

YARRABILBA PRECINCT 5 - PRECINCT NETWORK PLAN - WATER AND WASTEWATER INFRASTRUCTURE

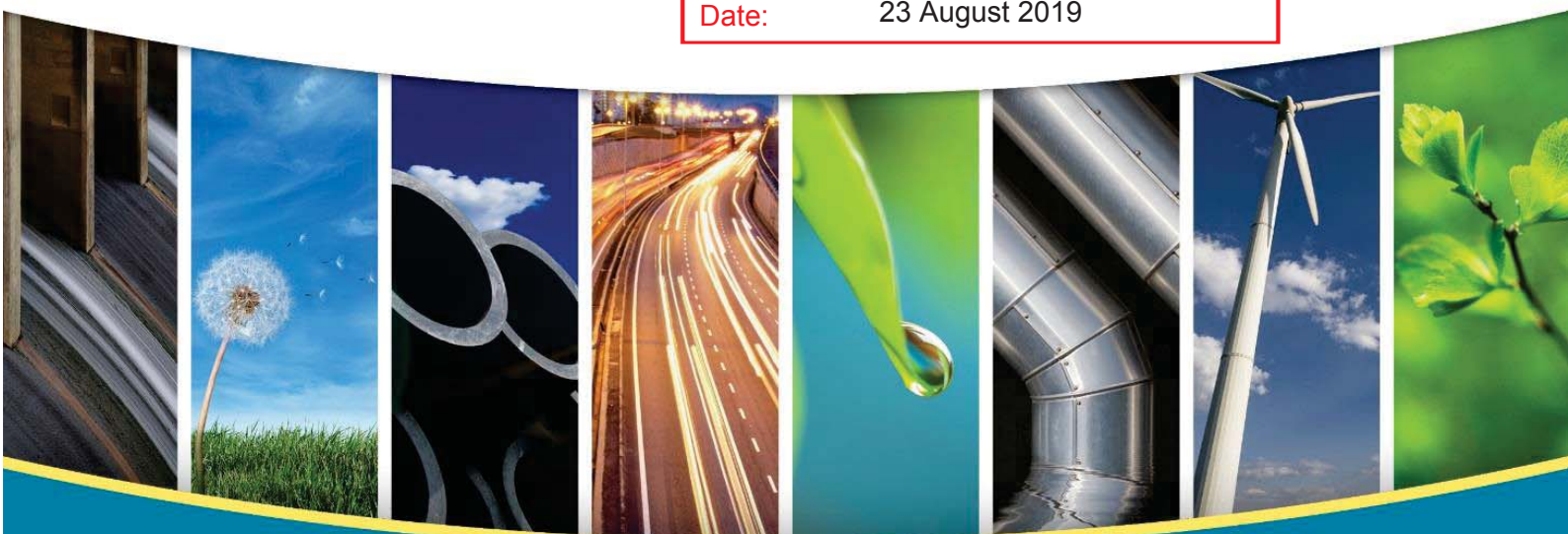
Prepared for Lendlease

January 2018

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL

Approval no: DEV2017/860

Date: 23 August 2019



Revision	Description	Author		Quality Check		Independent Review	
0	Draft	H Lin	18/07/2017	S O'Brien	18/07/2017	S O'Brien	18/07/2017
1	Final	H Lin	12/10/2017	S O'Brien	12/10/2017	S O'Brien	12/10/2017
2	Final	S O'Brien	12/01/2018	P Hall	12/01/2018	P Hall	12/01/2018

Sign-off Sheet

This document entitled 'YARRABILBA PRECINCT 5 - PRECINCT NETWORK PLAN - WATER AND WASTEWATER INFRASTRUCTURE' was prepared by MWH, now part of Stantec for the account of Lendlease. Any reliance on this document by any third party is strictly prohibited. The material in it reflects the professional judgment of MWH, now part of Stantec in light of the scope, schedule and other limitations stated in the document and in the contract between MWH, now part of Stantec and Lendlease. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, MWH, now part of Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that MWH, now part of Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Prepared by ____



Henry Lin

Reviewed by ____



Shane O'Brien RPEQ 9064

Table of Contents

TABLE OF CONTENTS.....	I
ABBREVIATIONS.....	III
1.1 PRECINCT 5 VILLAGES.....	2
1.2 DEVELOPMENT TIMELINE.....	2
2.1 WATER DEMAND AND PEAKING FACTORS	3
2.2 WATER DEMAND AND PEAKING FACTORS	3
2.3 WASTEWATER DESIGN FLOW AND PEAKING FACTORS	3
3.1 APPROACH.....	4
3.2 PLANNING DENSITIES AND OCCUPANCY RATES.....	4
3.3 POPULATION SUMMARY	4
4.1 DEMAND	8
4.2 STORAGE AND BULK SUPPLY ASSESSMENT	8
4.3 PROPOSED PRECINCT WATER SUPPLY LAYOUT.....	10
4.3.1 Trunk Supply to Yarrabilba	10
4.3.2 Internal Trunk System	10
4.3.3 Hydraulic Performance.....	10
5.1 OVERVIEW OF SEWERAGE SYSTEM.....	16
5.2 DESIGN FLOWS	16
5.3 ULTIMATE SERVICING STRATEGY	18
5.4 INTERNAL SEWERAGE NETWORK	19
5.4.1 Reticulation Sewers	19
5.4.2 Trunk Sewers	19
5.5 PUMPING STATIONS AND RISING MAINS	19
5.5.1 Pumping Station PS1 Capacity.....	19
5.5.2 Interim Pumping Station PS 3A.....	20
LIST OF TABLES	
Table 1 Potable Water Demand Peaking Factors	3
Table 2 Key Water Network Design Criteria	3
Table 3 Expected Water EP within Precincts 1, 2, 3 and 5.....	5
Table 4 Expected Sewerage EP within Precincts 1, 2, 3 and 5.....	6
Table 5 Yarrabilba Precincts 1, 2, 3 and 5 Demand Summary.....	8
Table 6 Modelled PMA Performance and Pressure Reductions.....	11

Table 7 Design Flows Summary (by Precinct) for Precincts 1, 2, 3 and 5.....	16
Table 8 Design Flows Summary (by Pumping Station) for Precincts 1, 2, 3 and 5.....	16

LIST OF FIGURES

Figure 1 Locality of Yarrabilba Precinct 5 Development (extracted from Precinct 5 CPAS).....	1
Figure 2 Proposed Bulk Water Supply Servicing Strategy (LCC)	9
Figure 3 Layout of Yarrabilba Ultimate Water Supply Network.....	12
Figure 4 Ultimate Maximum Hour Network Performance (Without Pressure Reduction)	13
Figure 5 Ultimate Fire Flow Network Performance	14
Figure 6 Ultimate Zero Demand Network Performance.....	15
Figure 7 Yarrabilba Precincts 1 to 5 Sewerage Pumping Station Catchments.....	17
Figure 8 Logan South Regional Sewerage Strategy	19

LIST OF APPENDICES

Appendix A Precinct 5 CPAS and Yield Plans

Appendix B Population Calculations

Appendix C Service Layout

Appendix D LCC DSOS (2014)

Abbreviations

AD	Average day
ADWF	Average dry weather flow
CPAS	Context planning area strategy
CPP	Critical pressure point
DSOS	Desired standards of service
EDQ	Economic Development Queensland
EP	Equivalent persons
LCC	Logan City Council
MD	Maximum day
MDMM	Mean day maximum month
MPP	Maximum pressure point
PMA	Pressure management areas
PWWF	Peak weather flow
RIGS	Reduced infiltration gravity sewer
SRWP	Southern Regional Water Pipeline
STP	Sewerage treatment plant
WTP	Water treatment plant
UFW	Unaccounted for water

1 Introduction

This report outlines the requirements for the water and sewerage network for Precinct 5 of the Yarrabilba development.

In accordance with the Yarrabilba Precinct 5 Context Planning Area Strategy (Precinct 5 CPAS) endorsed by Economic Development Queensland (EDQ), Precinct 5 is the fourth major area of Yarrabilba to be developed. The precinct has a total area of 247 ha and is located to the south of Precinct 3 development as shown in Figure 1. The eastern boundary adjoins the Plunkett Conservation Reserve and future Precinct 14 and the northern boundary is adjacent to existing Precinct 3 development. It is noted that the Powerlink easement (47 ha) is within the Precinct 5 boundary.

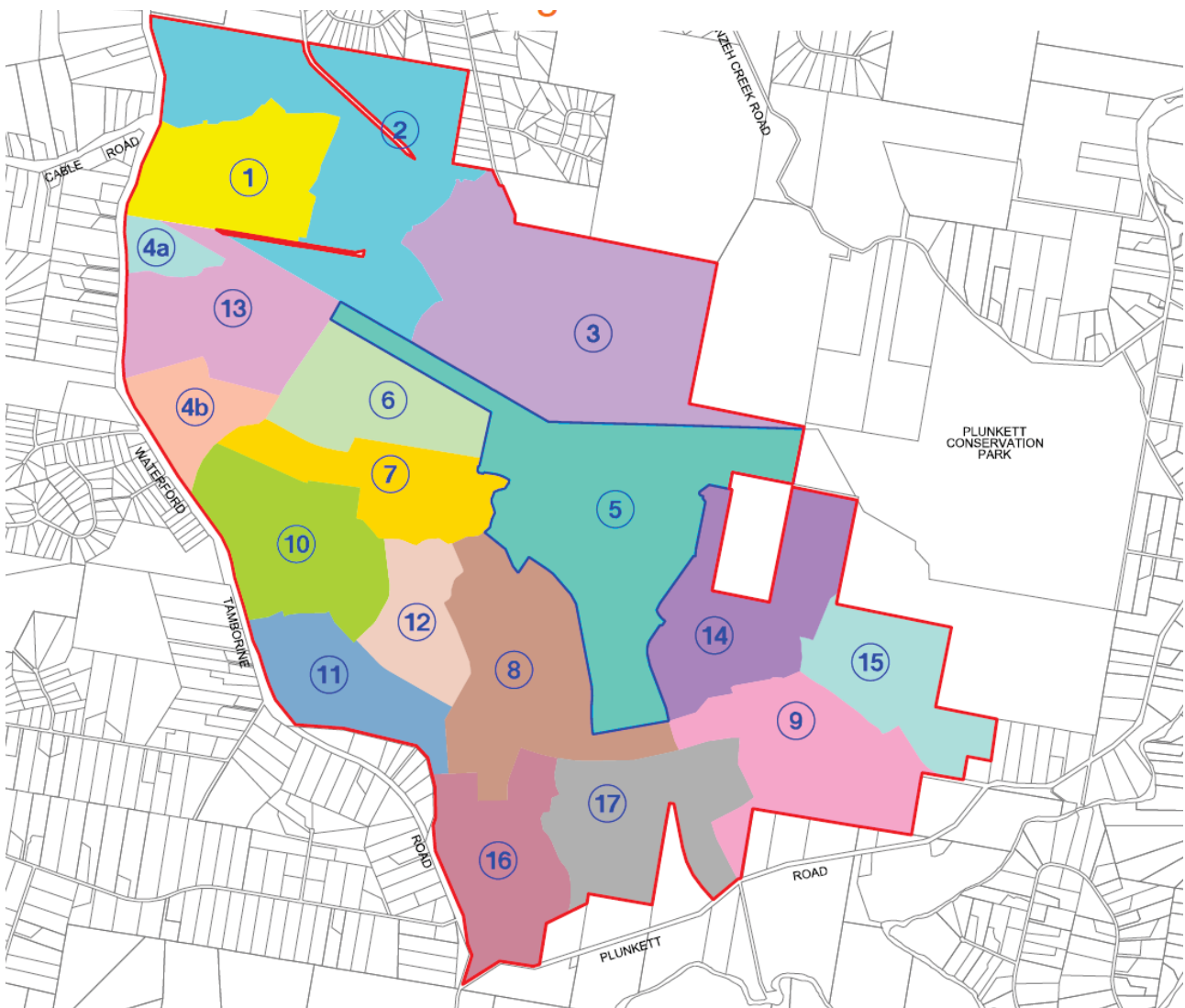


Figure 1 Locality of Yarrabilba Precinct 5 Development (extracted from Precinct 5 CPAS)

1.1 Precinct 5 Villages

There are seven villages defined in the Precinct 5 CPAS (refer to the Context Plan in Appendix A) as follows:

1. Village 5A
 - a. Detached and attached residential allotments (low to medium density)
 - b. District recreation park
 - c. District sports park
2. Village 5B
 - a. Detached and attached residential allotments (low to medium density)
 - b. State primary school (the second state primary school in the Yarrabilba development)
3. Village 5C
 - a. Detached and attached residential allotments (low to medium density)
 - b. South Rock local park
4. Village 5D
 - a. Detached and attached residential allotments (low to medium density)
 - b. Neighbourhood park
5. Village 5E
 - a. Detached and attached residential allotments (low to medium density)
6. Villages 5F and 5H
 - a. Attached residential allotments (minimum density of 15 dwellings per ha and with possible investigation for higher densities)
7. Village 5G
 - a. Attached residential allotments (minimum density of 20 dwellings per ha).

