUM FLOW
VELOCITY
APPENDIX A-30

REVISIONS

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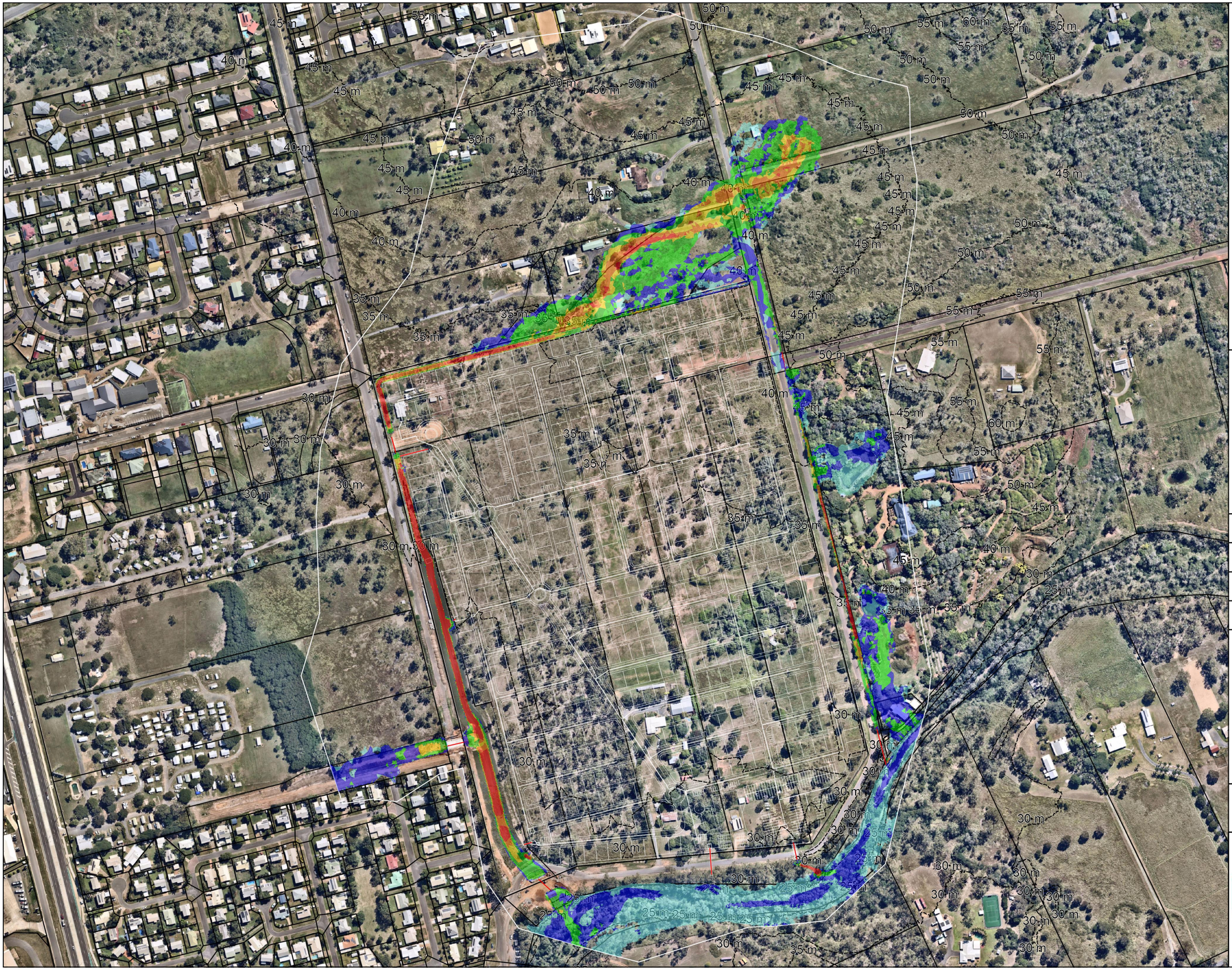

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

1% AEP (DEVELOPED)
MAXIMUM FLOW
VELOCITY
APPENDIX A-31

REVISIONS

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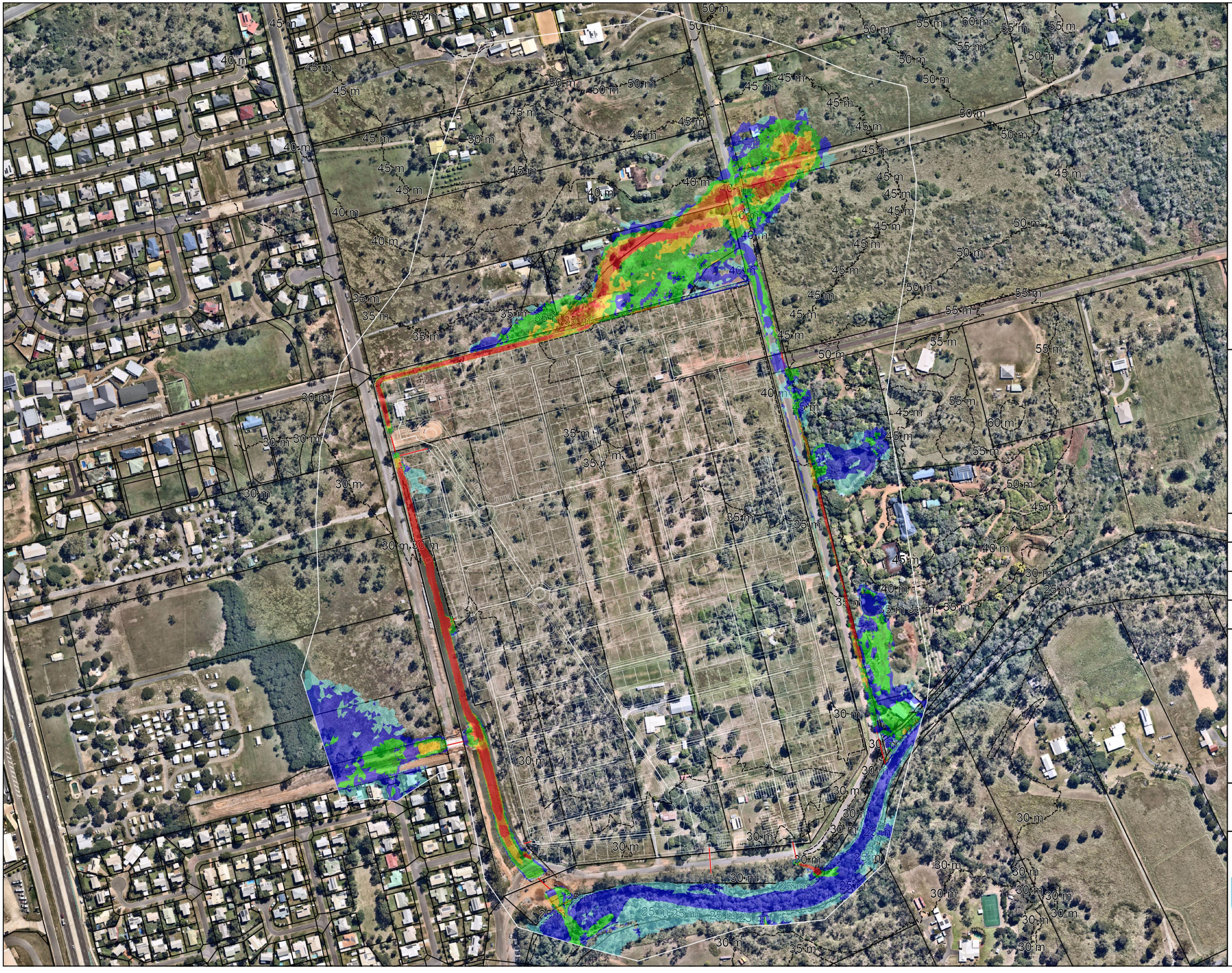

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

1 IN 500 YEAR
(DEVELOPED)
MAXIMUM FLOW
VELOCITY
APPENDIX A-32

REVISIONS

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(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

63% AEP (DEVELOPED)

WATER LEVEL AFFLUX APPENDIX A-33

REVISIONS

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(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

39% AEP (DEVELOPED)

WATER LEVEL AFFLUX
APPENDIX A-34

REVISIONS

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(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

18% AEP (DEVELOPED)

WATER LEVEL AFFLUX APPENDIX A-35

REVISIONS

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WESTERA PARTNERS



(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

10% AEP (DEVELOPED)

WATER LEVEL AFFLUX
APPENDIX A-36

REVISIONS

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(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

5% AEP (DEVELOPED)

WATER LEVEL AFFLUX APPENDIX A-37

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(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

2% AEP (DEVELOPED)

WATER LEVEL AFFLUX APPENDIX A-38

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(S25-028)
930-960 NORMAN ROAD, PARKHURST

PROPOSED RETIREMENT LIVING FACILITY

1% AEP (DEVELOPED)

WATER LEVEL AFFLUX APPENDIX A-39

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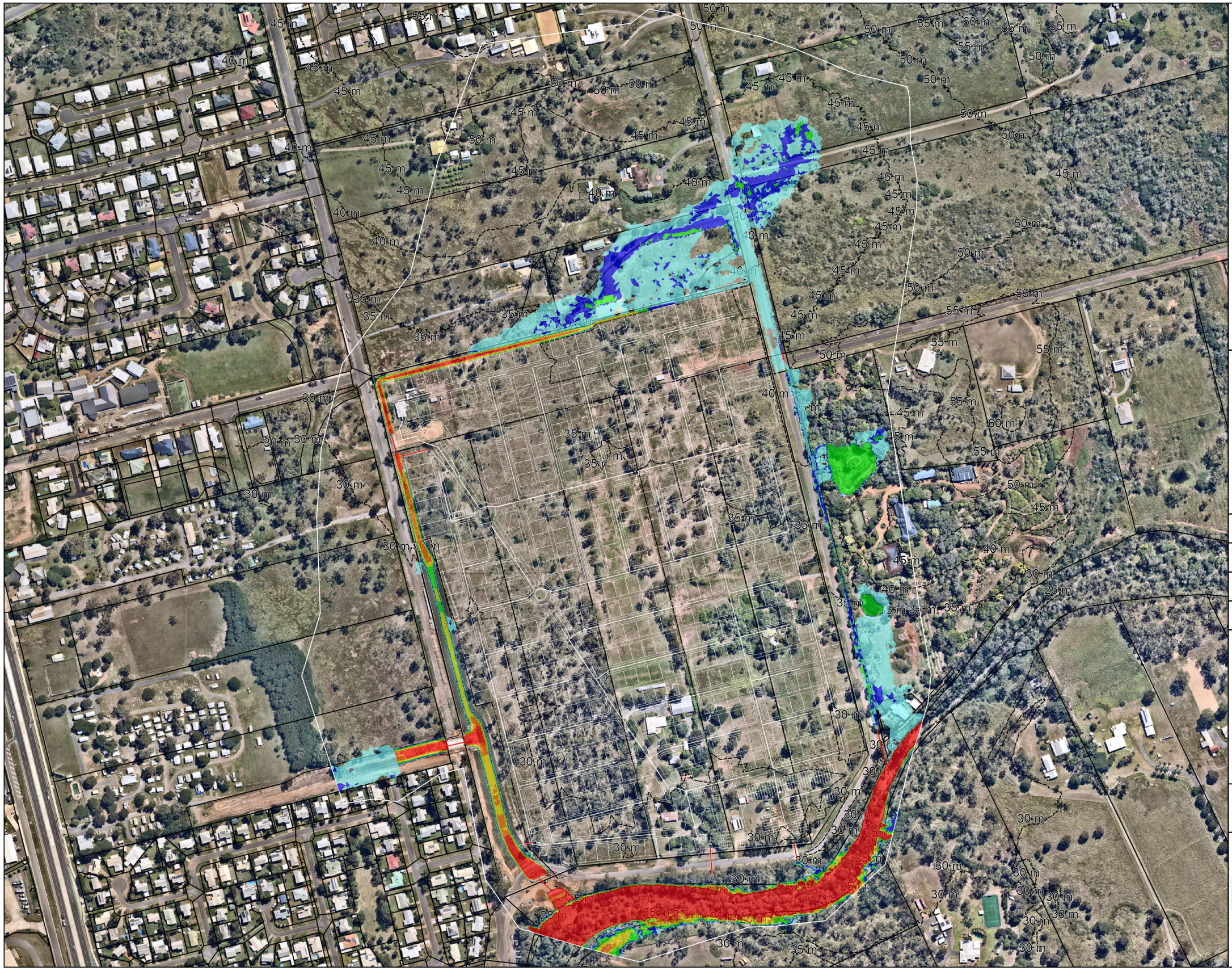

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

1% AEP (DEVELOPED)
MAXIMUM FLOOD DEPTH
ROUGHNESS
SENSITIVITY
APPENDIX A-40

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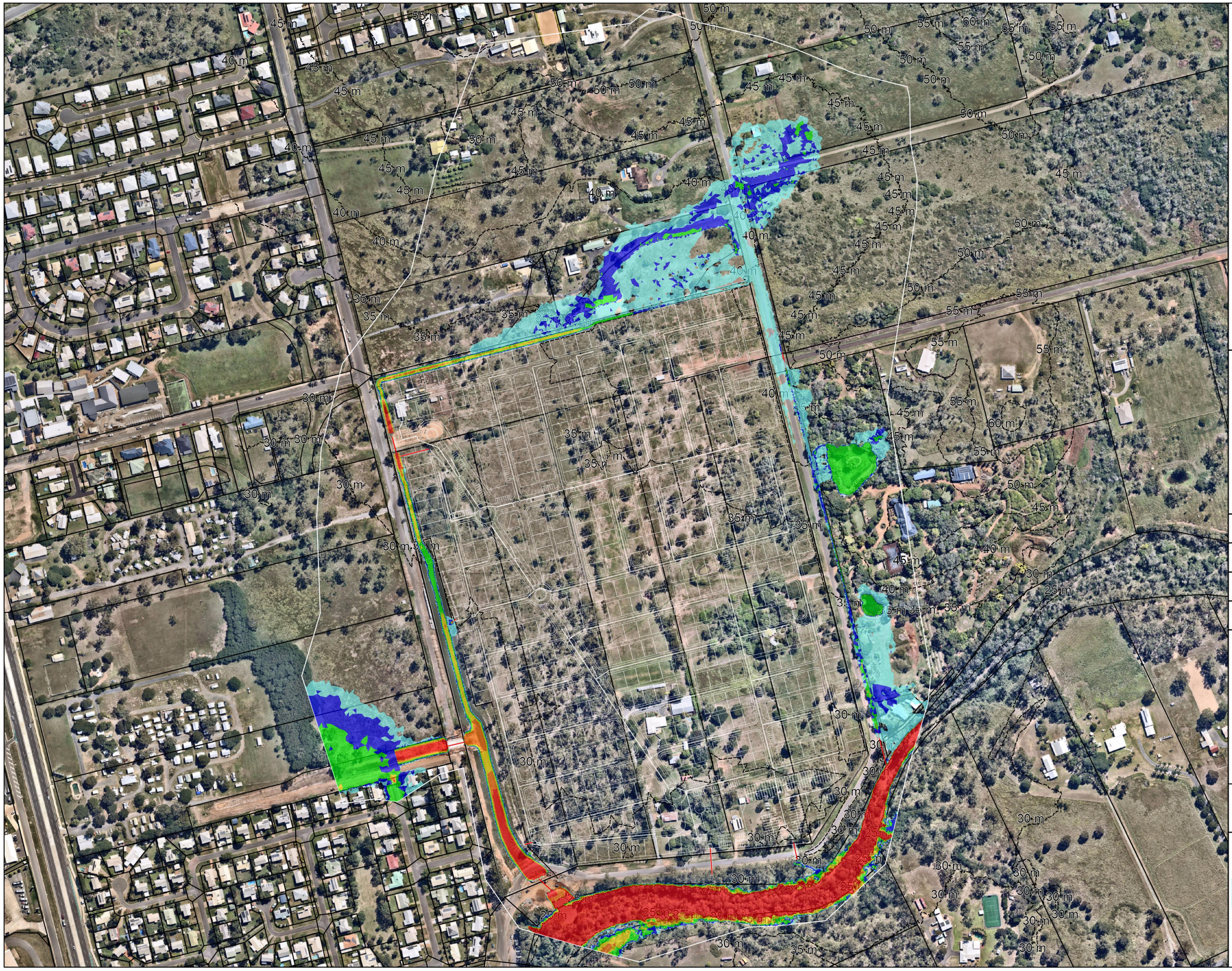

(S25-028)
930-960 NORMAN ROAD,
PARKHURST

PROPOSED RETIREMENT
LIVING FACILITY

1% AEP (DEVELOPED)
MAXIMUM FLOOD DEPTH
BLOCKAGE SENSITIVITY
APPENDIX A-41

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6.2 Appendix B – Engineering Drawings

PROPOSED RETIREMENT LIVING DEVELOPMENT

930 - 960 NORMAN ROAD, PARKHUST

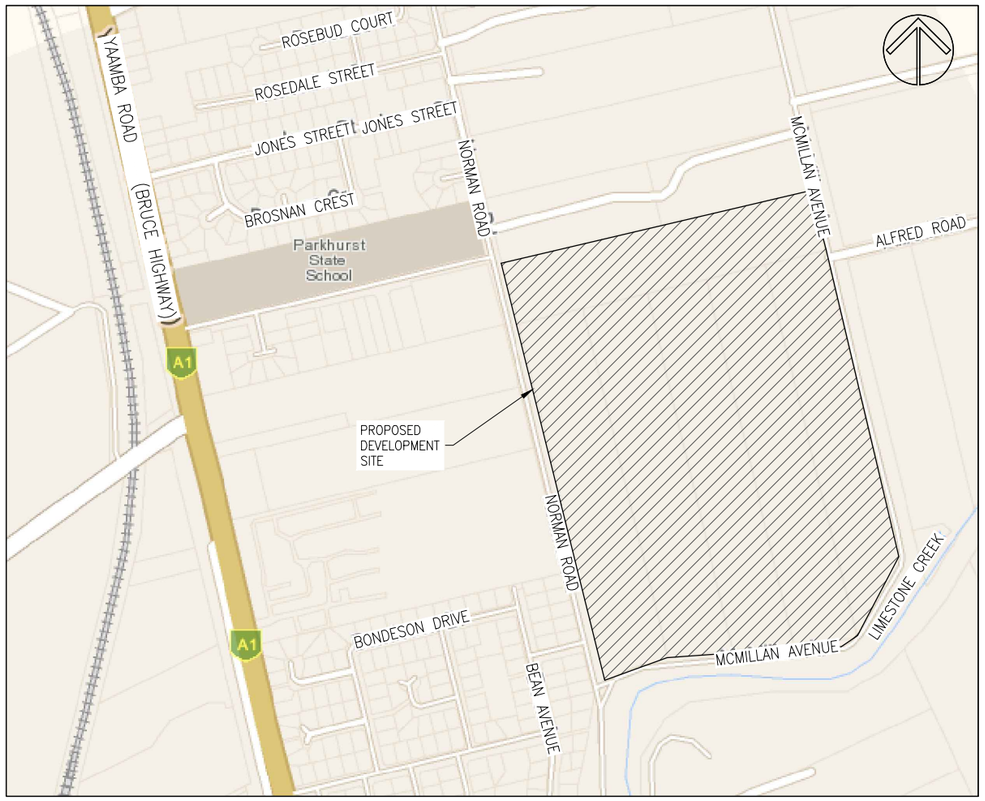
RUBY DEVELOPMENTS PTY LTD

Project Number: S25-028

INDEX OF DRAWINGS

GENERAL DRAWINGS
S25-028-G01 COVER SHEET

CIVIL DRAWINGS
S25-028-PC01 CIVIL NOTES & LEGEND
S25-028-PC02 SITE PLAN
S25-028-PC03 PRELIMINARY CATCHMENTS PLAN
S25-028-PC04 PRELIMINARY CIVIL WORKS PLAN 1 of 4
S25-028-PC05 PRELIMINARY CIVIL WORKS PLAN 2 of 4
S25-028-PC06 PRELIMINARY CIVIL WORKS PLAN 3 of 4
S25-028-PC07 PRELIMINARY CIVIL WORKS PLAN 4 of 4
S25-028-PC08 PRELIMINARY CHANNEL SECTIONS
S25-028-PC09 PRELIMINARY STORMWATER TANK DETAILS 1 of 5
S25-028-PC10 PRELIMINARY STORMWATER TANK DETAILS 2 of 5
S25-028-PC11 PRELIMINARY STORMWATER TANK DETAILS 3 of 5
S25-028-PC12 PRELIMINARY STORMWATER TANK DETAILS 4 of 5
S25-028-PC13 PRELIMINARY STORMWATER TANK DETAILS 5 of 5



LOCALITY PLAN
NOT TO SCALE

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of
WESTERA PARTNERS PTY. LTD.
APPROVED

WESTERA PARTNERS
STRUCTURAL+CIVIL+ENVIRONMENTAL ENGINEERS
www.westerapartners.com.au | ABN 52 097 417 975

BRISBANE T 07 3852 4333 E brisbane@westerapartners.com.au
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CENTRAL VICTORIA T 03 5441 0922 E centralvic@westerapartners.com.au

SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199

DATUM A.H.D.
P.M. 202931
R.L. 32.447

USE FIGURED DIMENSIONS ONLY. DO NOT SCALE, IF A DISCREPANCY ARISES CHECK WITH THE PROJECT ENGINEER AND/OR SUPERVISING AUTHORITY. DO NOT WORK FROM REDUCED SCALE DRAWINGS (A1-A3 SIZE PAPER). COPYRIGHT OF ALL DRAWINGS & WORKS EXECUTED FROM THEM IS VESTED IN WESTERA PARTNERS AND USE OF THERE FORE WITHOUT PERMISSION IS STRICTLY PROHIBITED! IT IS THE BUILDERS RESPONSIBILITY TO ENSURE ALL WORKS ARE CARRIED OUT WITH DUE CARE AND DILIGENCE TO COMPLY WITH THE CONTRACT DOCUMENTS.

PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE COVER SHEET
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25-028-G01
SHEET NUMBER 01 OF 01
REVISION

S25-028-G_Coversheet.dwg

GENERAL NOTES

G1 WESTERA PARTNERS HAS LIMITED CONTROL OR INPUT TO LOCAL GOVERNMENT OR OTHER LEGISLATED APPROVALS UNLESS SPECIFICALLY ENGAGED BY IT'S CLIENT. ANY CHANGES TO APPROVAL REQUIREMENTS (INCLUDING ORDERS FOR SUSPENSION OF WORKS ETC) SHOULD BE COMMUNICATED TO WESTERA PARTNERS AND ALL OTHER RELEVANT DESIGNERS TO ALLOW ASSESSMENT OF POTENTIAL RISKS AND ENSURE DESIGN AND SAFETY COMPLIANCE.

G2 ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LOCAL AUTHORITIES STANDARD DRAWINGS & SPECIFICATIONS AND COMPLETED TO THE SATISFACTION OF THE SUPERINTENDENT AND LOCAL AUTHORITY.

G3 UNLESS SPECIFIED OTHERWISE ALL MATERIALS AND WORK SHALL COMPLY WITH THE RELEVANT AUSTRALIAN STANDARDS.

G4 PRIOR TO THE COMMENCEMENT OF CONSTRUCTION THE CONTRACTOR MUST LOCATE ALL EXISTING SERVICES AND PROMPTLY PROVIDE THE LOCATION DATA TO THE DESIGN ENGINEER TO ASSESS IMPACTS ON THE DESIGN.

G5 ALL CONNECTIONS TO EXISTING SEWERS AND WATER MAINS ARE TO BE CONSTRUCTED BY THE LOCAL AUTHORITY OR AN APPROVED CONTRACTOR. THE CONTRACTOR IS TO ALLOW IN HIS CONTRACT SUM FOR THE COST OF ANY PROPOSED CONNECTIONS.

G6 ALL SEWERS ARE TO BE 150MM DIA. U.P.V.C. CLASS SN8 RUBBER RING JOINTED AND PROPERTY CONNECTIONS ARE TO BE 100MM DIA. U.P.V.C CLASS SN6 UNLESS NOTED OTHERWISE

G7 THE PAVEMENT DEPTHS SHOWN ARE PRELIMINARY ONLY AND ARE TO BE VERIFIED FOLLOWING SUB-SOIL TESTS OF THE SUB-GRADE MATERIAL.

G8 ALL ROOFWATER CONNECTIONS FROM KERB ADAPTERS ARE TO BE 100MM DIA CLASS SN10 AT A MIN GRADE OF 1.0% UNLESS SHOWN OTHERWISE. ROOFWATER CONNECTIONS FROM FIELD INLETS OR GULLY PITS ARE TO BE 150MM DIA CLASS SN8 AT A MIN GRADE OF 1.0% UNLESS NOTED OTHERWISE.

G9 ALL U.P.V.C. STORMWATER DRAINAGE PIPES ARE TO BE CLASS SN8 (U.N.O.)

ALL R.C. PIPES ARE TO BE CLASS 3 (U.N.O.)
< 900ø = USE SPIGOT AND SOCKET PIPES WITH RUBBER RING JOINTS
900ø < PIPES < 1050ø = USE FLUSH JOINTED PIPES WITH EXTERNAL ELASTOMERIC BAND
1050ø < PIPES = USE FLUSH JOINTED PIPES WITH EXTERNAL ELASTOMERIC BAND AND INTERNAL CEMENT MORTAR JOINT

ALL F.R.C. PIPES ARE TO BE FRCPIPE+ CLASS 4 (U.N.O.) AND SHALL BE DUAL RUBBER RING JOINT WITH COLLAR. PIPES SHALL BE FROM 225ø TO 600ø ONLY.

POLYPROPYLENE/POLYETHYLENE STORMWATER PIPE MINIMUM CLASS SN8 (U.N.O.) SUBJECT TO ACCEPTANCE BY CERTIFYING ENGINEER AND LOCAL AUTHORITY. CONSTRUCTION AND EMBEDMENT TO BE IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.

G10 WATER PIPES SHALL BE;
- P.V.C.–M WATER PIPES ARE TO BE SERIES 2 PN16 SN10 R.R.J.
- D.I.C.L. WATER PIPES ARE TO BE PN35 WITH ALL FITTINGS TO BE FUSION BONDED POLYMERIC COATED.
- PE WATER PIPES ARE TO BE PN16 SDR11 PE100. DN25 AND DN32 WATER SERVICES SHALL BE PE80B.

G11 ALL "AS CONSTRUCTED" INFORMATION IS TO BE RECORDED AS REQUIRED BY THE LOCAL AUTHORITY AND SUBMITTED TO THE SUPERINTENDENT IMMEDIATELY AFTER COMPLETION OF THE WORKS.

G12 ALL ALLOTMENTS ARE TO BE GRADED AT A MINIMUM GRADE OF 1 IN 200.

CONCRETE NOTES

C1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3600 CONCRETE STRUCTURES CODE AND THE REFERENCED STANDARDS THEREIN.

C2 THE CONCRETE STRENGTH GRADE AND THE COVER TO REINFORCEMENT FOR THE VARIOUS CONCRETE ELEMENTS SHALL BE AS LISTED BELOW:
- CLIMATE ZONE: TROPICAL / TEMPERATE / ARID
- LOCATION: COASTAL / NEAR COASTAL / INLAND

ELEMENT	EXPOSURE CLASSIFICATION	STRENGTH GRADE	MINIMUM COVER
MANHOLES	B1	N32	40
	C2	S50	65
FIELD INLET PITS	B1	N32	40
	C2	S50	65
HEADWALLS	B1	N32	40
	C2	S50	65
INTERNAL ROADS	B1	N32	40
KERB/CHANNEL	B1	N32	–
FOOTPATHS	B1	N32	40
RETAINING WALL PANELS	B1	N32	30*
	C2	S50	60*
BORED PIERS	B1	N32	40
	C2	S50	65

*RIGID FORMWORK & INTENSE COMPACTION

C3 CONCRETE TO HAVE A MAXIMUM AGGREGATE SIZE OF 20mm WITH 80mm MAXIMUM SLUMP, A WATER/CEMENT RATIO OF NOT GREATER THAN 0.65 AND A MAXIMUM FINAL BASIC DRYING SHRINKAGE STRAIN OF 800 x 10^{-6}, UNLESS APPROVED OTHERWISE.

C4 NO ADDITIVES SHALL BE ADDED OF APPLIED TO THE CONCRETE MIX WITHOUT THE APPROVAL OF THE ENGINEER.

C5 THE MAXIMUM PERMISSIBLE TRANSPORT TIME FOR CONCRETE BETWEEN BATCHING AND PLACEMENT ON SITE SHALL BE IN ACCORDANCE WITH THE FOLLOWING TABLE.

AMBIENT AIR TEMPERATURE	MAX. BATCHING TO PLACEMENT TIME
10° – 24°C	120 MINUTES
25° – 27°C	90 MINUTES
28° – 30°C	60 MINUTES
31° – 33°C	45 MINUTES
34° – 36°C	30 MINUTES
37°C+	NO PLACEMENT OF CONCRETE UNLESS CHILLED WATER OR ICE IN MIX

C6 ALL CONCRETE SHALL BE MECHANICALLY VIBRATED. VIBRATORS SHALL NOT BE USED TO SPREAD CONCRETE.

C7 ALL CONCRETE SHALL BE SAMPLED AND TESTED IN ACCORDANCE WITH AS1379 ADOPTING THE PROJECT ASSESSMENT METHOD FOR COMPRESSIVE STRENGTH AND SLUMP COMPLIANCE. THE RESULTS OF ALL TESTS SHALL BE PROMPTLY SUBMITTED TO THE ENGINEER FOR REVIEW.

C8 WHEN THE AIR TEMPERATURE EXCEEDS 30°C, ALIPHATIC ALCOHOL SHALL BE APPLIED TO THE CONCRETE SURFACE OF SLABS IMMEDIATELY AFTER THE INITIAL SCREED AND AGAIN AFTER BULL FLOATING.

C9 CURING OF ALL CONCRETE SURFACES SHALL COMMENCE IMMEDIATELY AFTER COMPLETING CONCRETE FINISHING AND SHALL CONTINUE FOR 7 DAYS. CONTRACTOR TO CONFIRM METHOD OF CURING WITH ENGINEER PRIOR TO USE.

C10 SIZES OF CONCRETE ELEMENTS DO NOT INCLUDE THICKNESS OF APPLIED FINISHES.

C11 BEAM DEPTHS ARE WRITTEN FIRST AND INCLUDE SLAB THICKNESS, IF ANY.

C12 NO HOLES, CHASES OR EMBEDDED ITEMS OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT PRIOR APPROVAL OF THE ENGINEER. CONDUITS, PIPES ETC. SHALL NOT BE PLACED IN THE COVER THICKNESS OF THE CONCRETE.

C13 WHERE SERVICE PIPES PENETRATE CONCRETE ELEMENTS, PROVISION SHOULD BE MADE TO ALLOW FOR MOVEMENT OF THE ELEMENT.

C14 FORMWORK SHALL BE DESIGNED, CONSTRUCTED AND STRIPPED IN ACCORDANCE WITH AS3610 FORMWORK CODE, UNLESS NOTED OTHERWISE ON THE DRAWINGS.

C15 REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND NOT NECESSARILY SHOWN IN TRUE PROJECTION OR SCALE.

C16 ALL REINFORCEMENT SHALL BE SECURELY SUPPORTED IN ITS CORRECT POSITION ON PLASTIC BAR CHAIRS, GENERALLY AT NOT GREATER THAN 800mm CENTRES IN BOTH DIRECTIONS.

C17 WELDING AND HEATING OF REINFORCEMENT SHALL NOT BE PERMITTED WITHOUT APPROVAL OF THE ENGINEER.

C18 ALL STEEL REINFORCEMENT IN CONCRETE ELEMENTS SHALL BE INSPECTED BY THE ENGINEER AND PASSED PRIOR TO POURING OF ANY CONCRETE.

C19 LAP REINFORCEMENT ONLY AT LOCATIONS SHOWN ON THE DRAWINGS OR AS APPROVED BY THE ENGINEER.

C20 SLAB FABRIC SHALL BE LAPPED ONE FULL PANEL OF FABRIC PLUS 50mm SO THAT THE TWO OUTERMOST TRANSVERSE WIRES OF ONE SHEET OVERLAP THE TWO OUTERMOST TRANSVERSE WIRES OF THE SHEET BEING LAPPED BY 50mm.

C21 BAR REINFORCEMENT SHALL BE LAPPED IN ACCORDANCE WITH THE FOLLOWING TABLE.

TYPICAL BAR REINFORCEMENT LAP LENGTHS		
BAR	LAP LENGTH UNO	HORIZONTAL BARS WITH GREATER THAN 300mm OF CONCRETE CAST BELOW THEM
N12	550	750
N16	800	1100
N20	1100	1400
N24	1250	1600
N28	1400	1800
N32	1600	2100
N36	2000	2500

WHERE LAPS ARE SHOWN ON THE DRAWINGS THE ABOVE LAP LENGTHS SHALL BE ADOPTED UNLESS NOTED OTHERWISE. WHERE BARS OF DIFFERENT DIAMETER ARE SHOWN LAPPED, ADOPT THE LAP LENGTH APPROPRIATE TO THE SMALLER DIAMETER BAR.

C22 A VAPOUR BARRIER OF 0.2mm (200um) MINIMUM THICK POLYTHENE SHEETING SHALL BE PLACED BENEATH SLABS ON GROUND UNLESS NOTED OTHERWISE.

LEGEND

GENERAL

ASPHALTIC CONCRETE PAVEMENT
REINFORCED CONCRETE PAVEMENT
REINFORCED CONCRETE PATHWAY/CROSSOVER
TURF
STONE PITCHING
CEMENT GROUTED STONE PITCHING
TELECOMMUNICATION (T)
GAS MAIN (G)
ELECTRICITY OVERHEAD (V)
ELECTRICITY UNDERGROUND (E)
LIGHT POLE (LP)
POWER POLE (PP)
PIT (TELSTRA/ELEC)
EDGE OF BITUMEN
FENCE
EXISTING SURFACE LEVEL (× 2.53)
EXISTING CONTOUR MINOR (33.75)
EXISTING CONTOUR MAJOR (34.00)
DESIGN SURFACE LEVEL (× 2.53)
DESIGN CONTOUR MINOR (33.75)
DESIGN CONTOUR MAJOR (34.00)
RETAINING WALL
STAGE BOUNDARY

STORMWATER DRAINAGE

	NEW	EXISTING
STORMWATER PIPE		
SAG GULLY PIT		
ON GRADE GULLY PIT		
MANHOLE		
600 x 600 FIELD INLET		
900 x 600 FIELD INLET		
1050 DIA FIELD INLET		
HEADWALL		

KERB ADAPTER WITH ROOFWATER PIPE (SWO)
STORMWATER STRUCTURE LABEL (2A)

WATER

	NEW	EXISTING	DISUSED
WATER MAIN	W W	W W	W W
FIRE HYDRANT	W FH W	W FH W	W FH W
DUAL OUTLET FIRE HYDRANT	DFH	DFH	DFH
SWABBING DUAL OUTLET FIRE HYDRANT	SDFH		
SWABBING FIRE HYDRANT	W SFH W	W SFH W	W SFH W
ISOLATION VALVE	W V W	W V W	W V W
SCOUR VALVE	W W	W W	W W
AIR VALVE	W AV W	W AV W	W AV W
DEAD END	W W	W W	W W
TEST/CHLORINATION POINT	W W		
REDUCER	150 W 100 W	150 W 100 W	150 W 100 W
PIPE MATERIAL CHANGE	PVC W DICL W	PVC W DICL W	PVC W DICL W
WATER SERVICE PRE-TAPPED TEE			
WATER SERVICE PIPE & CONDUIT	DN25ø		
FLOW METER	WM		
FLUSHING POINT	F W		

SEWERAGE

	NEW	EXISTING	DISUSED
GRAVITY SEWER MAIN	S S	S S	S S
SEWER RISING MAIN	RM	RM RM	
SEWER VACUUM MAIN	VM	VM VM	
MAINTENANCE HOLE & END OF LINE	1/1 S S	1/1 S S	1/1 S S
END OF LINE	1/1 E 1 S S	1/1 E 1 S S	1/1 E 1 S S
MAINTENANCE SHAFT	1/1 S S	1/1 S S	1/1 S S
HORIZONTAL/VERTICAL BEND	VB1 1 HB1 1 S S	VB1 1 HB1 1 S S	VB1 1 HB1 1 S S
COMPOUND BEND	CB1 1 S S	CB1 1 S S	CB1 1 S S
STUB / TEMPORARY END	S		
RODDING END	S RE 1		
PROPERTY CONNECTION	S S		
OVERFLOW MAINTENANCE HOLE	OFMH S S		
ISOLATION VALVE	RM RM		
SCOUR VALVE AND CHAMBER	RM RM		
GAS RELEASE VALVE	GRV RM RM		
FLUSHING POINT	FP RM RM		
DISCHARGE MAINTENANCE HOLE	DMH RM S		
NON-RETURN/REFLUX VALVE	RM RM		
VENT POLE / ODOUR CONTROL UNIT	V		

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199
DATUM A.H.D.
P.M. 202931
R.L. 32.447

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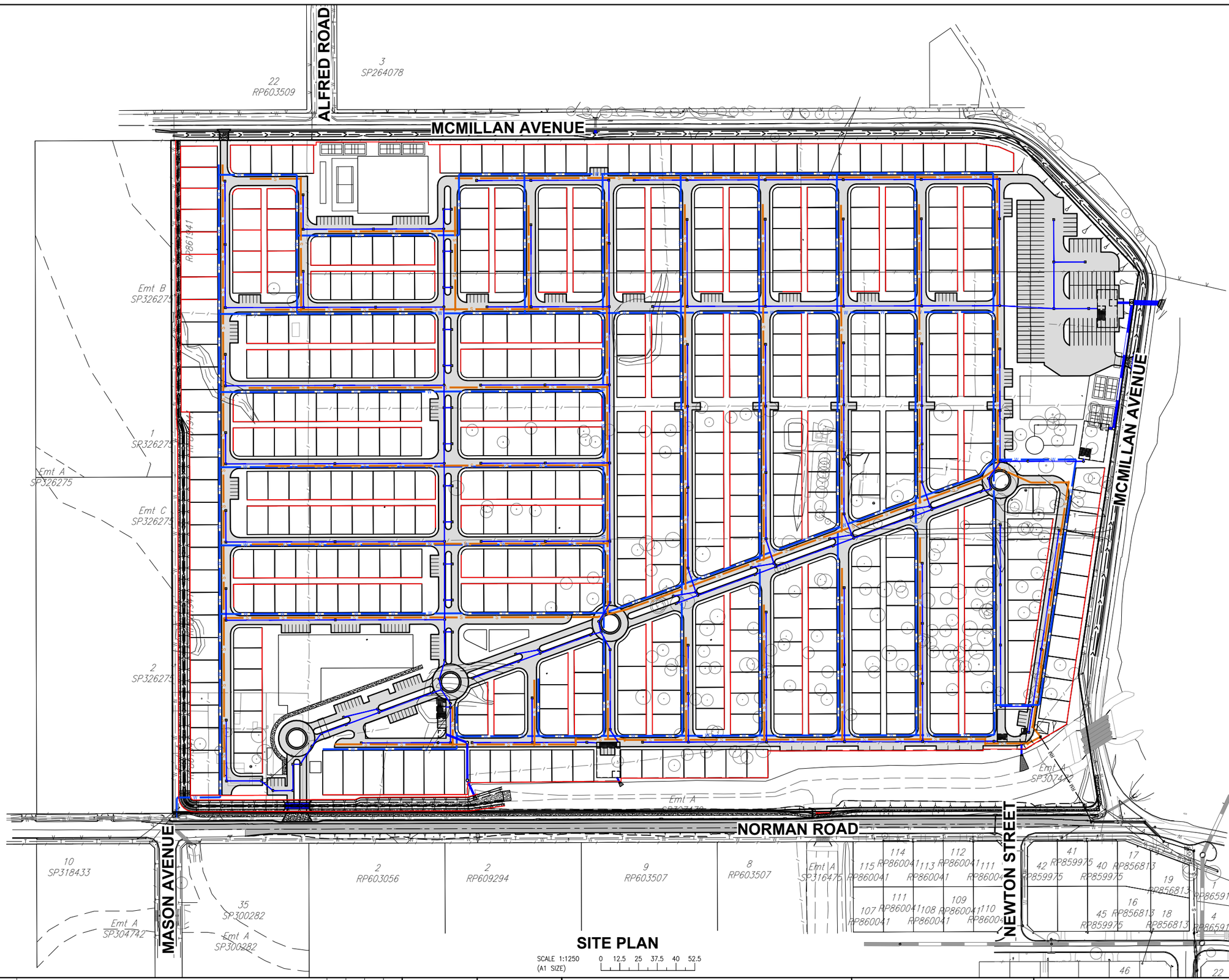
PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE CIVIL NOTES AND LEGEND
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25-028-PC01
SHEET NUMBER 01 OF 13
REVISION