1.2 Development Timeline

Lendlease advises that the Precinct 5 development is likely to start in 2018 with a development sequence of Village 5B, followed by 5E, 5A, 5C, 5D, 5F, 5H and 5G. This study assumes that the entire Precinct 5 development would be completed around 2026.

2 Desired Standards of Service

The Desired Standards of Service (DSOS) adopted for this assessment are in accordance with 2014 standards provided by LCC. The DSOS is provided in Appendix D and the key criteria are provided in the following sections.

2.1 Water Demand and Peaking Factors

An average day potable water demand (AD) of 165 L/EP/day plus an unaccounted for water (UFW) allowance of 25 L/EP/day was adopted.

Water supply peaking factors are summarised in Table 1.

Table 1 Potable Water Demand Peaking Factors

Peaking Factor	Residential Detached	Residential Attached	Commercial / Education	Industry
Maximum Day (MD) / AD	1.7	1.6	1.3	1.3
Maximum Hour (MH) / AD	3.1	2.6	2.0	1.7
Mean Day Maximum Month (MDMM) / AD	1.3	1.3	1.2	1.2

2.2 Water Demand and Peaking Factors

The key criteria applied to this study are outlined in Table 2.

Table 2 Key Water Network Design Criteria

Parameter	Description
Minimum service pressure	22 m at the property boundary
Maximum service pressure	55 m
Fire flow demands	Residential: 15 L/s Non-Residential: 30 L/s
Residual pressure during fire flow event	12 m at the fire flow location
Background demand during fire	2/3 MH demand
Maximum allowable pipe headloss	5 m/km for diameter ≤ 150 mm 3 m/km for diameter > 150 mm

2.3 Wastewater Design Flow and Peaking Factors

An average dry weather flow (ADWF) of 165 L/EP/day is adopted for this study in accordance with the 2014 LCC DSOS. As 'Reduced Infiltration Gravity Sewers' (RIGS) are utilised in the Yarrabilba development, the peak weather flow (PWWF) was calculated based on 1,000 L/EP/day.

3 Population Projection

3.1 Approach

Expected population growth and equivalent persons (EP) are assessed based on the proposed subdivision layouts (provided by Lendlease) and the occupancy rates/densities agreed with Logan City Council (LCC).

The residential population for Precincts 1, 2, 3 and 5 was calculated using the following methodology:

- A lot count was performed for areas where the subdivision layout was complete and where the future layout was sufficiently detailed.
- Terrace houses and town houses were regarded as attached residential dwellings
- Where the future layout was not detailed 11.2 % of the total number of residential lots was assumed to be attached residential dwellings.

The projected yield of each village of future precincts (Precincts 4, 6 to 13) of the Yarrabilba development was provided by Lendlease for use in this study. The map of future precincts outlines the extent of future commercial, industrial, open space and varying densities of residential development within the studied area. The projected number of dwellings for each of village was provided by Lendlease (YB_Thurs_17_Nov_FINAL.xlsx). The development staging plan provided by Lendlease is included in Appendix A. These documents form the basis of long term population projection assessment.

3.2 Planning Densities and Occupancy Rates

The following planning density and occupancy rates were used for estimating the EP for Precincts 1 to 5:

- Residential occupancy rates:
 - Detached dwelling: 2.8 EP/dwelling
 - Attached dwelling: 1.78 EP/dwelling.
- Non-residential planning densities:
 - Commercial and Industrial: 30 EP/ha (water) and 37 EP/ha (sewerage)
 - Education (Primary School): 0.25 EP/pupil and staff
 - Education (High School): 0.5 EP/pupil and staff
 - Toilet block: 1.1 EP/toilet.

3.3 Population Summary

A breakdown of the development in Precincts 1, 2, 3 and 5 is as follows:

- Precinct 1:
 - 527 detached residential lots and 127 attached residential lots
 - District and central park: 10 toilets + 0.16 ha commercial site
 - District centre: 10.91 ha mixed use/employment site
 - Private primary school: 850 students plus 10% allowance for staff
 - Childcare: 70 pupils plus 10% allowance for staff
- Precinct 2:
 - 1,712 detached residential lots and 442 attached residential lots
 - State primary school: 1,100 students plus 60 staff
 - Private high school: 2,400 plus 10% allowance for staff
- Precinct 3 Village A:
 - 216 detached residential lots and 25 attached residential lots (including MFS lots)
 - State high school: 1,800 students plus 120 full time staff.
 - Childcare facility: 200 plus 10% allowance for staff
 - Neighbourhood centre and community facilities: 1 ha

- Mixed uses development: 2.78 ha (including attached residential plus ground floor commercial lots development density of 80 dwellings per ha)
- Precinct 3 Village B:
 - 446 detached residential lots and 33 attached residential lots
- Precinct 3 Village C:
 - 223 detached residential lots and 16 attached residential lots
- Precinct 3 Village D:
 - Future employment generating uses: 10.2 ha (estimated). It is noted that the land use of Precinct 3D will be revised after a better understanding of the utility facilities is available and the remaining area for non-residential development is confirmed.
- Precinct 5 Village A:
 - 179 residential lots (11.2% are attached residential)
- Precinct 5 Village B:
 - 163 residential lots (11.2% are attached residential)
 - State primary school: 1,100 students plus 60 staff
- Precinct 5 Village C:
 - 247 residential lots (11.2% are attached residential)
- Precinct 5 Village D:
 - 746 residential lots (11.2% are attached residential)
- Precinct 5 Village E:
 - 433 residential lots (11.2% are attached residential)
- Precinct 5 Village F:
 - 279 residential lots (11.2% are attached residential)
- Precinct 5 Village G:
 - 77 residential lots (11.2% are attached residential)
- Precinct 5 Village H:
 - 99 residential lots (11.2% are attached residential)

A detailed table of the population calculations is included in Appendix B. A summary of the expected populations in Precincts 1 to 5 is provided in Table 3 and Table 4. The forecast of sales and occupied lots is provided in Appendix B.

Table 3 Expected Water EP within Precincts 1, 2, 3 and 5

Precinct	Residential Detached	Residential Attached	Commercial/Em ployment/Retail/ Community	Education	Total EP	Estimated 2021 Connected EP
1	1,658	110	375	253	2,396	2,396
2 (Res)	5,432	320	0	0	5,752	5,752
2 (State Primary)	0	0	0	319	319	319
2 (Private High)	0	0	0	1,320	1,320	0
3A	605	369	98	55	1,127	1,127
3A (Stage High)					960	0

Precinct	Residential Detached	Residential Attached	Commercial/Em ployment/Retail/ Community	Education	Total EP	Estimated 2021 Connected EP
3B	1,249	59	0	0	1,308	1,308
3C	625	29	0	0	653	509
3D	0	0	306	0	306	0
5A	442	36	0	0	478	239
5B	405	33	0	0	438	418
5B (State Primary)				319	319	0
5C	614	49	0	0	663	235
5D	1,854	149	0	0	2,003	0
5E	1,076	87	0	0	1,163	0
5F	693	56	0	0	749	0
5G	191	15	0	0	207	0
5H	246	20	0	0	266	47
Precinct 5 subtotal	5,522	445	0	319	6,286	6,286
Total (without 3D)	15,090	1,332	474	3,226	20,121	12,350
Total (with 3D)	15,090	1,332	780	3,226	20,427	12,350

Table 4 Expected Sewerage EP within Precincts 1, 2, 3 and 5

Precinct	Residential Detached	Residential Attached	Commercial/Em ployment/Retail/ Community	Education	Total EP	2021 Connected EP
1	1,658	110	460	253	2,481	2,481
2 (Res)	5,432	320	0	0	5,752	5,752
2 (State Primary)	0	0	0	319	319	319
2 (Private High)	0	0	0	1,320	1,320	0
3A	605	369	121	55	1,150	1,150
3A (Stage High)					960	0
3B	1,249	59	0	0	1,308	1,308

Precinct	Residential Detached	Residential Attached	Commercial/Em ployment/Retail/ Community	Education	Total EP	2021 Connected EP
3C	625	29	0	0	653	510
3D	0	0	377	0	377	0
5A	442	36	0	0	478	239
5B	405	33	0	0	438	418
5B (State Primary)				319	319	0
5C	614	49	0	0	663	235
5D	1,854	149	0	0	2,003	0
5E	1,076	87	0	0	1,163	0
5F	693	56	0	0	749	0
5G	191	15	0	0	207	0
5H	246	20	0	0	266	47
Precinct 5 subtotal	5,522	445	0	319	6,286	6,286
Total (without 3D)	15,090	1,332	582	3,226	20,229	12,458
Total (with 3D)	15,090	1,332	959	3,226	20,607	12,458

4 Water Supply Network Assessment

Water supply to Precinct 5 will be provided from the new Travis Road reservoir. In the interim, supply will be provided from the South Maclean pumping station with the long term supply being provided through a new connection to the Southern Regional Water Pipeline (SRWP) at Chambers Flat. The regional water strategy is currently being reviewed and both the ultimate supply approach and the staging of the supply will be determined following completion of the Seqwater regional water strategy and the revised LCC South Logan study. These studies are expected to be completed by the end of 2017.

Pressure management areas (PMA) are proposed as the service pressure at lots with elevation lower than 50 m AHD will potentially be over 55 m, which is the maximum service pressure stated in LCC 2014 DSOS. PMA planning and proposed PMA performance are detailed in the following sections.

4.1 Demand

The maximum day (MD) and mean day maximum month (MDMM) demands for Precincts 1, 2, 3 and 5 were calculated in accordance with the LCC 2014 DSOS. The population of Logan Village at 2026 was provided by Logan Water as 1,727 EP detached residential, 1,080 EP attached residential and 470 EP non-residential. The ultimate demand for Yarrabilba Precincts 1, 2, 3 and 5 is summarised in Table 5.

Table 5 Yarrabilba Precincts 1, 2, 3 and 5 Demand Summary

Category	Water Demand (ML/d)			
	Yarrabilba (P1, 2, 3 and 5)		Logan Village @ 2026	
	MD	MDMM	MD	MDMM
Detached residential	4.23	3.24	0.48	0.37
Attached residential	0.35	0.29	0.29	0.23
Commercial	0.10	0.09	0.05	0.05
Industry	0	0	0.02	0.02
Education	0.69	0.64	-	-
Constant flow	-	-	0.03	0.02
Leakage/loss allowance	0.5	0.5	0.08	0.08
Total (ML/d)	5.88	4.76	0.95	0.77

4.2 Storage and Bulk Supply Assessment

The required reservoir volume to serve the Yarrabilba Precincts 1, 2, 3 and 5 plus 2026 Logan Village population was estimated as 4.8 ML. The existing Travis Road reservoir capacity is 3 ML and a new 6 ML reservoir will be constructed by mid 2018. Hence there will be sufficient storage for Yarrabilba development until the end of Precinct 5 development.

The LCC report 'Travis Road Reservoir and Outlet Main: Detailed Planning, December 2016' (LCC Travis Road Reservoir Report), concludes that the existing trunk infrastructure upstream of the Travis Road reservoir has

sufficient capacity to serve the Yarrabilba development to around 2022 (based on a connected population of around 14,210 EP, accounting for building lag and non-residential development).

The report notes that the capacity of the trunk supply to the Travis Road reservoirs will be reached by around 2022 (assuming a development rate of 600 lots per year). The adopted approach and timing of the new supply is contingent on Seqwater's plans for a regional solution to supply Beaudesert. It is understood that Seqwater are proposing to construct the first stage of the Wyaralong water treatment plant (WTP) to service the Beaudesert area. As the Seqwater investigation has not yet been completed the future approach to supplying the Yarrabilba/Logan Village area is assumed to be a new connection to the SRWP as shown in Figure 2. This connection is required around 2022, as stated in the LCC Travis Road Reservoir Report. The sizing of this main and any staging opportunities (smaller main with boosting) will be investigated closer to the delivery target date. At this stage a 600 mm diameter main is assumed as provided for in the SRIP.

It is noted that the construction responsibility and funding arrangements will not be finalised until the Seqwater investigation is completed around late-2017.

The assessment of the Camp Cable Road main is considered in Section 4.3.

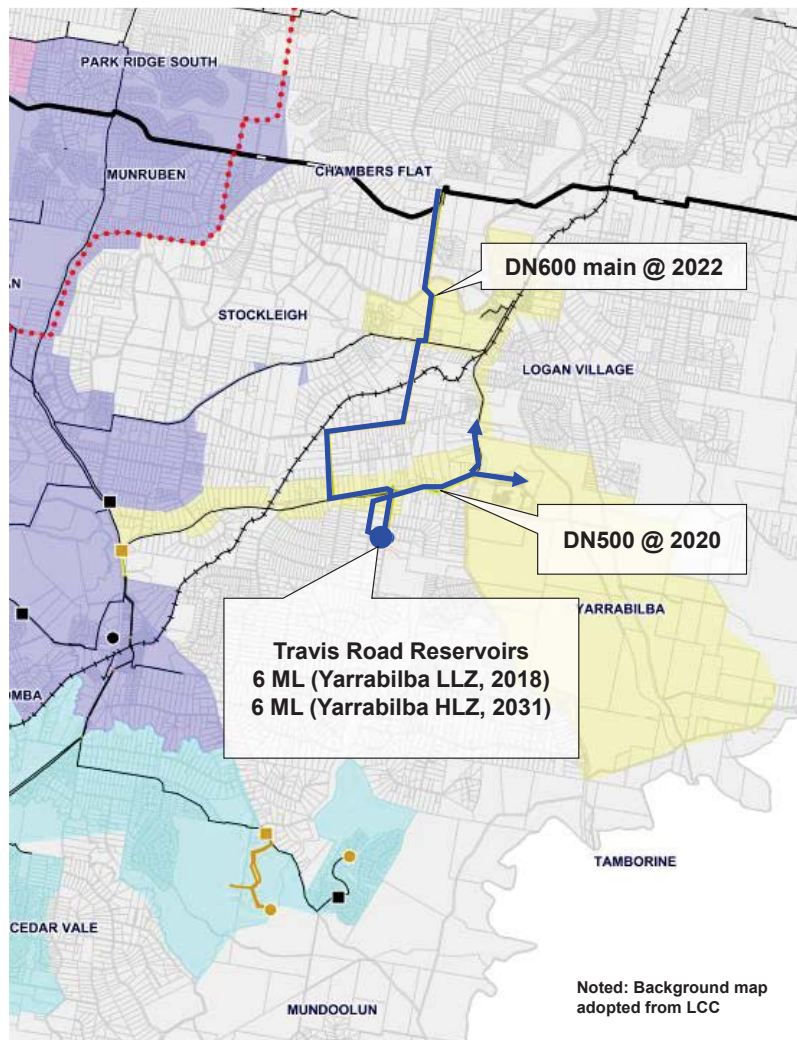


Figure 2 Proposed Bulk Water Supply Servicing Strategy (LCC)

4.3 Proposed Precinct Water Supply Layout

4.3.1 Trunk Supply to Yarrabilba

The LCC Travis Road Reservoir report recommended a new 6 ML reservoir with a TWL of 110 m AHD and floor level of 104 m AHD, which is currently under construction. For assessment of the Yarrabilba reticulation system a minimum operation level of new reservoir is 105 m AHD is assumed, which is the same as the current 3 ML reservoir.

The LCC Travis Road Reservoir report also indicates that the Camp Cable Road augmentation will be required at 2020, to allow for two tanker filling points (30 L/s) to operate in the Travis Road supply zone.

It is also noted that Camp Cable trunk main augmentation will be upsized to 600 mm diameter to ensure that areas within the Yarrabilba development area can be served. In the LCC Travis Road report it was stated that a 500 mm diameter main would be suitable for servicing the ultimate demand. However, the elevation of developable land is up to 72.5 m AHD and therefore the headloss between the Travis Road reservoirs and the high points is an important consideration. Network assessment shows that to service the ultimate development will require a 600 mm diameter main in Camp Cable Road, compared to a 500 mm diameter main as nominated by LCC.

4.3.2 Internal Trunk System

The proposed water supply layout with PMA boundaries is shown in Figure 3.

Proposed PMA boundaries were developed to achieve the targeted 55 m maximum pressure in any part of the network in the ultimate planning horizon. In accordance with the LCC DSOS requirements all areas with maximum pressure greater than 55 m should be pressure managed. LCC advised that elevated areas above 50 m approximately could be included in un-managed zones. Three approximately equal sized PMAs have been created for Yarrabilba Precincts 1, 2, 3 and 5.

The key internal trunk mains to be constructed for Precinct 5 are:

- The 500 mm diameter main from the state high school site to Precinct 3B will be constructed in conjunction with the causeway, due to be completed in late 2017.
- The 600 mm diameter main on Yarrabilba Drive between Highland Street and Summerview Avenue is due to be constructed by the end of 2018. This will enable PMA 1 and PMA 2 to be constructed and commissioned.

4.3.3 Hydraulic Performance

The hydraulic performance of the network and PMAs was assessed against the LCC DSOS with the forecast population in the ultimate planning horizon. The following scenarios were assessed:

- Maximum Hour (MH) demand scenario (Figure 4)
- Fire Flow scenario (Figure 5)
- Zero Demand scenario (Figure 6).

Lendlease advised that the Precinct 3C development is not likely to proceed before the initial four villages of Precinct 5 development. Therefore the 2021 modelling scenario included Precincts 1, 2, 3A, 3B and approximately 1,000 lots of Precinct 5 development (which would be sufficient to serve 5A, 5B, 5C and part of 5D, however this is dependent on the final sequence of development).

The MH network performance is shown in Figure 4 assuming that PMA 1, 2 and 3 are in place without pressure reduction. All pressures remain above the required minimum pressure of 22 m. Headloss (m/km) of each trunk and reticulation pipe meet the design standards under the SEQ Code (less than 3 m/km).

Fire flow demands were assigned to the network which was then assessed against DSOS. A number of 30 L/s non-residential cases were identified, in particular schools in both PMAs. Fire flow was individually simulated at each location (node) within the PMAs.

Analysis under the fire flow conditions showed that all areas achieved the design criteria. A plan showing the locations of applied 30 L/s demands and worst case pressure performance in the ultimate planning horizon is provided in Figure 5.

Under the zero demand scenario, the reservoir level is set as the TWL of 110 m AHD. The proposed PMAs were assessed for potential pressure reduction at the supply inlet. The following points were identified:

- Critical Pressure Point (CPP) – location of the minimum pressure within the PMA.
- Maximum Pressure Point (MPP) – location of the maximum pressure within the PMA.

PRV settings were determined to ensure that pressure at the CPP remains above the required pressure of 22 m (a minimum of 25 m was assumed under all conditions). The performance of the three PMAs and the proposed pressure reduction is summarised in Table 6. The locations of PMA critical nodes are shown in Figure 6.

Table 6 Modelled PMA Performance and Pressure Reductions

Pressure Management Area	Estimated EP Serviced	Elevation Range (m AHD)	Maximum Hour Demand	Zero Demand		Maximum Pressure Reduction* (m)
			Pressure at CPP (m)	Pressure at CPP (m)	Pressure at MPP (m)	
PMA 1	4,787	25.9 to 53.0	45.2	57.0	83.9	32.0
PMA 2	7,102	23.7 to 56.0	38.8	54.0	86.1	29.0
PMA 3	4,612	27.4 to 54.0	37.1	56.0	82.6	31.0

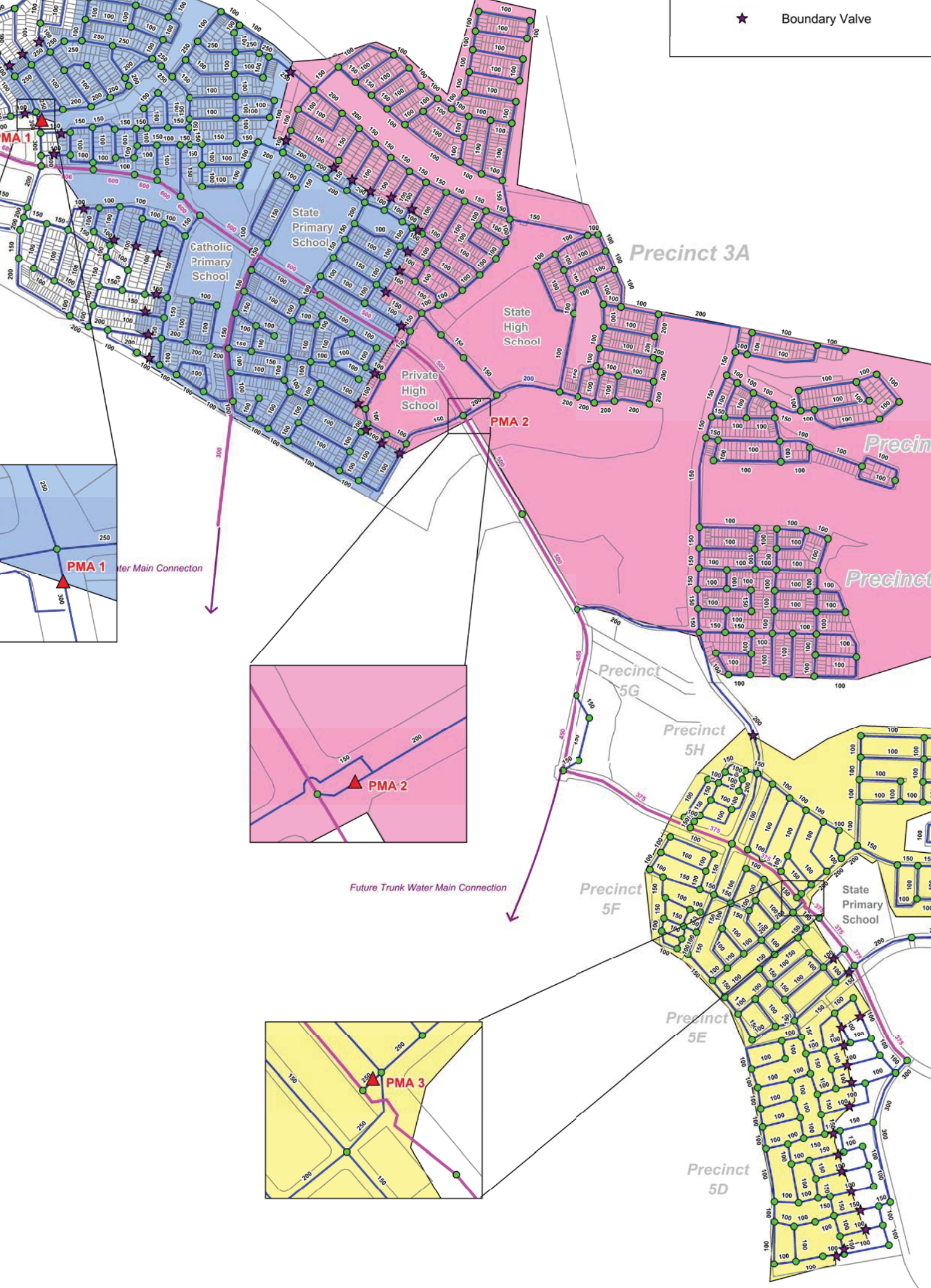
*Maximum pressure reduction is calculated based on a target pressure of 25 m which allows for any errors in the PRV control accuracy.