S25-028-PC_Pre_Civil_Notes.dwg



SITE PLAN

SCALE 1:1250 (A1 SIZE)

0 12.5 25 37.5 40 52.5

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

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SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199

DATUM A.H.D.
P.M. 202931
R.L. 32.447

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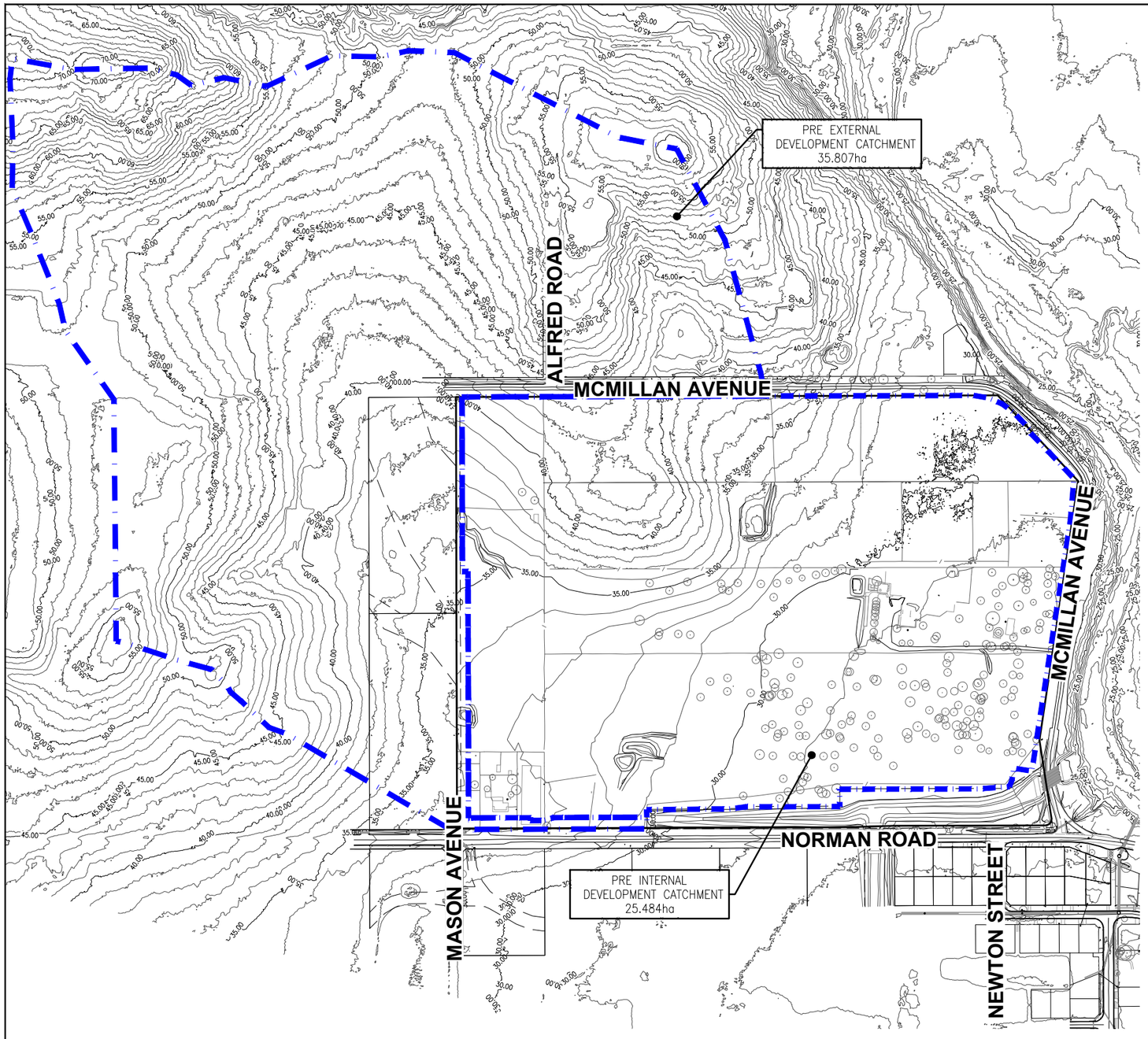
PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE SITE PLAN
CLIENT RUBY DEVELOPMENTS PTY LTD

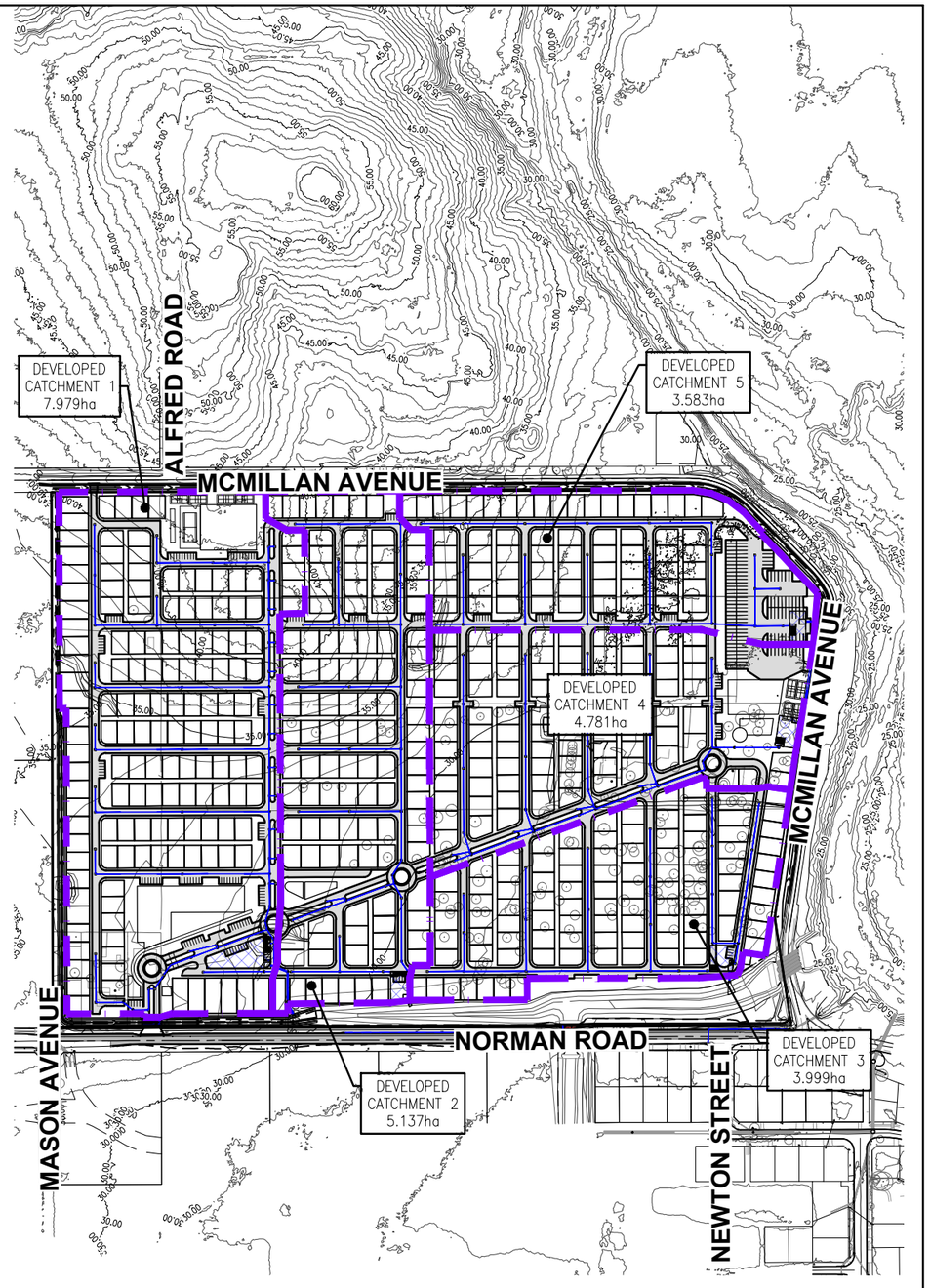
DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25-028-PC02
SHEET NUMBER 02 OF 13
REVISION

S25-028-PC_Pre_Civil_Site.dwg



EXISTING CATCHMENT PLAN

SCALE 1:2500 (A1 SIZE) 0 25 50 75 100 125



NOTE:
DEVELOPMENT CATCHMENTS EXCLUDE PERIMETER OPEN CHANNELS.

DEVELOPED CATCHMENT PLAN

SCALE 1:2500 (A1 SIZE) 0 25 50 75 100 125

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
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SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199
DATUM A.H.D.
P.M. 202931
R.L. 32.447

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY CATCHMENT PLANS
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25–028–PC03
SHEET NUMBER 03 of #REF!
REVISION

S25–028–PC_Pre_Stm_Catch.dwg

REFER DWG. PC07 FOR CONTINUATION

REFER DWG. PC05 FOR CONTINUATION

Emt C SP326275

2 SP326275
EXISTING WATER MAIN TO BE PRESERVED.

PROVIDE CONCRETE LINED INVERT CUT OFF DRAIN FOR RUNOFF FROM UPSTREAM CATCHMENT.

PROVIDE GROUTED STONE PITCHING TO CHANNEL BASE AROUND 90° BEND.

PROVIDE NEW WATER SERVICE & METER ASSEMBLY

A PC8

B PC8

COUNTRY CLUB

DETENTION TANK A

TOTAL AREA	= 1,025m²
INTERNAL HEIGHT	= 1.90m
TREATMENT AREA	= 78m²
TOTAL TANK VOLUME	= 1,947.5m³
DETENTION VOLUME	= 1,877.3m³

DETENTION TANK B

TOTAL AREA	= 355m²
INTERNAL HEIGHT	= 2.90m
TREATMENT AREA	= 56m²
TOTAL TANK VOLUME	= 1,029.5m³
DETENTION VOLUME	= 979.1m³

PROVIDE STORMWATER OUTLET & SCOUR PROTECTION TO PROPOSED CUT OFF DRAIN.

CONNECT PROPOSED CUT OFF DRAIN TO EXISTING OPEN CHANNEL.

PROVIDE STORMWATER OUTLET & SCOUR PROTECTION TO EXISTING OPEN CHANNEL DRAIN.

NORMAN ROAD

PRELIMINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE) 0 5 10 15 20 25

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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SURVEYOR CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199
DATUM A.H.D. P.M. 202931 R.L. 32.447

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY CIVIL WORKS PLAN 1 of 4
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25–028–PC04
SHEET NUMBER 04 OF 13
REVISION

S25–028–PC_Pre_Civilwks.dwg

REFER DWG. PC06 FOR CONTINUATION

REFER DWG. PC04 FOR CONTINUATION

MCMILLAN AVENUE

NORMAN ROAD

PRELIMINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE)

0 5 10 15 20 25

DETENTION TANK C
TOTAL AREA = 429m²
INTERNAL HEIGHT = 2.10m
TREATMENT AREA = 42m²
TOTAL TANK VOLUME = 900m³
DETENTION VOLUME = 862.2m³

EXISTING 6x2400x1200 RCBC
USIL = 25.22
DSIL = 25.11
LENGTH = 20.93
GRADE = 0.53%

EXISTING 6x1200x900 RCBC
USIL = 26.49
DSIL = 26.25
LENGTH = 19.44
GRADE = 1.23%

PROVIDE STORMWATER OUTLET & SCOUR PROTECTION TO EXISTING OPEN CHANNEL DRAIN.

REFER TO S24-148-S SET FOR EXTERNAL SEWER DETAILS.

Emt A SP307472

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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CENTRAL VICTORIA T 03 5441 0922 E centralvic@westerapartners.com.au

SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199

DATUM A.H.D.
P.M. 202931
R.L. 32.447

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY CIVIL WORKS PLAN 2 of 4
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25-028-PC05
SHEET NUMBER 05 OF 13
REVISION

S25-028-PC_Pre_Civilwks.dwg

PRELIMINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE)

0 5 10 15 20 25

MCMILLAN AVENUE

RV COMPOUND

LIFESTYLE PAVILION

MCMILLAN AVENUE

DETENTION TANK E

TOTAL AREA	= 325m²
INTERNAL HEIGHT	= 3.00m
TREATMENT AREA	= 45.5m²
TOTAL TANK VOLUME	= 975m³
DETENTION VOLUME	= 934.05m³

DETENTION TANK D

TOTAL AREA	= 410m²
INTERNAL HEIGHT	= 3.00m
TREATMENT AREA	= 49m²
TOTAL TANK VOLUME	= 1,230m³
DETENTION VOLUME	= 1,185.9m³

PROVIDE 2x1200 RCBC. RESTORE EXISTING ROAD PAVEMENT.

PROVIDE STORMWATER OUTLET & SCOUR PROTECTION TO LIMESTRONE CREEK.

PROVIDE STORMWATER OUTLET & SCOUR PROTECTION TO LIMESTRONE CREEK.

REFER DWG. PC07 FOR CONTINUATION

REFER DWG. PC05 FORCONTINUATION

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of
WESTERA PARTNERS PTY. LTD.
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SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199

DATUM A.H.D.
P.M. 202931
R.L. 32.447

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PROJECT	PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION	LOTS 7–12 SP603508 930 – 960 NORMAN ROAD, PARKHUST
TITLE	PRELIMINARY CIVIL WORKS PLAN 3 of 4
CLIENT	RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS: PRELIMINARY N.F.C.
DRAWING NUMBER: S25-028-PC06
SHEET NUMBER: 06 OF 13
REVISION:

S25-028-PC_Pre_Civilwks.dwg

PRELIMINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE)

0 5 10 15 20 25

ALFRED ROAD

MCMILLAN AVENUE

SPORTS PRECINT

Emt B SP326275

1 SP326275

PROVIDE CONCRETE CUT OFF DRAIN FOR RUNOFF FROM UPSTREAM CATCHMENT.

PROVIDE VEGETATED CUT OFF DRAIN FOR RUNOFF FROM UPSTREAM CATCHMENT.

C PC8

REFER DWG. PC06 FOR CONTINUATION

REFER DWG. PC04 FOR CONTINUATION

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
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APPROVED

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CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199

DATUM A.H.D.
P.M. 202931
R.L. 32.447

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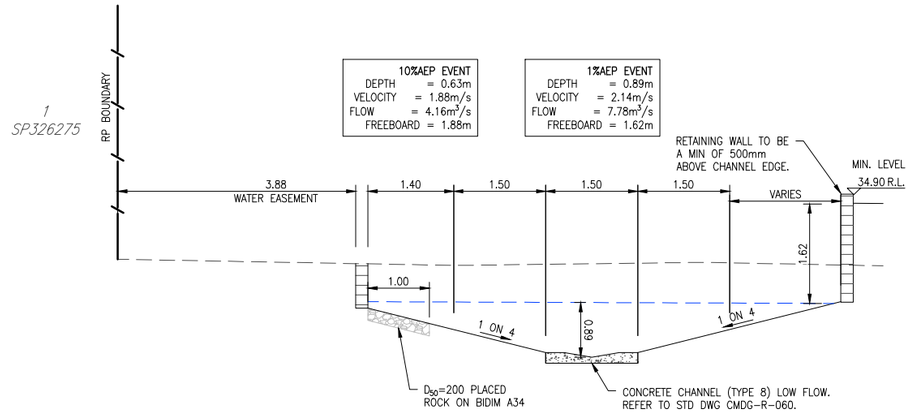
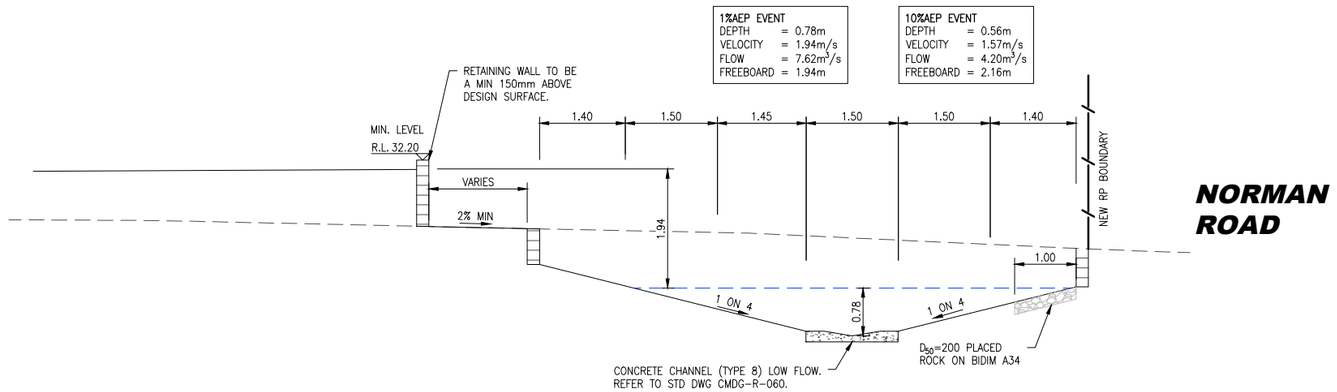
PROJECT	PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION	LOTS 7–12 SP603508 930 – 960 NORMAN ROAD, PARKHUST
TITLE	PRELIMINARY CIVIL WORKS PLAN 4 of 4
CLIENT	RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS: PRELIMINARY N.F.C.
DRAWING NUMBER: S25–028–PC07
SHEET NUMBER: 07 OF 13
REVISION:

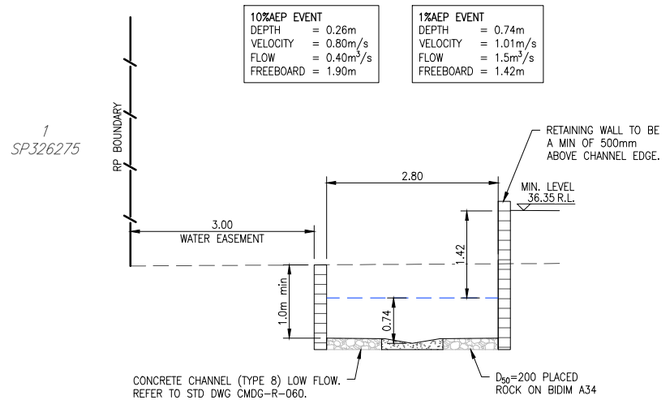
S25–028–PC_Pre_Civilwks.dwg



SECTION A
SCALE A1 – 1 : 50
A3 – 1 : 100
PC06



SECTION B
SCALE A1 – 1 : 50
A3 – 1 : 100
PC06



SECTION C
SCALE A1 – 1 : 50
A3 – 1 : 100
PC06

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
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CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199
DATUM A.H.D.
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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY CHANNEL SECTIONS
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25-028-PC08
SHEET NUMBER 08 OF 13
REVISION

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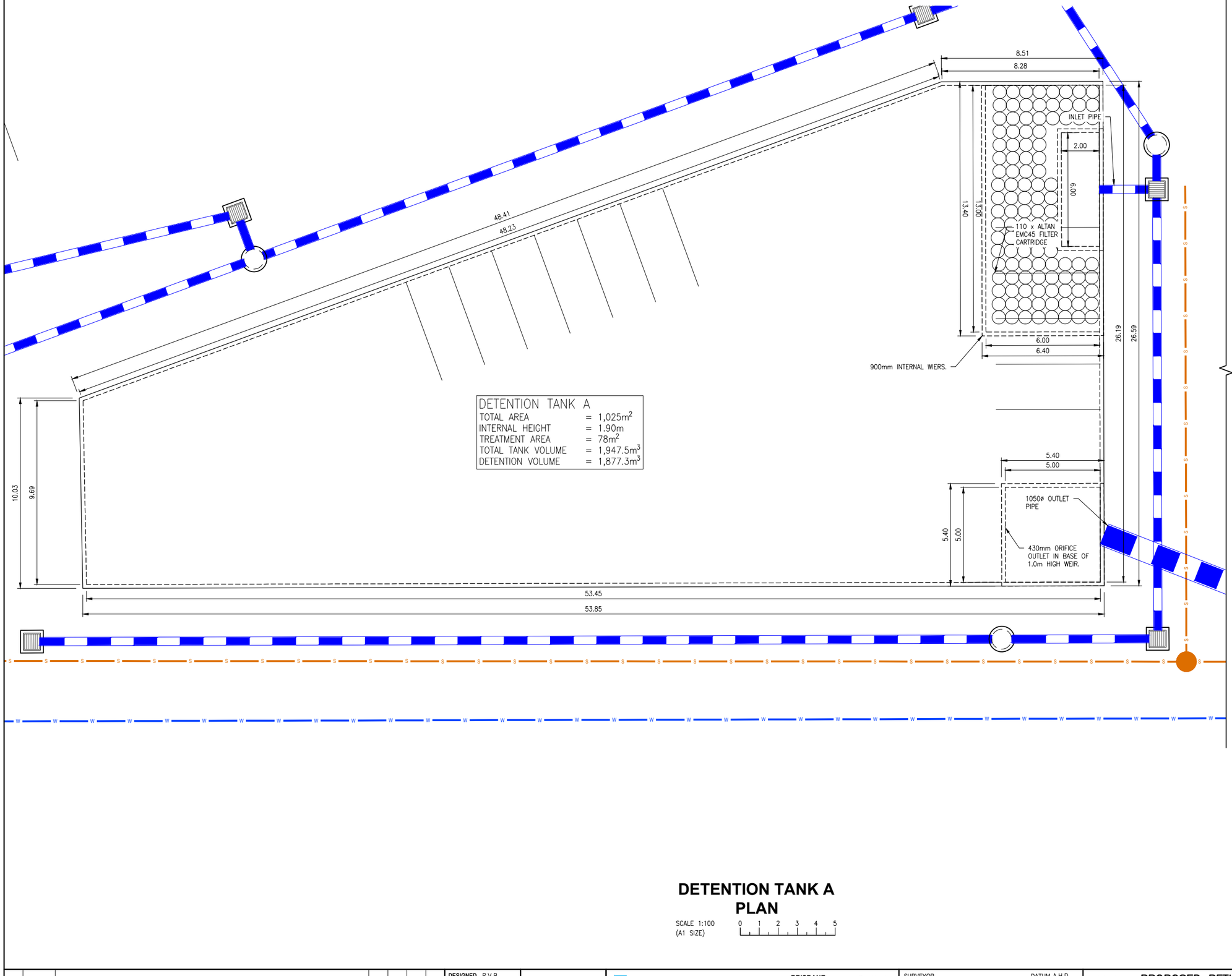
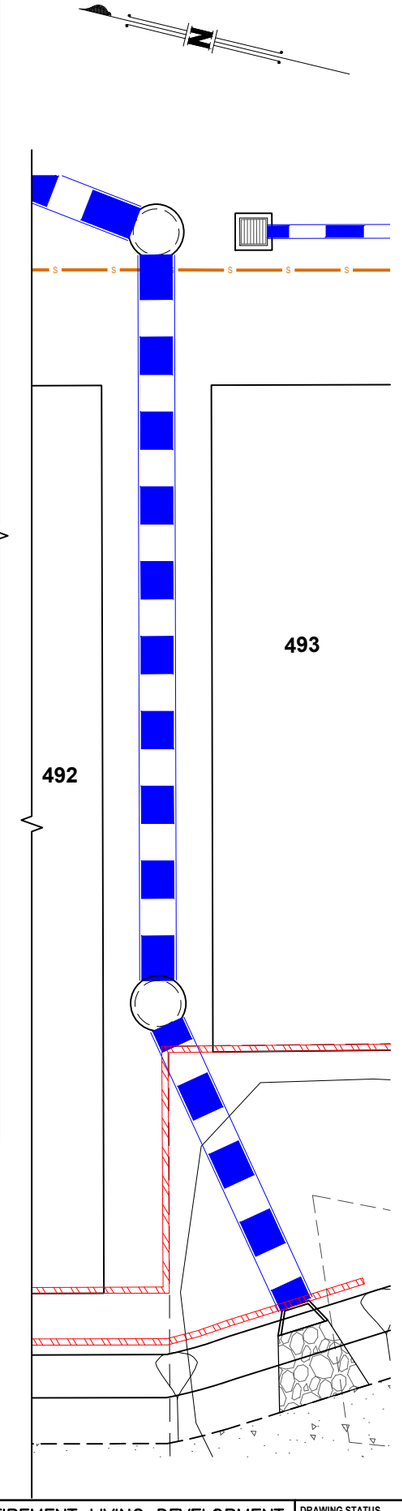


DETENTION TANK A

TOTAL AREA	=	1,025m^2
INTERNAL HEIGHT	=	1.90m
TREATMENT AREA	=	78m^2
TOTAL TANK VOLUME	=	1,947.5m^3
DETENTION VOLUME	=	1,877.3m^3



DETENTION TANK A
PLAN

SCALE 1:100
(A1 SIZE)

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CHECKED J.M.H.
APPROVED J.M.H.
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930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY STORMWATER TANK 1 of 5
CLIENT RUBY DEVELOPMENTS PTY LTD

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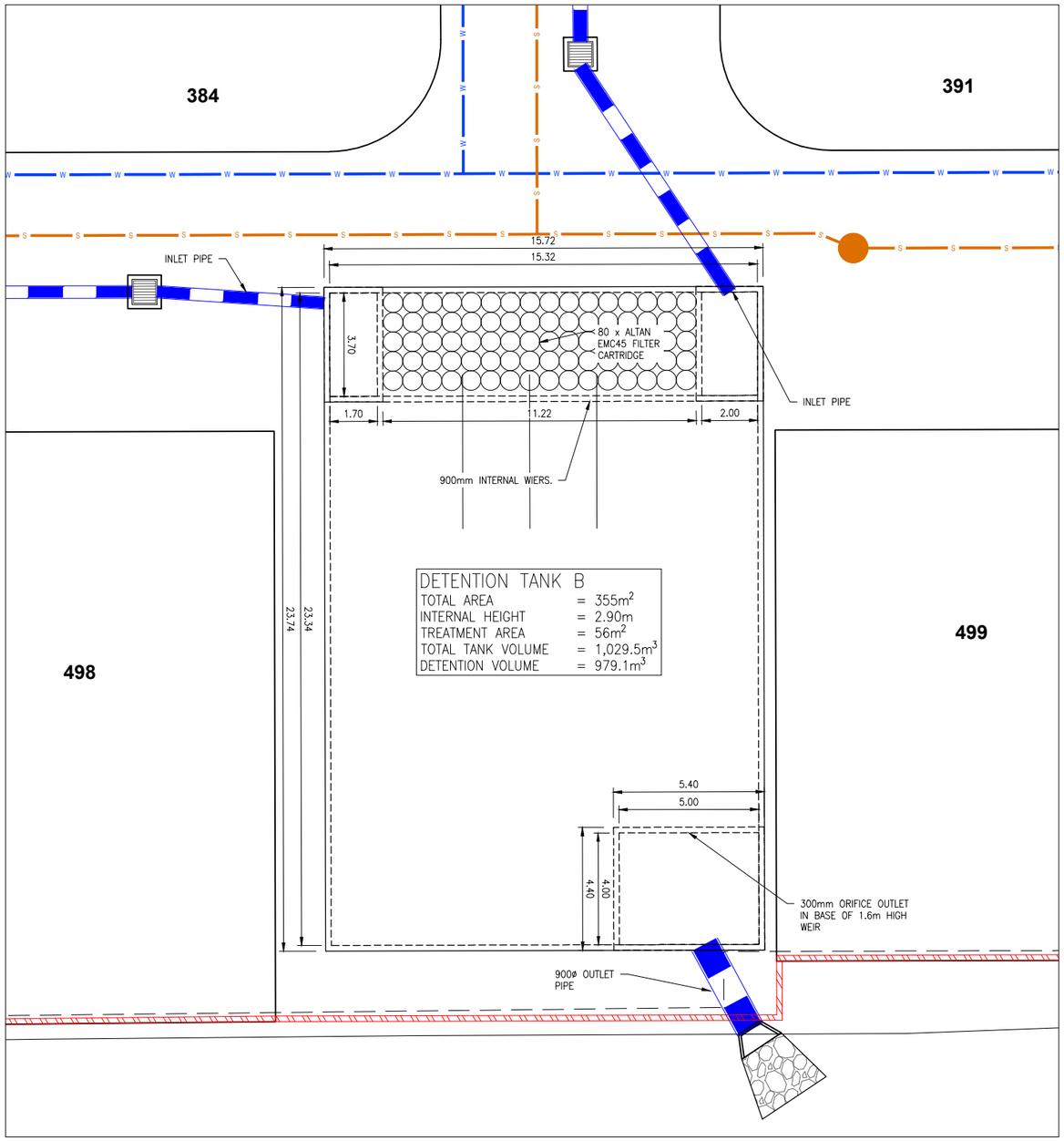

DETENTION TANK B
PLAN

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY STORMWATER TANK 2 of 5
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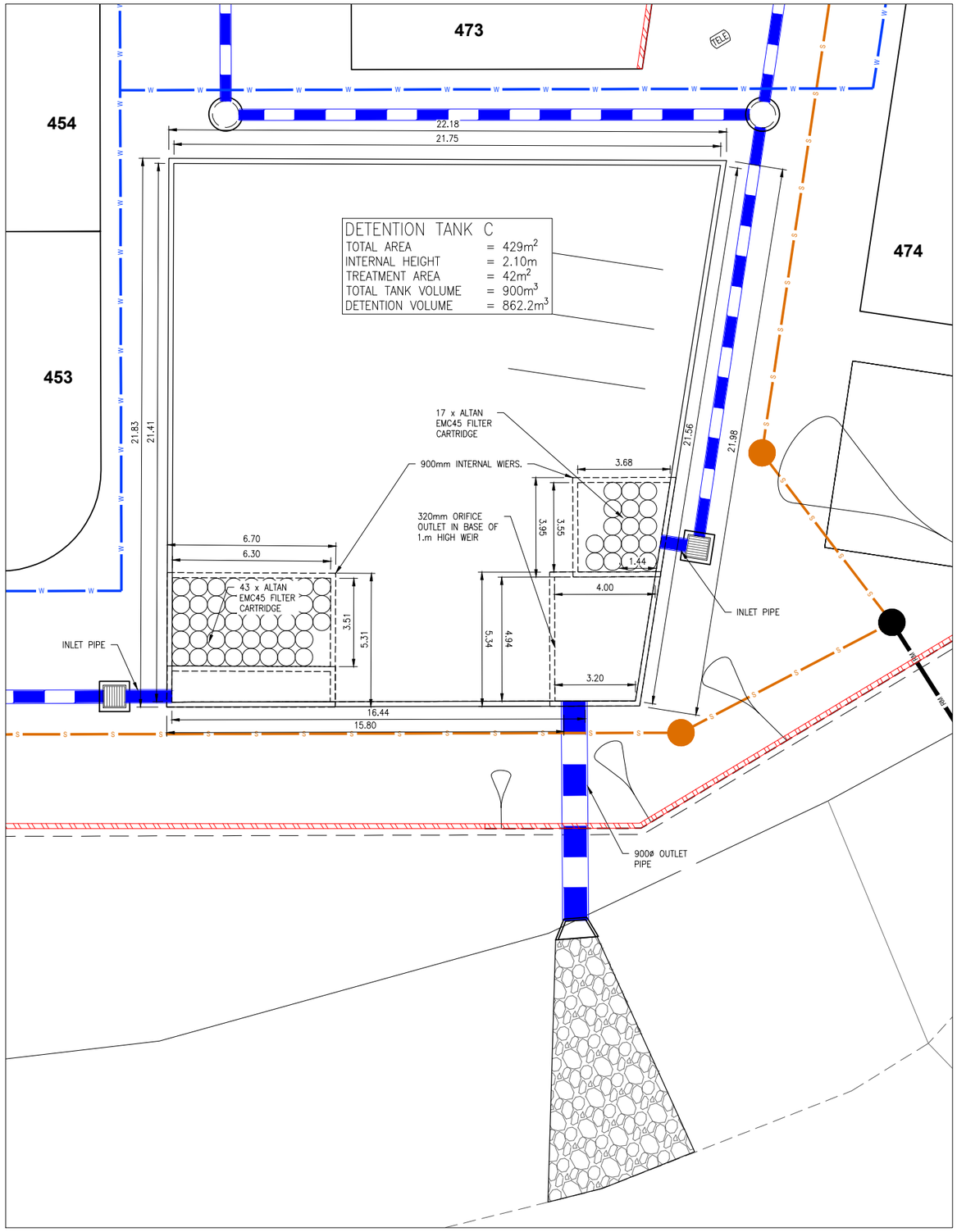

DETENTION TANK C
PLAN

SCALE 1:100 (A1 SIZE)

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508 930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY STORMWATER TANK 3 of 5
CLIENT RUBY DEVELOPMENTS PTY LTD

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SHEET NUMBER 11 OF 13
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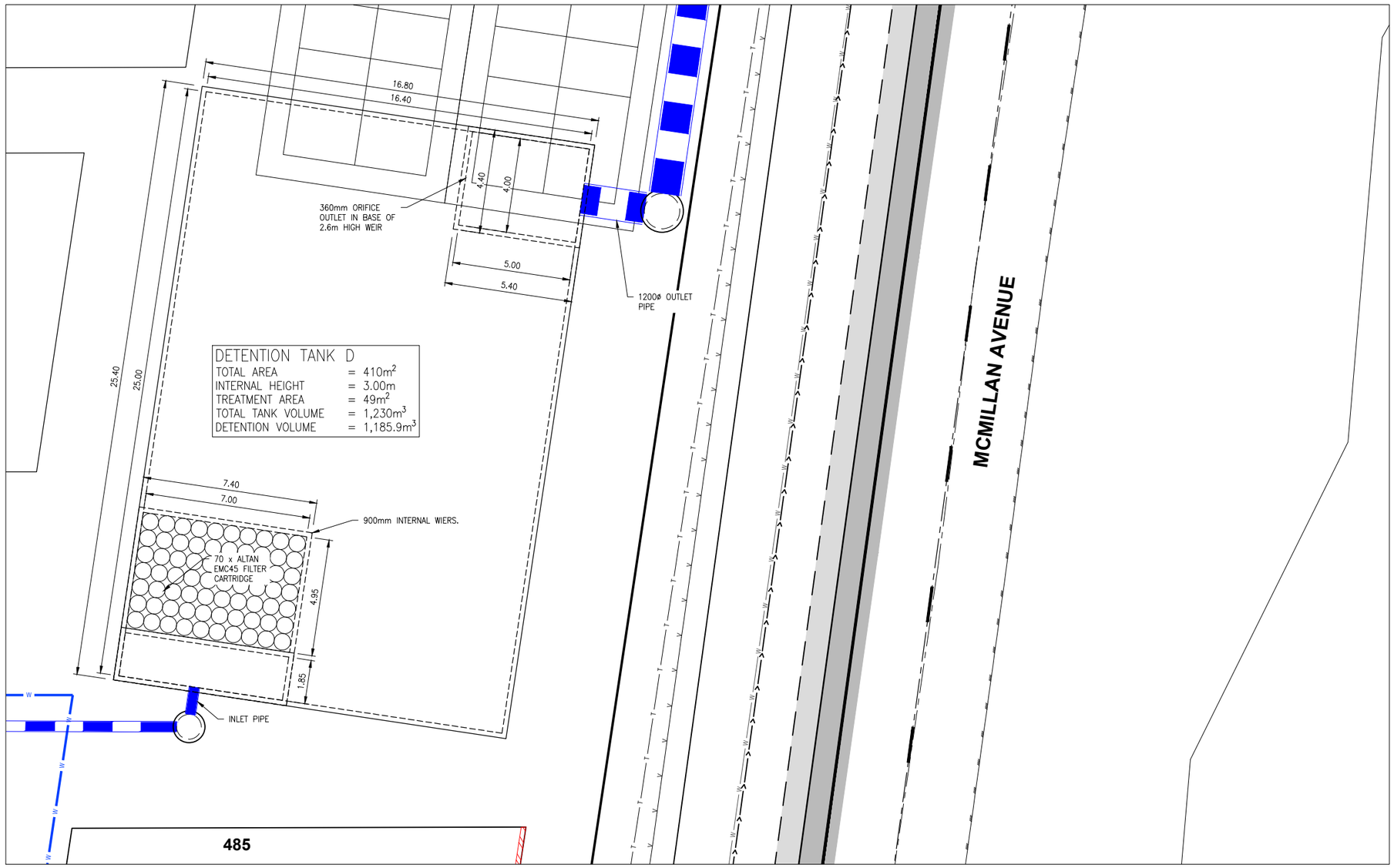

DETENTION TANK D
PLAN

SCALE 1:100
(A1 SIZE)

0 1 2 3 4 5

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY STORMWATER TANK 4 of 5
CLIENT RUBY DEVELOPMENTS PTY LTD