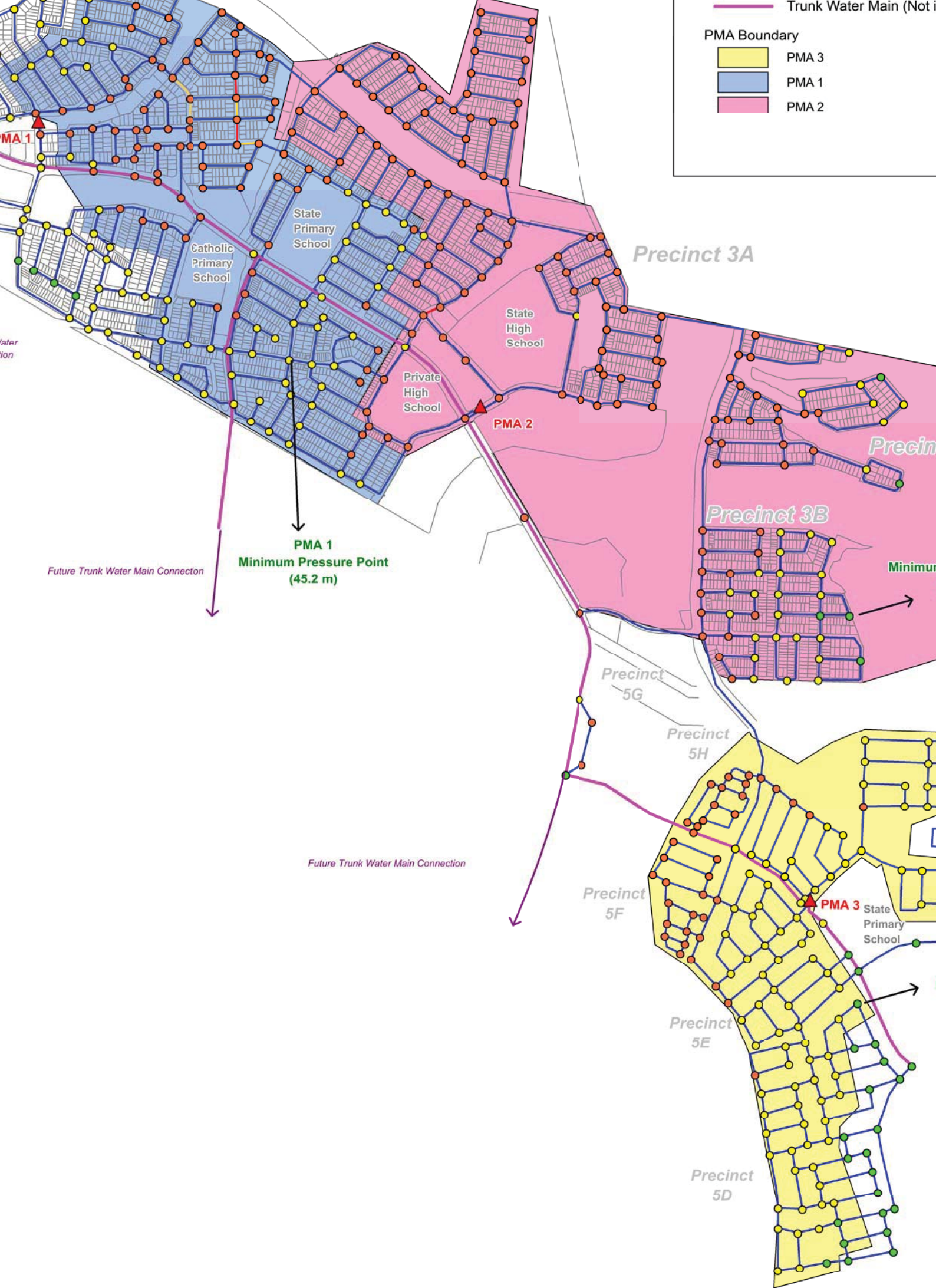
Maximum pressure reduction is the difference between the minimum static head and target pressure of 25 m.

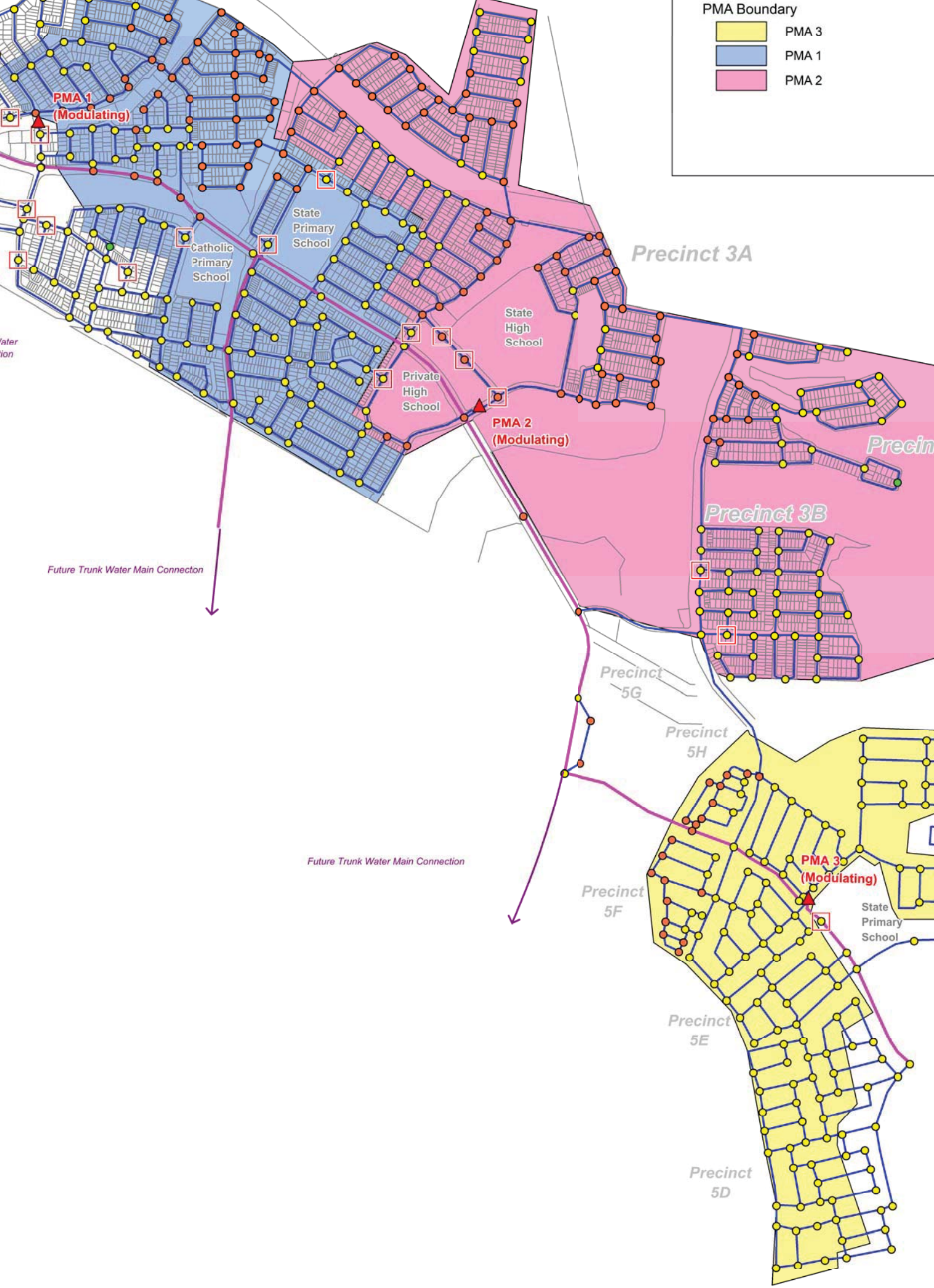
The assessment shows that there is potential for a maximum pressure reduction of up to 32.0 m in the proposed PMAs during low (zero) demand periods at night. With pressure reduction in place, the maximum target pressures outlined in the DSOS can be achieved throughout most of the PMAs. There are small areas in both PMA 2 and PMA 3 that will remain up to 3 m above the target of 55 m due to the elevation difference between the lowest and highest points to be served.

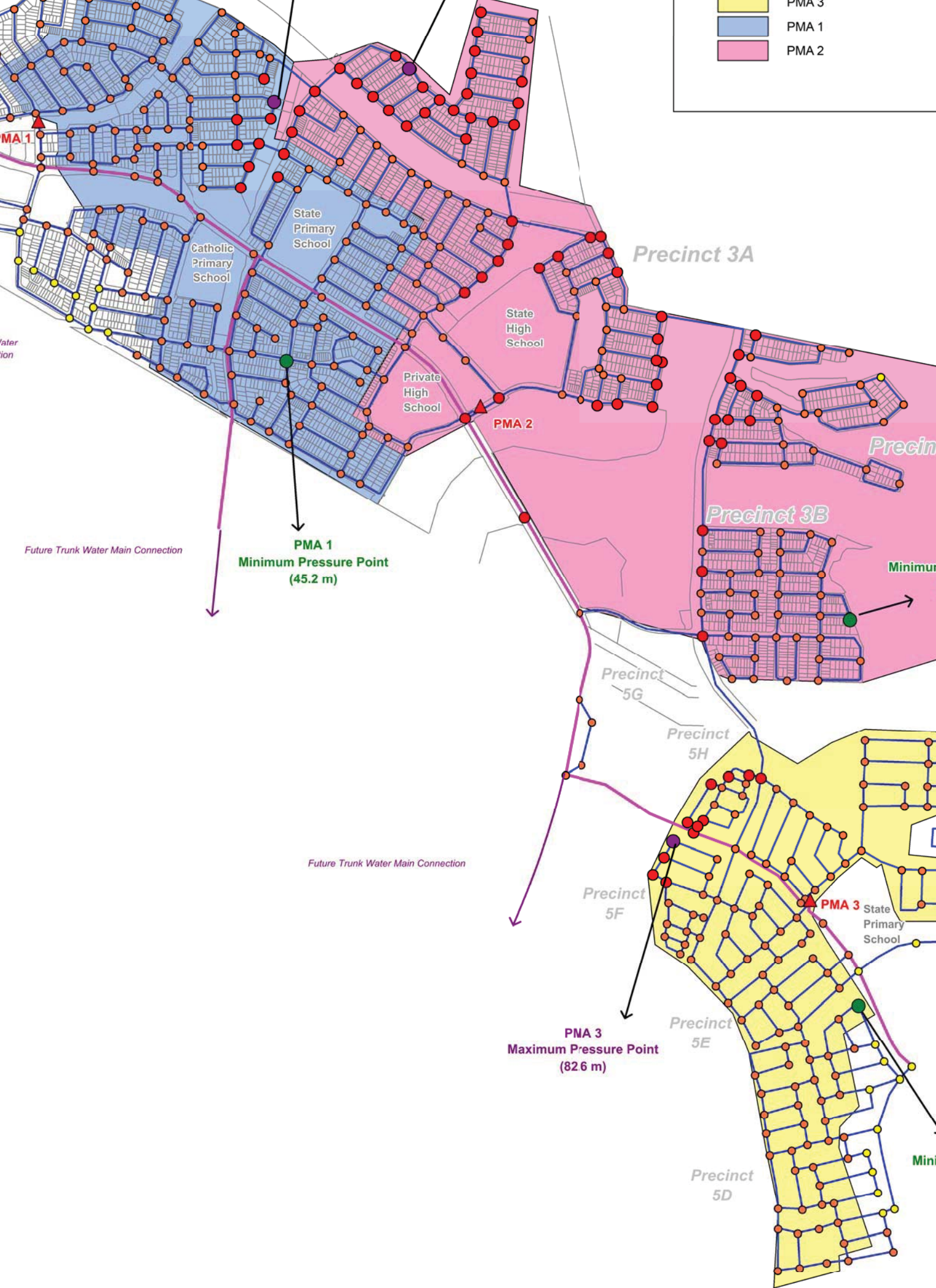
The proposed PRVs will need to be modulating to ensure that fire flows can be met.

★ Boundary Valve









5 Sewerage Network Assessment

5.1 Overview of Sewerage System

Sewage from Precinct 1 and western portion of Precinct 2 are served by the existing pumping PS 1. Sewage from the eastern portion of Precinct 2 and western part of Precinct 3A are collected by existing gravity sewers servicing Precincts 1 and 2 to pumping station PS 2, which transfers through the existing 200 mm diameter rising main to pumping station PS 1. This pumping station transfers sewage via a 300/375 mm diameter rising main to LCC's Logan Village pumping station (PS LV) and then to Chambers Flat and ultimately to the Loganholme sewerage treatment plant (STP).

Sewage from the eastern part of Precinct 3A, Precincts 3B and 3C and all village of Precinct 5 will gravitate to the interim pumping station, PS 3A, located in the Precinct 3D area to the west of Yarrabilba Drive. The interim pumping station will be replaced in future by the ultimate regional pumping station PS 3, which is proposed to service approximately 50,000 EP. The interim pumping station PS 3A transfers flows to PS 1 and then to LCC's wastewater network at Logan Village. Locations of pumping stations PS 1, PS 2 and PS 3A and the catchment boundary are shown in Figure 7.