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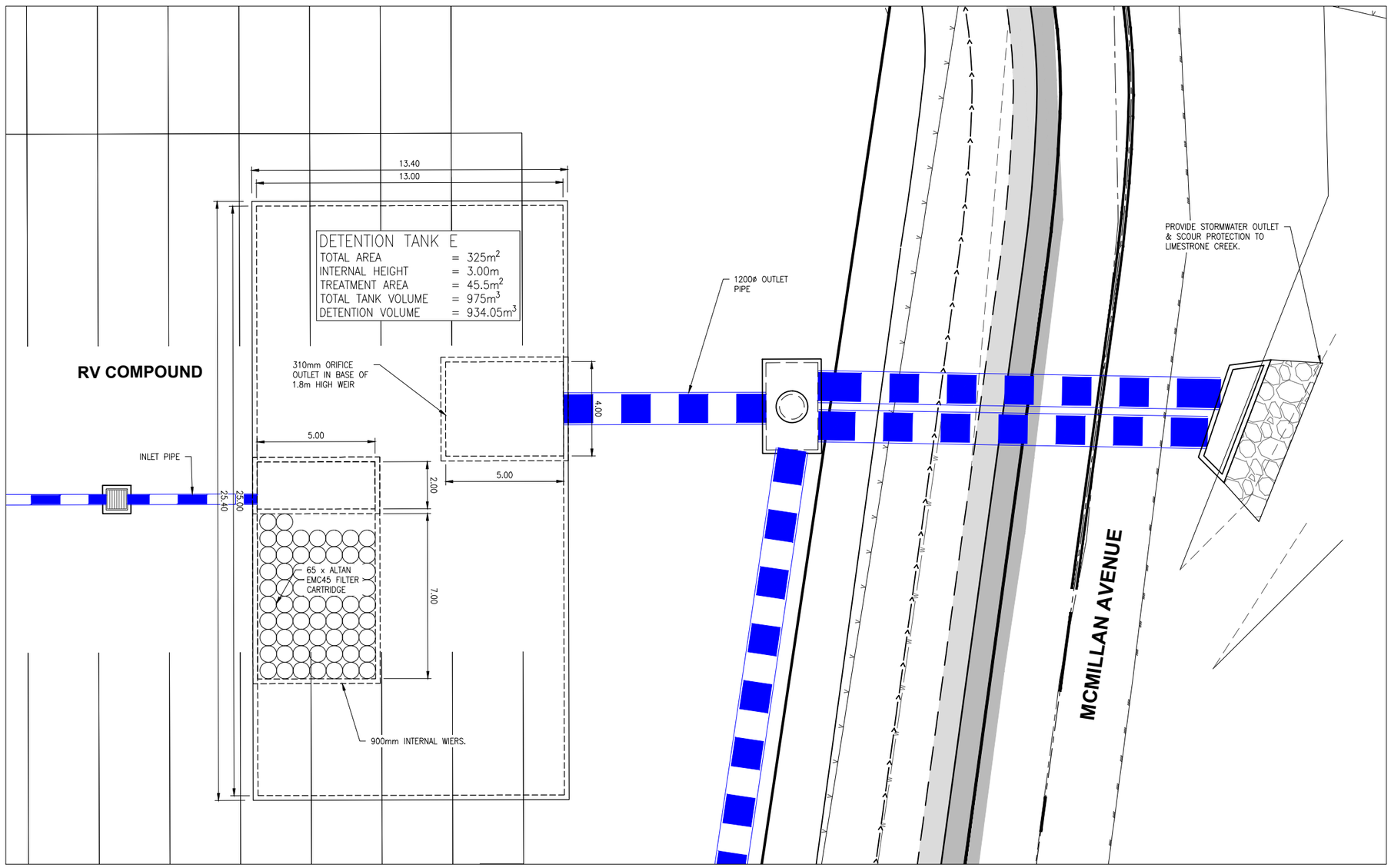

DETENTION TANK E
PLAN

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY STORMWATER TANK 5 of 5
CLIENT RUBY DEVELOPMENTS PTY LTD

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DRAWING NUMBER S25-028-PC13
SHEET NUMBER 13 OF 13
REVISION

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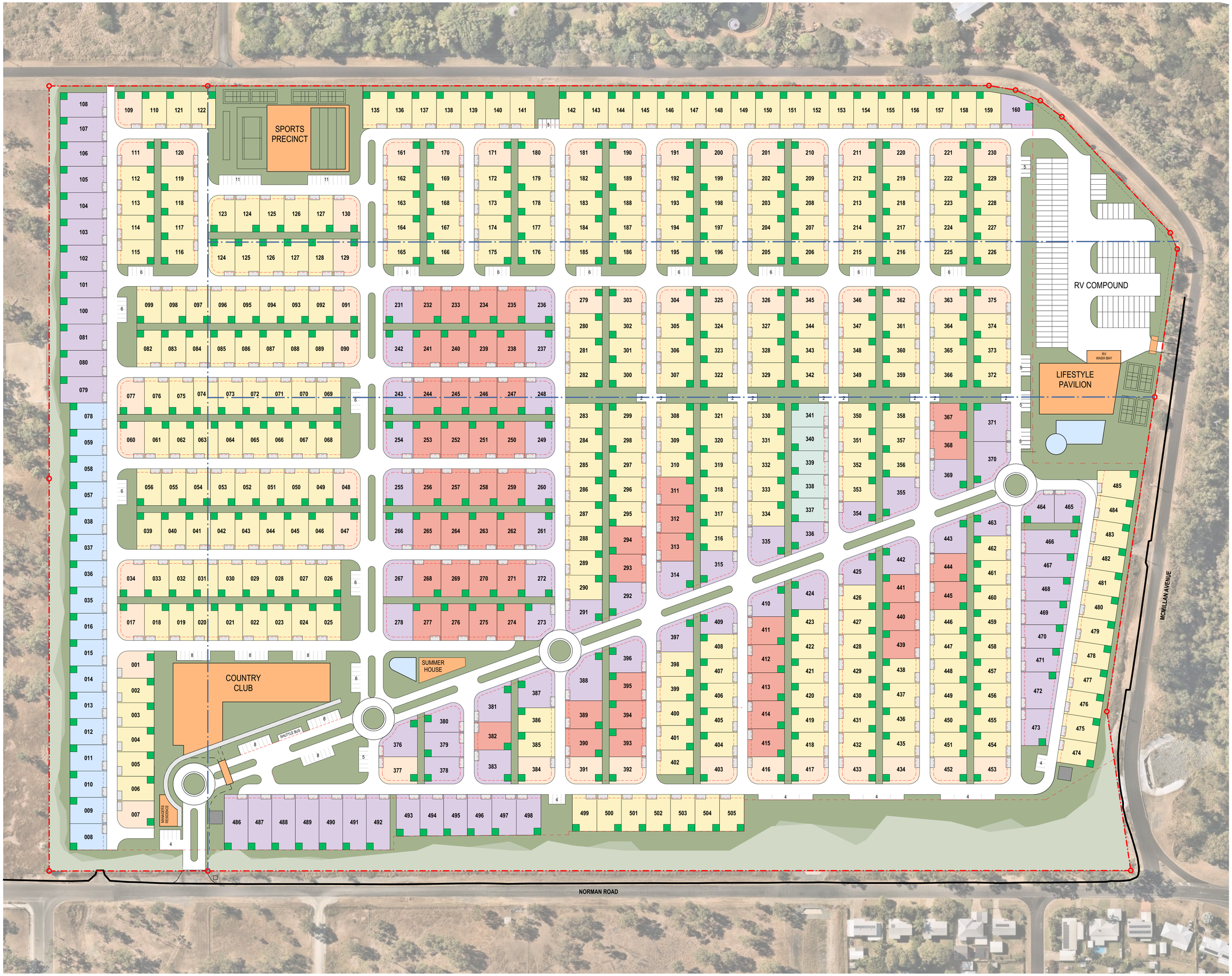
6.3 Appendix C – Master Plan & Site Survey



1 Master Plan
1:1000

Living Gems

120 SIGANTO DRIVE, HELENSVALE, QLD, 4212
INFO@LIVINGGEMS.COM.AU
WWW.LIVINGGEMS.COM.AU

REGISTERED ARCHITECT - PHILLIP NIELSEN
QLD 5331 - NSW 10322

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PLEASE READ CAREFULLY

THIS PLAN CERTIFIED CORRECT IS THE ONE REFERRED TO IN THE CONTRACT & SPECIFICATIONS AND I UNDERSTAND CHANGES HEREAFTER MAY NOT BE POSSIBLE. THESE SUPERSEDE ALL OTHER PREVIOUS PLANS OR SKETCHES.

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REV	DESCRIPTION	DATE
AA	Master Plan Concept	26/09/2024
AB	Master Plan Updated	30/09/2024
AD	Master Plan Updated	8/10/2024
AE	Master Plan Updated	24/10/2024
AF	Master Plan Updated	28/11/2024
AG	Master Plan Updated	20/12/2024
AH	Master Plan Updated	7/01/2025
AI	Master Plan Updated	13/01/2025
AJ	Master Plan Updated	7/02/2025
AK	Master Plan Updated	12/02/2025
AL	Master Plan Updated	17/02/2025

SITE INFO

SITE AREA:	276,156.35 m²
VISITOR PARKING:	220
RV PARKING:	126
SHUTTLE BUS PARKING:	001

OPEN SPACE CALCS

LANDSCAPING:	XXm²
RECREATIONAL SPACES:	XXm²
PEDESTRIAN SHAREWAY:	XXm²
TOTAL OPEN SPACE:	**XXm² / XX.XX%**

SITE COVERAGE

DESIGN AVERAGE (193m²):	XXm²
CLUBHOUSE UNDER ROOF AREA:	XXm²
LIFESTYLE PAVILION UNDER ROOF AREA:	XXm²
TOTAL SITE COVERAGE:	**XXm² / XX.XX%**

TOTAL YIELD	**505**
15.0 x 21.0m LARGE LOT (MIN.)	017
14.0 x 21.0m TYPICAL LOT (MIN.)	298
13.5 x 21.0m TYPICAL LOT (MIN.)	005
15.5 x 21.0m TYPICAL CORNER LOT (MIN.)	050
15.5 x 21.0m SPECIAL CORNER LOT (MIN.)	000
21.0 x 16.0m SPECIAL LARGE LOT (MIN.)	000
SPECIAL LOT	080
16 x 21.0m LARGE LOT (MIN.)	055

SCALE
1:1000 @ A1
PRINT AT 50% @ A3

0 50 m 100 m

PROJECT
LIVING GEMS ROCKHAMPTON
19 McMillan Avenue Parkhurst QLD 4702 Australia

BRANCH	SITE
LG	PRH
GATE	DOC TYPE
1	DWG
BUILDING CODE	DISCIPLINE
MP	A
DRAWING No	REVISION
A010	AL

DRAWN	CHECKED	APPROVED
PN	PN	PN

DRAWING TITLE
Master Plan

FILE NAME
LG-PRH-DWG-MP-A-A010

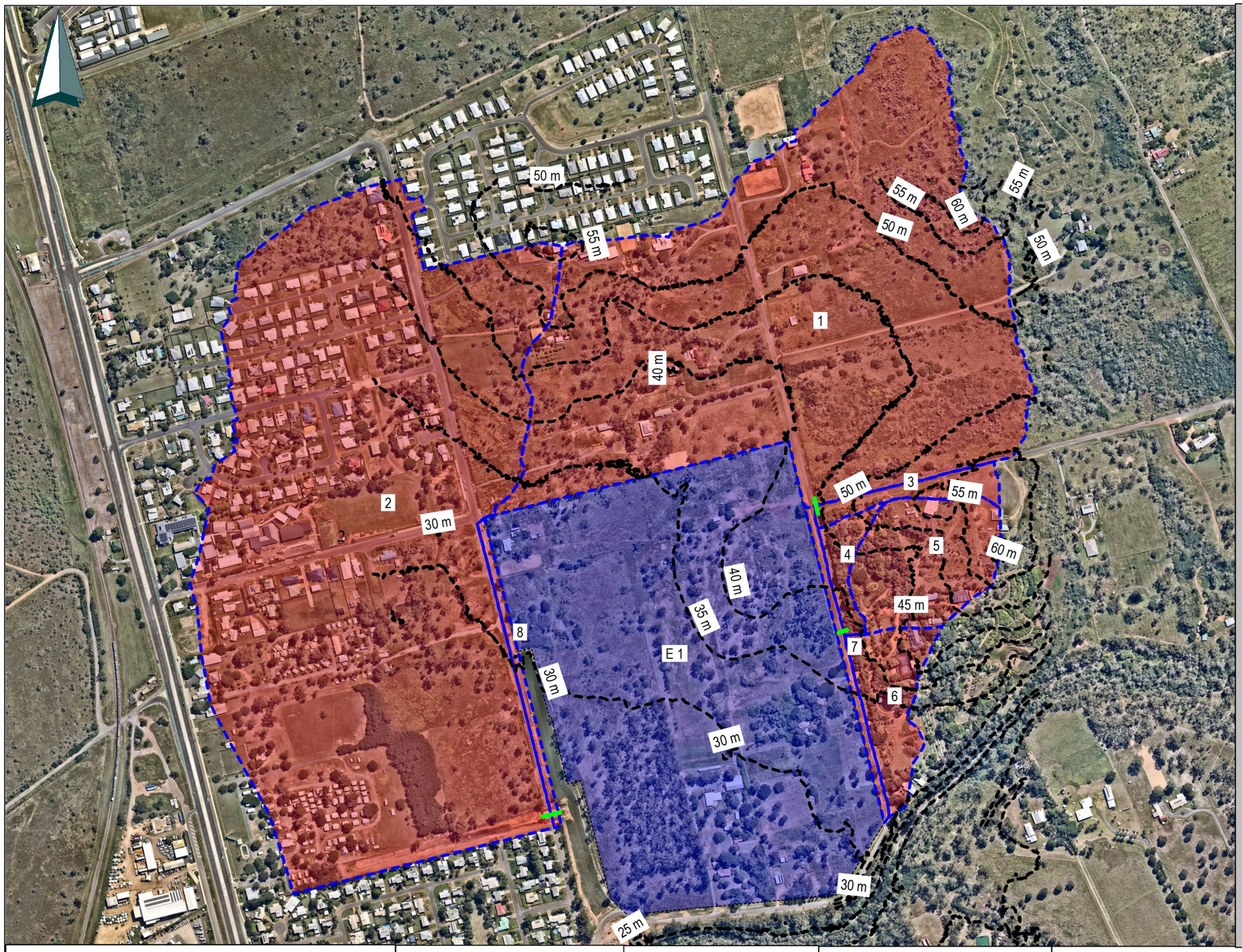
6.4 Appendix D – Existing and Developed Catchments

Existing Catchments Fraction Impervious

Catchment	Fraction Impervious	Catchment Area (Ha)
E 1	0%	26.23
1	0%	30.57
2	50.6%	38.67
3	5%	0.82
4	5%	0.69
5	5%	3.33
6	5%	1.90
7	50%	0.48
8	60%	0.52

Developed Catchments Fraction Impervious

Catchment	Fraction Impervious	Catchment Area (Ha)
Developed Catchment 1	85%	7.98
Developed Catchment 2	85%	5.32
Developed Catchment 3	85%	3.99
Developed Catchment 4	85%	4.78
Developed Catchment 5	85%	3.58
1	0%	30.57
2	50.6%	38.67
3	5%	0.82
4	5%	0.69
5	5%	3.33
6	5%	1.90
7	50%	0.48
8	60%	0.52



LEGEND

- EXISTING CATCHMENT
- EXTERNAL SUBCATCHMENTS
- EXISTING CULVERTS
- 5.0M EXISTING CONTOURS

0 m 100 m 200 m 300 m

-	JOB REF - S25028	APPROVED	WESTERA PARTNERS	930-960 NORMAN ROAD, PARKHURST PROPOSED RETIREMENT LIVING FACILITY
-		J. HILL RPEQ 19891 FOR AND ON BEHALF OF		TITLE: EXISTING CATCHMENT PLAN APPENDIX D-1
-	Westerapartners.com.au - ABN 52 097 417 975			
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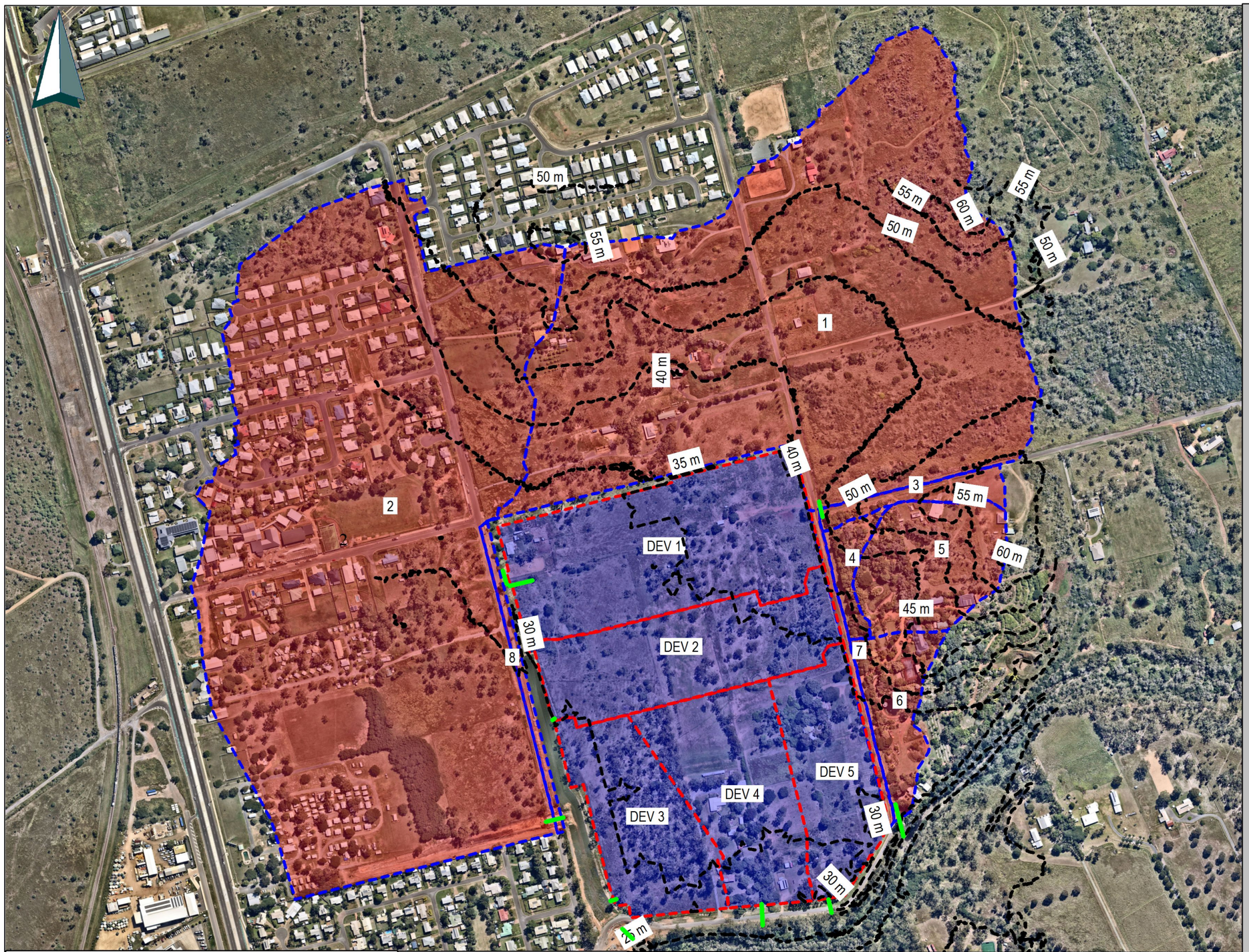

LEGEND

- DEVELOPED CATCHMENTS
- EXTERNAL SUBCATCHMENTS
- PROPOSED CULVERTS
- 5.0M DEVELOPED CONTOURS

0 m 100 m 200 m 300 m

-	JOB REF - S25028	APPROVED J. HILL RPEQ 19891 FOR AND ON BEHALF OF	WESTERA PARTNERS	930-960 NORMAN ROAD, PARKHURST PROPOSED RETIREMENT LIVING FACILITY TITLE: DEVELOPED CATCHMENT PLAN APPENDIX D-2
-				
-	Westerapartners.com.au - ABN 52 097 417 975			
REVISIONS				

Stormwater Management Report

Proposed Retirement Living Facility

930-960 Norman Road & 19-71 McMillan Avenue
Parkhurst

For: Ruby Developments Pty Ltd

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: **D/187-2023**

Dated: **18 September 2024**

13 March 2025

Ref: S25-028

A QUALITY ASSURED COMPANY

CERTIFIED QUALITY ASSURANCE – ISO AS/NZS 9001, 4801 & 14001

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DOCUMENT INFORMATION

Project Name: Proposed Retirement Living Facility

Westera Partners Ref: S25-028

Westera Partners Contact:

Jared Hill
Phone: 0437 335 403
Email: jaredh@westerapartners.com.au

Certified for Issue by:



Jared Hill RPEQ 19891

13 March 2025

Document Control:

Revision	Author	Checked for Issue	Date
A	J. Hill RPEQ 19891	J. Hill RPEQ 19891	13.03.2025

This report has been prepared for Ruby Developments Pty Ltd for the purpose of accompanying a Development Application to Rockhampton Regional Council. This report must only be used by Ruby Developments Pty Ltd for this purpose and must not be used or relied upon by any other person for any other purpose.

The assessment, conclusions or recommendations in this report are based on conditions encountered and information received at the time of preparing the report and may not be relied upon as site conditions or operations vary over time.

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1 INTRODUCTION

Westera Partners Pty Ltd has been commissioned by Ruby Developments Pty Ltd to prepare a Stormwater Management Report to accompany a development application for a proposed Retirement Living Facility.

The proposal involves 505 villas including associated internal access roads, carparking and ground level features. The primary access point will be provided from Norman Road.

This report documents how stormwater runoff will be managed on site in accordance with Rockhampton Regional Council's (RRC's) requirements.

2 SITE DESCRIPTION

2.1 Location and Land Use

The proposed development site is located at 930-960 Norman Road & 19-71 McMillan Avenue Parkhurst, also known as Lots 7-12 RP603508. The site area is approximately 27.628Ha and is currently mostly vacant rural land improved with dwellings and a golf driving range. The site falls at varying grade to the south and west towards a recently constructed open drain and McMillan Avenue.

The site is bound by rural properties to the north and east, McMillan Ave to the south and east and Norman Road to the west. Refer to Figure 1 for an indicative site location and Appendix D for detail site survey information.



Figure 1 – Indicative site location (Nearmap, 2024)

2.2 Lawful Point of Discharge

The existing site currently discharges stormwater to the south and west towards McMillan Ave and the open drain located along the east boundary of the site. Recently constructed box culverts conveys stormwater under McMillan Avenue from the open drain to Limestone Creek.

Stormwater runoff from approximately 50% of the development area will be collected on site and discharged to the open drain with the balance of the site to be discharged directly to Limestone Creek via new culvert crossing under McMillan Avenue. Refer to the engineering plans within Appendix C for further information.

2.3 Existing Infrastructure

The development site is currently burdened by the recently constructed open drain built to convey stormwater to McMillan Avenue. Six 2400x1200 RCBC units have been constructed under McMillan Avenue to facilitate this connection. Six 1200x900 RCBC units were also constructed under Norman Avenue to direct runoff from the west of the development site towards Limestone Creek. The open drain is contained within an easement and is not proposed to be altered as part of the development works, though the drain is proposed to be extended to the north and east to manage upslope overland flow.

2.4 Upstream Drainage Connection

The development site does not have any neighbouring properties that would require a piped connection through the development site to achieve a lawful point of discharge.

2.5 Flooding

The development site is mapped as being impacted by overland flow flooding from external catchments to the north and east. This overland flow flooding is proposed to be collected and diverted around the development footprint to establish flood free homes. Refer to separate Flood Impact Assessment by Westera Partners for further information on flooding.

3 STORMWATER QUANTITY MANAGEMENT

The development site is located within a large catchment that collectively discharges runoff to Limestone Creek via the recently constructed box culverts under McMillan Avenue with the development site being located within the lower portion of the catchment. It is therefore considered that stormwater detention for the development site would have an adverse impact on the performance of the box culverts downstream of the site as would result in the peak discharge from site occurring closer to that of the peak for larger catchment. Stormwater attenuation is therefore proposed for the 1EY event only to comply with the waterway stability objectives of the State Planning Policy (2017) with larger events allowed to freely discharge off site to ensure no impact on the peak discharge from larger catchment as a whole.

A stormwater quantity analysis of the existing and developed site conditions for the 1EY event only has been undertaken with reference to the requirements and procedure outlined by:

- Queensland Urban Drainage Manual (QUDM)
- Australian Rainfall and Runoff 2019 (ARR2019)

The DRAINS software package has been used for modelling the peak flows off site. ARR2019 rainfall patterns have been adopted in drains utilising an Initial Loss – Continuing Loss (IL-CL) hydrological model with loss parameter input as specified by the ARR2019 data hub for Rockhampton.

The following losses have been adopted in the DRAINS hydrological model:

- Effective impervious area initial loss 1 mm

- Effective impervious area continuing loss 0 mm/hr
- Remaining area initial loss 35 mm
- Remaining area continuing loss 1.7 mm/hr

Design ARR2019 storms for Rockhampton have been added into DRAINS utilising a rainfall pattern file downloaded from the ARR data hub along with IFD rainfall depth files downloaded from the Bureau of Meteorology (BOM) website.

3.1 Existing Catchment

Catchment Area

The site currently consists of two vacant, mostly cleared, rural residential properties, another property improved by a detached dwelling and a fourth with a golf driving range. The total existing site area is approximately 27.628Ha, however the existing overland flow easement portion of the site has been excluded from the modelling. The modelled existing site catchment details are outlined in Table 1.

Table 1 - Existing catchment details

Catchment	Area (Ha)	% Impervious	Time of Concentration (T_c)
Existing	26.261	2.6%	**24mins** This comprises: • 200m sheet flow 3% slope average grass – 20mins (QUDM figure 4.4) 400m concentrated flow 3%-6% slope at 1.5m/s – 4mins

3.1.1 DRAINS results for existing site

Peak flow rates from the existing site and external catchments have been determined by modelling various storm durations for each AEP storm ensemble. The peak flow rate for the median AEP storm event is given in Table 2.

Table 2 - Existing site peak flow rates

AEP Storm Event	Peak flow rate (m3/s)
1EY	1.90

3.2 Developed Site

Catchment Area

The development involves the construction of a retirement living facility, including community facilities and landscaped areas. The considered development footprint will remain unchanged at approximately 26.261Ha. The developed site catchment details are summarised in Table 4:

Table 3 – Developed catchment details

Catchment	Area (Ha)	% Impervious	Time of Concentration (T_c)
Development	26.261	85%	8mins

3.2.1 DRAINS results for developed site

Peak flow rates from the developed site have been determined by modelling various storm durations for each AEP storm ensemble. The peak flow rate for the median AEP storm event is given in Table 5.

Table 4 - Developed site peak flow rates

AEP Storm Event	Peak flow rate (m3/s)
1EY	6.01

3.2.2 DRAINS results calibration

The DRAINS results for both the existing site and developed site are compared against rational method calculated flow rates in Table 3 below. Rainfall intensities have been obtained from the BOM IFD 2016 tool and other catchment parameters are as provided in Table 5.

Table 5 – Developed flow rate comparison – Rational Method

AEP Storm Event	Existing peak flow rate (m3/s) (DRAINS)	Existing peak flow rate (m3/s) (rational method)	Developed peak flow rate (m3/s) (DRAINS)	Developed peak flow rate (m3/s) (rational method)
1EY	1.90	2.68	6.15	5.19

As shown in Table 3 above, the existing and developed DRAINS model output is considered to generally align with the ballpark results of the rational method. The significant losses considered in the IL/CL method for the existing case is considered to contribute in a large way to the disparity here.

3.3 Water Quantity Comparison

Table 6 compares the peak flow rates for the median design storm for the existing and developed cases.

Table 6 - Difference in existing vs developed peak flow rates

AEP Storm Event	Existing peak flow rate (m3/s)	Developed peak flow rate (m3/s)	Difference (m3/s)
1EY	1.90	6.15	4.25

As shown in Table 6, the peak flow rate of stormwater runoff has increased for the development as a result of the increase in impervious area. Stormwater detention is therefore required to offset this increase in peak flow rate to maintain waterway stability.

3.4 Stormwater Detention

Stormwater detention for the development for the 1EY event only is proposed to be provided by five separate combined treatment/detention tanks. Runoff from the development shall be split into five sub-catchments with each directed to a separate tank at the detailed design phase. Catchments have been assigned A through E. Further in depth review and optimisation of the detention tank design and catchments directed to the tanks will be required at the detailed design phase. Each tank is designed to have runoff in excess of the 1EY storm event freely flow over the internal high flow weir and to the open drain. Refer to Table 7 and Appendix C for further details of the modelled detention tanks.

Table 7 - Detention System Details

Description	Specification
Assumed total catchment to detention tank A	7.929 Ha (85% impervious)
Assumed total catchment to detention tank B	5.112 Ha (85% impervious)
Assumed total catchment to detention tank C	3.921 Ha (84% impervious)
Assumed total catchment to detention tank D	4.673 Ha (86% impervious)
Assumed total catchment to detention tank E	4.147 Ha (88% impervious)
Assumed catchment bypassing detention	0.479 Ha (5% impervious)
Detention tank A geometry	1025m^2 total area 1.90m total depth 1,947.5m^3 total volume 1877.3m^3 detention volume (excludes treatment volume)
Detention tank B geometry	355m^2 total area 2.90m total depth 1,029.5m^3 total volume 979.1m^3 detention volume (excludes treatment volume)
Detention tank C geometry	429m^2 total area 2.10m total depth 900m^3 total volume 862.2m^3 detention volume (excludes treatment volume)
Detention tank D geometry	410m^2 total area 3.00m total depth

Description	Specification
	1230m^3 total volume 1185.9m^3 detention volume (excludes treatment volume)
Detention tank E geometry	325m^2 total area 3.00m total depth 975m^3 total volume 934.05m^3 detention volume (excludes treatment volume)
Detention tank A 1EY outlet	540mm orifice in base of 1.40m high weir
Detention tank B 1EY outlet	350mm orifice in base of 2.50m high weir
Detention tank C 1EY outlet	340mm orifice in base of 1.70m high weir
Detention tank D 1EY outlet	360mm orifice in base of 2.60m high weir
Detention tank E 1EY outlet	320mm orifice in base of 2.60m high weir
Total detention volume for site	5,838.55m^3

Figure 2 illustrates the DRAINS model layout developed for this detention system.

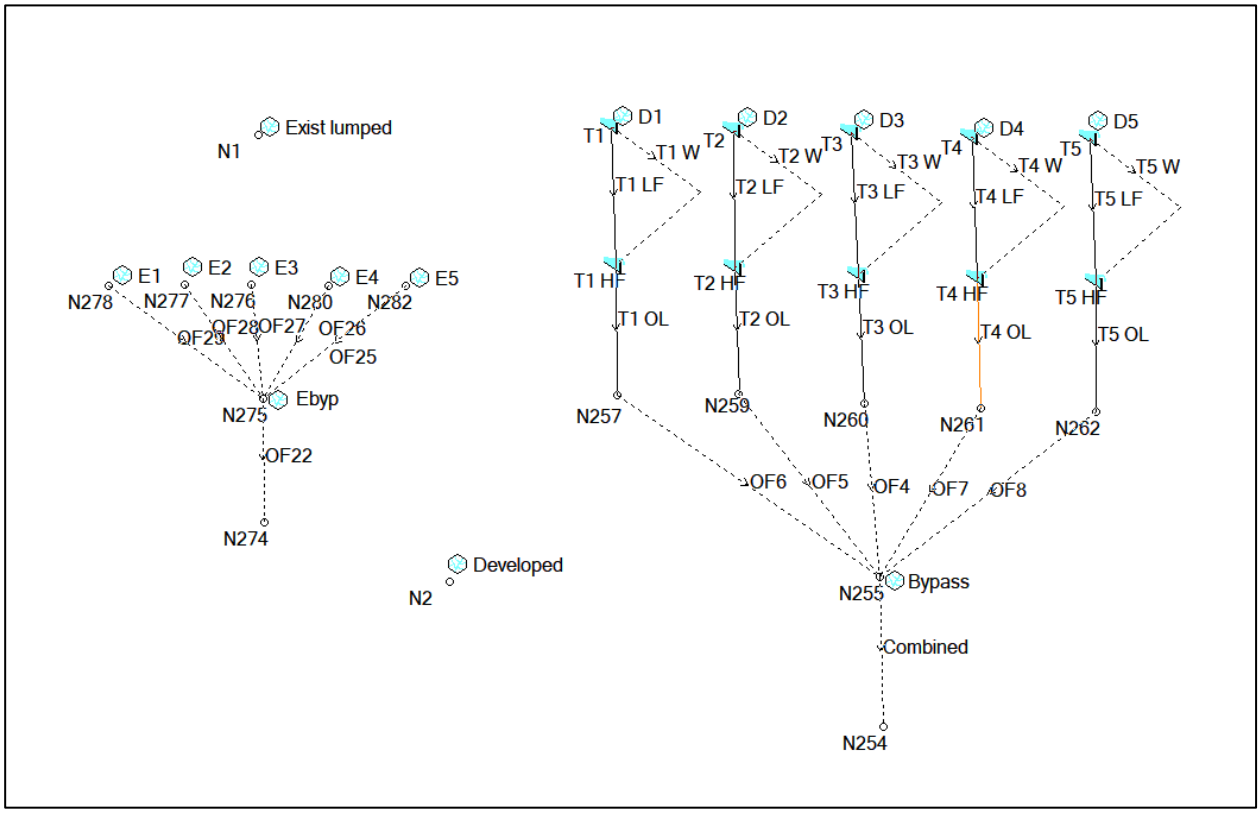


Figure 2 - Drains model layout

A comparison of modelled flow rates determined for the existing, developed, and mitigated cases are outlined in Table 8 below.

Table 8 – Comparison of mitigated peak flow rates

AEP Storm Event	Existing peak flow rate (m^3/s)	Developed peak flow rate (m3/s)	Mitigated peak flow rate (m3/s)
1EY	1.90	6.01	1.86 (-0.04)

As demonstrated by Table 8, the proposed detention tanks adequately mitigate the increase in peak flow rate for the 1EY to comply with waterway stability requirements. The proposed detention tanks are therefore considered appropriate but should be refined further at the detailed design phase.

The volume of the proposed tanks has also been checked to ensure capacity for runoff up to the 1% AEP event, with adequate volume being achieved by the proposed tanks.

Refer to Figures 3 & 4 for the 1EY & 1% AEP DRAINS model runs respectively.

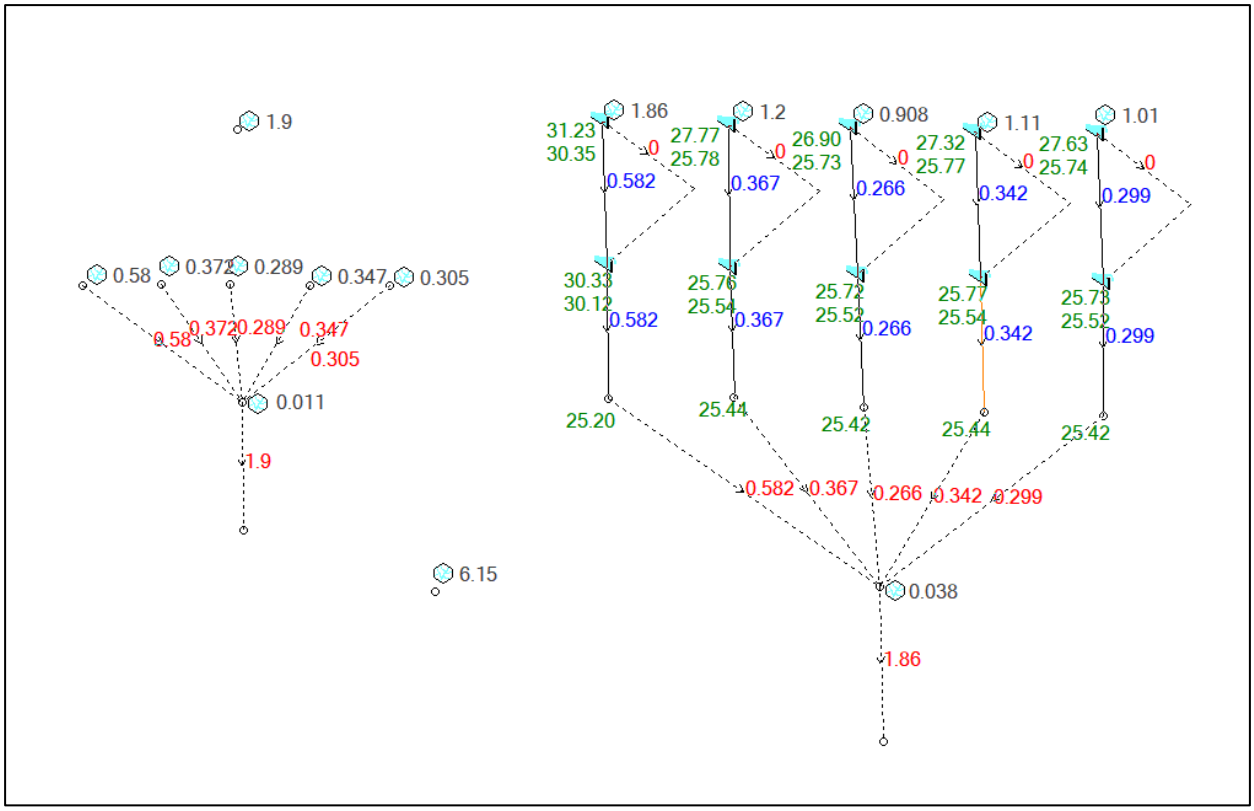


Figure 3 - 1EY AEP DRAINS model run

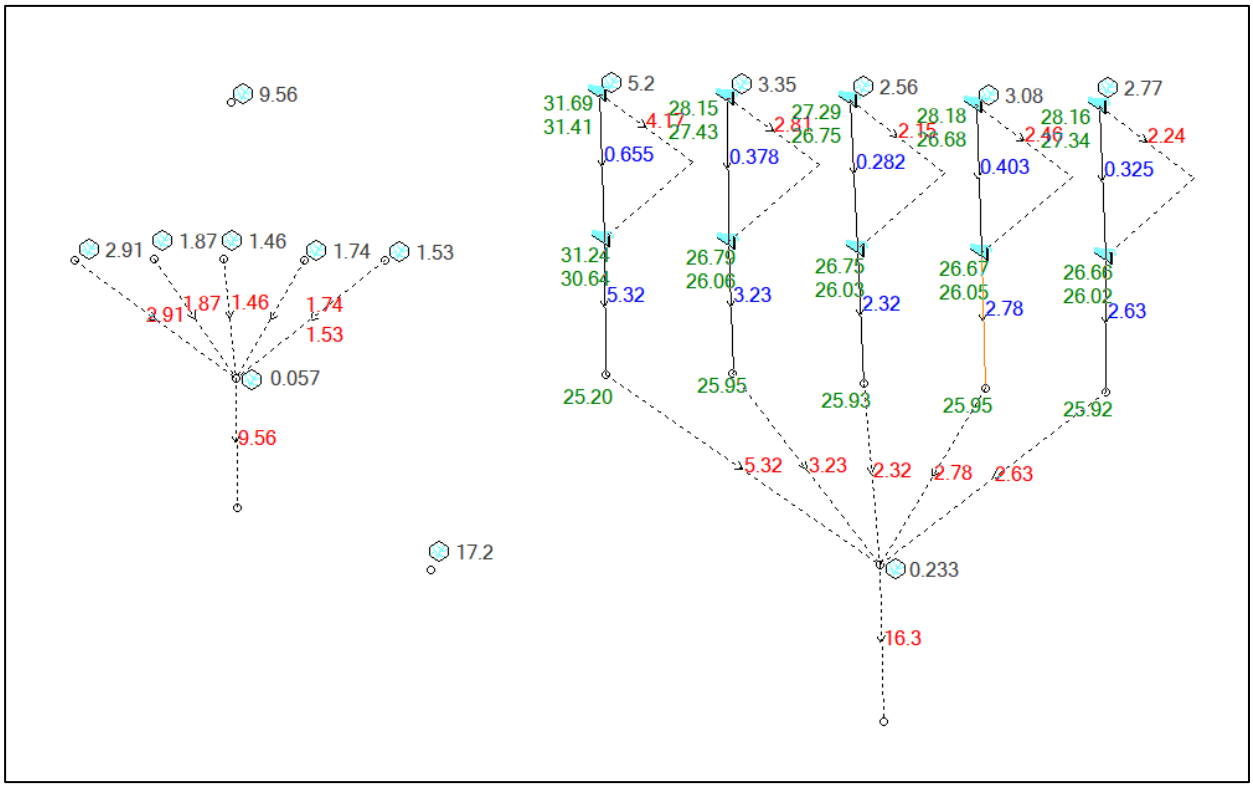


Figure 4 - 1% AEP DRAINS model run

3.5 Culvert Assessment

As noted previously, stormwater detention is not considered to be required for events in excess of the 1EY event as the development site is within the lower third of the contributing catchment to the culverts under McMillan Avenue and detention is therefore considered likely to have a detrimental impact on the culverts by delaying the contributing peak flow off site. DRAINS has been utilised to generate hydrographs for both the wider catchment and the development site to confirm this assumption. The development site catchments have been modelled with the parameters outlined in sections 3.1 & 3.2 and the wider catchment has been modelled with below parameters summarised in Table 9.