5.2 Design Flows

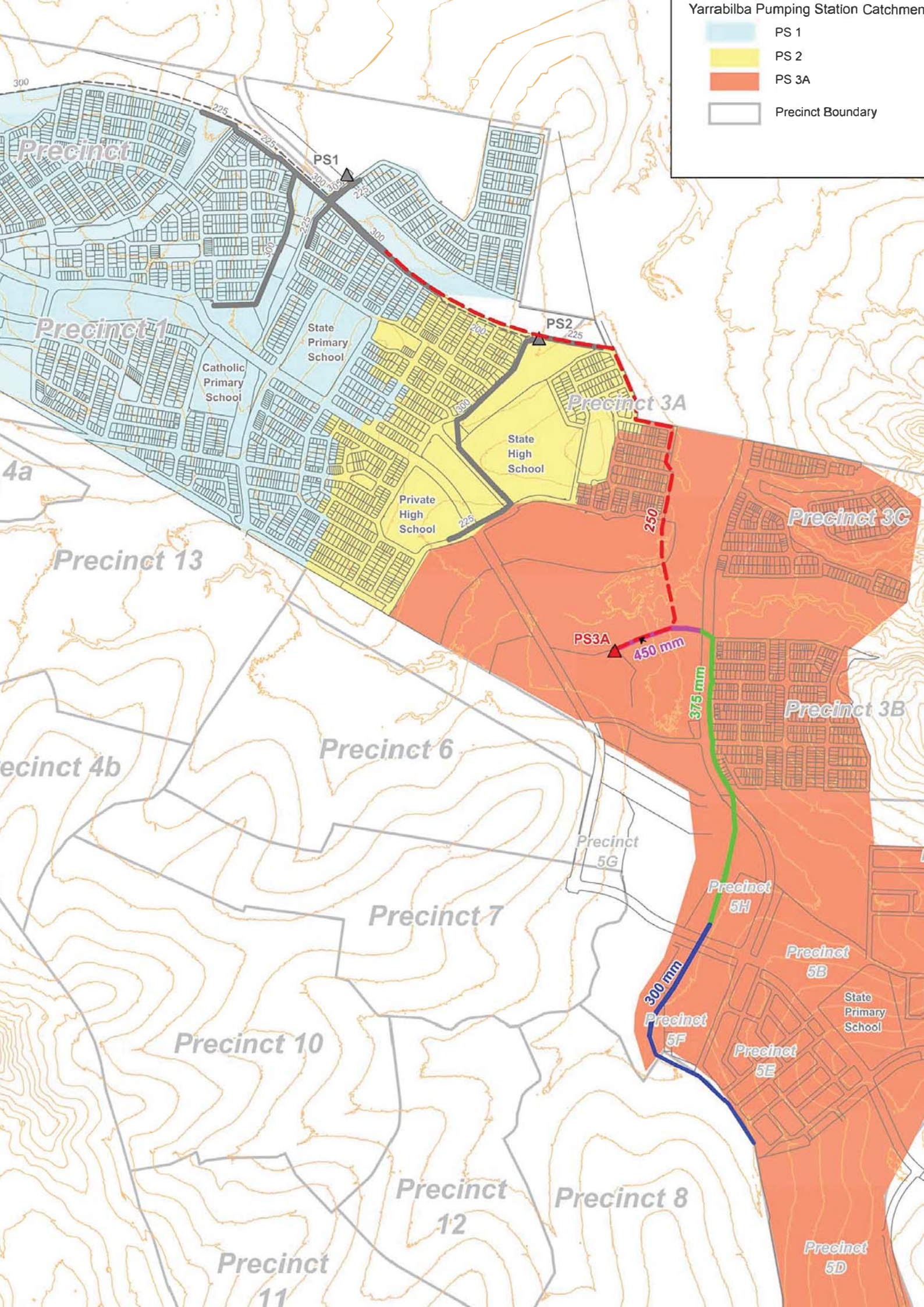
The ADWF and PWWF for Precincts 1, 2, 3 and 5 are based on the agreed DSOS (refer to Section 2) and are summarised in Table 7 and Table 8. By 2021, the overall Yarrabilba design ADWF and PWWF is forecast to be 23.8 and 144.2 L/s respectively.

Table 7 Design Flows Summary (by Precinct) for Precincts 1, 2, 3 and 5

Precinct	EP	ADWF (L/s)	PWWF (L/s)
Precinct 1	2,481	4.7	28.7
Precinct 2	7,391	14.1	85.5
Precinct 3 (without 3D)	4,071	7.8	47.1
Precinct 5	6,286	12.0	72.8
Total	20,229	38.6	234.1

Table 8 Design Flows Summary (by Pumping Station) for Precincts 1, 2, 3 and 5

Precinct	EP	ADWF (L/s)	PWWF (L/s)
PS 1 (local catchment)	2,481	4.7	28.7
PS 1 (including PS 2)	11,612	22.2	134.4
PS 1 (including PS 2 and PS 3A)	14,292	27.3	165.4
PS 2 (local catchment)	4,467	8.5	51.7
PS 3A (interim station)	7,344	14.0	85.0



5.3 Ultimate Servicing Strategy

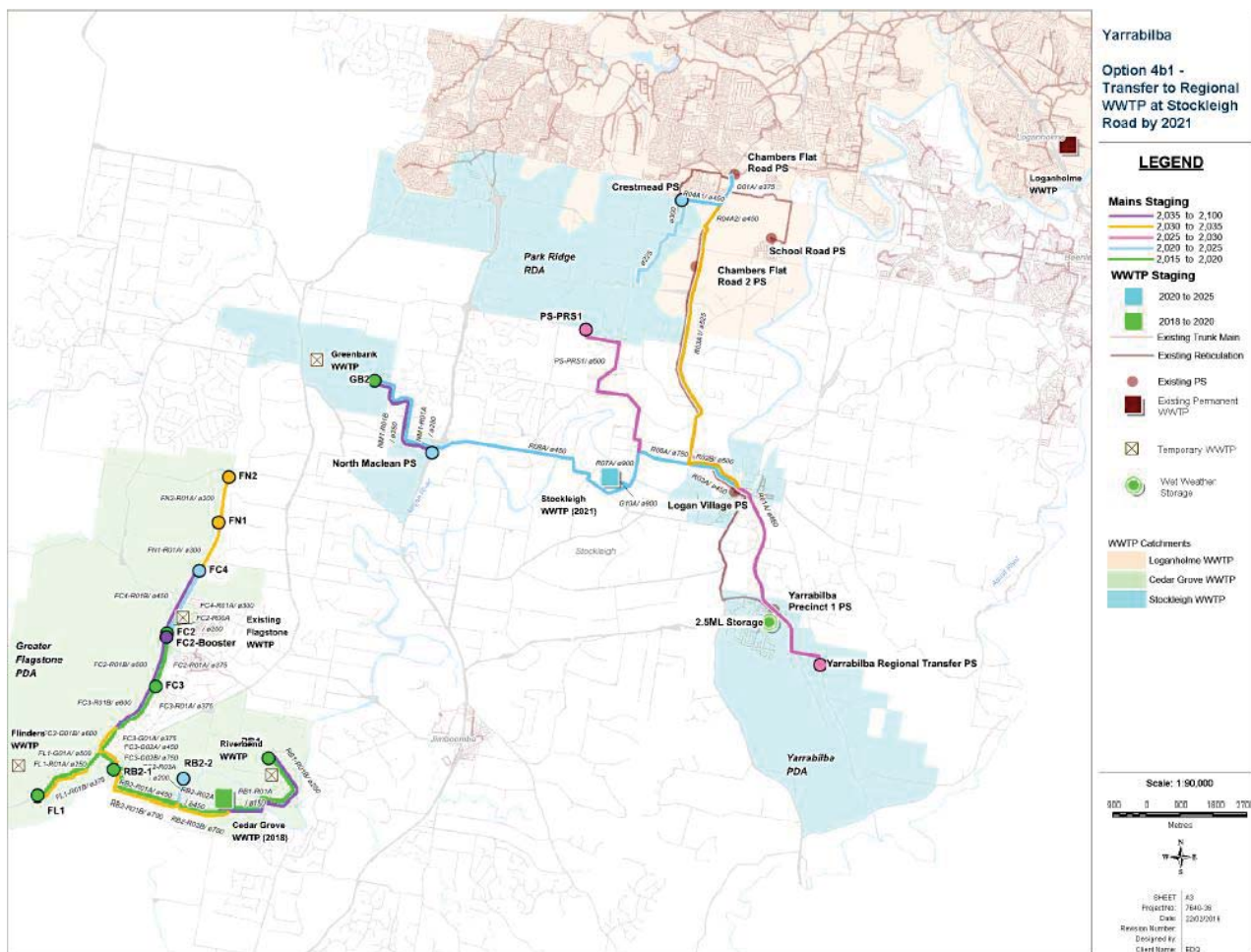
In 2016, EDQ, in conjunction with LCC and developer stakeholders, developed a revised sewerage strategy for the Logan South region, including the Yarrabilba, Logan Village and Park Ridge areas. Based on the strategy outlined in the EDQ Logan South report, a new regional sewage treatment plant will be constructed to the west of Logan Village before 2021.

Sewage from the development is currently transferred by the existing Yarrabilba pumping station PS1 to LCC's Logan Village pumping station via a dedicated 300/375 mm diameter rising main and then to the Loganholme STP for treatment.

In accordance with the EDQ South Logan report, the preferred strategy to service the Yarrabilba PDA is shown in Figure 8. The short and medium term strategies are summarised as follows:

- Short term strategy (up to 2021 or approximately 12,729 EP connected):
 - Construct a 2 ML temporary wet weather storage at the site of pumping station PS1 (to be completed by end of 2017).
 - Transfer sewage via pumping station PS 1 to Logan Village and then to the Loganholme STP through the existing LCC sewerage network via Chambers Flat PS. When the capacity of this temporary system is reached, estimated to be 2021, the new STP will be required.
 - Construct an interim pumping station, PS3A, (in lieu of the regional pumping station PS3), together with a temporary 250 mm diameter rising main to pumping station PS1, to serve Precincts 3 and part of Precinct 5. The construction of this station is about to commence with completion in early 2018.
- Long term strategy (after 2021 or approximately 12,729 EP connected):
 - Stage 1:
 - Construct a new regional STP at a suitable site near to Logan Village
 - Provide a rising main to transfer flow from PS1 to Logan Village and then to the new STP
 - Upgrade PS3A to pump to the new STP
 - Reconfigure the existing Yarrabilba pumping station, PS1, to inject flow into the shared rising main to the new STP
 - Stage 2:
 - Construct a new regional transfer pumping station, PS3, at Yarrabilba to pump to the new STP
 - Construct a 600 mm diameter rising main from PS3 to PS1.
 - Decommission the existing 300/375 mm diameter rising main from PS1 to Logan Village in the longer term.

The short term strategy can provide sufficient capacity for the estimated connected population of 12,458 EP (refer to Section 3.3) in 2021. It is noted that the above strategy requires significant detailed planning to finalise the STP site and discharge license as well as the staging and sizing of rising mains. On the basis of this assessment, the ultimate works outlined above will be required to be delivered to service the full development of Precinct 1, 2, 3 and 5.



(Extracted from the EDQ South Logan report)

Figure 8 Logan South Regional Sewerage Strategy

5.4 Internal Sewerage Network

5.4.1 Reticulation Sewers

In accordance with the LCC's DSOS, the internal sewerage network for Yarrabilba Precincts 1, 2, 3 and 5 as designed by KN Group for Lendlease is included in Appendix C.

5.4.2 Trunk Sewers

The proposed layout of trunk mains is shown in Figure 7.

5.5 Pumping Stations and Rising Mains

5.5.1 Pumping Station PS1 Capacity

Pumping station PS1 transfers sewage from the Yarrabilba development to LCC's Logan Village pumping station via a 300 mm diameter rising main and a 375 mm diameter sealed sewer. Pumping station PS1 catchment includes Precinct 1 and the eastern portion of Precinct 2 development. Based on flowmeter readings, pumping station PS1 the capacity of the single pump operation is approximately 120 L/s and combined pumping capacity is around 155 L/s (estimate extracted from EDQ's Logan South sewerage strategy report).

The downstream capacity of the sewerage system is a constraint on utilising the full capacity of PS1. Capacity constraints between Logan Village and Chambers Flat reduce the available transfer to a connected population of 12,729 EP. The maximum pumping station PS1 pump rate will be limited at 66.3 L/s (refer to the

report 'Yarrabilba PS1 Wet Weather Storage Tank Concept', July 2016) through the installed VSD. This will be achieved using a 2 ML storage to attenuate peak wet weather flows at PS1.

5.5.2 Interim Pumping Station PS 3A

As discussed above, pumping station PS3 will ultimately be a regional pumping station collecting the majority of the development. Pumping station PS3 will transfer flows to the new STP with PS1 injecting to the rising main. Sewage from Precinct 3A (part), 3B and 3C as well as Precinct 5 are located in the future pumping station PS3 catchment.

As outlined in the Precinct 3 PNP report, the construction of the ultimate PS3 station at this stage is not a practical option. It is therefore proposed to build an interim pumping station, PS3A, in the vicinity of the future pumping station PS3 site. The proposed layout of the pumping station can be found in the PS3A Design Report.

The interim PS 3A, together with the PS1 storage and a temporary 250 mm diameter rising main will provide a capacity of around 85 L/s which service development up to a connected population of 7,344 EP. The total population of the Precinct 3 contributing to PS3A is 1,679 EP (excluding Precinct 3C which will not be developed in the short term). Therefore the capacity available in PS 3A for Precinct 5 is 5,665 EP (compared to the total population of 6,286 EP).