Table 9 – Wider catchment details

Catchment	Area (Ha)	% Impervious	Time of Concentration (T_c)
External	70.771 (97.035Ha less site area, refer Figure 5)	12%	**38mins** This comprises: • 80m sheet flow 6% slope average grass – 15mins (QUDM figure 4.4) 1350m concentrated flow 2%-4% slope at 1.0m/s – 23mins

The wider catchment area is shown in Figure 5 below.



Figure 5 – Wider catchment area (RRC mapping)

The drains model set up along with 1% AEP model run are shown in Figures 6 & 7 below followed by the respective combined hydrographs in Figure 8.

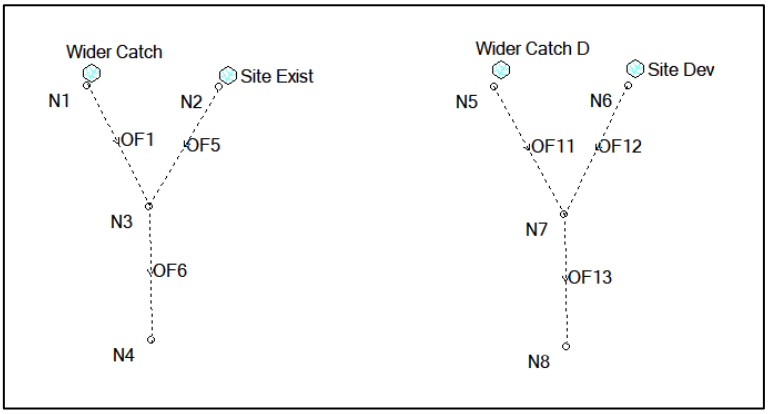


Figure 6 – DRAINS model wider catchment assessment

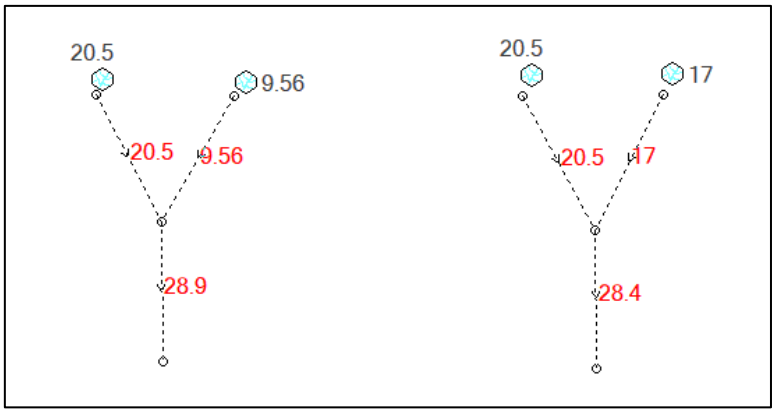


Figure 7 – Wider catchment 1% AEP model run

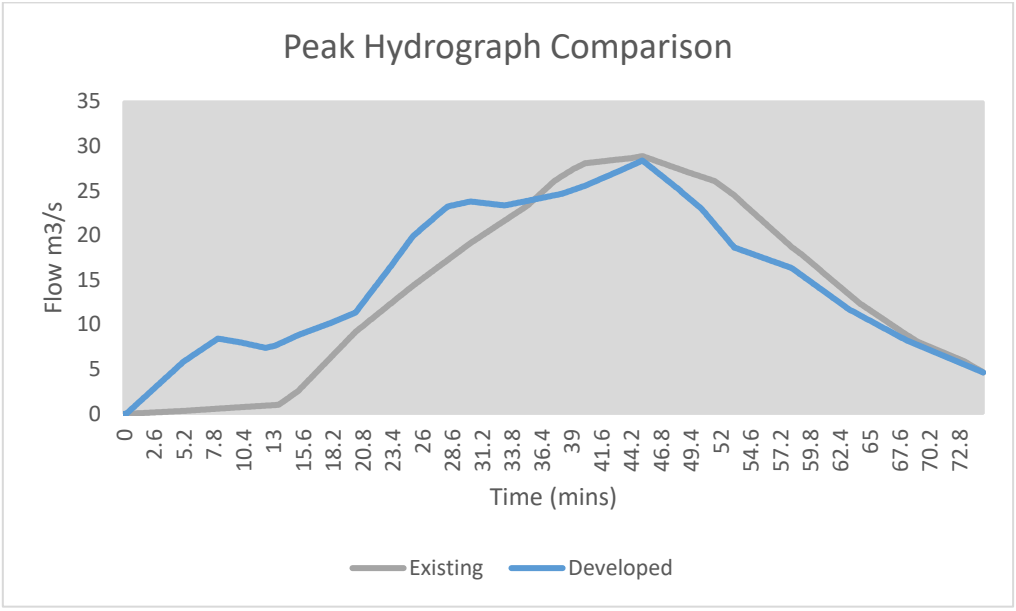


Figure 8 – Peak Hydrograph Comparison

As summarised in Figures 6-8 the overall peak flow has actually marginally reduced as a result of the development catchment increasing in impervious area and as a result shortening the subcatchment time of concentration.

4 WATER QUALITY MANAGEMENT

4.1 Operational Phase

The proposed development must address the State Planning Policy (SPP 2017) as the development site area exceeds 2500m^2. The development shall ensure that environmental values of receiving waters downstream of the development are maintained or enhanced during the construction and operation of the development in accordance with State Legislation and Local Government requirements. The stormwater quality management proposed for the development are required to achieve the following pollutant load reduction objectives in accordance with SPP requirements for Central Queensland (south):

- ≥ 85 % reduction in total suspended solids load (TSS)
- ≥ 60 % reduction in total phosphorus load (TP)
- ≥ 45 % reduction in total nitrogen load (TN)

- ≥ 90 % reduction in gross pollutant load

Pollutants typically generated during the operational phase of the development include:

- Litter/gross pollutants;
- Sediment;
- Nutrients (N & P);
- Hydrocarbons (oils and grease); and
- Heavy metals.

Stormwater treatment measures are shown on the attached stormwater management drawings and include:

- ATLAN Stormsack 200 micron filter baskets – gross pollutant filter baskets shall be installed within field inlets on site to act as a primary treatment device for the removal of TSS, nutrients and hydrocarbons (refer to Appendix B for further info).
- ATLAN EMC45 Filter system to be installed within the six proposed combined treatment/detention tanks within development site for final treatment of stormwater prior to discharging to the stormwater network (refer to Appendix B for further info).

Stormwater modelling has been carried out using MUSIC modelling software to determine the required infrastructure needed to meet the Water Quality Objectives (WQO's) above.

4.2 MUSIC Model

MUSIC modelling for this development has been carried out using MUSIC Version 6.3 and rainfall data obtained from the pluviograph tool on the eWATER website for Rockhampton using rainfall from the 1990-2000 period. The developed site catchment and treatment measure details included in the MUSIC model are outlined in Table 10.

As the development proposal is for a retirement living facility, final house designs are not known at this stage and therefore assumptions have had to be made with regards to site roof portion and impervious area fraction.

Table 10 – MUSIC model parameters

Description	Specification
Assumed catchment A road to all treatment	1.621 Ha (100% impervious)
Assumed catchment A ground to all treatment	1.612 Ha (50% impervious)
Assumed catchment A lots roof area to ATLAN Filters only (assumed to be 80% of lot area)	3.374 Ha (100% impervious)
Assumed catchment A lots ground area to ATLAN Filters only (assumed to be 20% of lot area)	0.844 Ha (60% impervious)
Assumed catchment A additional roof to ATLAN Filters only	0.478 Ha (100% impervious)
Number of modelled ATLAN Stormsacks within catchment A	80

Description	Specification
Number of modelled ATLAN Filters in tank A	110
Assumed catchment B road to all treatment	0.893 Ha (100% impervious)
Assumed catchment B ground to all treatment	0.664 Ha (35% impervious)
Assumed catchment 2 lots roof area to ATLAN Filters only (assumed to be 80% of lot area)	2.739 Ha (100% impervious)
Assumed catchment B lots ground area to ATLAN Filters only (assumed to be 20% of lot area)	0.685 Ha (60% impervious)
Number of modelled ATLAN Stormsacks within catchment B	60
Number of modelled ATLAN Filters in tank B	80
Assumed catchment C road to all treatment	0.767 Ha (100% impervious)
Assumed catchment C ground to all treatment	0.664 Ha (45% impervious)
Assumed catchment C lots roof area to ATLAN Filters only (assumed to be 80% of lot area)	1.992 Ha (100% impervious)
Assumed catchment C lots ground area to ATLAN Filters only (assumed to be 20% of lot area)	0.498 Ha (60% impervious)
Number of modelled ATLAN Stormsacks within catchment C	30
Number of modelled ATLAN Filters in tank C	60
Assumed catchment D road to all treatment	1.158 Ha (100% impervious)
Assumed catchment D ground to all treatment	0.494 Ha (28% impervious)
Assumed catchment D lots roof area to ATLAN Filters only (assumed to be 80% of lot area)	2.297 Ha (100% impervious)
Assumed catchment D lots ground area to ATLAN Filters only (assumed to be 20% of lot area)	0.574 Ha (60% impervious)
Assumed catchment D additional roof to ATLAN Filters only	0.15Ha (100% impervious)
Number of modelled ATLAN Stormsacks within catchment D	45

Description	Specification
Number of modelled ATLAN Filters in tank D	70
Assumed catchment E road to all treatment	0.819 Ha (100% impervious)
Assumed catchment E ground to all treatment	0.515 Ha (45% impervious)
Assumed catchment E lots roof area to ATLAN Filters only (assumed to be 80% of lot area)	2.250 Ha (100% impervious)
Assumed catchment E lots ground area to ATLAN Filters only (assumed to be 20% of lot area)	0.563 Ha (60% impervious)
Number of modelled ATLAN Stormsacks within catchment E	45
Number of modelled ATLAN Filters in tank E	65
Assumed catchment bypassing all treatment	0.479 Ha (5% impervious)

The MUSIC model layout is shown in Figure 9.

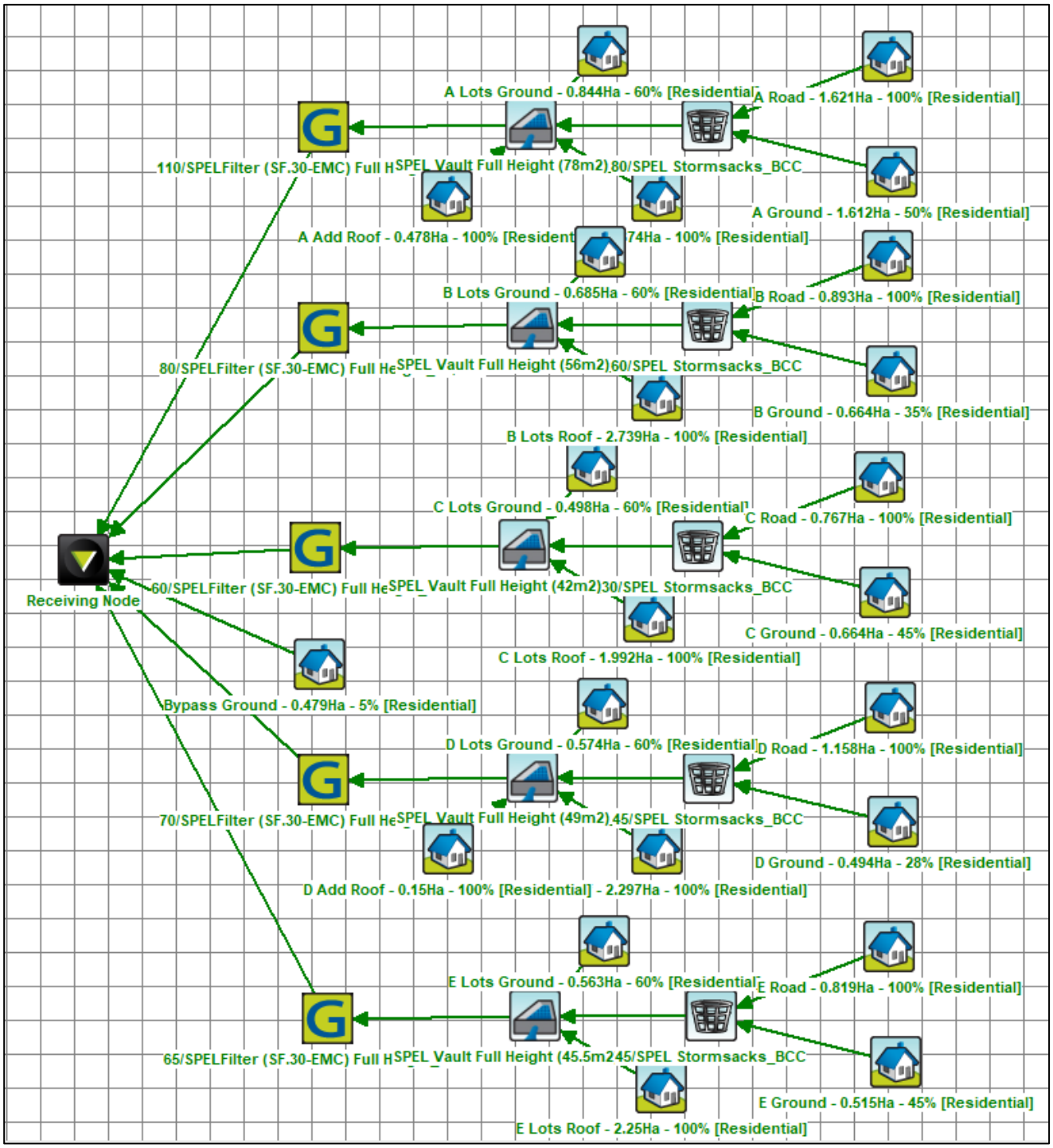


Figure 9 - MUSIC layout for development

The developed site treatment train effectiveness is outlined in Table 11.

Table 11 - Treatment train effectiveness.

Modelled Parameters	Source nodes	Residual load	% Reduction
Flow (ML/yr)	149	149	0
Total Suspended Solids (kg/yr)	22300	3250	85.4
Total Phosphorus (kg/yr)	48.5	14.6	69.9
Total Nitrogen (kg/yr)	312	130	58.3
Gross Pollutants (kg/yr)	3590	6.76	99.8

Based on the MUSIC modelling results in Table 11 above, the proposed treatment train achieves the required pollutant load reduction objectives for all pollutants. The proposed proprietary treatment measures are therefore considered adequate for the development. Further review and refinement of the water quality treatment measures should be undertaken at the detailed design phase.

4.3 Construction Phase

Management of stormwater runoff during construction and the implementation of an erosion & sediment control program is necessary to avoid impacts to receiving waters from pollutants typically generated during the construction phase. Typical pollutants are described in Table 12 below:

Table 12 – Pollutants Typically Generated During the Construction Phase

Pollutant	Sources
Litter (Gross Pollutants)	Paper, construction packaging, food packaging, cement bags.
Sediment	Unprotected exposed soils and stockpiles during earthworks and building.
Hydrocarbons	Fuel and oil spills, leaks from construction equipment.
Toxic materials	Cement slurry, asphalt prime, solvents, cleaning agents, wash waters.
pH altering substances	Acid sulphate soils, cement slurry and wash waters.

In addition to the degradation of receiving waters, impacts of inadequate erosion and sediment control downstream from the site include:

- traffic safety problems;
- blocked drains;
- local flooding problems;
- aesthetic pollution of drainage paths; and
- damage to local ecosystems.

4.3.1 Design Objectives

Management of stormwater runoff during construction should be undertaken in accordance with Appendix 2 of the SPP (July 2017). The SPP outlines the design objectives for construction phase stormwater management. These are presented in Table 13, Table 14 and Table 15.

Table 13 – SPP Appendix 2: Part 1 Construction Phase – Stormwater Management Design Objectives

Issue	Desired Outcomes
Drainage Control	1. Manage stormwater flows around or through areas of exposed soil to avoid contamination. 2. Manage sheet flows in order to avoid or minimise the generation of rill or gully erosion. 3. Provide stable concentrated flow paths to achieve the construction phase stormwater management design objectives for temporary drainage works (part 2). 4. Provide emergency spillways for sediment basins to achieve the construction phase stormwater management design objectives for emergency spillways on temporary sediment basins (part 3).
Erosion Control	1. Stage clearing and construction works to minimise the area of exposed soil at any one time. 2. Effectively cover or stabilise exposed soils prior to predicted rainfall. 3. Prior to completion of works for the development, and prior to removal of sediment controls, all site surfaces must be effectively stabilised using methods which will achieve effective short-term stabilisation.
Sediment Control	1. Direct runoff from exposed site soils to sediment controls that are appropriate to the extent of disturbance and level of erosion risk. 2. All exposed areas greater than 2500 metres must be provided with sediment controls which are designed, implemented and maintained to a standard which would achieve at least 80% of the average annual runoff volume of the contributing catchment treated (i.e. 80% hydrological effectiveness) to 50mg/L Total Suspended Solids (TSS) or less, and pH in the range (6.5–8.5).
Litter, Hydrocarbons and other contaminants	1. Remove gross pollutants and litter. 2. Avoid the release of oil or visible sheen to released waters. 3. Dispose of waste containing contaminants at authorised facilities.
Waterway Stability and flood flow management	1. Where measures are required to meet post-construction waterway stability objectives, these are either installed prior to land disturbance and are integrated with erosion and sediment controls, or equivalent alternative measures are implemented during construction. 2. Earthworks and the implementation of erosion and sediment controls are undertaken in ways which ensure flooding characteristics

Issue	Desired Outcomes
	(including stormwater quantity characteristics) external to the development site are not worsened during construction for all events up to and including the 1 in 100 year ARI (1% AEP).

Table 14 – SPP Appendix 2: Part 2 Construction Phase – Stormwater Management Design Objectives for Temporary Drainage Works

Temporary Drainage Works	Anticipated Operation Design Life and Minimum Design Storm Event		
	<12 Months	12-24 Months	>24 Months
Drainage Structure	1 in 2 year ARI/39% AEP	1 in 5 year ARI/18% AEP	1 in 10 year ARI/10% AEP
Where located immediately up-slope of an occupied property that would be adversely affected by the failure or overtopping of the structure	1 in 10 year ARI/10% AEP		
Culvert Crossing	1 in 1 year ARI/63% AEP		

Table 15 – SPP Appendix 2: Part 3 Construction Phase – Stormwater Management Design Objectives for Emergency Spillways on Temporary Sediment Basins

Drainage Structure	Anticipated Operation Design Life and Minimum Design Storm Event		
	<3 Months	3-12 Months	>12 Months
Emergency spillways on temporary sediment basins	1 in 10 year ARI/10% AEP	1 in 20 year ARI/5% AEP	1 in 50 year ARI/2% AEP

Best practice erosion and sediment controls must be installed to minimise the discharge of sediment laden runoff during construction and to achieve the objectives outlined in Tables 13-15. This is discussed in the following section.

4.3.2 Erosion and Sediment Control

Management of stormwater runoff during construction is necessary to avoid pollution of downstream waterways from sediment and gross pollutant loading. Impacts of inadequate erosion and sediment control downstream from the site include:

- traffic safety problems;
- blocked drains;
- local flooding problems;

- aesthetic pollution of drainage paths; and
- damage to local ecosystems.

Best practice erosion and sediment controls must be installed to minimise the discharge of sediment laden runoff during construction. Erosion and sediment control plans shall be developed during detailed design phase and must be continually maintained and amended as required to minimise environmental harm.

Erosion and sediment control plans are based on three sets of control measures:

- drainage control;
- erosion control; and
- sediment control.

These control measures must be maintained in an effective operational condition. Sediment disposal from site is to occur to the satisfaction of Rockhampton Regional Council. Defects in erosion and sediment control devices, such as sediment fences, are to be inspected and documented. Upon Inspection, the Contractor is to determine whether the device should be replaced or repaired. Documentation is to include how the damage was caused and what measures can be implemented to reduce the possibility of repeat occurrences. Any damage to either permanent or temporary water quality control structures or devices is to be immediately rectified at the contractor's expense.

The effectiveness of the erosion and sediment control devices can be monitored by visual audits. All ESC measures are to be inspected:

- at least daily (when work is occurring on site) or weekly (when work is not occurring on site);
- within 24 hours of expected rain; and
- within 18 hours of a rainfall event (i.e. an event of sufficient intensity and duration to mobilise sediment on site).

Drainage paths are to be inspected to ensure the sediment fences are not being bypassed as a result of soil erosion.

Sediment laden runoff shall be prevented from entering neighbouring properties. This shall be achieved by landscaping disturbed areas immediately and prior to a rainfall event.

The proposed development has scored a 27 on the IECA erosion hazard assessment with trigger score value exceeded as a result of the development land area (refer Appendix A for details). Refer to conceptual ESC plans contained within Appendix C.

4.3.3 Maintenance and Monitoring Requirements

Periodic maintenance and monitoring of stormwater devices proposed in this report is crucial to ensure effective operation and design life.

Inspect field inlet grates, pits and underground pipes for blockage or damage at least 6 monthly or after significant rainfall event. Any installed filter baskets shall be inspected and maintained preferably by the manufacturer to avoid damage to units and to ensure adequate cleaning and record keeping. For the first 12 months routine inspections of filter baskets shall be carried out monthly with routine clean out at alternate months. Results of the initial 12 months maintenance program shall be used to determine future maintenance intervals. Refer manufactures maintenance and monitoring methodology for specific details. Maintenance of ESC measures must occur in accordance with Table 16.

Table 16 - ESC maintenance requirements.

ESC Measure	Maintenance Trigger	Timeframe for Completion of Maintenance
Sediment basins	When settled sediment exceeds the volume of the sediment storage zone	Within 7 days of the inspection.
Other ESC measures	The capacity of ESC measures falls below 75%.	By the end of the day.

Sediment accumulation on ESC devices is to be removed and disposed of to the satisfaction of Rockhampton Regional Council.

5 CONCLUSION

This Stormwater Management Report outlines how stormwater runoff from the site will be managed in order to not adversely impact the receiving environment.

Stormwater runoff from the development site shall be directed to the existing open channel in the west portion of the site that is being extended as part of the flood management strategy as well as under McMillan Avenue to Limestone Creek. Stormwater detention for 1EY event only is proposed to be provided by five separate underground combined treatment/detention tanks providing 5,838.55m^3 of detention volume.

Stormwater quality treatment is proposed to be managed on site to achieve the water quality objectives through primary treatment from filter basket inserts in the field inlets in driveway and tertiary treatment from ATLAN filter cartridges in the five combined treatment/detention tanks. MUSIC modelling has been undertaken to demonstrate runoff from the development site achieves the water quality pollution load reduction targets of the State Planning Policy.

The development site is impacted by upstream overland flow flooding which is proposed to be managed by an extension of the open drain along the west and north boundaries to achieve flood free development footprint.

Further refinement of the proposed stormwater management measures is recommended at the detailed design phase to ensure coordination with final architectural layout.

By implementing the proposed stormwater management system, and providing adequate maintenance, the downstream environment and neighbouring properties will not experience any adverse deterioration of water quality as a result of the proposed development.

6 APPENDICES

Appendix A – Erosion Hazard Assessment

Erosion Hazard Assessment Form

Condition	Points	Score	Trigger value
AVERAGE SLOPE OF DISTURBANCE AREA [1]			
• not more than 3% [3% . 33H:1V]	0		
• more than 3% but not more than 5% [5% = 20H:1V]	1	**1**	**4**
• more than 5% but not more than 10% [10% = 10H:1V]	2		
• more than 10% but not more than 15% [15% . 6.7H:1V]	4		
• more than 15%	6		
SOIL CLASSIFICATION GROUP (AS1726) [2]			
• GW, GP, GM, GC	0		
• SW, SP, OL, OH	1	**3**	
• SM, SC, MH, CH	2		
• ML, CL, or if *imported fill* is used, or if soils are untested	3		
EMERSON (DISPERSION) CLASS NUMBER [3]			
• Class 4, 6, 7, or 8	0		
• Class 5	2	**4**	**6**
• Class 3, (default value if soils are untested)	4		
• Class 1 or 2	6		
DURATION OF SOIL DISTURBANCE [4]			
• not more than 1 month	0		
• more than 1 month but not more than 4 months	2	**6**	**6**
• more than 4 months but not more than 6 months	4		
• more than 6 months	6		
AREA OF DISTURBANCE [5]			
• not more than 1000 m^2	0		
• more than 1000 m^2 but not more than 5000 m^2	1	**6**	**4**
• more than 5000 m^2 but not more than 1 ha	2		
• more than 1 ha but not more than 4 ha	4		
• more than 4 ha	6		
WATERWAY DISTURBANCE [6]			
• No disturbance to a watercourse, open drain or channel	0	**1**	**2**
• Involves disturbance to a constructed open drain or channel	1		
• Involves disturbance to a natural watercourse	2		
REHABILITATION METHOD [7]			
Percentage of area (relative to total disturbance) revegetated by seeding without light mulching (i.e. worst-case revegetation method).			
• not more than 1%	0	**0**	
• more than 1% but not more than 5%	1		
• more than 5% but not more than 10%	2		
• more than 10%	4		
RECEIVING WATERS [8]			
• Saline waters only	0	**2**	
• Freshwater body (e.g. creek or freshwater lake or river)	2		
SUBSOIL EXPOSURE [9]			
• No subsoil exposure except of service trenches	0	**2**	
• Subsoils are likely to be exposed	2		
EXTERNAL CATCHMENTS [10]			
• No external catchment	0	**1**	
• External catchment diverted around the soil disturbance	1		
• External catchment not diverted around the soil disturbance	2		
ROAD CONSTRUCTION [11]			
• No road construction	0	**0**	
• Involves road construction works	2		
pH OF SOILS TO BE REVEGETATED [12]			
• more than pH 5.5 but less than pH 8	0	**1**	
• other pH values, or if soils are untested	1		
Total Score [13]		**27**	

Explanatory notes

Requirements: Specific issues or actions required by the proponent.

Warnings: Issues that should be considered by the proponent.

Comments: General information relating to the topic.

[1] **REQUIREMENTS:**
For sites with an average slope of proposed land disturbance greater than 10%, a preliminary ESCP must be submitted to the regulatory authority for approval during planning negotiations.

Proponents must demonstrate that adequate erosion and sediment control measures can be implemented on-site to effectively protect downstream environmental values.

If site or financial constraints suggest that it is not reasonable or practicable for the prescribed water quality objectives to be achieved for the proposal, then the proponent must demonstrate that alternative designs or construction techniques (e.g. pole homes, suspended slab) cannot reasonably be implemented on the site.

WARNINGS:
Steep sites usually require more stringent drainage and erosion controls than flatter grade sites.

COMMENTS:
The steeper the land, the greater the need for adequate drainage controls to prevent soil and mulch from being washed from the site.

[2] **REQUIREMENTS:**
If the actual soil K-factor is known from soil testing, then the Score shall be determined from Table 1.

If a preliminary ESCP is required during planning negotiations, then it must be demonstrated that adequate space is available for the construction and operation of any major sediment traps, including the provision for any sediment basins and their associated embankments and spillways. It must also be demonstrated that all reasonable and practicable measures can be taken to divert the maximum quantity of sediment-laden runoff (up to the specified design storm) to these sediment traps throughout the construction phase and until the contributing catchment is adequately stabilised against erosion.

WARNINGS:
The higher the point score, the greater the need to protect the soil from raindrop impact and thus the greater the need for effective erosion control measures. A point score of 2 or greater will require a greater emphasis to be placed on revegetation techniques that do not expose the soil to direct rainfall contact during vegetation establishment, e.g. turfing and *Hydromulching*.

COMMENTS:
Table 2 provides an *indication* of soil conditions likely to be associated with a particular Soil group based on a statistical analysis of soil testing across NSW. This table provides only an initial estimate of the likely soil conditions.

The left-hand-side of the table provides an indication of the type of sediment basin that will be required (Type C, F or D). The right-hand-side of the table provides an indication of the likely erodibility of the soil based on the Revised Universal Soil Loss Equation (RUSLE) K-factor.

Table 3 provides some general comments on the erosion potential of the various soil groups.

Table 1 – Score if soil K-factor is known

	RUSLE soil erodibility K-factor			
	K < 0.02	**0.02<K<0.04**	**0.04<K<0.06**	**K > 0.06**
Score	0	1	2	3

Table 2 – Statistical analysis of NSW soil data [1]

Unified Soil Class System	Likely sediment basin classification (%)			Probable soil erodibility K-factor (%) [2]			
	Dry	Wet		Low	Moderate	High	Very High
	Type C	Type F	Type D	K < 0.02	0.02<K<0.04	0.04<K<0.06	K > 0.06
GM	30	**58**	12	12	**51**	26	12
GC	**42**	33	25	13	**71**	17	0
SW	40	**48**	12	**49**	39	12	0
SP	**53**	32	15	**76**	18	5	1
SM	21	**67**	12	26	**48**	25	1
SC	26	**50**	24	16	**64**	18	2
ML	5	**63**	32	4	35	**45**	16
CL	9	**51**	39	12	**56**	19	13
OL	2	**80**	18	34	**61**	5	1
MH	12	41	**48**	15	19	**41**	25
CH	5	44	**51**	39	**43**	11	7

Notes: [1] Analysis of soil data presented in Landcom (2004).

[2] Soil erodibility based on Revised Universal Soil Loss Equation (RUSLE) K-factor.

Unified Soil Classification System (USCS)

GW Well graded gravels, gravel-sand mixtures, little or no fines
GP Poorly graded gravels, gravel-sand mixture, little or no fines
GM Silty gravels, poorly graded gravel-sand-silt mixtures
GC Clayey gravels, poorly graded gravel-sand-clay mixtures
SW Well graded sands, gravelly sands, little or no fines
SP Poorly graded sands, gravelly sands, little or no fines
SM Silty sands, poorly graded sand-silt mixtures
SC Clayey sands, poorly graded sand-clay mixtures
ML Inorganic silts & very fine sands, rock flour, silty or clayey fine sands with slight plasticity
CL Inorganic clays, low–medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
OL Organic silts and organic silt-clays of low plasticity
MH Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
CH Inorganic clays of high plasticity, fat clays
OH Organic clays of medium to high plasticity

Table 3 – Typical properties of various soil groups [1]

Soil Groups	Typical properties [2]
GW, GP	• Low erodibility potential.
GM, GC	• Low to medium erodibility potential. • May create turbid runoff if disturbed as a result of the release of silt and clay particles.
SW, SP	• Low to medium erodibility potential.
SM, SC	• Medium erodibility potential. • May create turbid runoff if disturbed as a result of the release of silt and clay particles.
MH, CH	• Highly variable (low to high) erodibility potential. • Will generally create turbid runoff if disturbed.
ML, CL	• High erodibility potential. • Tendency to be dispersive. • May create some turbidity in runoff if disturbed.

Note: [1] After Soil Services & NSW DLWC (1998).
[2] Any soil can represent a high erosion risk if the binding clays or silts are unstable.

Table 4 provides **general** guidelines on the suitability of various soil groups to various engineering applications.

Table 4 – Engineering suitability based on Unified Soil Classification [1]

Unified Soil Class	USC Group	Embankments		Fill	Slope stability	Untreated roads
		Water retaining	Non water retaining			
Well graded gravels	GW	Unsuitable	Excellent	Excellent	Excellent	Average
Poorly graded gravel	GP	Unsuitable	Average	Excellent	Average	Unsuitable
Silty gravels	GM	Unsuitable	Average	Good	Average	Average
Clayey gravels	GC	Suitable	Average	Good	Average	Excellent
Well graded sands	SW	Unsuitable	Excellent	Excellent	Excellent	Average
Poorly graded sands	SP	Unsuitable	Average	Good	Average	Unsuitable
Silty sands	SM	Suitable [2]	Average	Average	Average	Poor
Clayey sands	SC	Suitable	Average	Average	Average	Good
Inorganic silts	ML	Unsuitable	Poor	Average	Poor	Unsuitable
Inorganic clays	CL	Suitable [2]	Good	Average	Good	Poor
Organic silts	OL	Unsuitable	Unsuitable	Poor	Unsuitable	Unsuitable
Inorganic silts	MH	Unsuitable	Poor	Poor	Poor	Unsuitable
Inorganic clays	CH	Suitable [2]	Average	Unsuitable	Average	Unsuitable
Organic clays	OH	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable
Highly organic soils	Pt	Unsuitable	Unsuitable	Unsuitable	Unsuitable	Unsuitable

Notes: [1] Modified from Hazelton & Murphy (1992)
[2] Suitable only after modifications to soil such as compaction and/or erosion protection

[3] If the soils have not been tested for Emerson Class, then adopt a score of 4.

REQUIREMENTS:
Works proposed on sites containing Emerson Class 1 or 2 soils have a very high pollution potential and must submit a conceptual ESCP to the regulatory authority for review and/or approval (as required by the authority) during planning negotiations.

WARNINGS:
Class 3 and 5 soils disturbed by cut and fill operations or construction traffic are highly likely to discolour stormwater (i.e. cause turbid runoff). Chemical stabilisation will likely be required if these soils are placed immediately adjacent to a retaining wall. Any disturbed Class 1, 2, 3 and 5 soils that are to be revegetated must be covered with a non-dispersive topsoil as soon as possible (unless otherwise agreed by the regulatory authority).

Class 1 and 2 soils are highly likely to discolour (pollute) stormwater if exposed to rainfall or flowing water. Treatment of these soils with gypsum (or other suitable substance) will most likely be required. These soils should not be placed directly behind a retaining wall unless it has been adequately treated (stabilised) or covered with a non-dispersible soil.

[4] The duration of disturbance refers to the total duration of soil exposure to rainfall up until a time when there is at least 70% coverage of all areas of soil.

REQUIREMENTS:
All land developments with an expected soil disturbance period greater than 6 months must submit a conceptual ESCP to the regulatory authority for review and/or approval (as required by the authority) during planning negotiations.

COMMENTS:
Construction periods greater than 3 months will generally experience at least some significant storm events, independent of the time of year that the construction (soil disturbance) occurs.

[5] **REQUIREMENTS:**
Development proposals with an expected soil disturbance in excess of 1ha must submit a conceptual ESCP to the regulatory authority for review and/or approval (as required by the regulatory authority) during planning negotiations.

The area of disturbance refers to the total area of soil exposed to rainfall or dust-producing winds either as a result of:

(a) the removal of ground cover vegetation, mulch or sealed surfaces;
(b) past land management practices;
(c) natural conditions.

WARNINGS:
A *Sediment Basin* will usually be required if the disturbed area exceeds 0.25ha (2500m^2) within any sub-catchment (i.e. land flowing to one outlet point).

COMMENTS:
For soil disturbances greater than 0.25ha, the revegetation phase should be staged to minimise the duration for which soils are exposed to wind, rain and concentrated runoff.

[6] **REQUIREMENTS:**
All developments that involve earthworks or construction within a natural watercourse (whether that watercourse is in a natural or modified condition) must submit a conceptual ESCP to the regulatory authority for review and/or approval (as required by the regulatory authority) during planning negotiations.

Permits and/or licences may be required from the State Government, including possible submission of the ESCP to the relevant Government department.

[7] **REQUIREMENTS:**
No areas of soil disturbance shall be left exposed to rainfall or dust-producing winds at the end of a development without an adequate degree of protection and/or an appropriate action plan for the establishment of at least 70% cover.

COMMENTS:
Grass seeding without the application of a light mulch cover is considered the least favourable revegetation technique. A light mulch cover is required to protect the soil from raindrop impact, excessive temperature fluctuations, and the loss of essential soil moisture.

[8] **COMMENTS:**
All receiving waters can be adversely affected by unnatural quantities of sediment-laden runoff. Freshwater ecosystems are generally more susceptible to ecological harm resulting from the inflow of fine or dispersible clays than saline water bodies. The further inland a land disturbance is, the greater the potential for the released sediment to cause environmental harm as this sediment travels towards the coast.

For the purpose of this clause it is assumed that all sediment-laden runoff will eventually flow into saline waters. Thus, sediment-laden discharges that flow first into freshwater are likely to adversely affect both fresh and saline water bodies and are therefore considered potentially more damaging to the environment.

This clause does **not** imply that sediment-laden runoff will not cause harm to saline waters.

[9] **COMMENTS:**
This clause refers to subsoils exposed during the construction phase either as a result of past land practices or proposed construction activities. The exposure of subsoils resulting from the excavation of minor service trenches should not be considered.

[10] **WARNINGS:**
The greater the extent of external catchment, the greater the need to divert up-slope stormwater runoff around any soil disturbance.

COMMENTS:
The ability to separate “clean” (i.e. external catchment) stormwater runoff from “dirty” site runoff can have a significant effect on the size, efficiency and cost of the temporary drainage, erosion, and sediment control measures.

[11] **REQUIREMENTS:**
Permission must be obtained from the owner of a road reserve before placing any erosion and sediment control measures within the road reserve.

WARNINGS:
Few sediment control techniques work efficiently when placed on a road and/or around roadside stormwater inlets. Great care must be taken if sediment control measures are located on a public roadway, specifically:

- safety issues relating to road users;
- the risk of causing flooding on the road or within private property.

The construction of roads (whether temporary or permanent) will usually modify the flow path of stormwater runoff. This can affect how "dirty" site runoff is directed to the sediment control measures.

COMMENTS:
"On-road" sediment control devices are at best viewed as secondary or supplementary sediment control measures. Only in special cases and/or on very small projects (e.g. kerb and channel replacement) might these controls be considered as the "primary" sediment control measure.

[12] **WARNINGS:**
Soils with a pH less than 5.5 or greater than 8 will usually require treatment in order to achieve satisfactory revegetation. Soils with a pH of less than 5 (whether naturally acidic or in acid sulfate soil areas) may also limit the choice of chemical flocculants (e.g. Alum) for use in the flocculation of *Sediment Basins*.

[13] **REQUIREMENTS:**
A preliminary ESCP must be submitted to the local government for approval during the planning phase for any development that obtains a total point score of 17 or greater or when any trigger value is scored or exceeded.

Appendix B – ATLAN Product Info

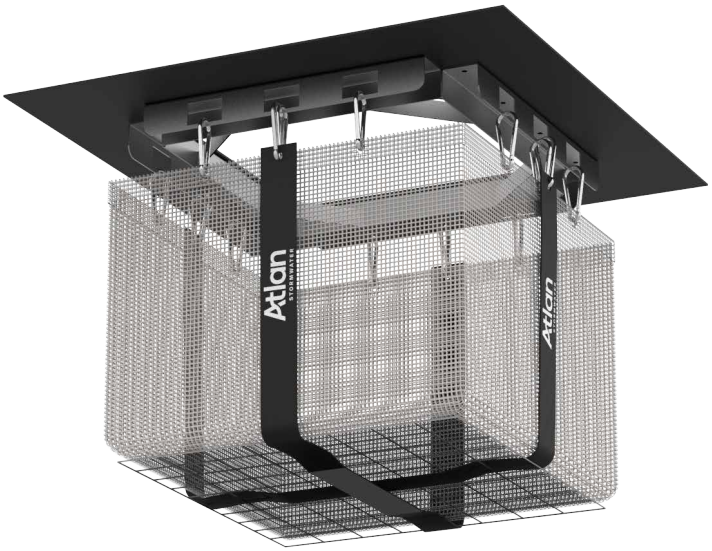
StormSack

At-Source Gross Pollutant Trap



atlan.com.au

Atlan STORMWATER





The Atlan StormSack is specifically designed for the capture of gross pollutants, sediment, litter, and oil and grease. Ideally suited for storm drain retrofits, the StormSack's unique design allows maintenance to be performed using conventional vacuum suction equipment.

StormSack filtration solutions are highly engineered water quality devices that are deployed directly in the stormwater system to capture contaminants close the surface for ease of maintenance. Easily retrofitted into new or existing structures, StormSack filtration technology is a decentralized approach to stormwater treatment that essentially repurposes traditional site infrastructure and customizes it to meet specific site water quality goals. In this way, it satisfies important objectives of today's LID (Low Impact Development) criteria.

From an operations perspective, catch basins with StormSack filters are also easier and quicker to clean out because pollutants are trapped just under the grate.

APPLICATIONS

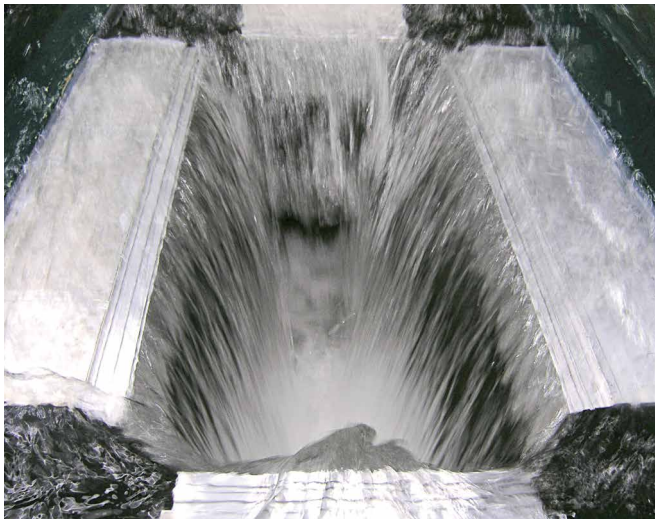
- Council storm drain retrofits
- Commercial / retail / residential
- Litter prone urban areas
- Scrap metal / solid waste / oil storage
- Part of treatment train
- Construction sediment / erosion

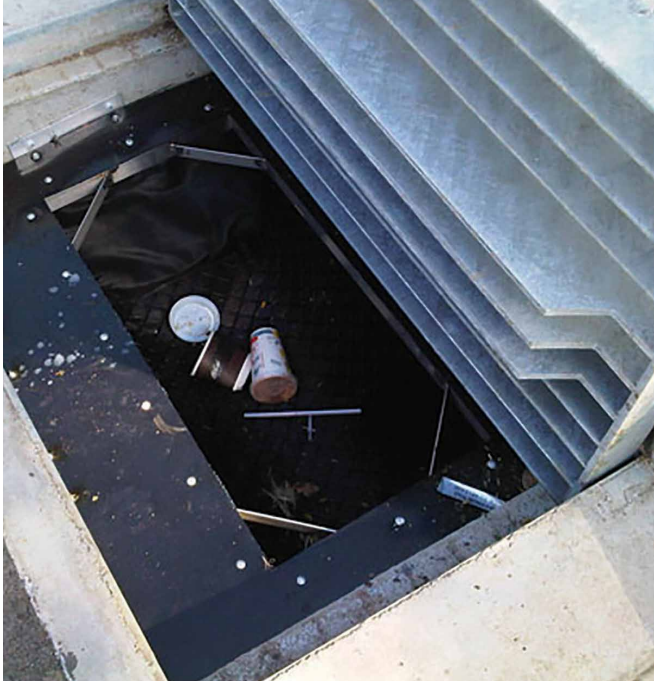
BENEFITS

- Can be modelled in MUSIC in conjunction with bio-retention
- Low cost gross pollutant capture
- Quick & easy installation
- Simple maintenance
- At-source capture
- Adjusts to custom pit sizes

The StormSack was introduced to the Australian market in 2012 and field testing is underway at several locations in South-east Queensland. Laboratory testing has shown capture of 99.99% of gross pollutants up to the bypass flow rate. Further results will be provided as they become available.

Recommended minimum clearance from bottom of StormSack to inside bottom of vault is 50mm. Typical frame adjustability range of 127mm in each direction.





HOW IT WORKS

This technology is a post developed stormwater treatment system. The StormSack provides effective filtration of solid pollutants and debris typical of urban runoff, while utilising existing or new storm drain infrastructure. The StormSack is designed to rest on the flanges of conventional catch basin frames and is engineered for most hydraulic and cold climate conditions.

Installation procedures shall include removing the storm grate, cleaning the ledge of debris and solids, measuring catch basin clear opening and adjusting flanges to rest on the grate support ledge. Install StormSack with splash guard under curb opening so the adjustable flanges are resting on the grate support ledge. Install corner filler pieces. Reinstall storm grate directly on support flanges rise shall be no more than 3mm.

FEATURES

POLLUTANT	EFFICIENCY
Gross Pollutants (GP)	100%
Total Suspended Solids (TSS)	61%
Total Phosphorus (TP)	28%
Total Nitrogen (TN)	45%

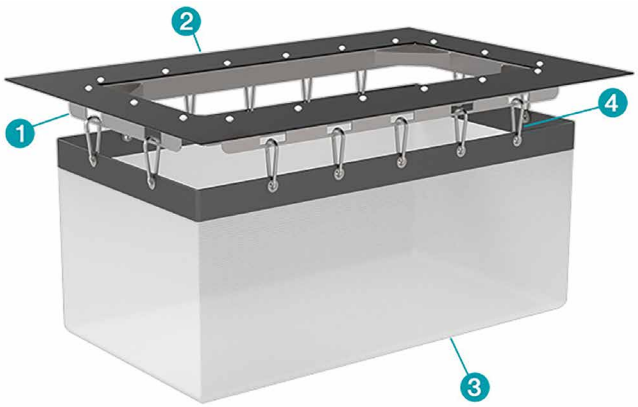
*Contact Atlan to confirm approved performance for the project LGA

MAINTENANCE

Typically the StormSack is serviceable from the street level, and therefore maintenance does not require confined space entry into the catch basin structure. The unit is designed to be maintained in place with a vacuum hose attached to a sweeper or a vactor truck. Use only Atlan replaceable parts.

Application	Regulatory Issue	Target Pollutants
Council Storm Drain Retrofits	At-source litter capture	Sediment, Litter, O&G
Commercial/Retail/Residential	Stormwater Compliance	Sediment, Litter, O&G
Litter Prone Urban Areas	Cost effective litter control	Litter ≥ 5 mm
Scrap Metal/Solid Waste/Oil Storage/Etc	Industrial Multi-Sector General Permit	Gross Pollutants, O&G
Part of Treatment Train	Council Stormwater Quality Improvement Targets	Sediment, Litter, O&G
Construction Sediment/Erosion	Sediment Control Plan	Sediment/Erosion Control

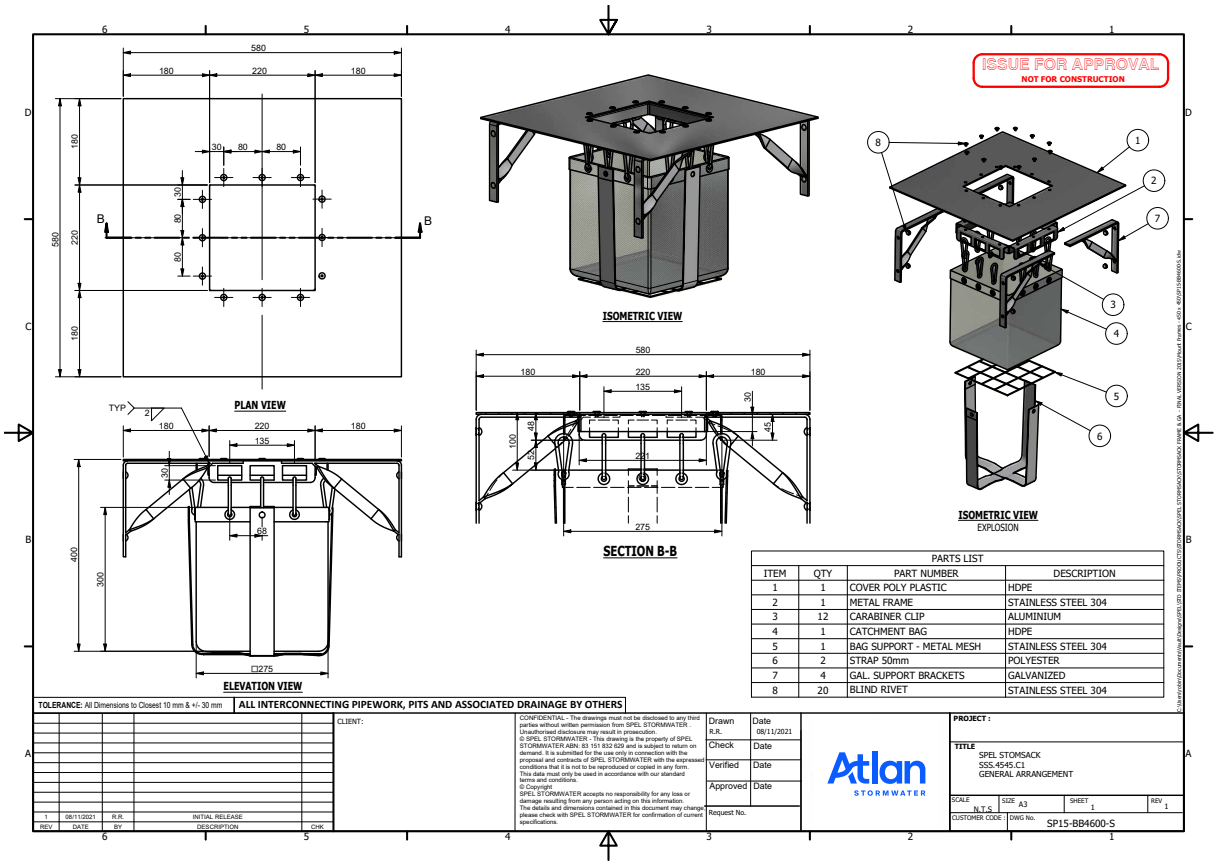
Features	
1.	1. Ultra-Durable Aluminium Frame • Available in 450x450mm, 600x600mm, 600x900mm and 900x900mm sizes • Custom pit arrangements upon request
2.	Black Poly Surround riveted to Frame • Can be cut to suit on site
3.	Reinforced Stormsack Bag • Bag has sewed eyelets • Square bottom design for even distribution
4.	Karabiners attach Bag to Frame for easy service & replacement
5.	5. Aluminium Support Angles & Fixings

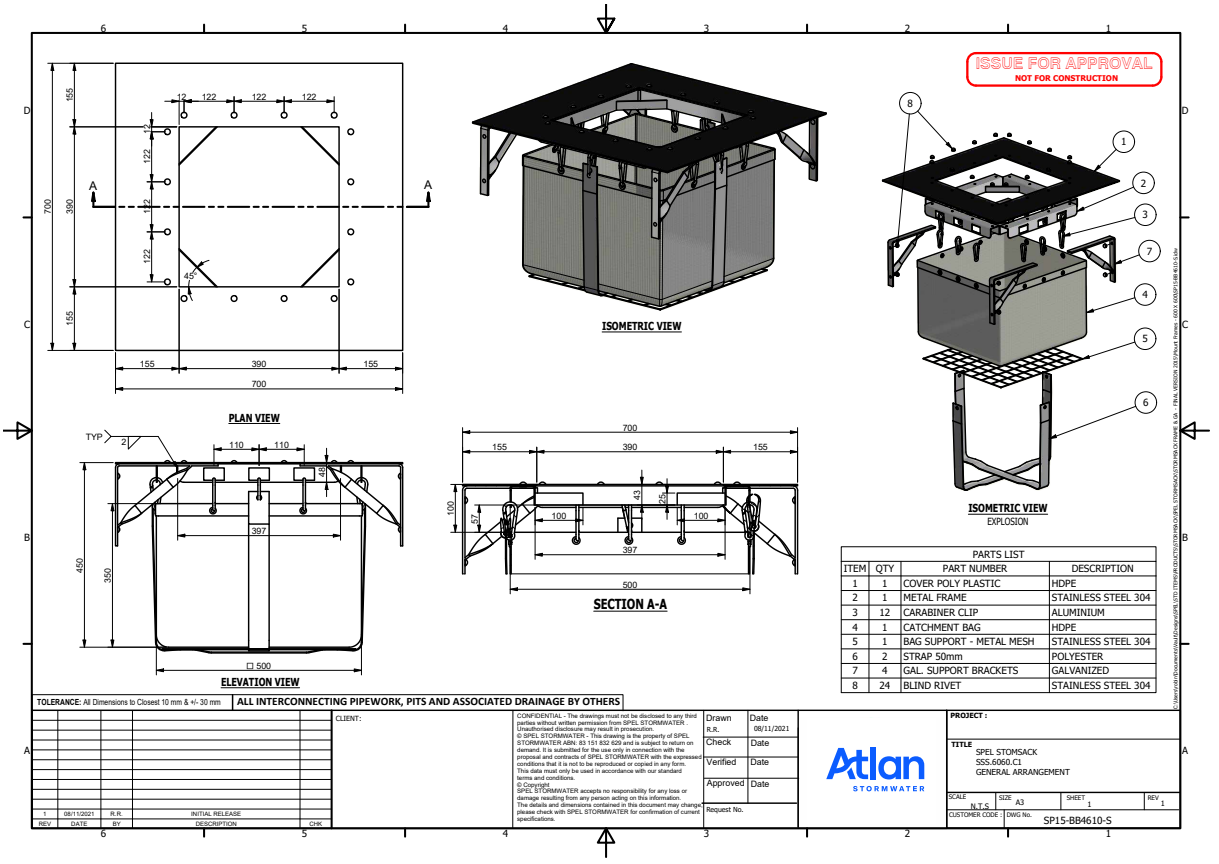


Standard StormSack to suit Pit Sizes
450x450mm
600x600mm
900x600mm
900x900mm

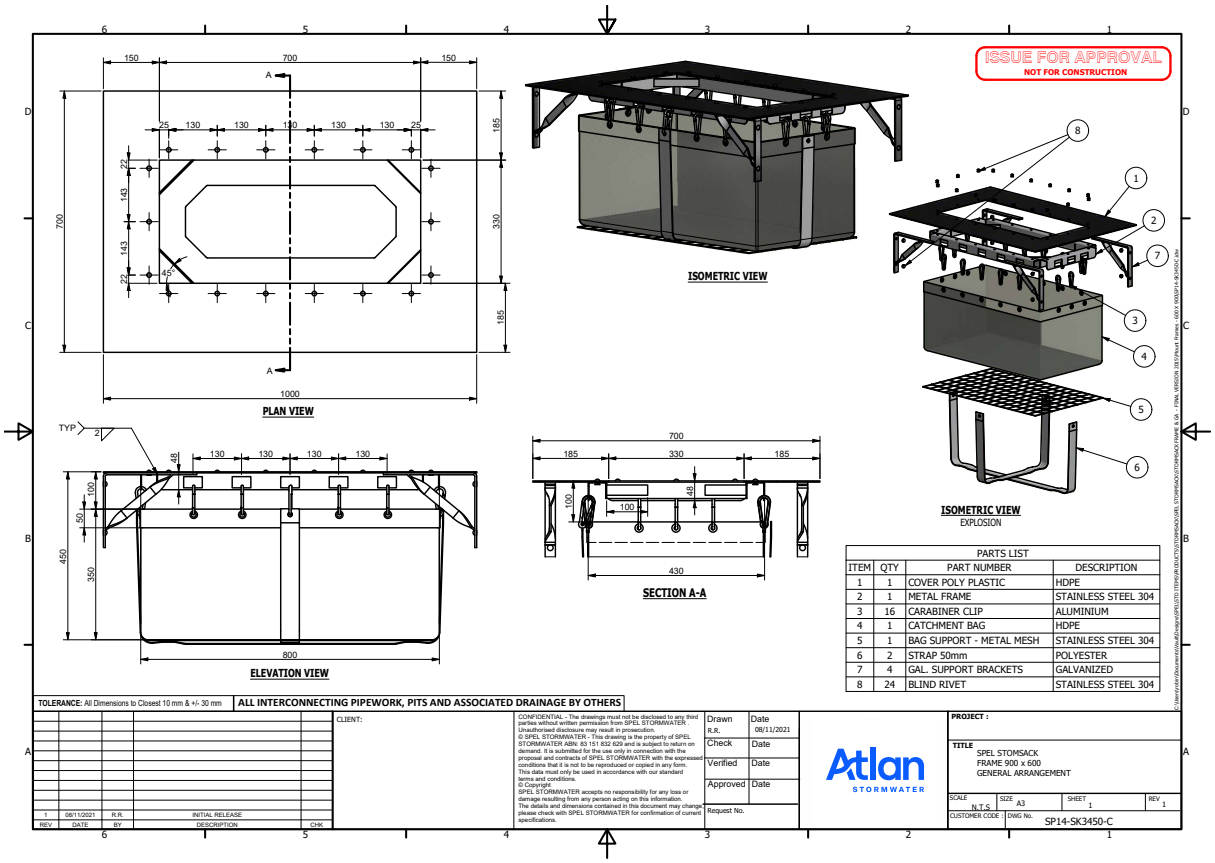
Custom sizes (i.e. 1200x900mm) can be manufactured on short lead times

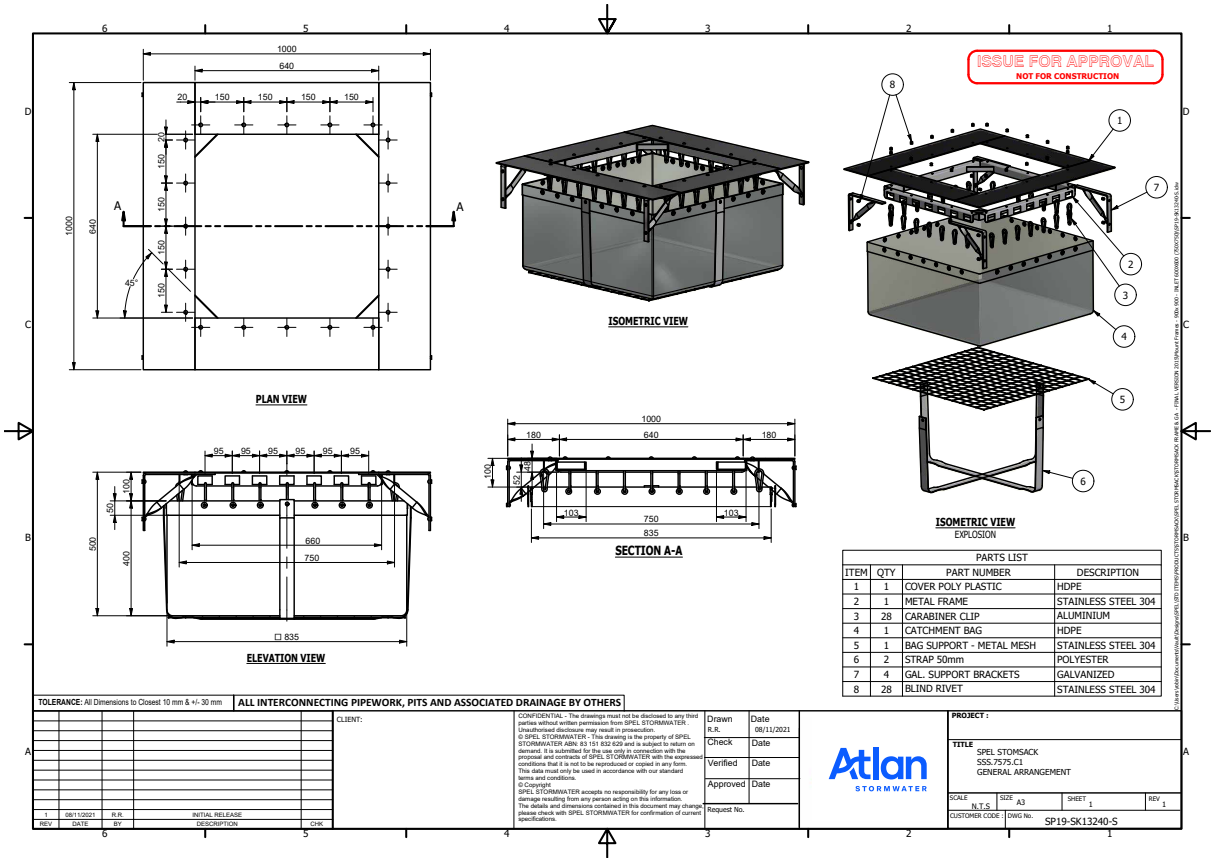
TECHNICAL DRAWINGS



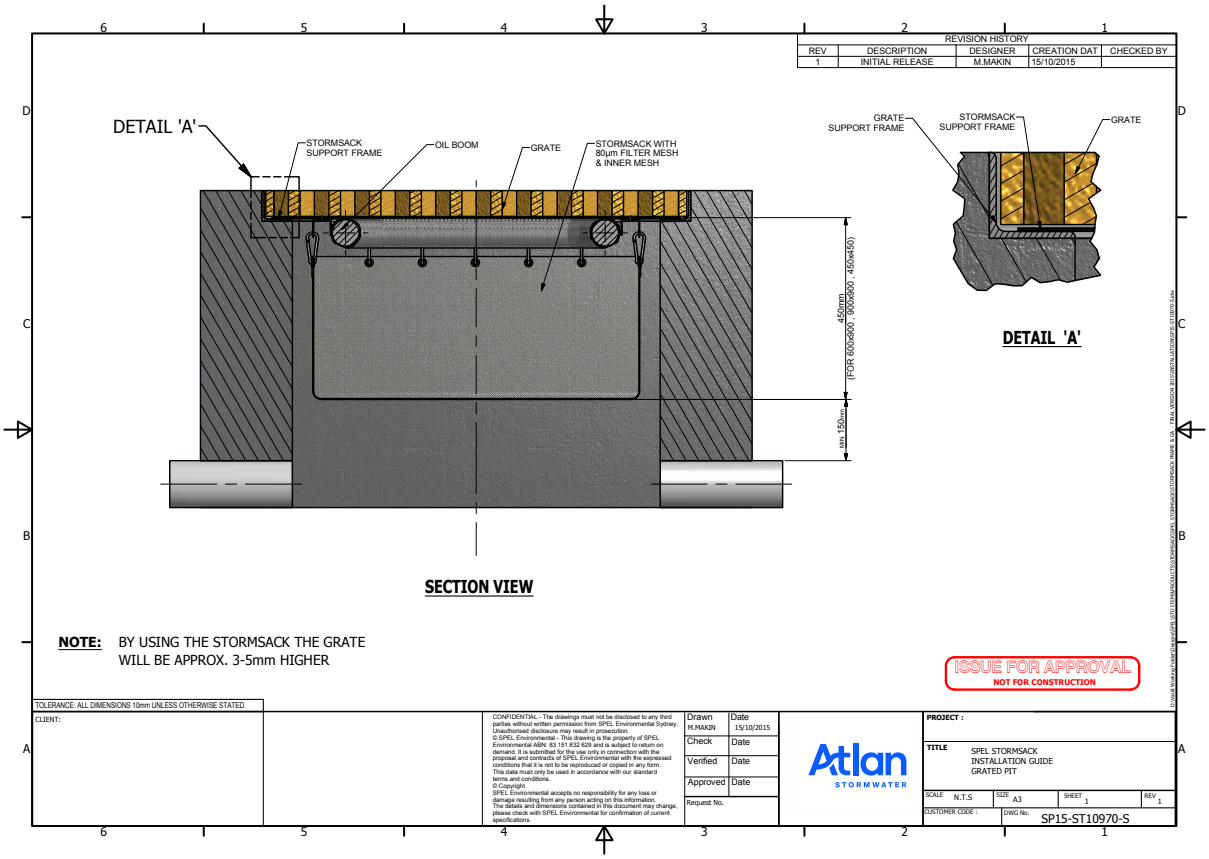


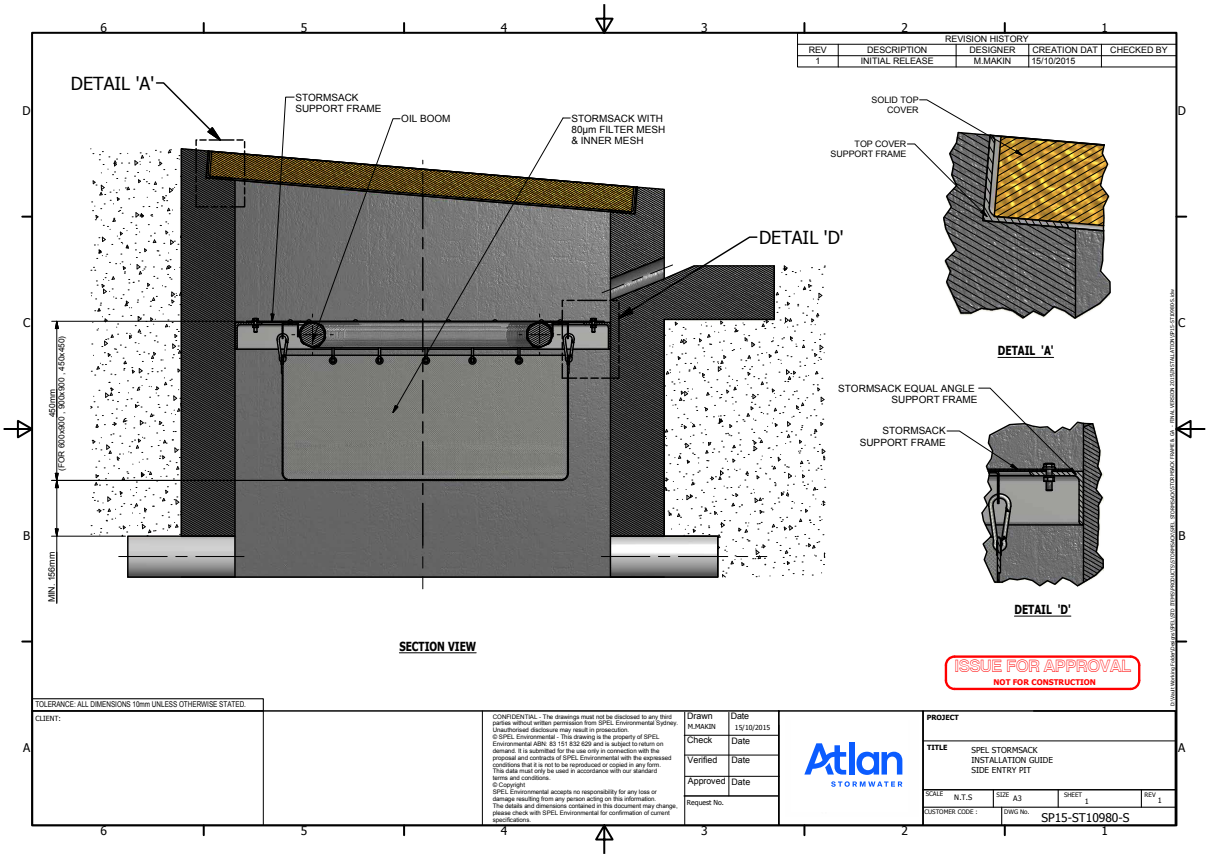
TECHNICAL DRAWINGS





INSTALLATION DETAILS





StormSack

At-Source Gross Pollutant Trap



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Joy in water

'We believe clean waterways are a right not a privilege and we work to ensure a joy in water experience for you and future generations.'

Andy Hornbuckle

Atlan STORMWATER

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100 Silverwater Rd, Silverwater NSW 2128 Australia
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AtlanFilter

Cartridge filter for tertiary stormwater treatment



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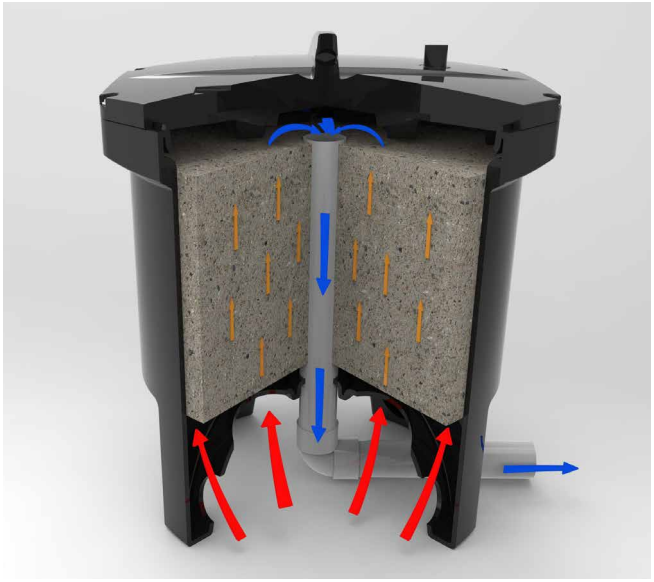
Atlan
STORMWATER



APPLICATIONS

- Car Parks & Shopping Centres
- Council Depots
- Industrial Estates
- Heavy Vehicle Maintenance
- Airport Aprons & Tarmacs
- Transport Depots & Loading Bays
- Tunnels
- Highways & Transport Corridors
- Recycling Yards

AtlanFilter is a cartridge filter system that incorporates an upflow treatment process that maximises surface treatment area. Flow through the filter cartridges utilises a self-regulating siphon which results in low maintenance and high performance stormwater treatment. Automatic backwash technology further lengthens the lifespan of the filter.

Hydraulic pressure forces water through the filter media resulting in a constant velocity throughout the filter area. This ensures consistent media contact time and treatment outcomes.

Optimised to suit your site specific water quality outcomes and local authority requirements, The AtlanFilter has no moving parts and uses a true siphon effect to ensure high-performance pollution removal. These devices maintain excellent removal efficiency whilst maintaining site surface yield.

FEATURES

The media cartridge provides a significantly greater surface contact area to footprint ratio than other filters.

With a flow rate of 3L/s per cartridge and underground installation, the AtlanFilter provides excellent removal efficiency whilst maintaining site surface yield.

- No moving parts, generating a true siphon effect
- Small footprint
- Inorganic filter media (doesn't leach nutrients)
- Can be deployed in various drainage structures such as manholes, OSD tanks, & vaults
- Contains no moving parts



Tested Treatment Efficiencies*

POLLUTANT	EFFICIENCY
Total Suspended Solids (TSS)	85%
Total Phosphorus (TP)	74%
Total Nitrogen (TN)	59%

*Contact Atlan to confirm approved performance for the project LGA



AtlanFilter is SQIDEP approved after passing Stormwater Australia's rigorous testing and performance assessment process.



BENEFITS

PROVEN SAND FILTER PERFORMANCE

The uniform size silica-sand filter media provides higher removal efficiencies than coarser types of media. AtlanFilter media is inorganic – it doesn't leach nitrogen and other nutrients.

Each AtlanFilter automatically backflushes under gravity. The backflush clears most sediment particles from out of the media and back into the vault floor, which allows the hydraulic conductivity from degrading throughout its service life. No moving parts are involved, which increases reliability. The AtlanFilter cartridge design life is in excess of 5 years.

HOW IT WORKS

The AtlanFilter has an upflow treatment process that maximises surface area. The innovative cartridge filter system provides excellent pollutant removal in a small footprint.

Hydraulic pressure forces water through the filter media, which discharges through the centre tube and out through the outlet collection manifold.

Upon completion of a treatment cycle, each cartridge backwashes and effectively dislodges particulates from the filtration layers. This reestablishes filter media porosity. The dislodged particles accumulate on the vault floor for easy removal during maintenance. AtlanFilter's design has no moving parts and generates a true siphon effect.

AtlanFilters are often installed downstream of nearby devices in a treatment train. For example, a Flowceptor Class 1 upstream greatly increases the life cycle interval of the AtlanFilter. These devices will remove larger gross pollutants, coarse sediments, total suspended solids and hydrocarbons - enabling the AtlanFilter to target fine particulate matter and nutrients.





FLEXIBILITY

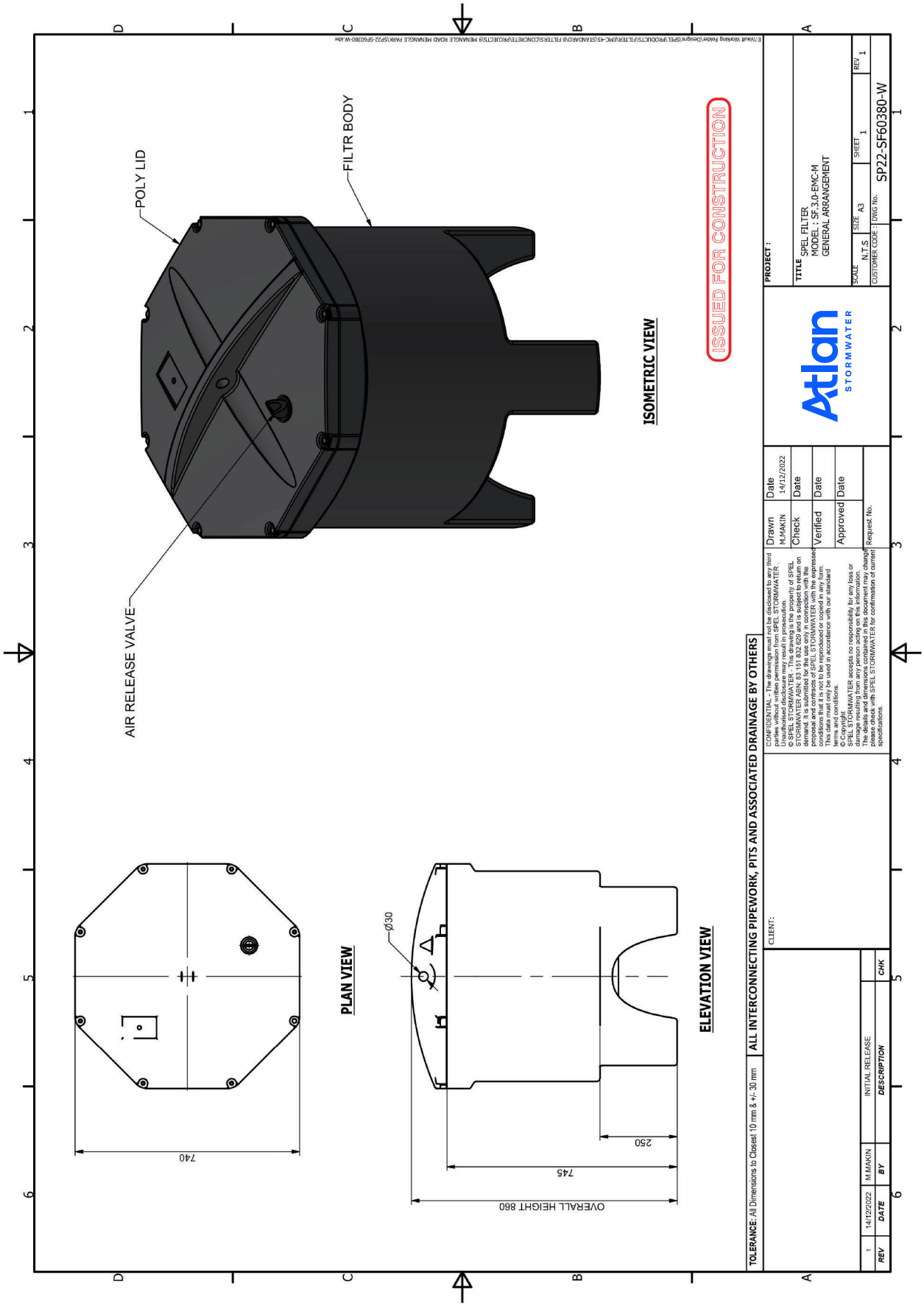
Due to greater surface area and high flow capacity, combined with the modular cartridge design, the AtlanFilter systems can be deployed in a variety of structures including manholes, precast vaults, and cast-in-place structures.

Each system is optimised to suit your specific site and local authority requirements by qualified and experienced professionals.