Prior to the interim solution capacity being reached in 2021, a new regional STP will be constructed as per the agreed long term Logan South strategy. After 2021, the interim pumping station, PS3A, will transfer flow directly to the new STP with PS1 injecting into the shared rising main. The transfer from PS3A to the STP will be through the following mains:

- 2.6 km of 250 mm diameter rising main between PS3A and PS 1
- 3.8 km of 500 mm diameter rising main between Yarrabilba pumping station PS1 and Logan Village pumping station (or Asset ID R01A in the EDQ Logan South report)
- 1.4 km of 500 mm diameter rising main between Logan Village pumping station and future Crestmead pumping station injection point (or Asset ID R02A in the EDQ Logan South report)
- 1.4 km of 750 mm diameter rising main between future Crestmead and Park Ridge South pumping station injection points (or Asset ID R06A in the EDQ Logan South report)
- 0.8 km of 900 mm diameter rising main between future Park Ridge South pumping station injection points and 900 mm diameter trunk sewer to the new STP (or Asset ID R07A in the EDQ Logan South report)
- 0.6 km of 900 mm diameter gravity sewer to the new STP (or Asset ID G10A in the EDQ Logan South report).

As stated above, the design flow rate for the interim PS 3A is proposed as 85 L/s. The estimated duty point of PS 3A, in the medium term (after 2021) is 85 L/s @ 65 m head. In the short term (to 2021), when pumping to PS1 only, the total head will be considerably lower and therefore a pump upgrade will be required after 2021 to pump to the new STP.

PS3A will have a nominal design capacity of 85 L/s, which would be potentially sufficient to service up to 7,344 EP or 2,720 lots, prior to the construction of the ultimate pumping station PS3. It is noted that storage could be provided at PS3A for wet weather operational flexibility, or if the STP construction is delayed. There is sufficient space available at the PS3A site for such storage.

The design parameters for PS3A are provided in the Precinct 3 PNP and PS3A Design Report.

The permanent pumping station PS3 and associated 600 mm diameter rising main to PS1 will be constructed when the actual capacity of the interim pumping station PS3A is reached. This is expected to be at or near the end of the Precinct 5 development, however will depend on the development of other areas such as the Town Centre.

6 Conclusions

The following conclusions are drawn from the assessment of the water supply and sewerage network requirements for Precinct 5:

1. The estimated population of Precincts 1, 2, 3 and 5 is 20,121 EP for water and 20,607 EP for sewerage (not including EP for the unknown future development of Precinct 3D). Based on forecast growth the connected population at 2021 is estimated to be 12,350 EP for water and 12,458 EP for sewerage.
2. The proposed water network layout, as outlined in Figure 3, can service the ultimate demands of Precincts 1, 2, 3 and 5 with the PMA arrangement outlined in Figure 3.
3. Trunk infrastructure upstream of the Travis Road reservoir does not have sufficient capacity for the Precincts 1, 2, 3 and 5 development at 2022, and therefore the SRWP connection will be required. The final option for this connection will depend on the outcomes of the a review of the Logan South water supply scheme and the Seqwater Beaudesert study which are currently underway.
4. A total of 4.8 ML of storage capacity is required to supply Precincts 1, 2, 3, 5 and forecast Logan Village demand in the 2026 planning horizon. LCC is currently constructing a 6 ML reservoir to extend the supply to around 2022, when it is proposed that the connection to the SRWP will be completed.
5. For ultimate servicing of Precincts 1, 2, 3, 5 and Logan Village, the 600 mm diameter main in Camp Cable Road Drive will need to be constructed by 2020.
6. The 600 mm diameter main in Yarrabilba Drive will be required to enable PMA 1 and PMA 2 to be constructed and to reduce high pressures in Precincts 1, 2 and 3. The construction of this main will proceed during 2018, together with the implementation of PMA 1 and PMA 2.
7. The 500 mm trunk main, to be constructed across the causeway south of the state high school, will also be required to serve Precinct 5. It is anticipated that this main will be commissioned in early 2018.
8. A third pressure management area, PMA 3, is proposed for Precinct 5 with a modulating PRV to achieve a pressure reduction of around 12.1 m at maximum demand of around 31 L/s. The final arrangement for this PMA will be determined when the surrounding development is detailed over the next couple of years.
9. The ultimate strategy for treating sewage from the Yarrabilba development is to construct a new STP to the west of Logan Village. It is proposed that this STP will be operational by 2021, based on the EDQ Logan South strategy agreed with LCC and developers. In the long term, sewage from Precinct 3 will be collected at a regional pumping station, PS3, and transferred to the new STP via a 10.6 km rising main.
10. Before 2021, sewage will be transferred to the Loganholme STP through the existing LCC network, which has a number of capacity constraints between the proposed development and the Chambers Flat PS. To overcome these deficiencies, a 2.0 ML wet weather storage is being constructed at PS1. This will ensure that capacity is available up to 2021 (assuming a growth rate of 600 lots per year).
11. An interim pumping station, PS3A, is being constructed as part of Precinct 3 development. This temporary station will be replaced by the construction of the ultimate pumping station PS3. The temporary station PS3A will transfer sewage to PS1 for transfer to Logan Village. This station capacity will be 85 L/s allowing for a contributing population of 7,344 EP (Precinct 3A, 3B and the majority of Precinct 5). It is proposed to upgrade PS3A in 2021 to pump directly to the new STP, until the capacity of the station is reached.

APPENDICES



Appendix A: **PRECINCT 5 CPAS AND YIELD PLANS**



Appendix B: **POPULATION CALCULATIONS**

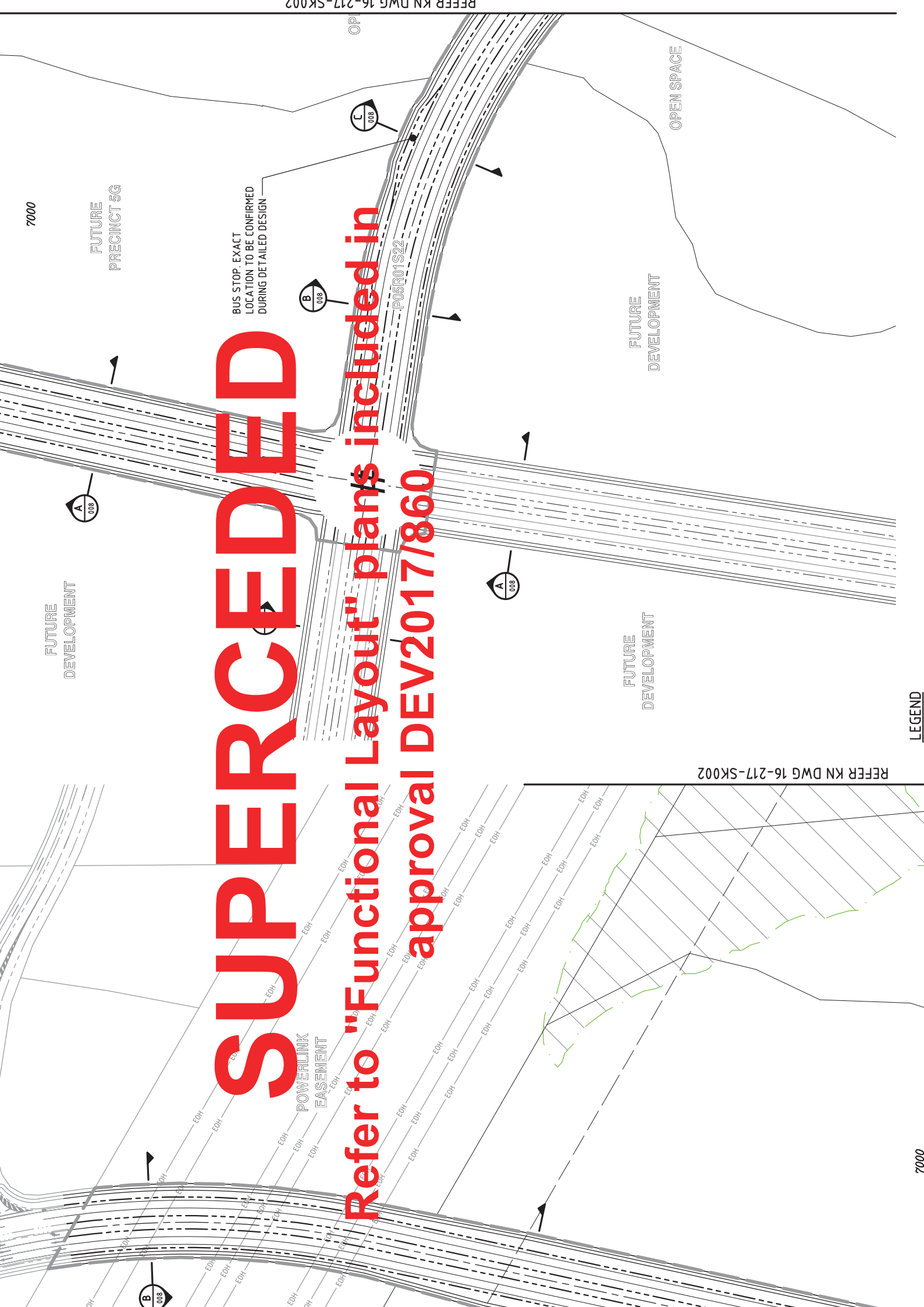
[illegible]

605	369	0	0	974	2018 /19	974	37	974	Includes 3A Superblock attached Res	207	216	240	80	81	
0	0	37	0	37	Commence 2019	0	37	37	Superblock, assume fully occupied by 2021.	423					
0	0	84	0	84	Commence 2019	0	84	84	Superblock, assume fully occupied by 2021.						
0	0	0	0	55	Commence 2018	55	55	55	Superblock, assume fully occupied by 2021.						
0	0	0	0	960	Commence 2021/2022	960	960	0	Superblock, assume fully occupied by 2021.						
1,249	59	0	0	1,308	Commence 2019	0	1,308	1,308	School expected to open 2022 (possibly 2021) to full capacity by 2024	33	446	260	219		
625	29	0	0	653	Commence 2019/2020	0	653	510	Assume fully occupied by 2020.	16	223		134	105	
0	0	377	0	377	Commence 2021	0	377	0	Assume fully occupied by 2021.	239					
442	36	0	0	478	Commence 2020/2021	0	478	239	Utility/Potential - would come on line 2021 / 22	20	158			178	
405	33	0	0	438	Commence 2019/2020	0	438	418		18	145		150	11	
0	0	0	0	319		319	319	0	Precinct 5 Primary School (Expected to open 2021 or 2022)						
614	49	0	0	663	Commence 2020/2021	0	663	235		28	219			175	72
1,854	149	0	0	2,003	Commence 2022	0	2,003	0		84	662			746	170
1,076	87	0	0	1,163	Commence 2021/2022	0	1,163	0		49	384			433	300
693	56	0	0	749	Commence 2021	0	749	0		31	248			279	133
191	15	0	0	207	Commence 2022	0	207	0		9	68			77	100
246	20	0	0	266	Commence 2020	0	266	47		11	88			35	35
5,522	445	0	0	319		319	6,286			99					29
15,090	1,332	582	3,226	20,229		3,226	20,229	12,458							
15,090	1,332	959	3,226	20,607		3,226	20,607	12,458				500	583	585	511