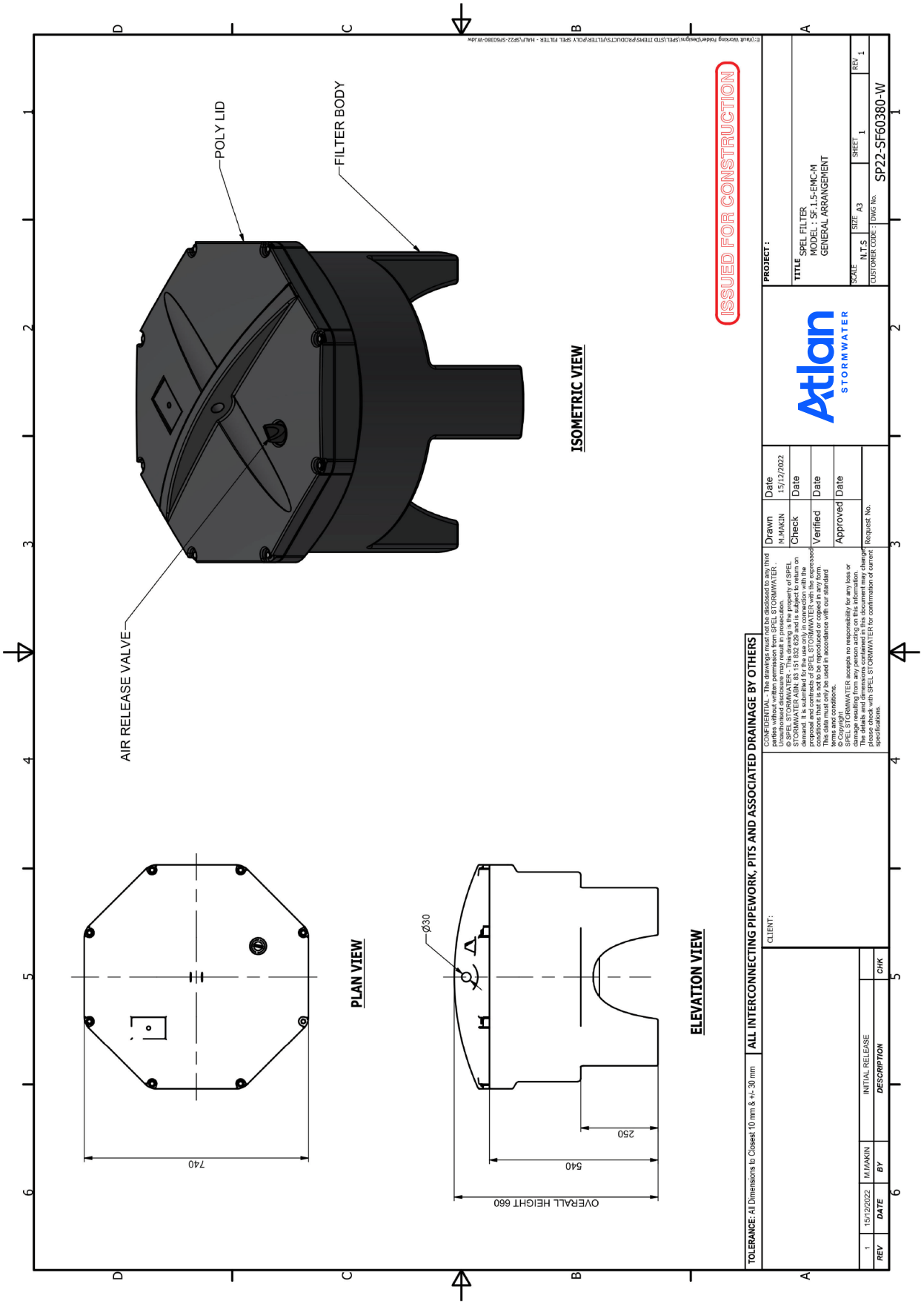
SIZE SPECIFICATIONS

ATLAN FILTER	FULL HEIGHT FIL.30-EMC-M	HALF HEIGHT FIL.15-EMC-M
Total height	860mm	660mm
Diameter	740mm	740mm
Minimum head required	850mm	550mm
Treatment flow rate	3.0L/s	1.5 L/s
Height of inlet ports above vault floor	250mm	250mm
Filtered water collection pipe diameter	50mm	50mm

DRAWING - FULL HEIGHT

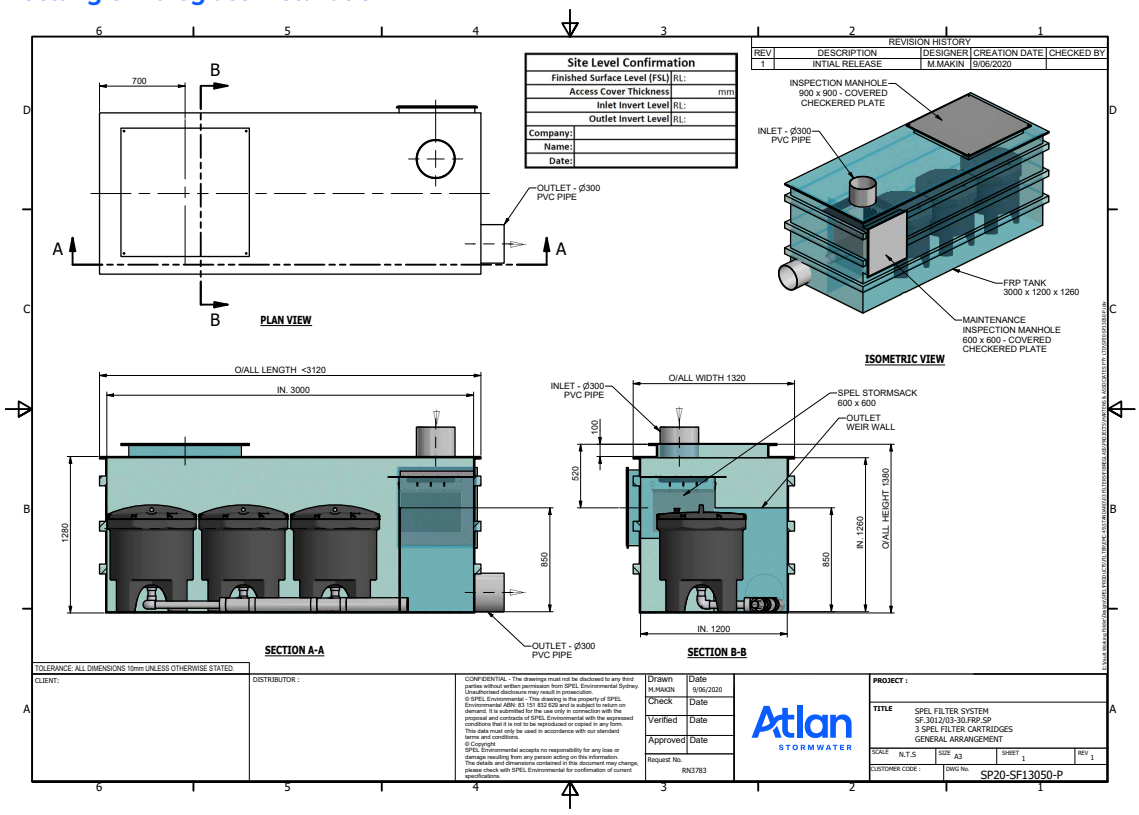


DRAWING - HALF HEIGHT

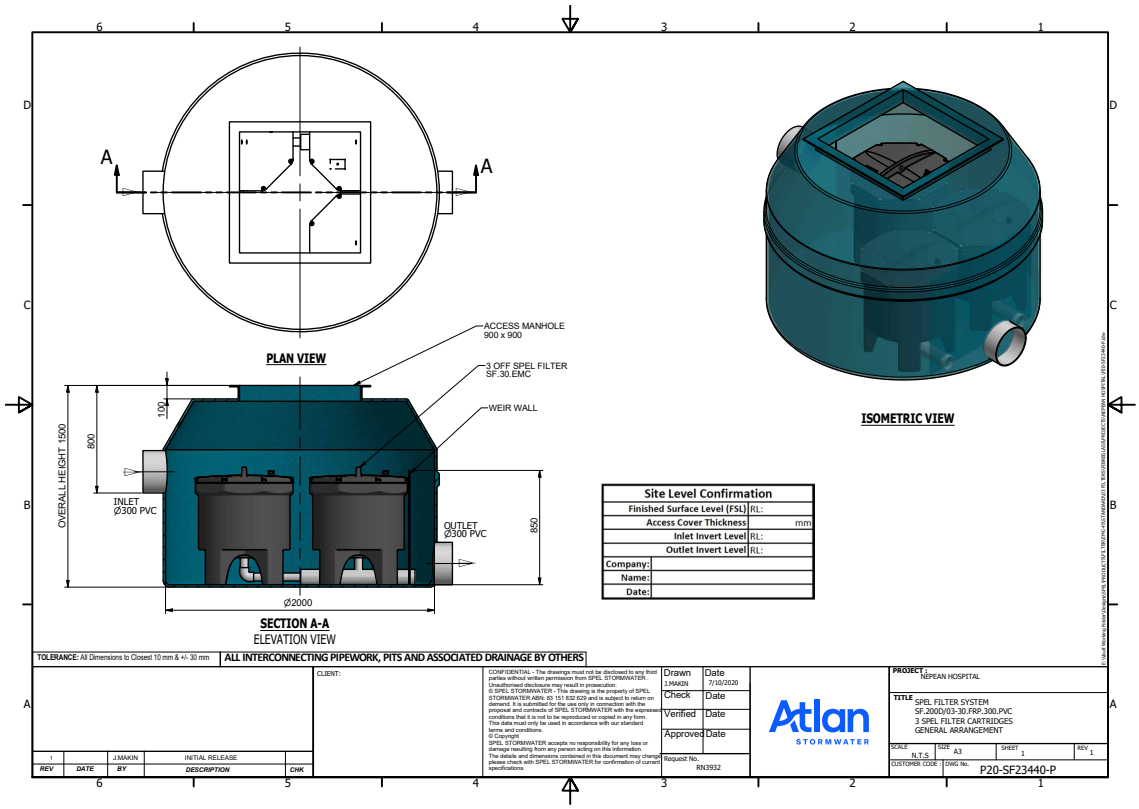


DRAWINGS

Rectangle Fibreglass Installation

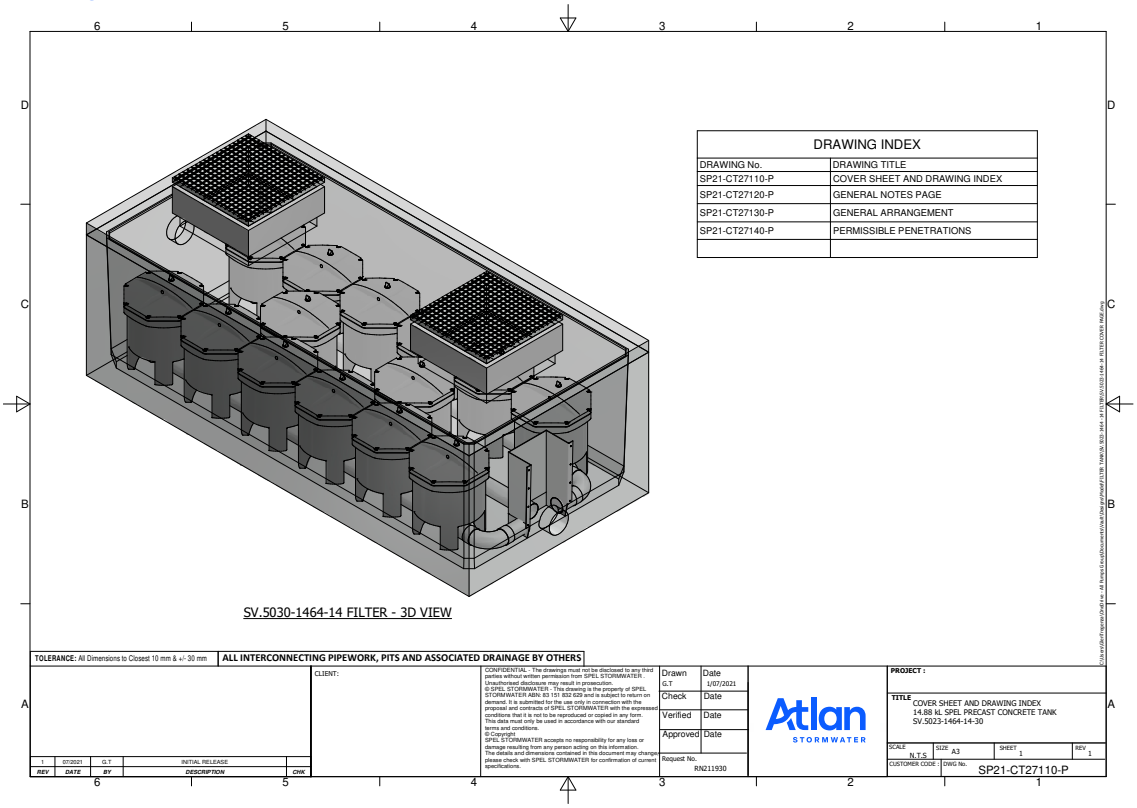


Round Fibreglass Tank Installation



DRAWINGS

Rectangle Concrete Installation



DRAWING INDEX	
DRAWING No.	DRAWING TITLE
SP21-CT27110-P	COVER SHEET AND DRAWING INDEX
SP21-CT27120-P	GENERAL NOTES PAGE
SP21-CT27130-P	GENERAL ARRANGEMENT
SP21-CT27140-P	PERMISSIBLE PENETRATIONS

SV.5030-1464-14 FILTER - 3D VIEW

TOLERANCE: All Dimensions to Closest 10 mm & +/- 30 mm

ALL INTERCONNECTING PIPEWORK, PITS AND ASSOCIATED DRAINAGE BY OTHERS

CLIENT:

REV	DATE	BY	DESCRIPTION	CHK
1	07/2021	G.T	INITIAL RELEASE	

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Drawn	G.T	Date 1/07/2021
Check		Date
Verified		Date
Approved		Date
Request No.	RN211930	

Atlan STORMWATER

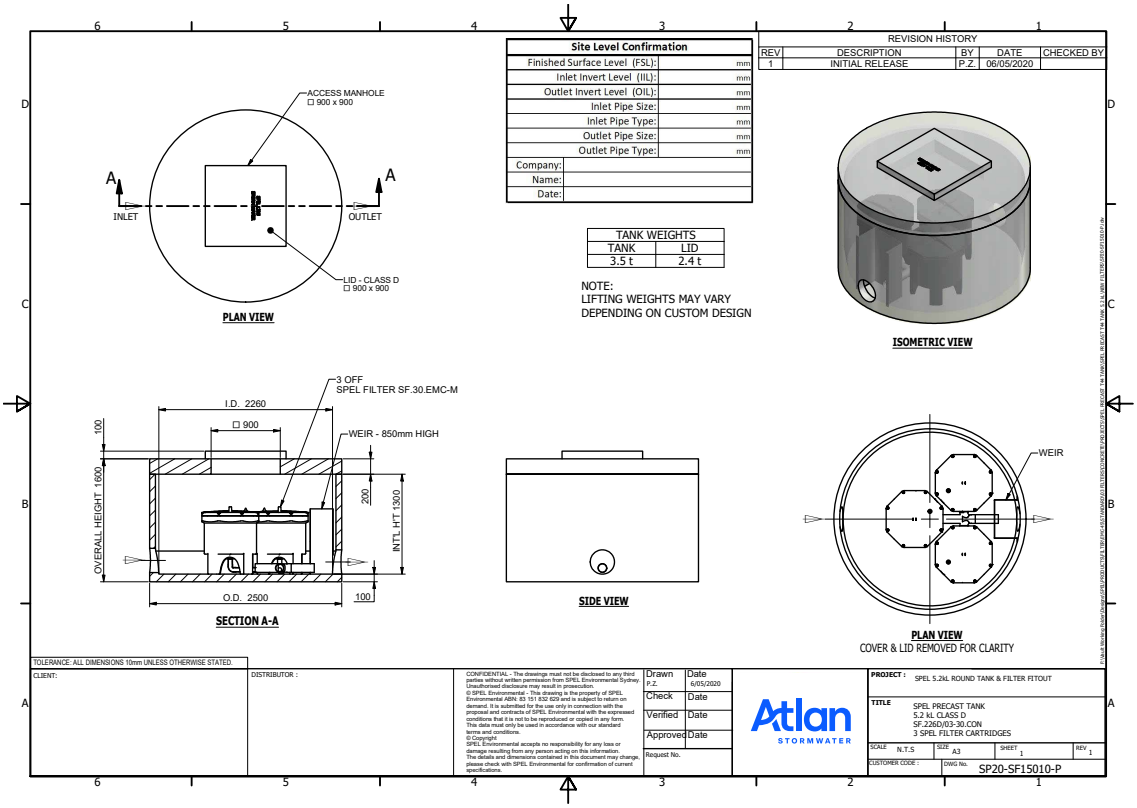
PROJECT :

TITLE
COVER SHEET AND DRAWING INDEX
14.88 kL SPEL PRECAST CONCRETE TANK
SV.5023-1464-14-30

SCALE	SIZE	SHEET	REV
N.T.S	A3	1	1

CUSTOMER CODE : DWG No. SP21-CT27110-P

Round Concrete Tank Installation



REVISION HISTORY				
REV	DESCRIPTION	BY	DATE	CHECKED BY
1	INITIAL RELEASE	P.Z.	06/05/2020	

Site Level Confirmation	
Finished Surface Level (FSL):	mm
Inlet Invert Level (IIL):	mm
Outlet Invert Level (OIL):	mm
Inlet Pipe Size:	mm
Inlet Pipe Type:	mm
Outlet Pipe Size:	mm
Outlet Pipe Type:	mm
Company:	
Name:	
Date:	

TANK WEIGHTS	
TANK	LID
3.5 t	2.4 t

NOTE:
LIFTING WEIGHTS MAY VARY
DEPENDING ON CUSTOM DESIGN

ACCESS MANHOLE
□ 900 x 900
INLET
OUTLET
LID - CLASS D
□ 900 x 900

PLAN VIEW

ISOMETRIC VIEW

3 OFF
SPEL FILTER SF.30.EMC-M
I.D. 2260
□ 900
WEIR - 850mm HIGH
100
OVERALL HEIGHT 1600
200
INTL HT 1300
100
O.D. 2500

SECTION A-A

SIDE VIEW

WEIR

PLAN VIEW
COVER & LID REMOVED FOR CLARITY

TOLERANCE: ALL DIMENSIONS 10mm UNLESS OTHERWISE STATED.

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Drawn	P.Z.	Date 6/05/2020
Check		Date
Verified		Date
Approved		Date
Request No.		

Atlan STORMWATER

PROJECT : SPEL 5.2kL ROUND TANK & FILTER FITOUT

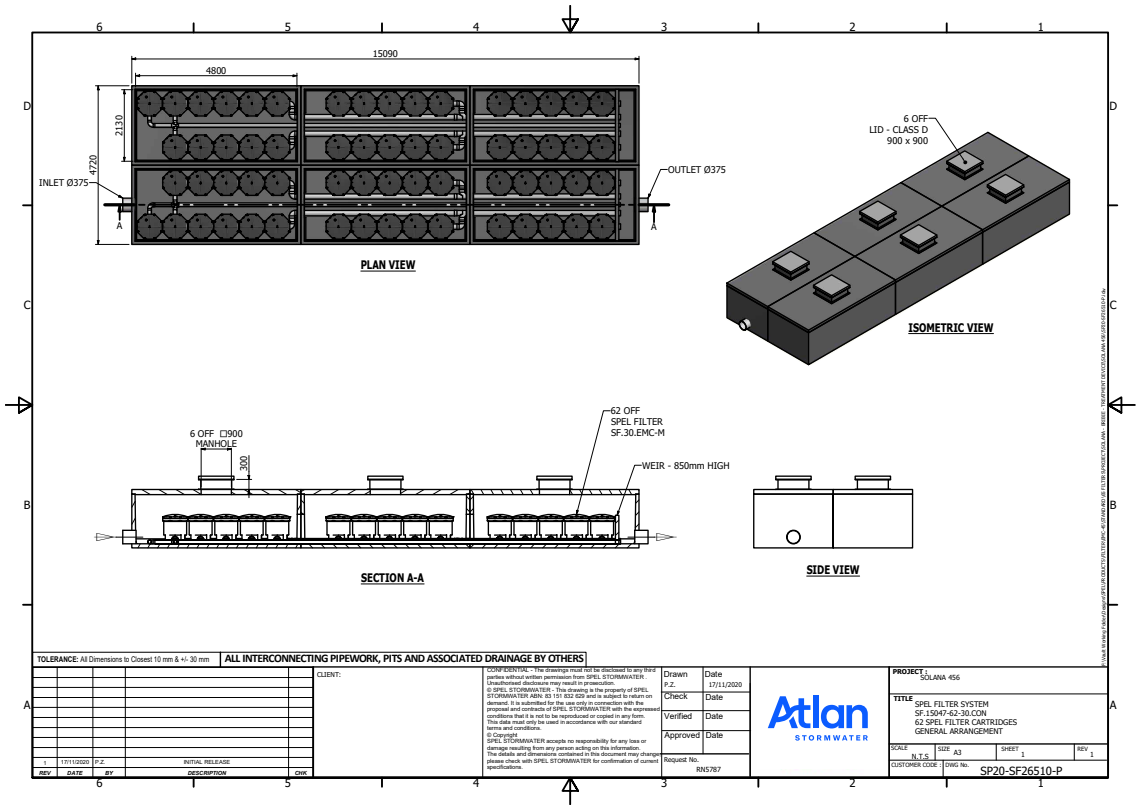
TITLE
SPEL PRECAST TANK
5.2 kL CLASS D
SF.226D/03-30.CON
3 SPEL FILTER CARTRIDGES

SCALE	SIZE	SHEET	REV
N.T.S	A3	1	1

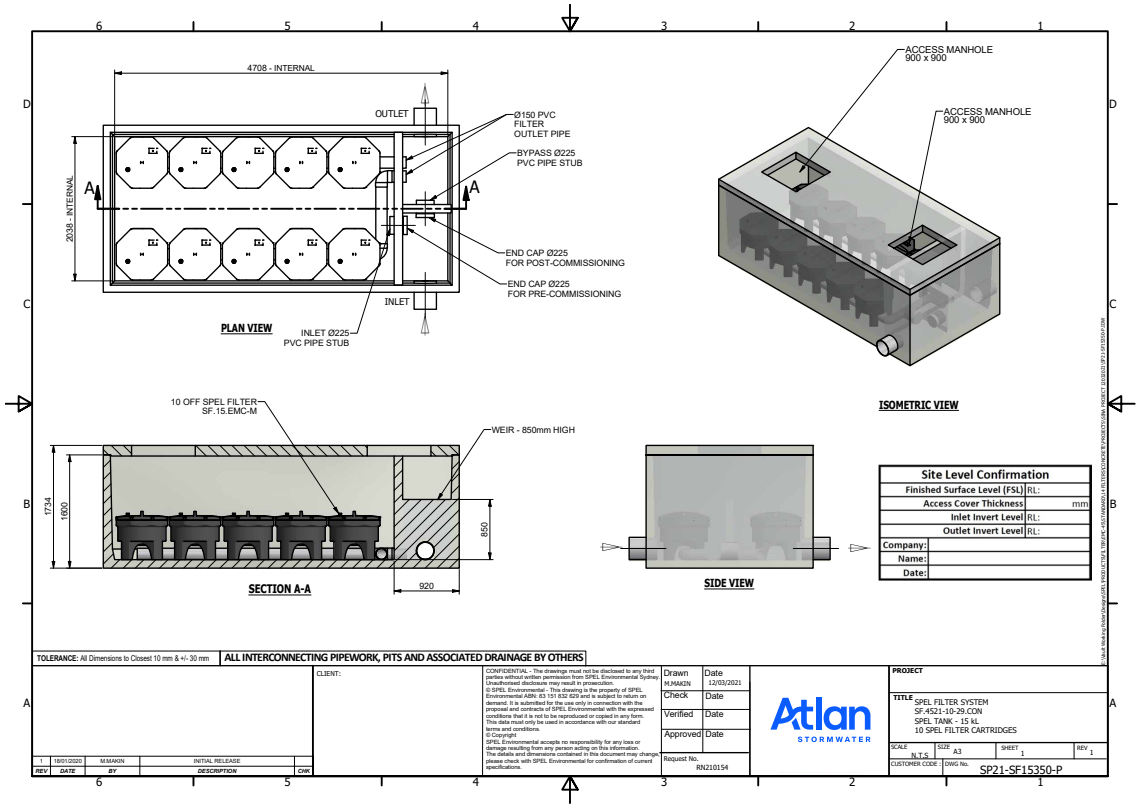
CUSTOMER CODE : DWG No. SP20-SF15010-P

DRAWINGS

Modular Filtration Tank Installation



Internal Bypass Arrangement Tank



AtlanFilter

Cartridge filter for tertiary stormwater treatment



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Joy in water

'We believe clean waterways are a right not a privilege and we work to ensure a joy in water experience for you and future generations.'

Andy Hornbuckle

Atlan STORMWATER

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spelstormwater
joy in water

Operation & Maintenance Manual

SPELFilter®

Cartridge filter for tertiary stormwater treatment



spel.com.au

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Introduction

Understanding how to correctly and safely maintain the SPELFilter is essential for the preservation of the filter's condition and its operational effectiveness. The SPELFilter is a highly engineered stormwater filtration device designed to remove sediments, heavy metals, nitrogen and phosphorus from stormwater runoff.

The filters can be housed in either a concrete or fibreglass structure that evenly distributes the flow between cartridges.

Flow through the filter cartridges is gravity driven and self-regulating, which makes the SPELFilter system a low maintenance, high performance stormwater treatment device.

This Guide will provide the necessary steps that are to be taken to correctly and efficiently ensure the life of the SPELFilter product



Figure 1 - SPELFilters in a concrete chamber / vault

Features

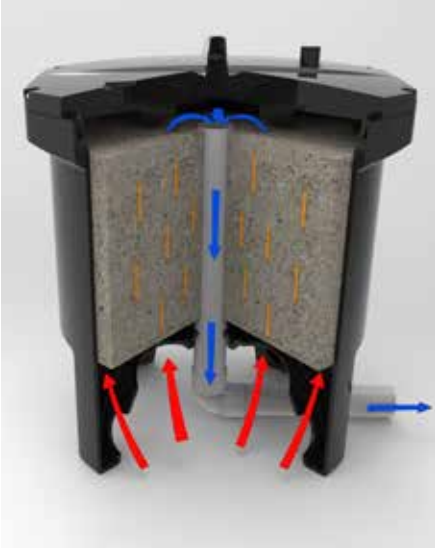


Figure 2 - Diagram of water flow through SPELFilter

The SPELFilter has a patented design that facilitates influent flow over the entire surface area of the media, providing consistent pollutant removal within a small footprint.

The SPELFilter provides highly effective media filtration using gravity flow conditions, without the need for moving parts or floating valves. This eliminates the risk of mechanical failure, such as stuck valves and seizing components during its service life. This provides highly robust treatment performance.

Hydraulic head provided by a suitably sized weir in the filter vault forces stormwater through the filter media via the inlet ports underneath the filter cartridge. Refer to the table below for minimum head required for the SPELFilter cartridges to assist in sizing the weir.

The water to be treated enters the SPELFilter cartridge via an upwards direction as the water level builds up around the SPELFilter. This 'up flow' reduces the amount of sediment that could enter the media cartridge, as the sediment is allowed to drop to the vault floor under gravity. Any remaining sediment in the water is introduced through the filter media under hydraulic pressure and is filtered.

Water is filtered through the media, where dissolved and particulate Total Nitrogen and Total Phosphorus are removed via reaction with the media, in addition to the removal of Total Suspended Solids / sediment.

SPELFilter Media Self-Backwash feature

A one-way air release valve located at the top of the filter cartridge allows air to escape as the cartridge fills up with water. This creates a siphonic flow condition as the air is completely evacuated from inside the SPELFilter cartridge. Siphonic flow conditions are maintained until such time the water level outside of the cartridge falls beneath the inlet ports underneath the filter. At this moment, the water level inside the SPELFilter cartridge is higher than the surrounding water level. The water inside the SPELFilter cartridge is then expelled upon the break of the siphon, and the water flows down and out of the inlet ports under gravity, onto the vault floor.

This is a highly effective backwash of the media and allows the expulsion of a high proportion of sediment out from the SPELFilter media. The expelled sediment can be removed either manually or with a vacuum from the vault floor.

This backwash effect allows the media to remain highly conductive and is the key to the industry leading longevity of the SPELFilter cartridge system, which does not need replacement for at least 5 years, and typically will achieve up to 6-8years of service, subject to the SPELFilter being regularly maintained in accordance with this guideline and in accordance with the specific needs of the catchment.



Figure 3 - Typical Outlet Weir Wall

Features

Self Supporting Feet

Each SPELFilter cartridge stands on 4 feet, which negates the need for the construction of a false floor in the vault. The feet are bolted to the vault floor with the supplied stainless steel angles and M10 bolts. The feet allow a clear height from the vault floor up to the inlet ports of 240mm. The absence of a false floor allows plenty of room for backwashed sediment to evacuate from underneath the cartridges and thereby avoid blocking the inlet ports to the SPELFilter from sediment buildup. It is for this reason that SPEL recommended the sediment buildup not exceed 150mm above the vault floor, so as to avoid blocking the inlet ports of the SPELFilter. Blockage of the inlet ports due to sediment accumulation in the vault floor will cause the SPELFilter to go into bypass and be ineffective. Hence it is important to keep up to date with monitoring and maintaining the SPELFilter vault.



Figure 4 - Bolting the feet

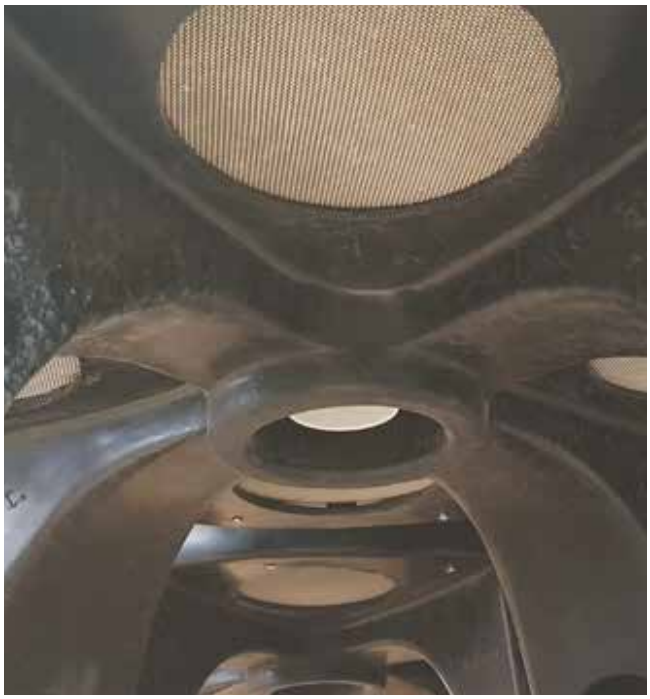


Figure 5 - Underside of the SPELFilter showing the screened inlet ports and the connection for the outlet pipe in the middle



Figure 6 - the top of the SPELFilter showing the location of the one way air valve

Sizes

SPEL Stormwater manufactures two height cartridges for varying site constraints as shown below. Each cartridge is designed to treat stormwater at a flow rate of 1.47 Litres per second and 2.83 Litres per second for the half-height cartridge (model No. SF.15-EMC-M) and full-height cartridge (model No. SF.30-EMC-M) respectively.

	Full Height SF.30-EMC -M	Half height SF.15–EMC-M
SPELFilter total height	874mm	560mm
SPELFilter Diameter	726mm	726mm
Minimum Head required	850mm	550mm
Treatment flow rate	2.83 L/s	1.47 L/s
Height of inlet ports above vault floor	250mm	250mm
Filtered water collection pipe diameter	50mm	50mm

SPELFilter Full Height- SF.30-EMC-M



SPELFilter Half Height - SF.15-EMC-M

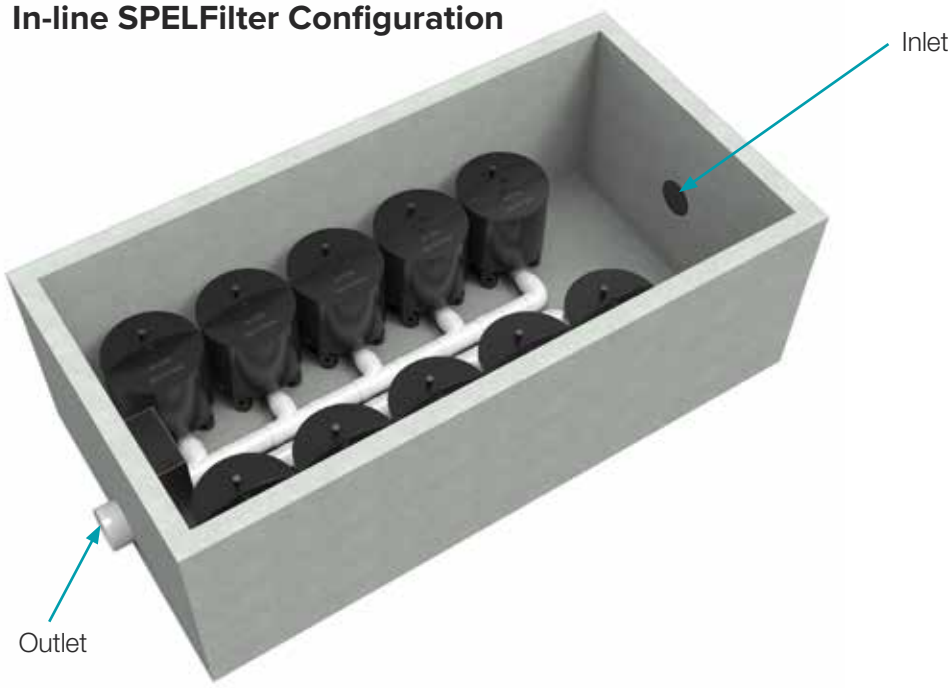




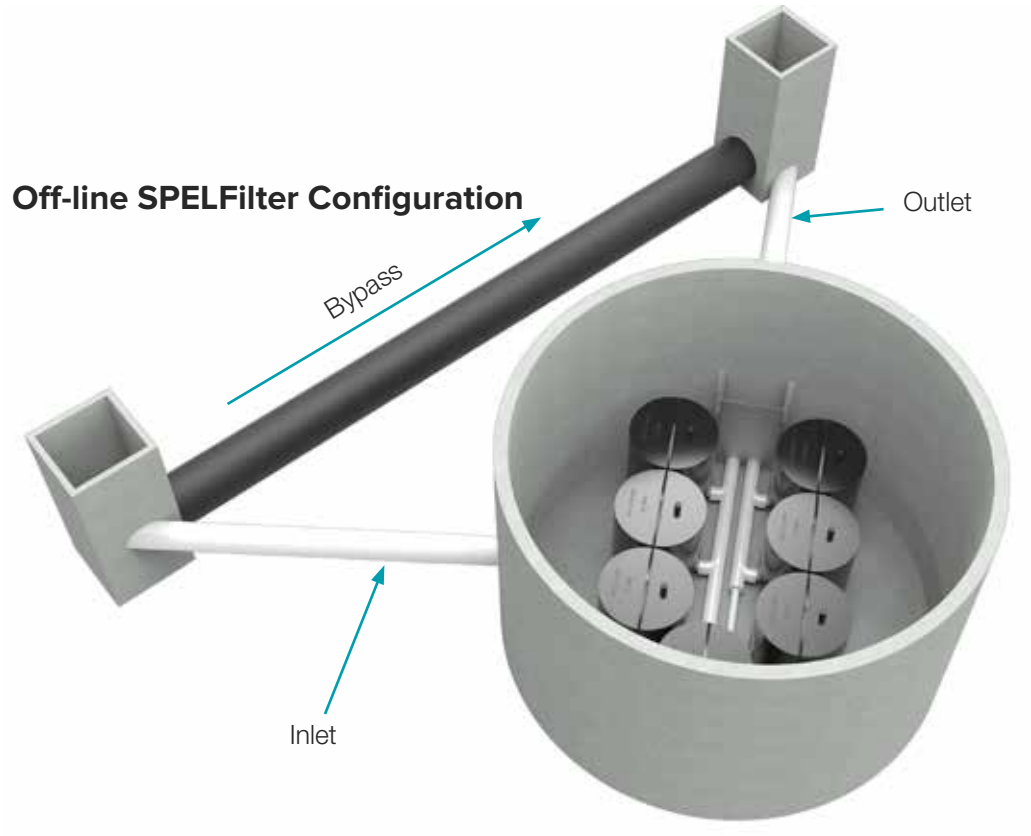
System Configuration

SPELFilter cartridges are installed in concrete or fibreglass tanks commonly referred to as ‘vaults’. The vault selection and configuration are based on site characteristics and/or constraints; computational stormwater quality modelling; and selected SPELFilter models. Typical SPELFilter system configurations are shown below.

In-line SPELFilter Configuration



Off-line SPELFilter Configuration



Health and Safety

A. Personal Health & Safety

When carrying out the necessary installation operations of the SPEL Filter all contractors and staff personnel must comply with all current workplace health and safety legislation.

The below measures should be adhered to as practically as possible.

- Comply with all applicable laws, regulations and standards
- All those involved are informed and understand their obligations in respect of the workplace health and safety legislation.
- Ensure responsibility is accepted by all employees to practice and promote a safe and healthy work environment.

B. Personal Protective Equipment / Safety equipment

When carrying out the necessary installation operations of the SPEL Filter, wearing the appropriate personal protective equipment and utilising the adequate safety equipment is vital to reducing potential hazards.

Personal protective equipment / safety equipment in this application includes:

- Eye protection
- Safety apron
- Fluorescent safety vest
- Form of skin protection
- Puncture resistant gloves
- Steel capped safety boots
- Ear muffs
- Hard hat/s
- Sunscreen

C. Confined space

In the event access is required into the vault, confined space permits will be required which is not covered in this Guide. Typical equipment required for confined space entry include:

- Harness
- Gas detector
- Tripod
- Spotter

D. Traffic Control

It is not uncommon for SPEL Filter cartridges to be installed underneath trafficable areas. Minimum traffic control measures will need to be put in place in accordance with traffic control plans set out by respective local and state road authorities.



Vaults are to be treated as confined space. Entry by permit only.

Monitor weather conditions prior to operation maintenance. Do not enter a vault during an episode of heavy rain as this can create a risk of drowning.







Maintenance Frequency

The SPELFilter's design allows for a greater life span when frequently maintenance. Maintenance is broken up into three categories which include: standard inspection; general cleaning; and cartridge replacement.

Standard inspection

Standard inspections are conducted at regular four-month intervals. At this time, an approved trained maintenance officer or SPEL representative shall undertake all measures outlined in Maintenance Procedure, Standard Inspection.

General Cleaning

At the end of each standard inspection, trigger measures will identify if general cleaning is required. General cleaning will need to be executed immediate during standard inspections if the follow triggers are satisfied:

- Build-up of debris/pollutants within the vault greater than 150mm;
- Accumulation of debris/pollutants on the outlet chamber of the SPELFilter vault;
- After large storm events, tidal or flooding impacts at the request of the owner;

Cartridge Replacement

Stormwater treatment is dependent on the effectiveness of the SPELFilter cartridge system. As the SPELFilter ages, pollutants will inundate the cartridge and ultimately reduce the treatment flow rate. At this point, a SPELFilter flow test apparatus will be utilities to determine if replacement cartridges are required.

Based on the [site] concept modelling (MUSIC) and previous industry experience, we estimate the life of the SPELFilter to be between 6 - 8 years. As a minimum requirement, each SPELFilter cartridge should be replaced within 10 years.

The life cycle of the SPELFilter can be impacted if standard inspections and general maintenance is not undertaken in accordance with this operation and maintenance Guide. Other factors that will affect the above life cycle of the SPELFilter include:

- Installation of cartridge system during construction phase and impacted by construction sediment loads;
- Neglecting to install pre-treatment using an industry approved GPT or a surface inlet pit trash bag such as the SPEL StormSack.
- Unforeseen environmental hazards affecting the SPELFilter functionality.

Maintenance Procedures

Stormwater pollutants captured and retained by the SPELFilter system need to be periodically removed to ensure environmental values are upheld. All associated maintenance works is heavily dependent on the site's operational activities and generated stormwater pollutants. To ensure the longevity of the installed SPELFilter treatment system, it is imperative that the procedures detailed in this Guide are followed and all appropriate measures are actioned immediately.

Standard inspection

The standard inspection requires personal experience of SPEL products to visual inspection the vault and filter conditions.

Confined space requirements may not be required if a full inspection and assessment of each SPELFilter can be achieved at surface level without being deemed a confined space entry.

The standard inspection requires personal experience of SPEL products to visual inspection the vault and filter conditions.

Confined space requirements may not be required if a full inspection and assessment of each SPELFilter can be achieved at surface level without being deemed a confined space entry.

Site Inspection Procedures

1. Implement Pre-start safety measures.

Ensure that the area in which operational works are to be carried out is cordoned off, to prevent unauthorised access. Adequate safety barriers must be erected. Area in which work is to be carried out must be clean, safe and hazard free. (Refer to figure 4.)

2. Set-up Gantry Tri-pod above Manhole.

Assemble and position the gantry above the manhole safely and as practically as possible. Attach the winch or chain block to the gantry for lifting the SPEL Filters. Perform safety procedures ie. Attach harnesses etc. (if confined space).

3. Open manhole lid.

Once you have sent up the Gantry and ensured that the area is safe to operate in, you can proceed to open the manhole lid, using lid lifters.

4. Conduct Gas tests.

(If tank is classed confined space)

Once the lids have been removed to a safe distance to prevent tripping, you must then proceed to conduct gas tests. Perform necessary gas tests according to the confined space regulations.

5. Once confined space has been deemed safe to operate in, enter tank safely.

Once you have carried out the required gas test and the work area is deemed safe, you may then enter the pit via a ladder or winch system to assess the work area you will be operating in. Ensure all confined space

6. SPELFilter system assessment.

Perform a review of the SPELFilter system using the SPELFilter assessment report/checklist. Sign off and forward a copy of the report to property manager and SPEL representative.