Appendix C: **SERVICE LAYOUT**

SUPERCEDED

Refer to "Functional Layout" plans included in approval DEV2017/860



SUPERCEDED

**Refer to "Functional Layout" plans included in
approval DEV2017/860**

7002

BALANCE LOT

FUTURE
PRECINCT 5F

FAUNA CORRIDOR

OPEN SPACE

B
008

F
009

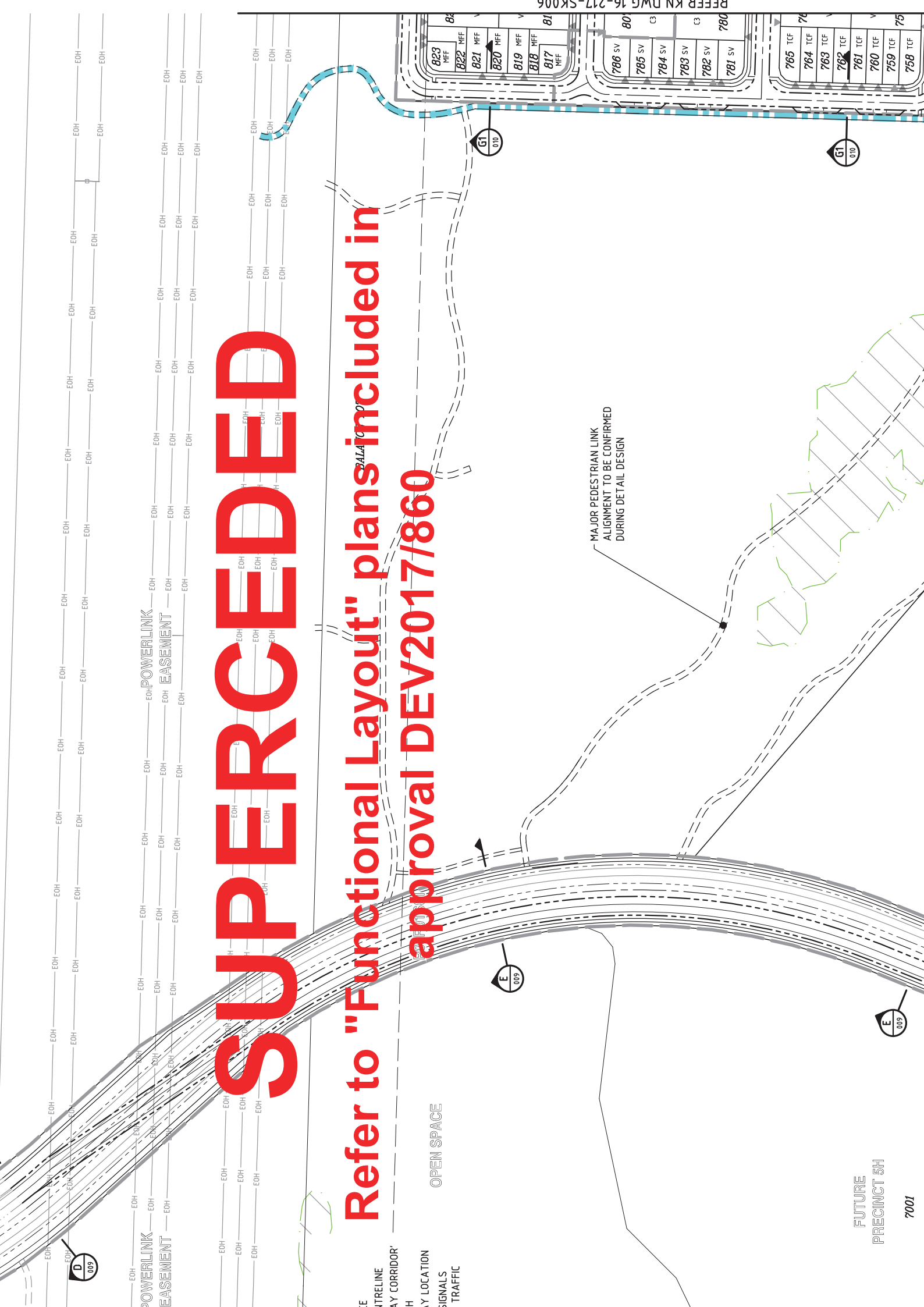
LEGEND

17-SK004

315

LOCATIO
DURIN

008



FUTURE
PRECINCT 5H

7001

SUPERCEDED

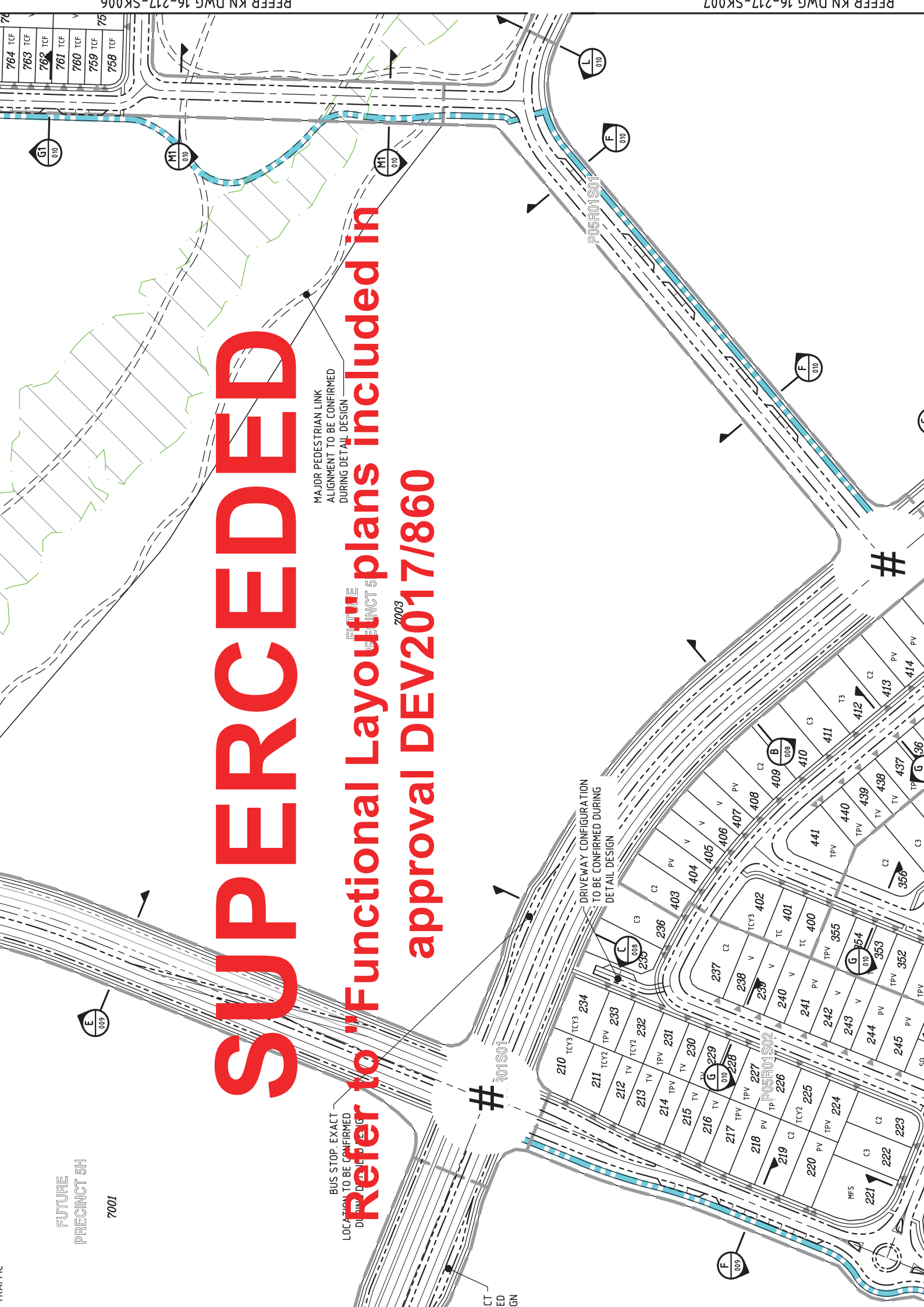
Refer to "Functional Layout" plans included in
approval DEV2017/860

BUS STOP. EXACT
LOCATION TO BE CONFIRMED
DURING DETAIL DESIGN

MAJOR PEDESTRIAN LINK
ALIGNMENT TO BE CONFIRMED
DURING DETAIL DESIGN

FUTURE
PRECINCT 5H

7003



BUS STOP EXACT
LOCATION TO BE CONFIRMED
DURING DETAILED DESIGN

SUPPRESSED

**Refer to "Functional Layout" plans included in
approval DEV2017/860**

FUTURE
PRECINCT 5D

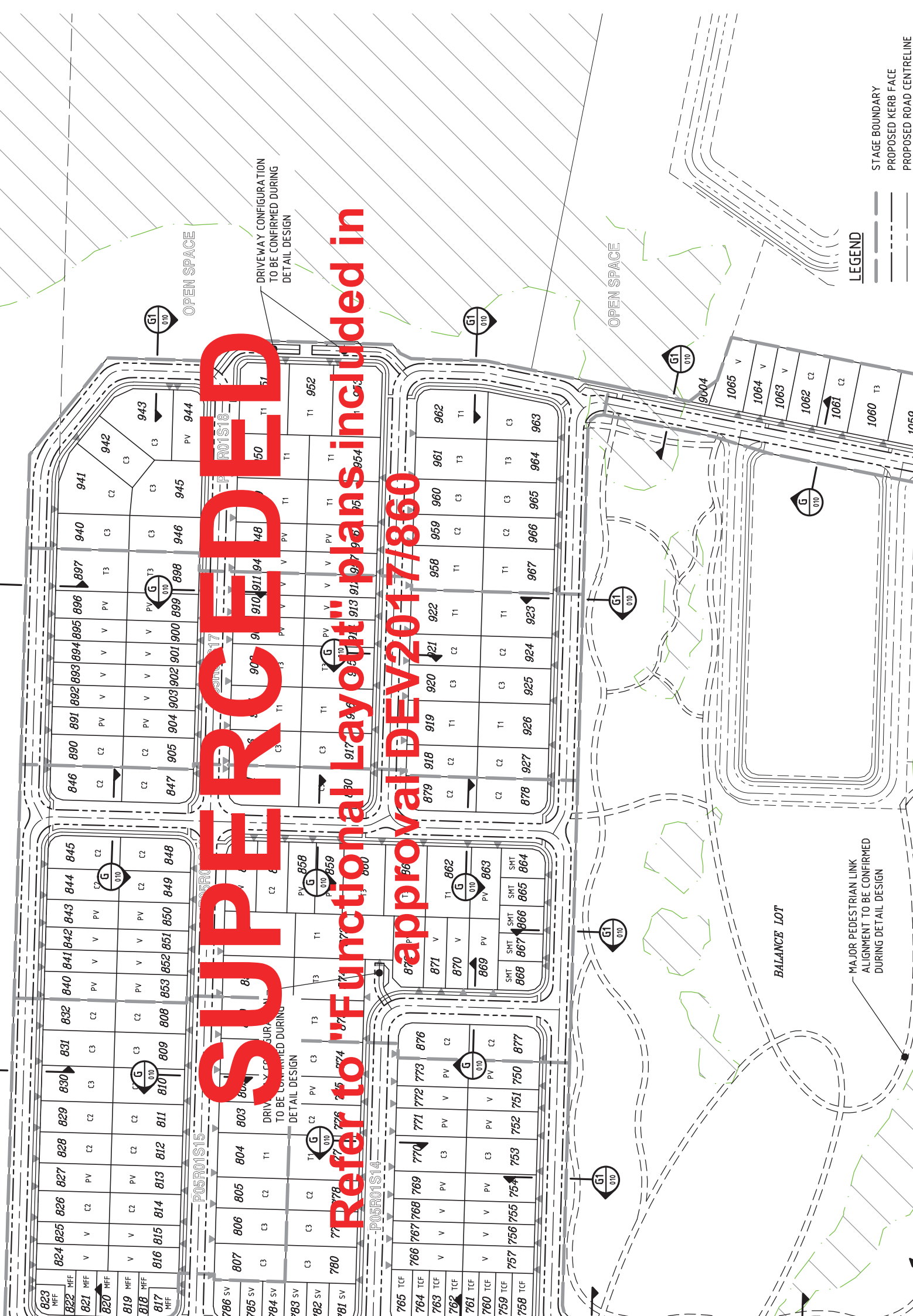
DRIVEWAY CONFIGURATION
TO BE CONFIRMED DURING
DETAIL DESIGN