7. Reinstate SPELFilter system and disposal.

At the completion of the site inspection, ensure the site is reinstated back to its initial state and all pollutants are removed from the site in line with pollutant disposal procedures.

8. Sign off and forward a copy of the report to property manager and SPEL representative.

General Cleaning

Vacuum out of Filter tank, removal, and disposal of pollutants at the completion of a standard inspection, general cleaning may be deemed necessary immediately or scheduled for a future date. Steps undertaken for general cleaning should be in general accordance with the procedure outlined below but not limited.

1. Implement Pre-start safety measures.

Ensure that the area in which operational works are to be carried out is cordoned off, to prevent unauthorised access. Adequate safety barriers must be erected. Area in which work is to be carried out must be clean, safe and hazard free. (Refer to figure 4.)

2. Set-up Gantry Tri-pod above Manhole.

Assemble and position the gantry above the manhole safely and as practically as possible. Attach the winch or chain block to the gantry for lifting the SPEL Filters. Perform safety procedures ie. Attach harnesses etc. (if confined space).

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6. SPELFilter system assessment.

Perform a review of the SPELFilter system using the SPELFilter assessment report/checklist.

7. Pollutant removal from tank.

Perform clean-up using a licenced vacuum truck contractor or wet/dry vacuum, depending on level of sediment built up and/or tank size.

8. Reinstate SPELFilter system and disposal.

At the completion of the site inspection, ensure the site is reinstated back to its initial state and all pollutants are removed from the site in line with pollutant disposal procedures.

9. Sign off and forward a copy of the report to property manager and SPEL representative.

Cartridge Recycling and Replacement

SPELFilter cartridges can be swapped out for new cartridges. The spent SPELFilter cartridges can be collected from site and sent to SPEL Stormwater's facilities – where the spent media will be removed from the cartridge in factory conditions and disposed of in accordance with environmental regulations.

The SPELFilter cartridge will be recharged with new media – thereby recycling and repurposing the cartridge.

SPEL Filter replacement procedures may vary depending on the configuration of the SPEL Filters, the type of vault and engineers' specs. Replacement instructions for manhole SPEL Filter systems and precast vault SPEL Filter systems are contained in this section.

At the completion of a standard inspection, SPEL Filter replacement may be deemed necessary immediately or scheduled for a future date. Steps undertaken for cartridge replacement should be in general accordance with the procedure outlined below but not limited.

1. Implement Pre-start safety measures.

Ensure that the area in which operational works are to be carried out is cordoned off, to prevent unauthorised access. Adequate safety barriers must be erected. Area in which work is to be carried out must be clean, safe and hazard free.

2. Set-up Gantry Tri-pod above Manhole.

Assemble and position the gantry above the manhole safely and as practically as possible. Attach the winch or chain block to the gantry for lifting the SPEL Filters. Perform safety procedures ie. Attach harnesses etc. (if confined space).

3. Open manhole lid.

Once you have sent up the Gantry and ensured that the area is safe to operate in, you can proceed to open the manhole lid, using lid lifters.



4. Conduct Gas tests. (If tank is classed confined space)

Once the lids have been removed to a safe distance to prevent tripping, you must then proceed to conduct gas tests. Perform necessary gas tests according to the confined space regulations.

5. Once confined space has been deemed safe to operate in, enter tank safely.

Once you have carried out the required gas test and the work area is deemed safe, you may then enter the pit via a ladder or winch system to assess the work area you will be operating in. Ensure all confined space procedures are followed.

6. Remove exhausted cartridges.

Disconnect all internal pipe work from inside the vault. Un-bolt anti-floatation measures and remove cartridges from the vault using Gantry Tri-pod method.

7. Pollutant removal.

Using a wet/dry vacuum or sucker truck, suck out all the residual pollutant from the vault.

8. Install pipework and SPEL Filters.

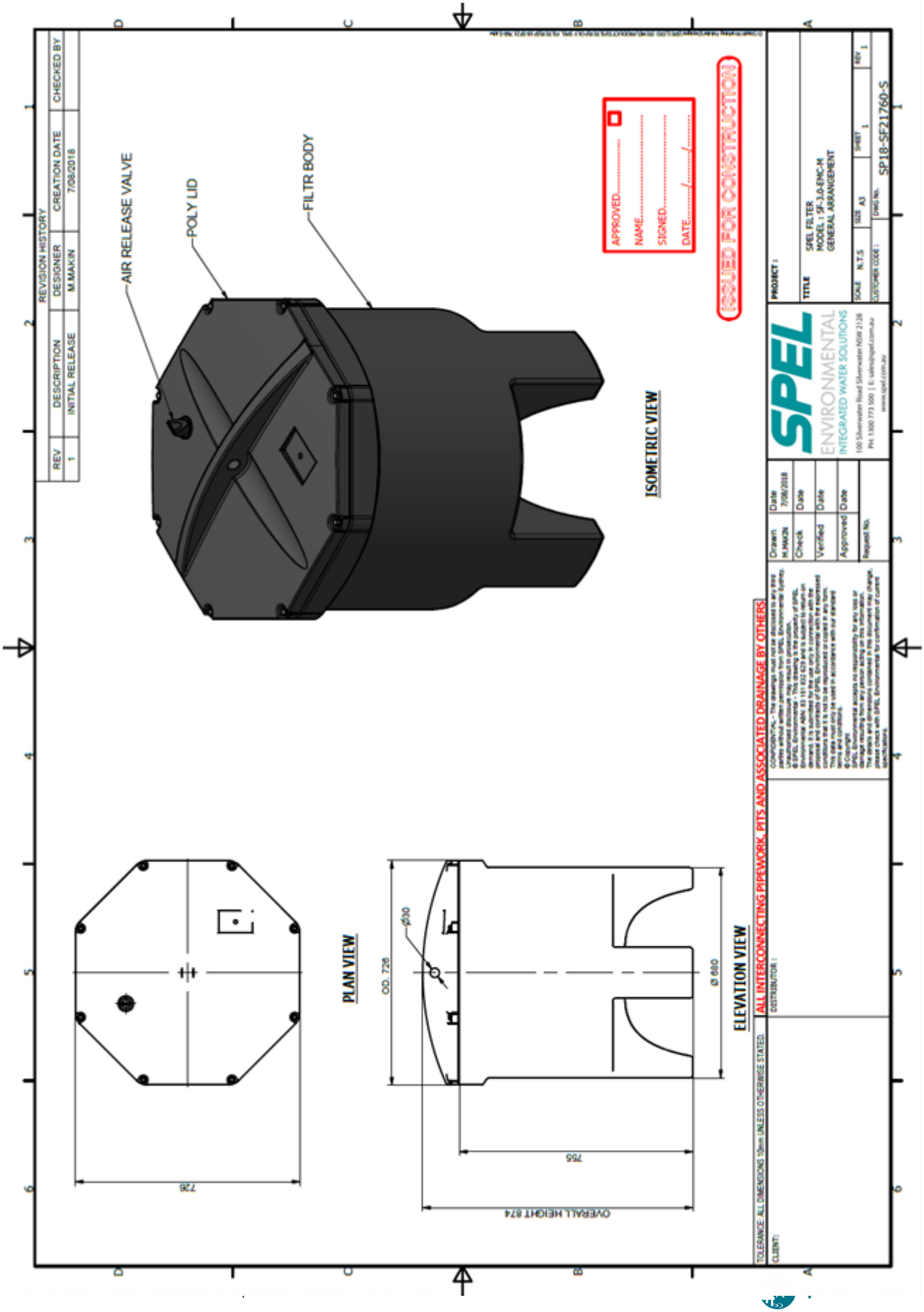
Please refer to the below standard install diagrams for the SPEL Filters. Then refer to your site specific drawings, as site requirements may require something different to the standard layout. Lower filters into tank, position into place, connect filter outlet pipework with the supplied fittings.

9. Install anti–floatation system.

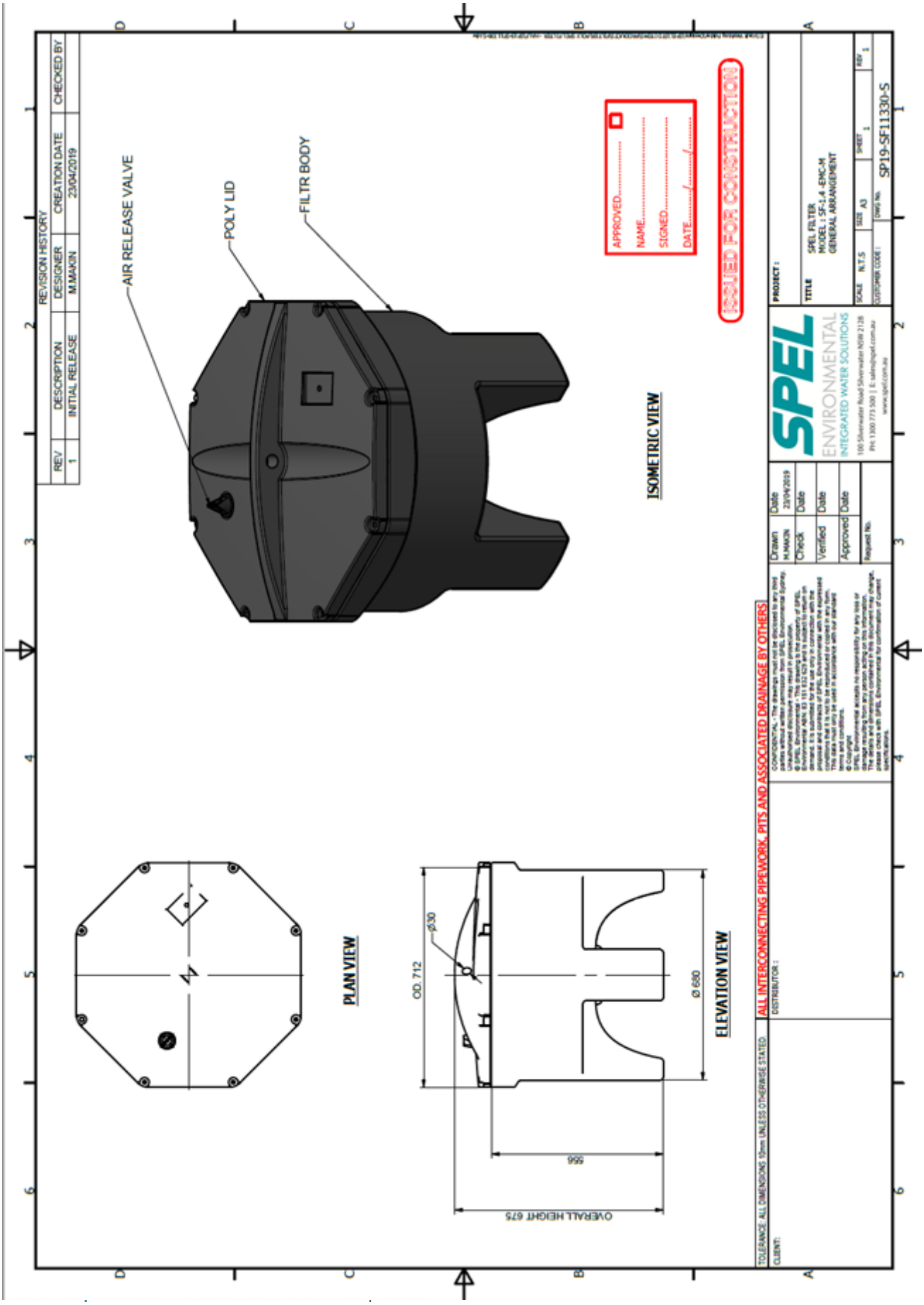
Please refer to the detailed drawings showing how the Anti – Floatation (Anchor) bars are to be installed.

10. Sign off and forward a copy of the report to property manager and SPEL representative.

Standard Drawings - Full Height



Standard Drawings - Half Height



Site Exit & Clean Up

At the end of the scheduled maintenance, approved contractors or SPEL maintenance crew are required to reinstate the site to pre-existing conditions. Steps included but limited to are:

- Ensure all access covers are securely inserted back into their frames;
- Remove and dispose collected pollutants from the site in accordance with local regulator authorities;
- Retrieve all traffic control measures and maintenance tools; and
- Return all exhausted and/or damaged SPEL products to SPEL Stormwater to begin recycling program.



NSW HEAD OFFICE 100 Silverwater Rd, Silverwater NSW 2128 PO Box 7138, Silverwater NSW 1811 P +61 2 8705 0255 P 1300 773 500 I nsw.sales@spel.com.au	**QLD MAIN OFFICE** 130 Sandstone Pl, Parkinson QLD 4115 P +61 7 3271 6960 P 1300 773 500 I qld.sales@spel.com.au **QLD SUNSHINE COAST BRANCH** 19-27 Fred Chaplin Circuit, Bells Creek, QLD 4551 P 1300 773 500 I qld.sales@spel.com.au	**VIC & TAS OFFICE** 897 Wellington Rd Rowville P +61 3 5274 1336 P 1800 810 139 I sales@spel.com.au **VIC GEELONG BRANCH** 70 Technology Close, Corio, P +61 3 5274 1336 P 1800 810 139 I sales@spel.com.au
SA OFFICE 9 Hampden Road, Mount Barker SA 5251 P 1300 773 500 I sales@spel.com.au	**WA OFFICE** 2 Modal Crescent Canning Vale WA 6155 P +61 8 9350 1000 P 1800 335 550 I sales@spel.com.au	**NZ OFFICE AUCKLAND** 100 Montgomerie Road Airport Oaks P +64 9 276 9045 I sales@spel.com.au
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We believe clean water is a right not a privilege and we work to ensure a joy in water experience for you with your children and grandchildren.

spelstormwater
joy in water

100 Silverwater Rd, Silverwater NSW 2128 Australia
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SPEL Stormwater accepts no responsibility for any loss or damage resulting from any person acting on this information. The details and dimensions contained in this document may change, please check with SPEL Stormwater for confirmation of current specifications.

Appendix C – Engineering Plans

PROPOSED RETIREMENT LIVING DEVELOPMENT

930 - 960 NORMAN ROAD, PARKHUST

RUBY DEVELOPMENTS PTY LTD

Project Number: S25-028

INDEX OF DRAWINGS

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CIVIL DRAWINGS
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ROCKHAMPTON REGIONAL COUNCIL

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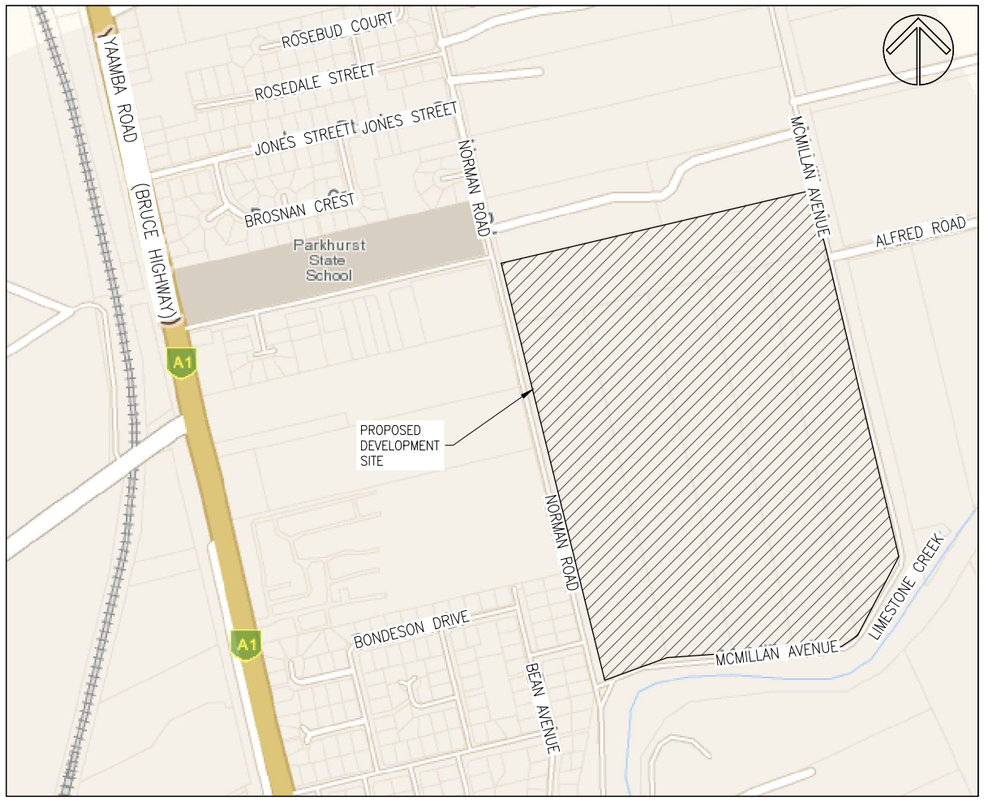

LOCALITY PLAN

NOT TO SCALE

No.	DATE	REVISIONS	DES	DRN	CHK	APD

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PHONE 07 4627 5199

DATUM A.H.D.
P.M. 202931
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930 – 960 NORMAN ROAD, PARKHUST
TITLE COVER SHEET
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25–028–G01
SHEET NUMBER 01 OF 01
REVISION

S25-028-G_Coversheet.dwg

GENERAL NOTES

G1 WESTERA PARTNERS HAS LIMITED CONTROL OR INPUT TO LOCAL GOVERNMENT OR OTHER LEGISLATED APPROVALS UNLESS SPECIFICALLY ENGAGED BY IT'S CLIENT. ANY CHANGES TO APPROVAL REQUIREMENTS (INCLUDING ORDERS FOR SUSPENSION OF WORKS ETC) SHOULD BE COMMUNICATED TO WESTERA PARTNERS AND ALL OTHER RELEVANT DESIGNERS TO ALLOW ASSESSMENT OF POTENTIAL RISKS AND ENSURE DESIGN AND SAFETY COMPLIANCE.

G2 ALL CONSTRUCTION AND MATERIALS SHALL BE IN ACCORDANCE WITH THE LOCAL AUTHORITIES STANDARD DRAWINGS & SPECIFICATIONS AND COMPLETED TO THE SATISFACTION OF THE SUPERINTENDENT AND LOCAL AUTHORITY.

G3 UNLESS SPECIFIED OTHERWISE ALL MATERIALS AND WORK SHALL COMPLY WITH THE RELEVANT AUSTRALIAN STANDARDS.

G4 PRIOR TO THE COMMENCEMENT OF CONSTRUCTION THE CONTRACTOR MUST LOCATE ALL EXISTING SERVICES AND PROMPTLY PROVIDE THE LOCATION DATA TO THE DESIGN ENGINEER TO ASSESS IMPACTS ON THE DESIGN.

G5 ALL CONNECTIONS TO EXISTING SEWERS AND WATER MAINS ARE TO BE CONSTRUCTED BY THE LOCAL AUTHORITY OR AN APPROVED CONTRACTOR. THE CONTRACTOR IS TO ALLOW IN HIS CONTRACT SUM FOR THE COST OF ANY PROPOSED CONNECTIONS.

G6 ALL SEWERS ARE TO BE 150MM DIA. U.P.V.C. CLASS SN8 RUBBER RING JOINTED AND PROPERTY CONNECTIONS ARE TO BE 100MM DIA. U.P.V.C CLASS SN6 UNLESS NOTED OTHERWISE

G7 THE PAVEMENT DEPTHS SHOWN ARE PRELIMINARY ONLY AND ARE TO BE VERIFIED FOLLOWING SUB-SOIL TESTS OF THE SUB-GRADE MATERIAL.

G8 ALL ROOFWATER CONNECTIONS FROM KERB ADAPTERS ARE TO BE 100MM DIA CLASS SN10 AT A MIN GRADE OF 1.0% UNLESS SHOWN OTHERWISE. ROOFWATER CONNECTIONS FROM FIELD INLETS OR GULLY PITS ARE TO BE 150MM DIA CLASS SN8 AT A MIN GRADE OF 1.0% UNLESS NOTED OTHERWISE.

G9 ALL U.P.V.C. STORMWATER DRAINAGE PIPES ARE TO BE CLASS SN8 (U.N.O.)

ALL R.C. PIPES ARE TO BE CLASS 3 (U.N.O.)
< 900ø = USE SPIGOT AND SOCKET PIPES WITH RUBBER RING JOINTS
900ø < PIPES < 1050ø = USE FLUSH JOINTED PIPES WITH EXTERNAL ELASTOMERIC BAND
1050ø < PIPES = USE FLUSH JOINTED PIPES WITH EXTERNAL ELASTOMERIC BAND AND INTERNAL CEMENT MORTAR JOINT

ALL F.R.C. PIPES ARE TO BE FRCPIPE+ CLASS 4 (U.N.O.) AND SHALL BE DUAL RUBBER RING JOINT WITH COLLAR. PIPES SHALL BE FROM 225ø TO 600ø ONLY.

POLYPROPYLENE/POLYETHYLENE STORMWATER PIPE MINIMUM CLASS SN8 (U.N.O.) SUBJECT TO ACCEPTANCE BY CERTIFYING ENGINEER AND LOCAL AUTHORITY. CONSTRUCTION AND EMBEDMENT TO BE IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.

G10 WATER PIPES SHALL BE;
- P.V.C.–M WATER PIPES ARE TO BE SERIES 2 PN16 SN10 R.R.J.
- D.I.C.L. WATER PIPES ARE TO BE PN35 WITH ALL FITTINGS TO BE FUSION BONDED POLYMERIC COATED.
- PE WATER PIPES ARE TO BE PN16 SDR11 PE100. DN25 AND DN32 WATER SERVICES SHALL BE PE80B.

G11 ALL "AS CONSTRUCTED" INFORMATION IS TO BE RECORDED AS REQUIRED BY THE LOCAL AUTHORITY AND SUBMITTED TO THE SUPERINTENDENT IMMEDIATELY AFTER COMPLETION OF THE WORKS.

G12 ALL ALLOTMENTS ARE TO BE GRADED AT A MINIMUM GRADE OF 1 IN 200.

CONCRETE NOTES

C1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3600 CONCRETE STRUCTURES CODE AND THE REFERENCED STANDARDS THEREIN.

C2 THE CONCRETE STRENGTH GRADE AND THE COVER TO REINFORCEMENT FOR THE VARIOUS CONCRETE ELEMENTS SHALL BE AS LISTED BELOW:
- CLIMATE ZONE: TROPICAL / TEMPERATE / ARID
- LOCATION: COASTAL / NEAR COASTAL / INLAND

ELEMENT	EXPOSURE CLASSIFICATION	STRENGTH GRADE	MINIMUM COVER
MANHOLES	B1	N32	40
	C2	S50	65
FIELD INLET PITS	B1	N32	40
	C2	S50	65
HEADWALLS	B1	N32	40
	C2	S50	65
INTERNAL ROADS	B1	N32	40
KERB/CHANNEL	B1	N32	–
FOOTPATHS	B1	N32	40
RETAINING WALL PANELS	B1	N32	30*
	C2	S50	60*
BORED PIERS	B1	N32	40
	C2	S50	65

*RIGID FORMWORK & INTENSE COMPACTION

C3 CONCRETE TO HAVE A MAXIMUM AGGREGATE SIZE OF 20mm WITH 80mm MAXIMUM SLUMP, A WATER/CEMENT RATIO OF NOT GREATER THAN 0.65 AND A MAXIMUM FINAL BASIC DRYING SHRINKAGE STRAIN OF 800 x 10^{-6}, UNLESS APPROVED OTHERWISE.

C4 NO ADDITIVES SHALL BE ADDED OF APPLIED TO THE CONCRETE MIX WITHOUT THE APPROVAL OF THE ENGINEER.

C5 THE MAXIMUM PERMISSIBLE TRANSPORT TIME FOR CONCRETE BETWEEN BATCHING AND PLACEMENT ON SITE SHALL BE IN ACCORDANCE WITH THE FOLLOWING TABLE.

AMBIENT AIR TEMPERATURE	MAX. BATCHING TO PLACEMENT TIME
10° – 24°C	120 MINUTES
25° – 27°C	90 MINUTES
28° – 30°C	60 MINUTES
31° – 33°C	45 MINUTES
34° – 36°C	30 MINUTES
37°C+	NO PLACEMENT OF CONCRETE UNLESS CHILLED WATER OR ICE IN MIX

C6 ALL CONCRETE SHALL BE MECHANICALLY VIBRATED. VIBRATORS SHALL NOT BE USED TO SPREAD CONCRETE.

C7 ALL CONCRETE SHALL BE SAMPLED AND TESTED IN ACCORDANCE WITH AS1379 ADOPTING THE PROJECT ASSESSMENT METHOD FOR COMPRESSIVE STRENGTH AND SLUMP COMPLIANCE. THE RESULTS OF ALL TESTS SHALL BE PROMPTLY SUBMITTED TO THE ENGINEER FOR REVIEW.

C8 WHEN THE AIR TEMPERATURE EXCEEDS 30°C, ALIPHATIC ALCOHOL SHALL BE APPLIED TO THE CONCRETE SURFACE OF SLABS IMMEDIATELY AFTER THE INITIAL SCREED AND AGAIN AFTER BULL FLOATING.

C9 CURING OF ALL CONCRETE SURFACES SHALL COMMENCE IMMEDIATELY AFTER COMPLETING CONCRETE FINISHING AND SHALL CONTINUE FOR 7 DAYS. CONTRACTOR TO CONFIRM METHOD OF CURING WITH ENGINEER PRIOR TO USE.

C10 SIZES OF CONCRETE ELEMENTS DO NOT INCLUDE THICKNESS OF APPLIED FINISHES.

C11 BEAM DEPTHS ARE WRITTEN FIRST AND INCLUDE SLAB THICKNESS, IF ANY.

C12 NO HOLES, CHASES OR EMBEDDED ITEMS OTHER THAN THOSE SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE MADE IN CONCRETE MEMBERS WITHOUT PRIOR APPROVAL OF THE ENGINEER. CONDUITS, PIPES ETC. SHALL NOT BE PLACED IN THE COVER THICKNESS OF THE CONCRETE.

C13 WHERE SERVICE PIPES PENETRATE CONCRETE ELEMENTS, PROVISION SHOULD BE MADE TO ALLOW FOR MOVEMENT OF THE ELEMENT.

C14 FORMWORK SHALL BE DESIGNED, CONSTRUCTED AND STRIPPED IN ACCORDANCE WITH AS3610 FORMWORK CODE, UNLESS NOTED OTHERWISE ON THE DRAWINGS.

C15 REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND NOT NECESSARILY SHOWN IN TRUE PROJECTION OR SCALE.

C16 ALL REINFORCEMENT SHALL BE SECURELY SUPPORTED IN ITS CORRECT POSITION ON PLASTIC BAR CHAIRS, GENERALLY AT NOT GREATER THAN 800mm CENTRES IN BOTH DIRECTIONS.

C17 WELDING AND HEATING OF REINFORCEMENT SHALL NOT BE PERMITTED WITHOUT APPROVAL OF THE ENGINEER.

C18 ALL STEEL REINFORCEMENT IN CONCRETE ELEMENTS SHALL BE INSPECTED BY THE ENGINEER AND PASSED PRIOR TO POURING OF ANY CONCRETE.

C19 LAP REINFORCEMENT ONLY AT LOCATIONS SHOWN ON THE DRAWINGS OR AS APPROVED BY THE ENGINEER.

C20 SLAB FABRIC SHALL BE LAPPED ONE FULL PANEL OF FABRIC PLUS 50mm SO THAT THE TWO OUTERMOST TRANSVERSE WIRES OF ONE SHEET OVERLAP THE TWO OUTERMOST TRANSVERSE WIRES OF THE SHEET BEING LAPPED BY 50mm.

C21 BAR REINFORCEMENT SHALL BE LAPPED IN ACCORDANCE WITH THE FOLLOWING TABLE.

TYPICAL BAR REINFORCEMENT LAP LENGTHS		
BAR	LAP LENGTH UNO	HORIZONTAL BARS WITH GREATER THAN 300mm OF CONCRETE CAST BELOW THEM
N12	550	750
N16	800	1100
N20	1100	1400
N24	1250	1600
N28	1400	1800
N32	1600	2100
N36	2000	2500

WHERE LAPS ARE SHOWN ON THE DRAWINGS THE ABOVE LAP LENGTHS SHALL BE ADOPTED UNLESS NOTED OTHERWISE. WHERE BARS OF DIFFERENT DIAMETER ARE SHOWN LAPPED, ADOPT THE LAP LENGTH APPROPRIATE TO THE SMALLER DIAMETER BAR.

C22 A VAPOUR BARRIER OF 0.2mm (200um) MINIMUM THICK POLYTHENE SHEETING SHALL BE PLACED BENEATH SLABS ON GROUND UNLESS NOTED OTHERWISE.

ROCKHAMPTON REGIONAL COUNCIL

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LEGEND

GENERAL

- ASPHALTIC CONCRETE PAVEMENT
- REINFORCED CONCRETE PAVEMENT
- REINFORCED CONCRETE PATHWAY/CROSSOVER
- TURF
- STONE PITCHING
- CEMENT GROUTED STONE PITCHING
- TELECOMMUNICATION (T)
- GAS MAIN (G)
- ELECTRICITY OVERHEAD (V)
- ELECTRICITY UNDERGROUND (E)
- LIGHT POLE (LP)
- POWER POLE (PP)
- PIT (TELSTRA/ELEC)
- EDGE OF BITUMEN
- FENCE
- EXISTING SURFACE LEVEL (× 2.53)
- EXISTING CONTOUR MINOR (33.75)
- EXISTING CONTOUR MAJOR (34.00)
- DESIGN SURFACE LEVEL (× 2.53)
- DESIGN CONTOUR MINOR (33.75)
- DESIGN CONTOUR MAJOR (34.00)
- RETAINING WALL
- STAGE BOUNDARY

STORMWATER DRAINAGE

	NEW	EXISTING
STORMWATER PIPE		
SAG GULLY PIT		
ON GRADE GULLY PIT		
MANHOLE		
600 x 600 FIELD INLET		
900 x 600 FIELD INLET		
1050 DIA FIELD INLET		
HEADWALL		

- KERB ADAPTER WITH ROOFWATER PIPE (SWO)
- STORMWATER STRUCTURE LABEL (2A)

WATER

	NEW	EXISTING	DISUSED
WATER MAIN	W	W	W
FIRE HYDRANT	FH	FH	FH
DUAL OUTLET FIRE HYDRANT	DFH	DFH	DFH
SWABBING DUAL OUTLET FIRE HYDRANT	SDFH		
SWABBING FIRE HYDRANT	SFH	SFH	SFH
ISOLATION VALVE	V	V	V
SCOUR VALVE			
AIR VALVE	AV	AV	AV
DEAD END			
TEST/CHLORINATION POINT			
REDUCER	150 / 100	150 / 100	150 / 100
PIPE MATERIAL CHANGE	PVC / DICL	PVC / DICL	PVC / DICL

- WATER SERVICE PRE-TAPPED TEE
- WATER SERVICE PIPE & CONDUIT (DN25ø)
- FLOW METER (WM)
- FLUSHING POINT (F)

SEWERAGE

	NEW	EXISTING	DISUSED
GRAVITY SEWER MAIN	S	S	S
SEWER RISING MAIN	RM	RM	
SEWER VACUUM MAIN	VM	VM	
MAINTENANCE HOLE & END OF LINE	1/1	1/1	1/1
END OF LINE	1/1, E 1	1/1, E 1	1/1, E 1
MAINTENANCE SHAFT	1/1	1/1	1/1
HORIZONTAL/VERTICAL BEND	VB1 1, HB1 1	VB1 1, HB1 1	VB1 1, HB1 1
COMPOUND BEND	CB1 1	CB1 1	CB1 1

- STUB / TEMPORARY END
- RODDING END (RE 1)
- PROPERTY CONNECTION
- OVERFLOW MAINTENANCE HOLE (OFMH)
- ISOLATION VALVE
- SCOUR VALVE AND CHAMBER
- GAS RELEASE VALVE (GRV)
- FLUSHING POINT (FP)
- DISCHARGE MAINTENANCE HOLE (DMH)
- NON-RETURN/REFLUX VALVE
- VENT POLE / ODOUR CONTROL UNIT

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
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APPROVED

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930 – 960 NORMAN ROAD, PARKHUST
TITLE CIVIL NOTES AND LEGEND
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25-028-PC01
SHEET NUMBER 01 OF 13
REVISION

S25-028-PC_Pre_Civil_Notes.dwg

ALFRED ROAD

MCMILLAN AVENUE

MCMILLAN AVENUE

NORMAN ROAD

NEWTON STREET

MASON AVENUE

22 RP603509

3 SP264078

RP861941

Emt B SP326275

1 SP326275

RP861934

Emt A SP326275

Emt C SP326275

2 SP326275

Emt A SP304742

Emt A SP304742

Emt A SP316475

10 SP318433

35 SP300282

Emt A SP300282

2 RP603056

2 RP609294

9 RP603507

8 RP603507

114 RP860041 115 RP860041 113 RP860041 112 RP860041 111 RP860041

111 RP860041 107 RP860041 108 RP860041 109 RP860041 110 RP860041

41 RP859975 42 RP859975 40 RP859975 17 RP856813 19 RP856813 1 RP865915 2 RP865915 3 RP865915 4 RP865915 16 RP856813 45 RP856813 18 RP856813 5 RP865915

46

22

SITE PLAN

SCALE 1:1250 (A1 SIZE)

0 12.5 25 37.5 40 52.5

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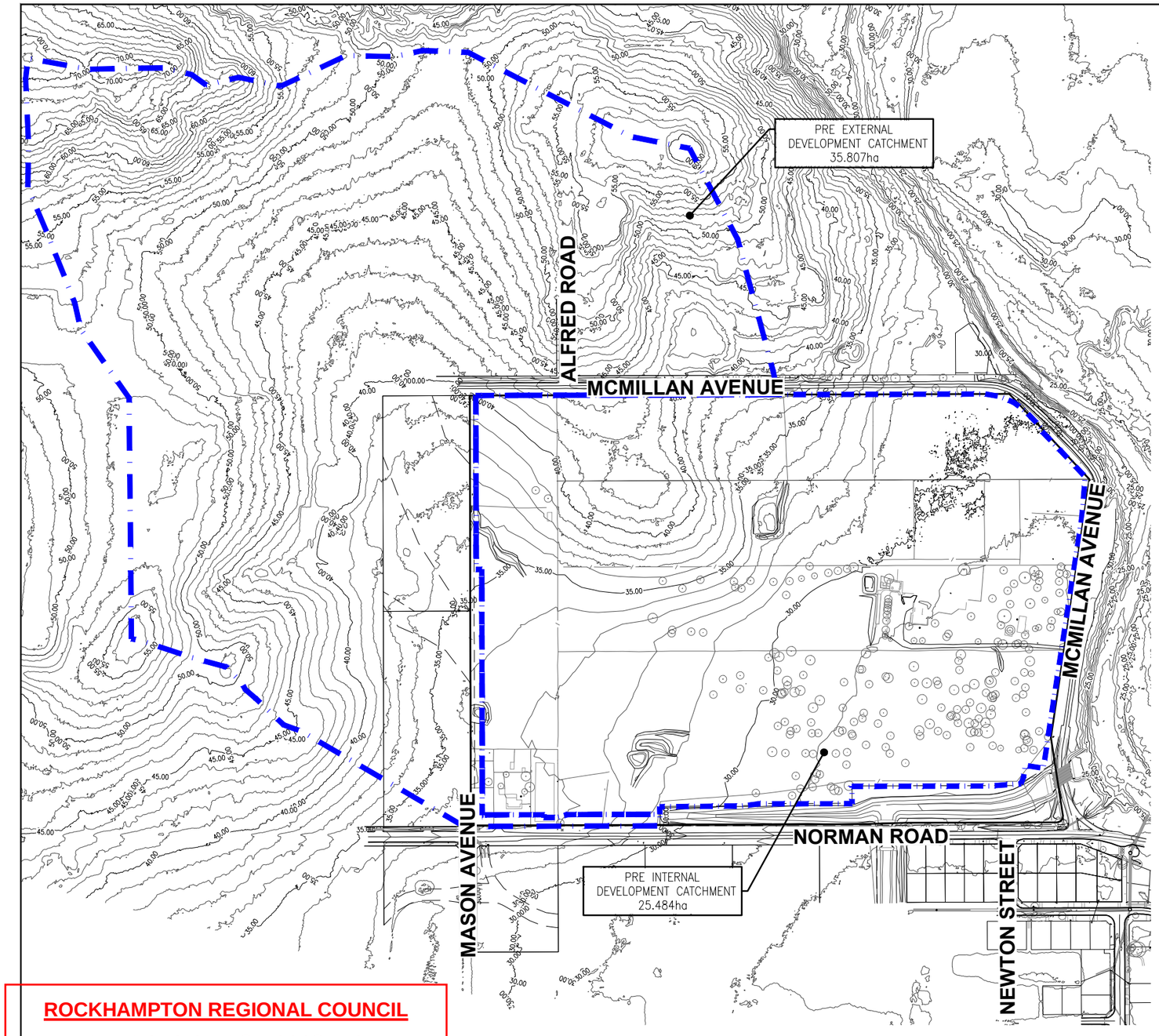
CLIENT RUBY DEVELOPMENTS PTY LTD

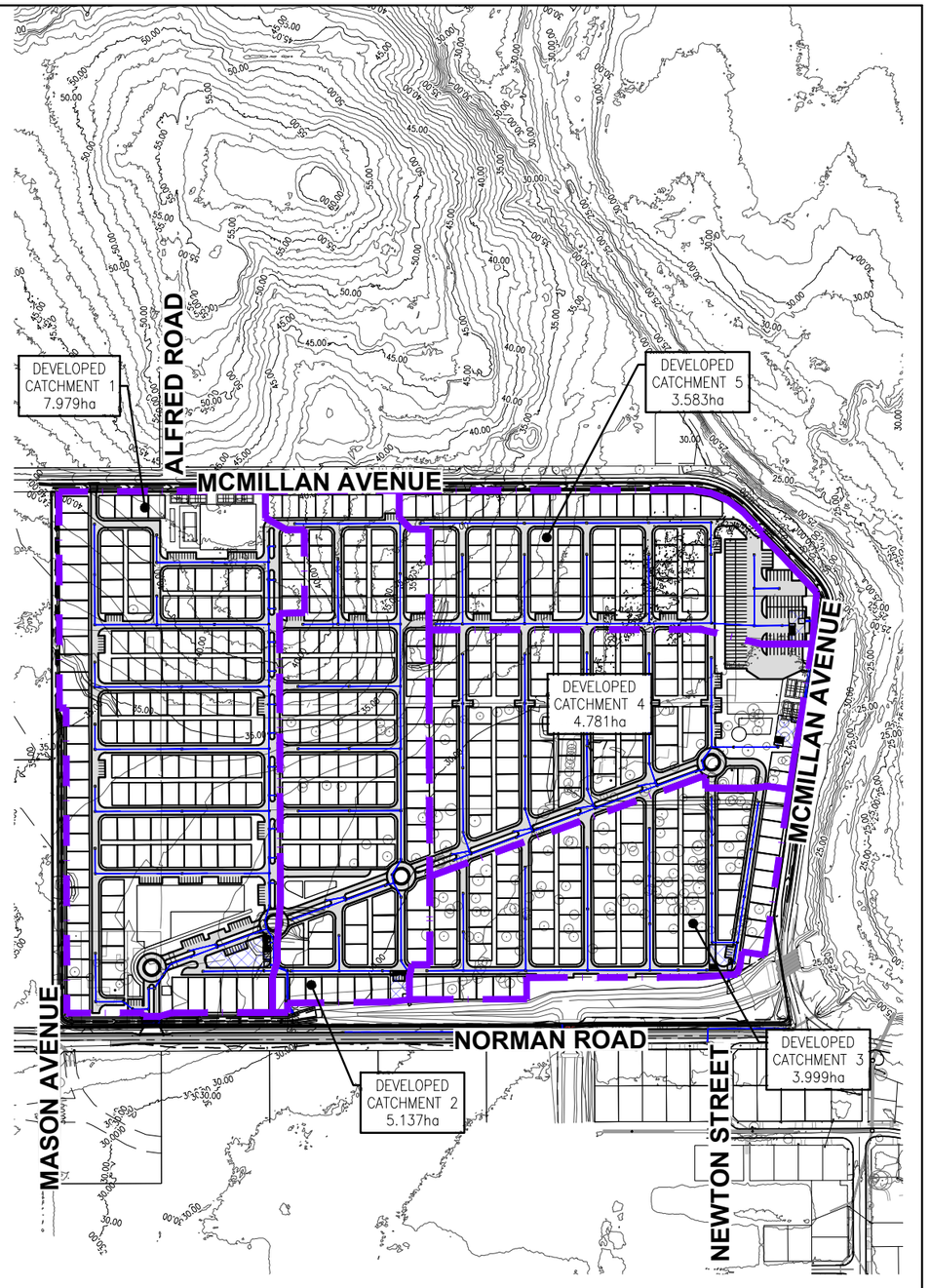
DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25-028-PC02
SHEET NUMBER 02 OF 13
REVISION

S25-028-PC_Pre_Civil_Site.dwg



EXISTING CATCHMENT PLAN

SCALE 1:2500 (A1 SIZE) 0 25 50 75 100 125



NOTE:
DEVELOPMENT CATCHMENTS EXCLUDE PERIMETER OPEN CHANNELS.

DEVELOPED CATCHMENT PLAN

SCALE 1:2500 (A1 SIZE) 0 25 50 75 100 125

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P.M. 202931
R.L. 32.447

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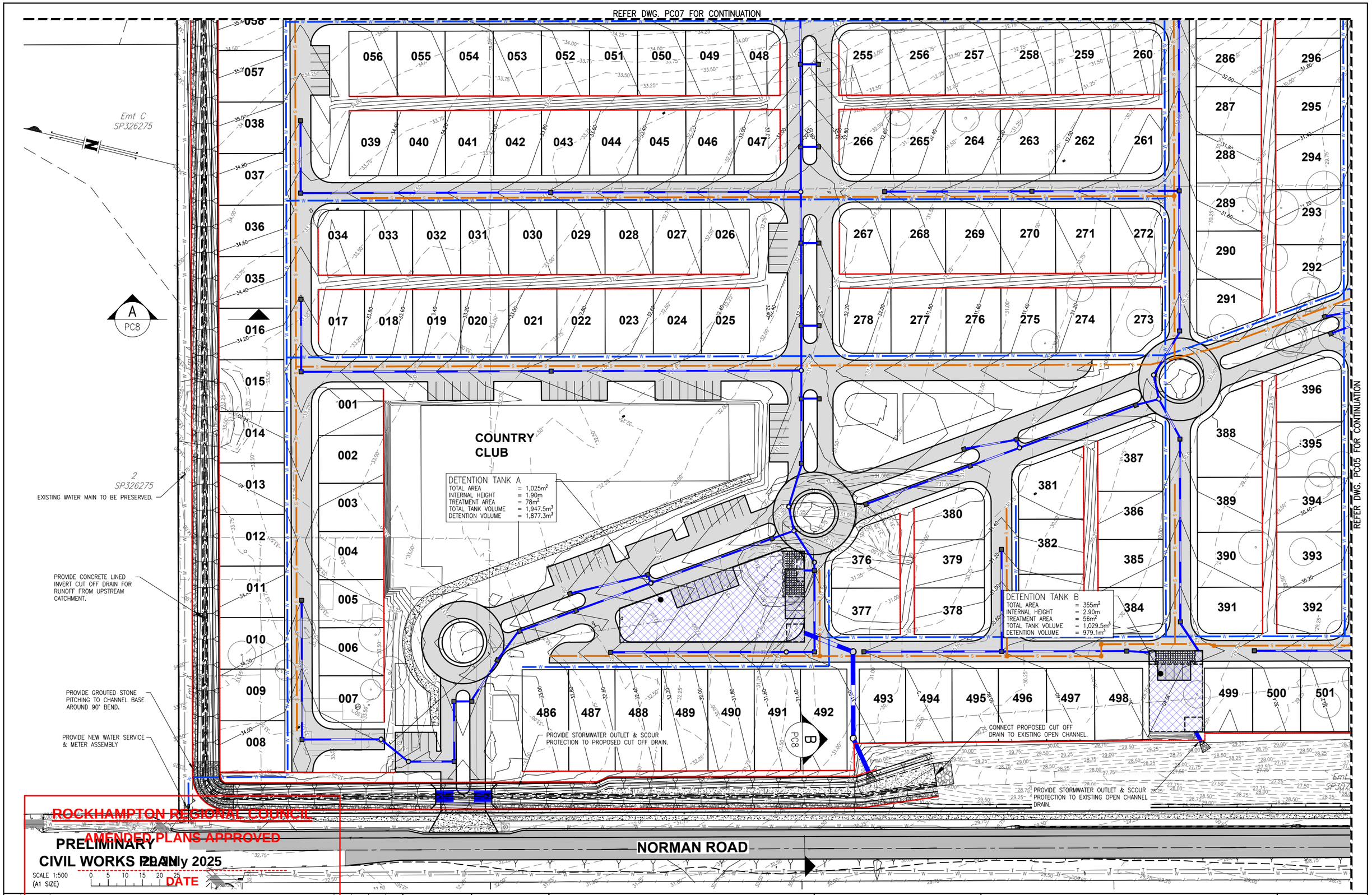
PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY CATCHMENT PLANS
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25–028–PC03
SHEET NUMBER 03 of #REF!
REVISION

S25–028–PC_Pre_Stm_Catch.dwg



ROCKHAMPTON REGIONAL COUNCIL
AMENDED PLANS APPROVED
DATE

PRELIMINARY
CIVIL WORKS PLAN
29 July 2025

SCALE 1:500 (A1 SIZE) 0 5 10 15 20 25

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/187-2023

Dated: 18 September 2024

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199
DATUM A.H.D.
P.M. 202931
R.L. 32.447

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY CIVIL WORKS PLAN 1 of 4
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25–028–PC04
SHEET NUMBER 04 OF 13
REVISION

S25–028–PC_Pre_Civilwks.dwg

REFER DWG. PC06 FOR CONTINUATION

REFER DWG. PC04 FOR CONTINUATION

MCMILLAN AVENUE

NORMAN ROAD

PRELIMINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE)

0 5 10 15 20 25

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

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Development Permit No.: D/187-2023

Dated: 18 September 2024

DETENTION TANK C

TOTAL AREA	= 429m²
INTERNAL HEIGHT	= 2.10m
TREATMENT AREA	= 42m²
TOTAL TANK VOLUME	= 900m³
DETENTION VOLUME	= 862.2m³

EXISTING 6x1200x900 RCBC
USIL = 26.49
DSIL = 26.25
LENGTH = 19.44
GRADE = 1.23%

PROVIDE STORMWATER OUTLET & SCOUR PROTECTION TO EXISTING OPEN CHANNEL DRAIN.

REFER TO S24-148-S SET FOR EXTERNAL SEWER DETAILS.

EXISTING 6x2400x1200 RCBC
USIL = 25.22
DSIL = 25.11
LENGTH = 20.93
GRADE = 0.53%

Emt A SP307472

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199

DATUM A.H.D.
P.M. 202931
R.L. 32.447

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PROJECT	PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION	LOTS 7–12 SP603508 930 – 960 NORMAN ROAD, PARKHUST
TITLE	PRELIMINARY CIVIL WORKS PLAN 2 of 4
CLIENT	RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS: PRELIMINARY N.F.C.
DRAWING NUMBER: S25-028-PC05
SHEET NUMBER: 05 OF 13
REVISION:

S25-028-PC_Pre_Civilwks.dwg

PRELIMINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE)

0 5 10 15 20 25

MCMILLAN AVENUE

REFER DWG. PC07 FOR CONTINUATION

REFER DWG. PC05 FORCONTINUATION

RV COMPOUND

LIFESTYLE PAVILION

DETENTION TANK E
TOTAL AREA = 325m²
INTERNAL HEIGHT = 3.00m
TREATMENT AREA = 45.5m²
TOTAL TANK VOLUME = 975m³
DETENTION VOLUME = 934.05m³

DETENTION TANK D
TOTAL AREA = 410m²
INTERNAL HEIGHT = 3.00m
TREATMENT AREA = 49m²
TOTAL TANK VOLUME = 1,230m³
DETENTION VOLUME = 1,185.9m³

PROVIDE 2x1200 RCBC. RESTORE EXISTING ROAD PAVEMENT.

PROVIDE STORMWATER OUTLET & SCOUR PROTECTION TO LIMESTRONE CREEK.

PROVIDE STORMWATER OUTLET & SCOUR PROTECTION TO LIMESTRONE CREEK.

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/187-2023

Dated: 18 September 2024

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
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APPROVED

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SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199

DATUM A.H.D.
P.M. 202931
R.L. 32.447

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY CIVIL WORKS PLAN 3 of 4
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25–028–PC06
SHEET NUMBER 06 OF 13
REVISION

S25–028–PC_Pre_Civilwks.dwg

PRELIMINARY CIVIL WORKS PLAN

SCALE 1:500 (A1 SIZE) 0 5 10 15 20 25

ALFRED ROAD

MCMILLAN AVENUE

SPORTS PRECINT

Emt B SP326275

1 SP326275

PROVIDE CONCRETE CUT OFF DRAIN FOR RUNOFF FROM UPSTREAM CATCHMENT.

PROVIDE VEGETATED CUT OFF DRAIN FOR RUNOFF FROM UPSTREAM CATCHMENT.

C PC8

REFER DWG. PC06 FOR CONTINUATION

REFER DWG. PC04 FOR CONTINUATION

ROCKHAMPTON REGIONAL COUNCIL
AMENDED PLANS APPROVED
29 July 2025
DATE

These plans are approved subject to the current conditions of approval associated with
Development Permit No.: D/187-2023
Dated: 18 September 2024

No.	DATE	REVISIONS	DES	DRN	CHK	APD
S25-028-PC_Pre_Lodgement						

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of WESTERA PARTNERS PTY. LTD.
APPROVED

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SURVEYOR CAPRICON SURVEY GROUP CQ PHONE 07 4627 5199
DATUM A.H.D. P.M. 202931 R.L. 32.447

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY CIVIL WORKS PLAN 4 of 4
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25–028–PC07
SHEET NUMBER 07 OF 13
REVISION

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

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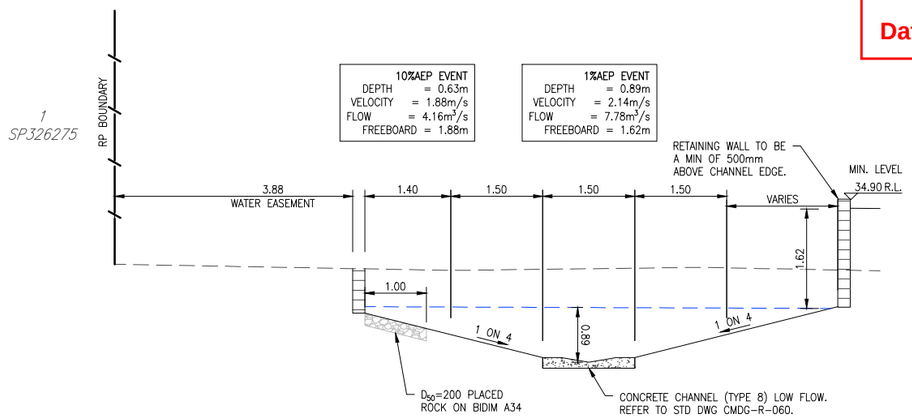
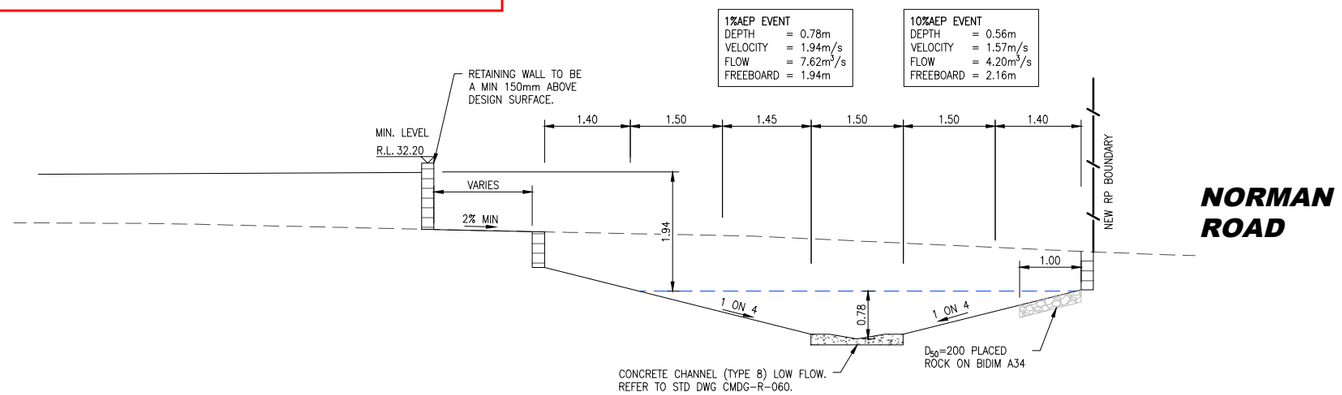
Development Permit No.: D/187-2023

Dated: 18 September 2024



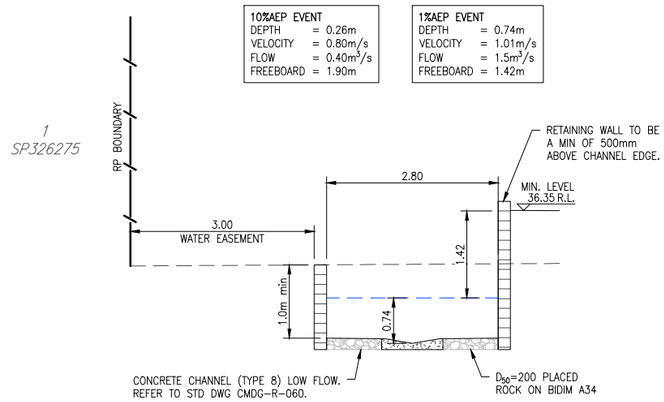
SECTION A PC06

SCALE A1 – 1 : 50
A3 – 1 : 100



SECTION B PC06

SCALE A1 – 1 : 50
A3 – 1 : 100



SECTION C PC06

SCALE A1 – 1 : 50
A3 – 1 : 100

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
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APPROVED

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CENTRAL VICTORIA T 03 5441 0922 E centralvic@westerapartners.com.au

SURVEYOR
CAPRICON SURVEY GROUP CQ
PHONE 07 4627 5199

DATUM A.H.D.
P.M. 202931
R.L. 32.447

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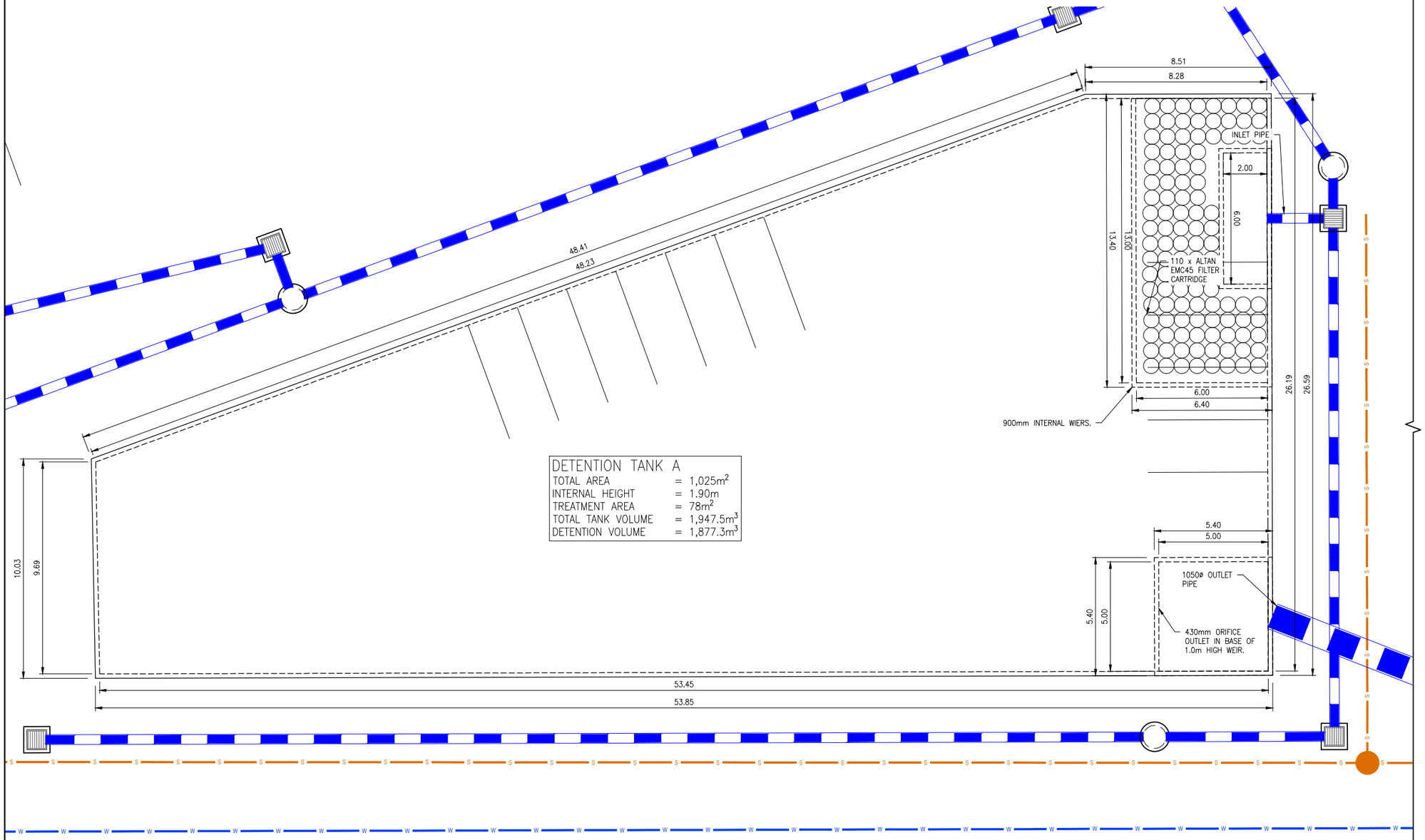
PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY CHANNEL SECTIONS
CLIENT RUBY DEVELOPMENTS PTY LTD

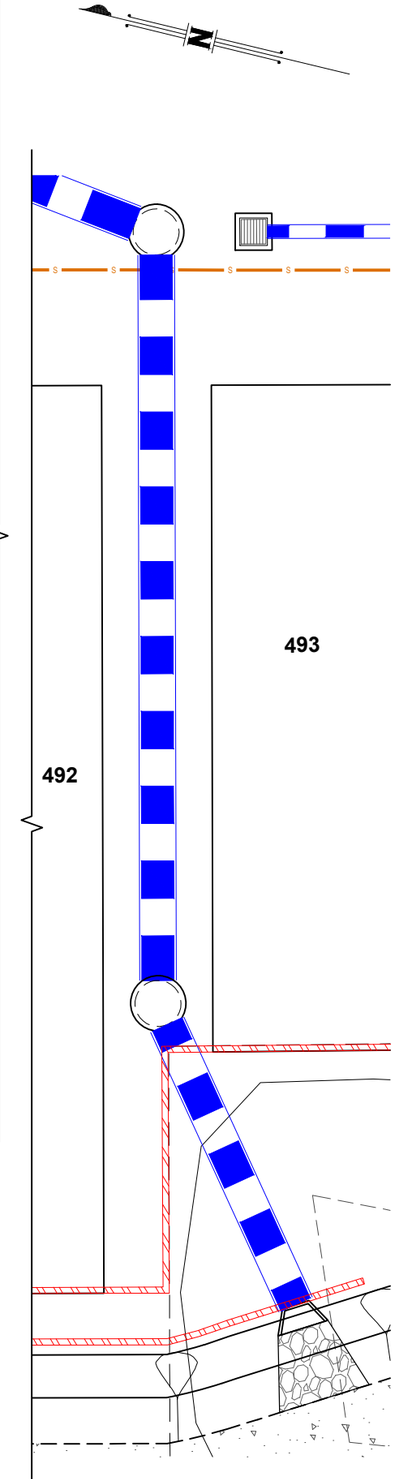
DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25-028-PC08
SHEET NUMBER 08 OF 13
REVISION

S25-028-PC_Pre_Civilwks.dwg



DETENTION TANK A

TOTAL AREA	=	1,025m^2
INTERNAL HEIGHT	=	1.90m
TREATMENT AREA	=	78m^2
TOTAL TANK VOLUME	=	1,947.5m^3
DETENTION VOLUME	=	1,877.3m^3



ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/187-2023

Dated: 18 September 2024

DETENTION TANK A PLAN

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of
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APPROVED

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SURVEYOR CAPRICON SURVEY GROUP CQ PHONE 07 4627 5199
DATUM A.H.D. P.M. 202931 R.L. 32.447

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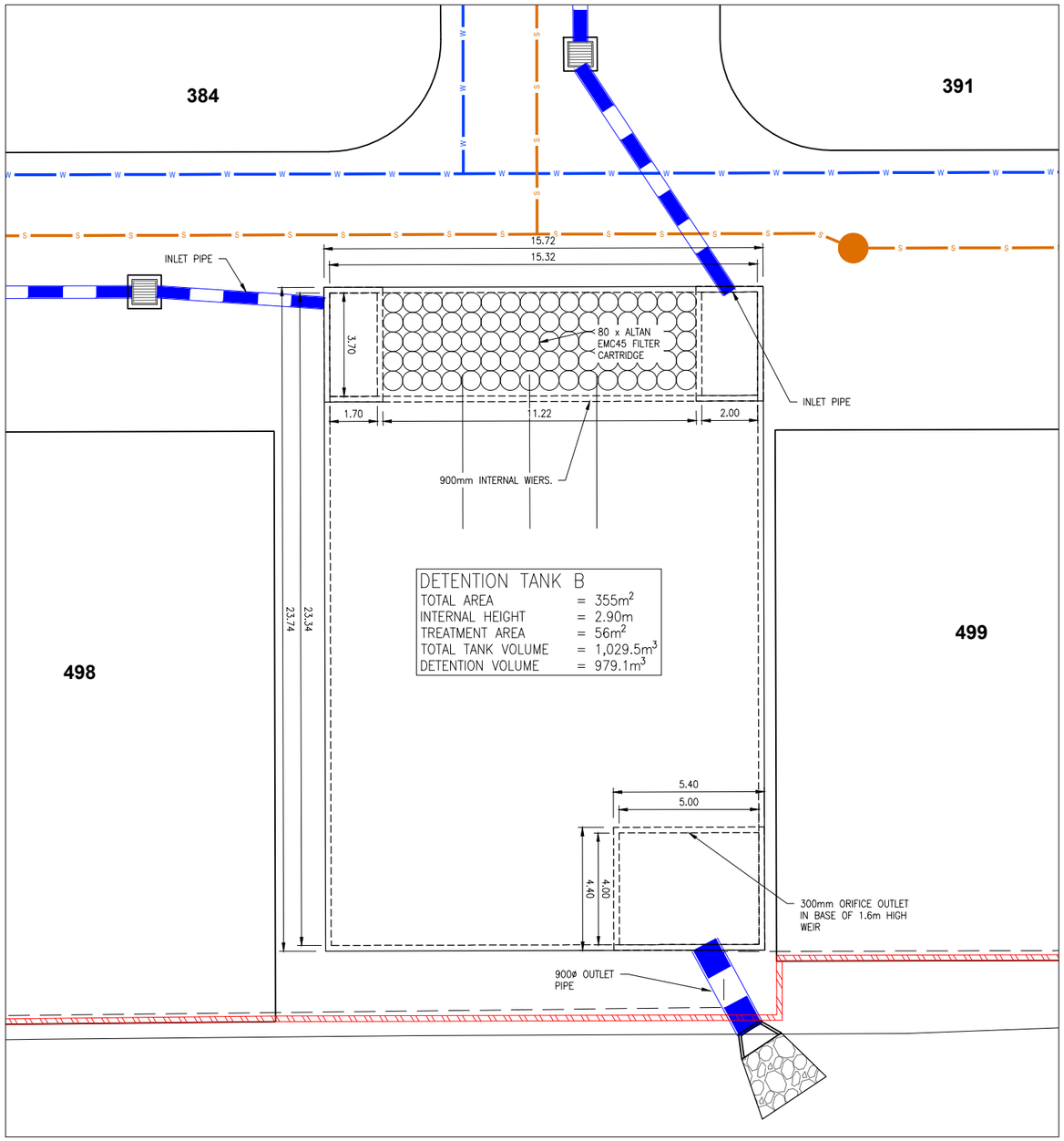
PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY STORMWATER TANK 1 of 5
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25–028–PC09
SHEET NUMBER 09 OF 13
REVISION

S25–028–PC_Pre_Stm_Tanks.dwg



DETENTION TANK B
PLAN

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

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Development Permit No.: **D/187-2023**

Dated: **18 September 2024**

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of
WESTERA PARTNERS PTY. LTD.
APPROVED

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SURVEYOR CAPRICON SURVEY GROUP CQ PHONE 07 4627 5199
DATUM A.H.D. P.M. 202931 R.L. 32.447

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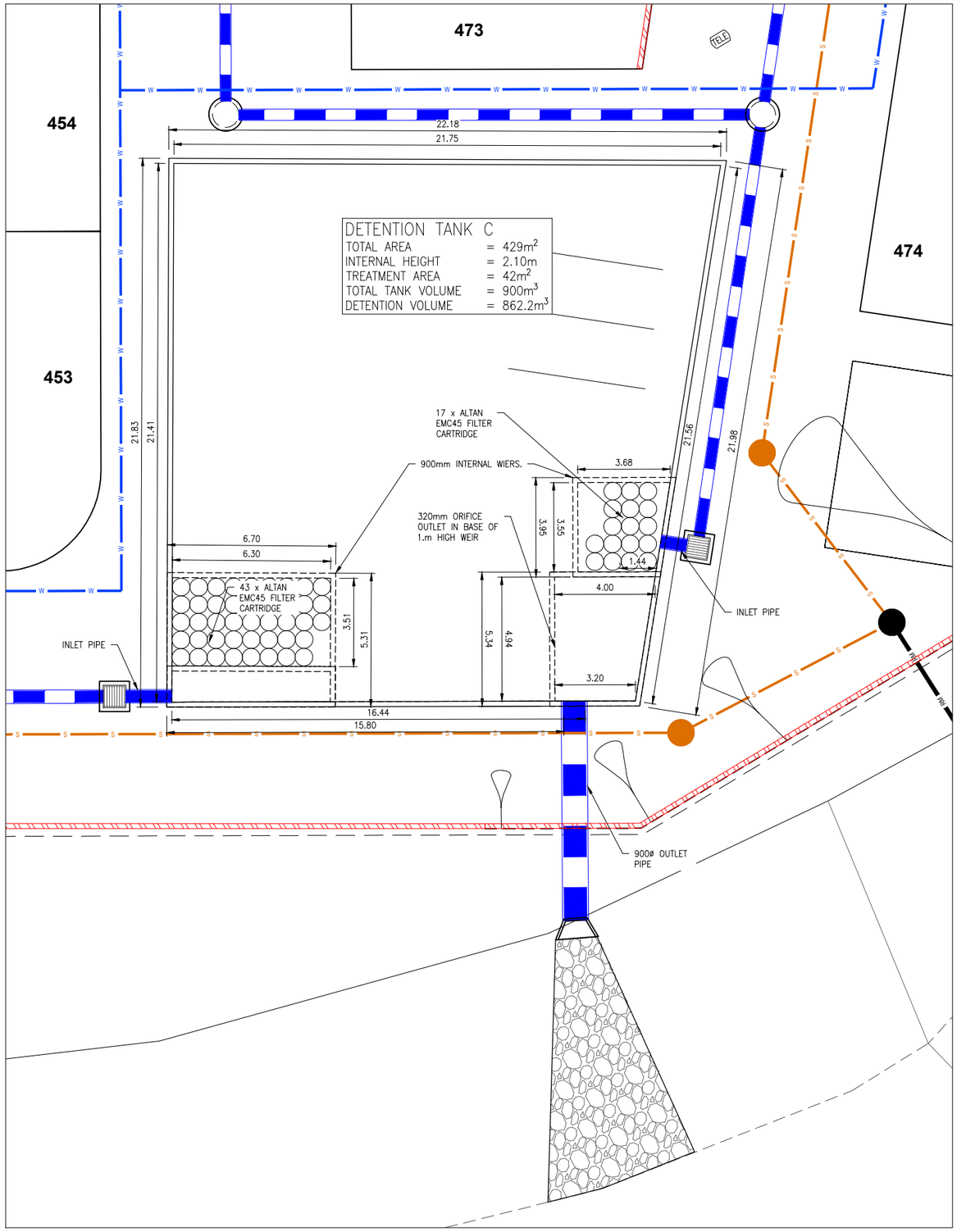
PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508
930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY STORMWATER TANK 2 of 5
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25–028–PC10
SHEET NUMBER 10 OF 13
REVISION

S25-028-PC_Pre_Stm_Tanks.dwg



ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

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Development Permit No.: D/187-2023

Dated: 18 September 2024

DETENTION TANK C PLAN

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of
WESTERA PARTNERS PTY. LTD.
APPROVED

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DATUM A.H.D. P.M. 202931 R.L. 32.447

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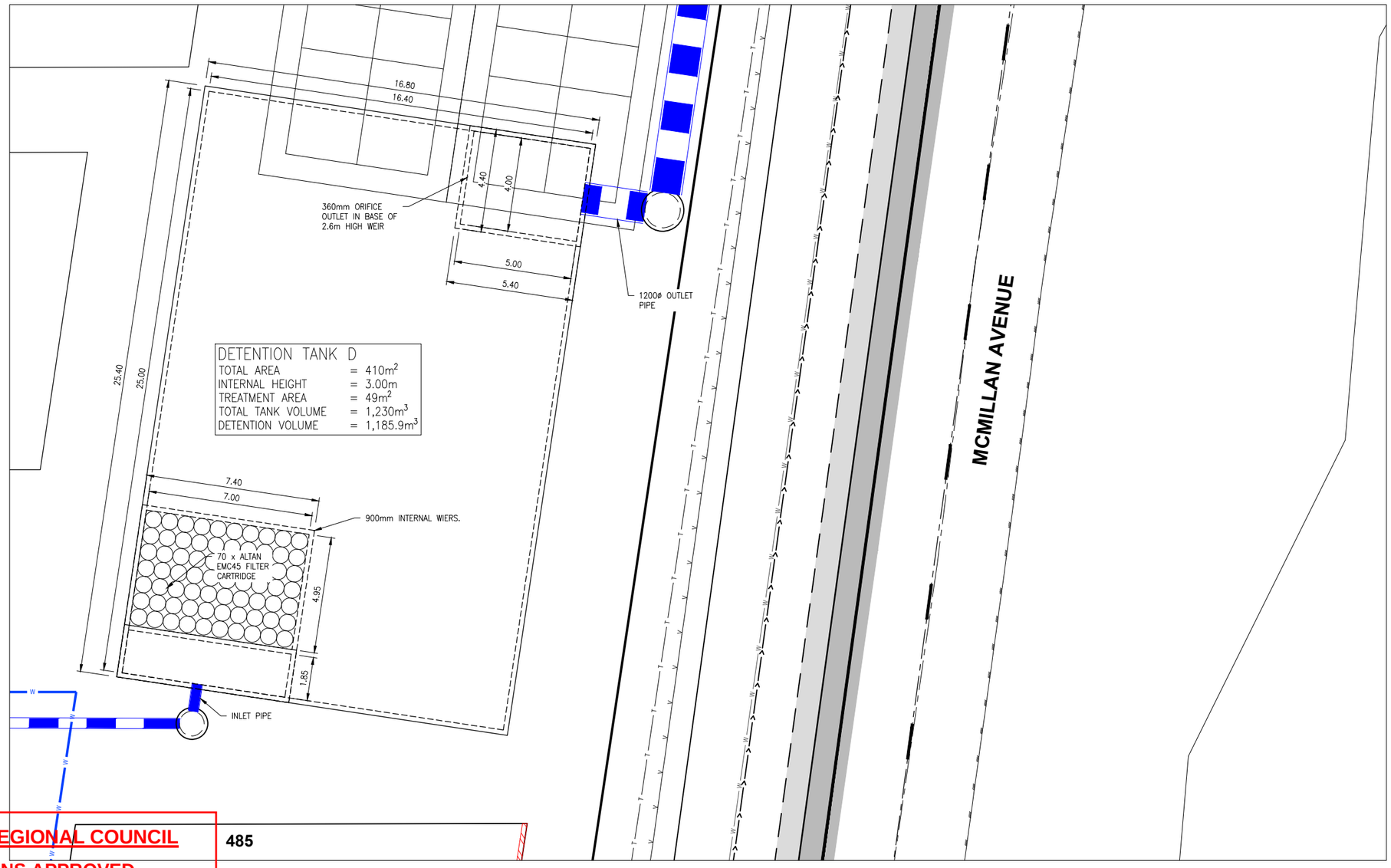
PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508 930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY STORMWATER TANK 3 of 5
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25–028–PC11
SHEET NUMBER 11 OF 13
REVISION

S25–028–PC_Pre_Stm_Tanks.dwg



ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/187-2023

Dated: 18 September 2024

DETENTION TANK D PLAN

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

J. HILL RPEQ 19891
For and on behalf of
WESTERA PARTNERS PTY. LTD.
APPROVED

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STRUCTURAL+CIVIL+ENVIRONMENTAL ENGINEERS
www.westerapartners.com.au | ABN 52 097 417 975

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DATUM A.H.D. P.M. 202931 R.L. 32.447

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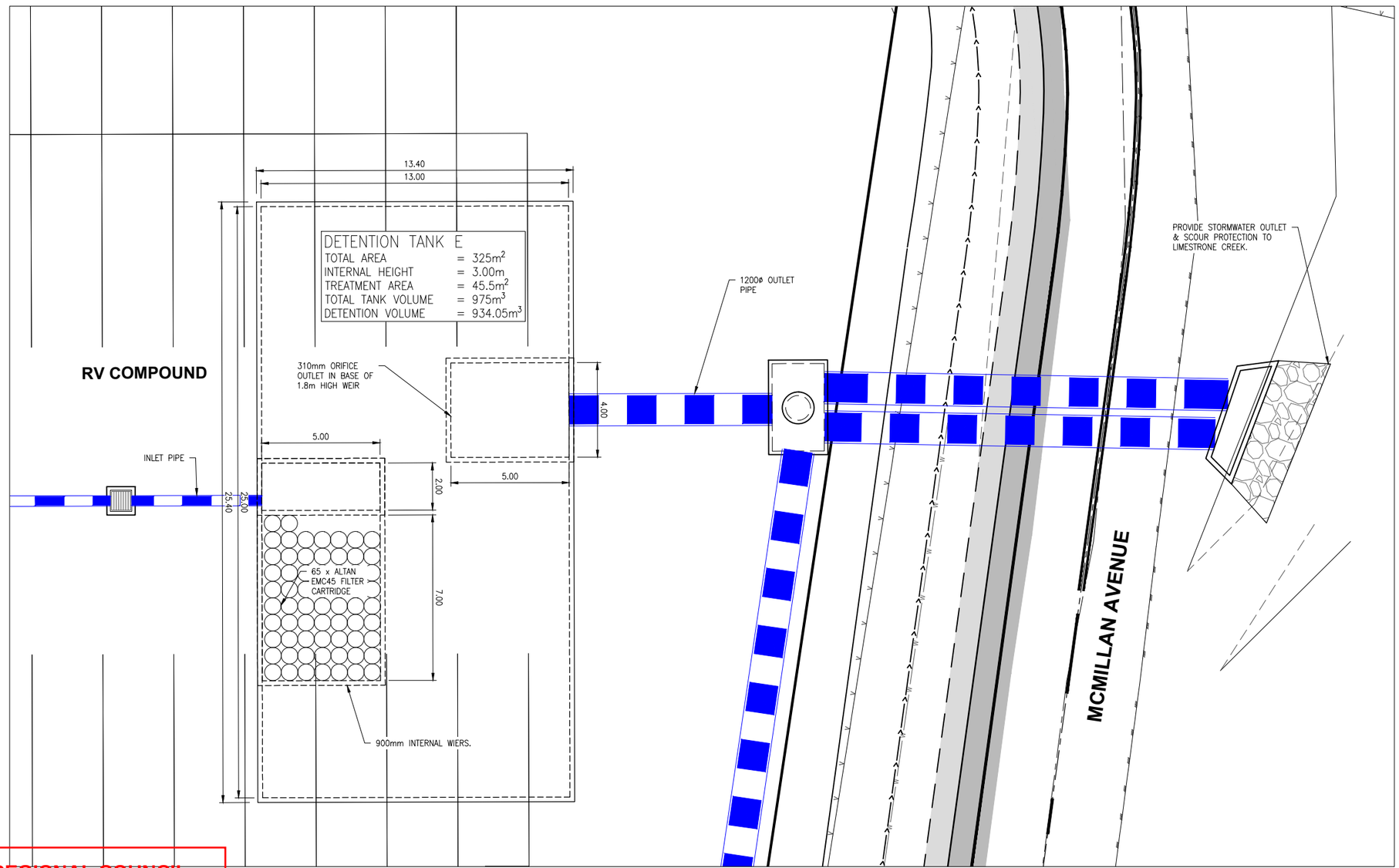
PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508 930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY STORMWATER TANK 4 of 5
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25–028–PC12
SHEET NUMBER 12 OF 13
REVISION

S25–028–PC_Pre_Stm_Tanks.dwg



ROCKHAMPTON REGIONAL COUNCIL

AMENDED PLANS APPROVED

29 July 2025

DATE

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Development Permit No.: D/187-2023

Dated: 18 September 2024

DETENTION TANK E PLAN

SCALE 1:100 (A1 SIZE) 0 1 2 3 4 5

No.	DATE	REVISIONS	DES	DRN	CHK	APD

DESIGNED R.V.B.
DRAWN J.J.D
CHECKED J.M.H.
APPROVED J.M.H.
DATE FEBRUARY 2025
DOCUMENT CONTROL

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DATUM A.H.D. P.M. 202931 R.L. 32.447

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PROJECT PROPOSED RETIREMENT LIVING DEVELOPMENT
LOCATION LOTS 7–12 SP603508 930 – 960 NORMAN ROAD, PARKHUST
TITLE PRELIMINARY STORMWATER TANK 5 of 5
CLIENT RUBY DEVELOPMENTS PTY LTD

DRAWING STATUS PRELIMINARY N.F.C.
DRAWING NUMBER S25-028-PC13
SHEET NUMBER 13 OF 13
REVISION

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