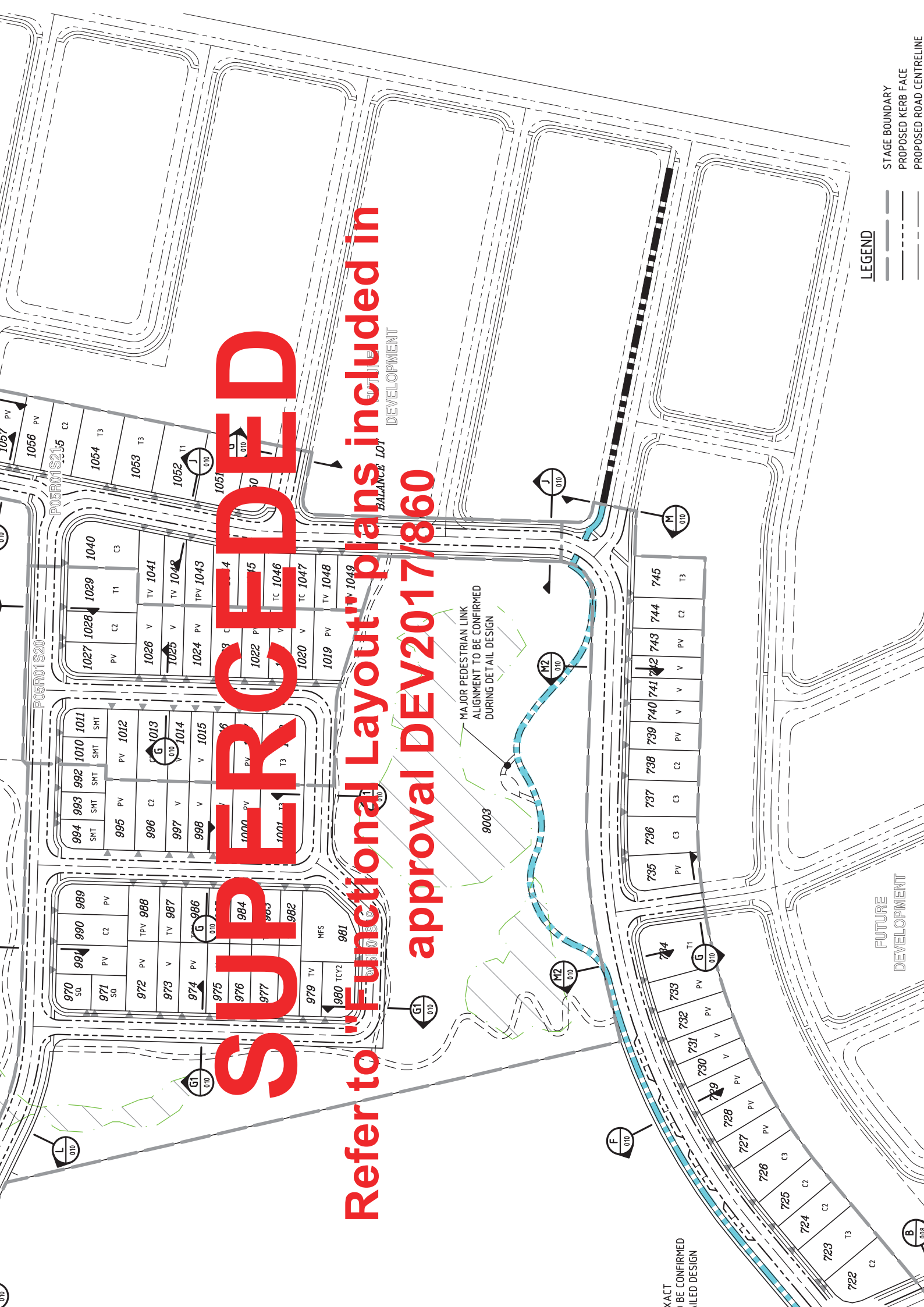
OPEN SPACE

OPEN SPACE

010

010





SUPERCEDED

Refer to "Functional Layout" plans included in approval DEV2017/860

LEGEND

- STAGE BOUNDARY
- PROPOSED KERB FACE
- PROPOSED ROAD CENTRELINE

FUTURE
DEVELOPMENT

EXACT
TO BE CONFIRMED
DURING DESIGN

MAJOR PEDESTRIAN LINK
ALIGNMENT TO BE CONFIRMED
DURING DETAIL DESIGN

BALANCE LOT
DEVELOPMENT



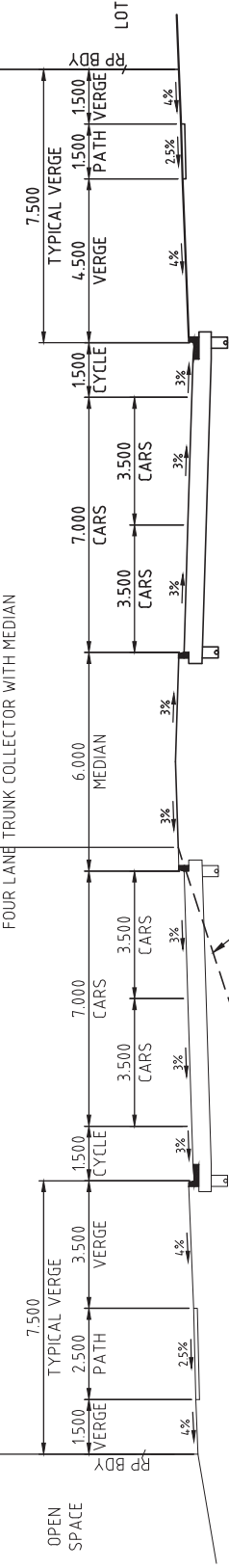
Refer to "Functional Layout" plans included in 33.350

[illegible]

B SECTION
SCALE 1:100
1,2,4,7



SECTION
SCALE 1:100

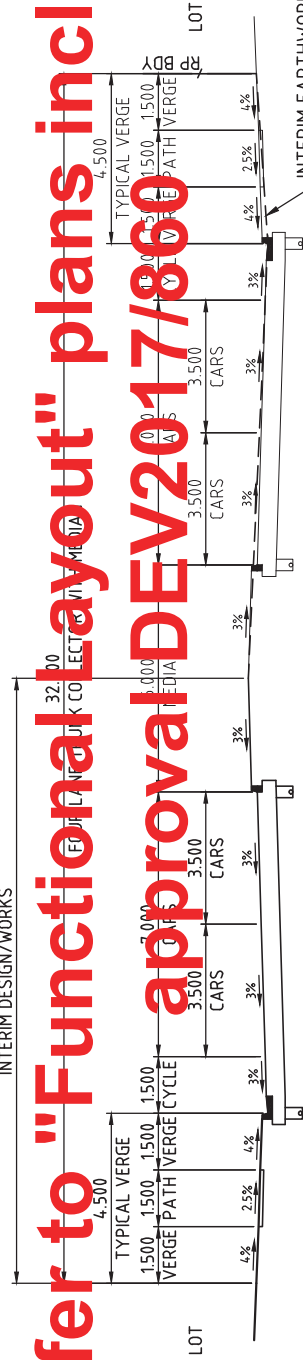


INTERIM 1 IN 3 BATTER
TO EXISTING

FOUR LANE TRUNK COLLECTOR WITH MEDIAN AND BUS BAYS
EASTERN PERIMETER LINK

SUPERCEDED

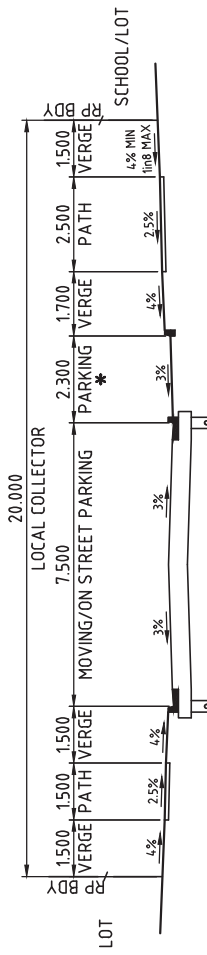
INTERIM DESIGN/WORKS



INTERIM EARTHWORKS

FOUR LANE TRUNK COLLECTOR WITH MEDIAN AND BUS BAYS
EASTERN PERIMETER LINK

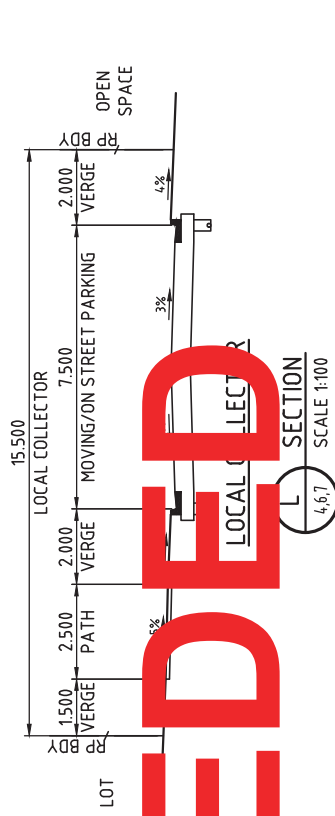
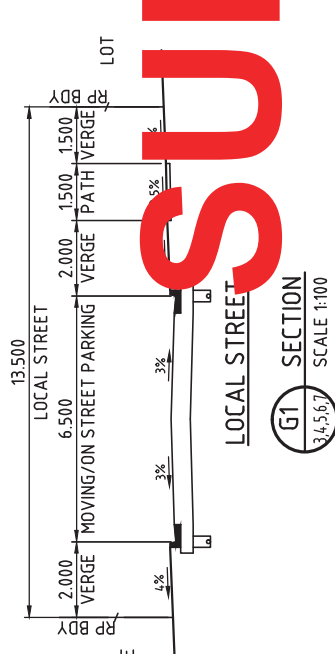
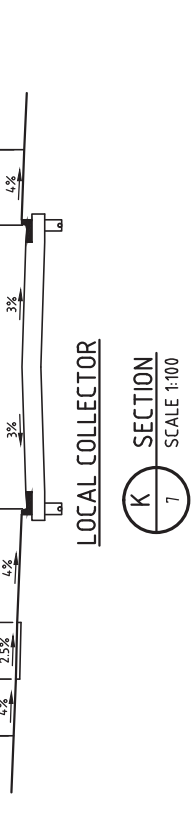
E SECTION
3/4 SCALE 1:100



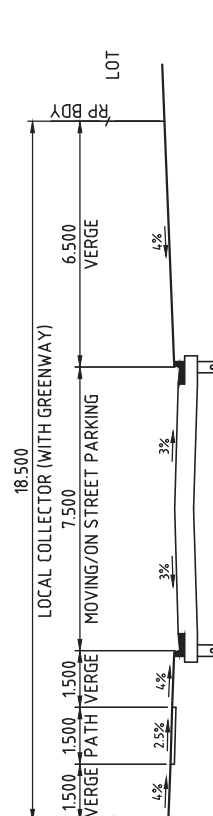
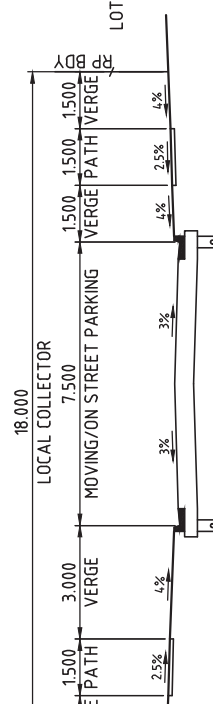
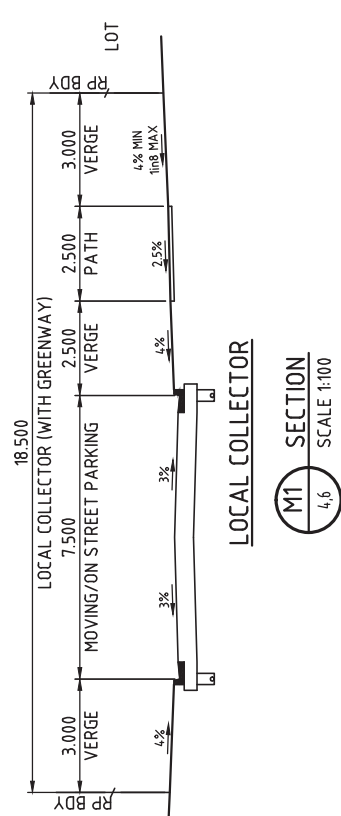
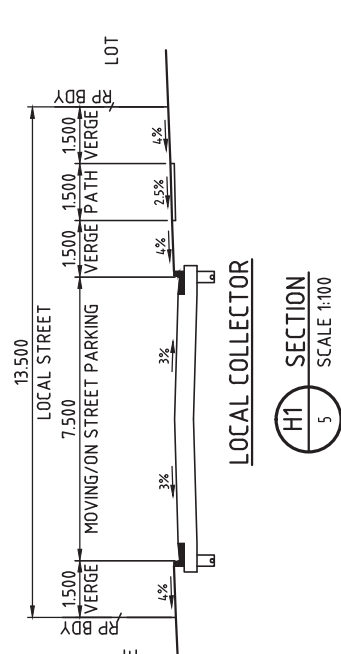
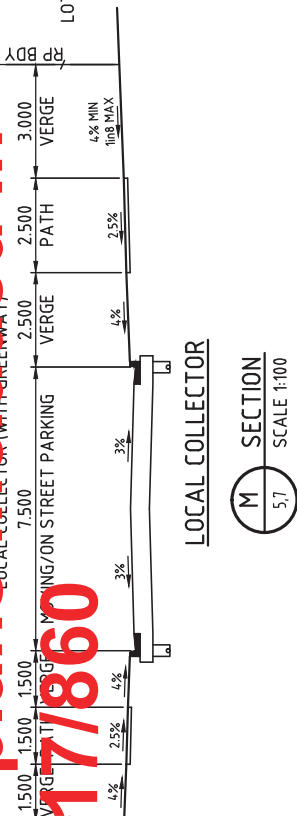
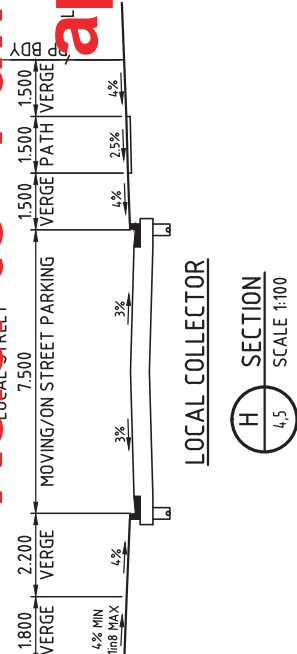
LOCAL COLLECTOR

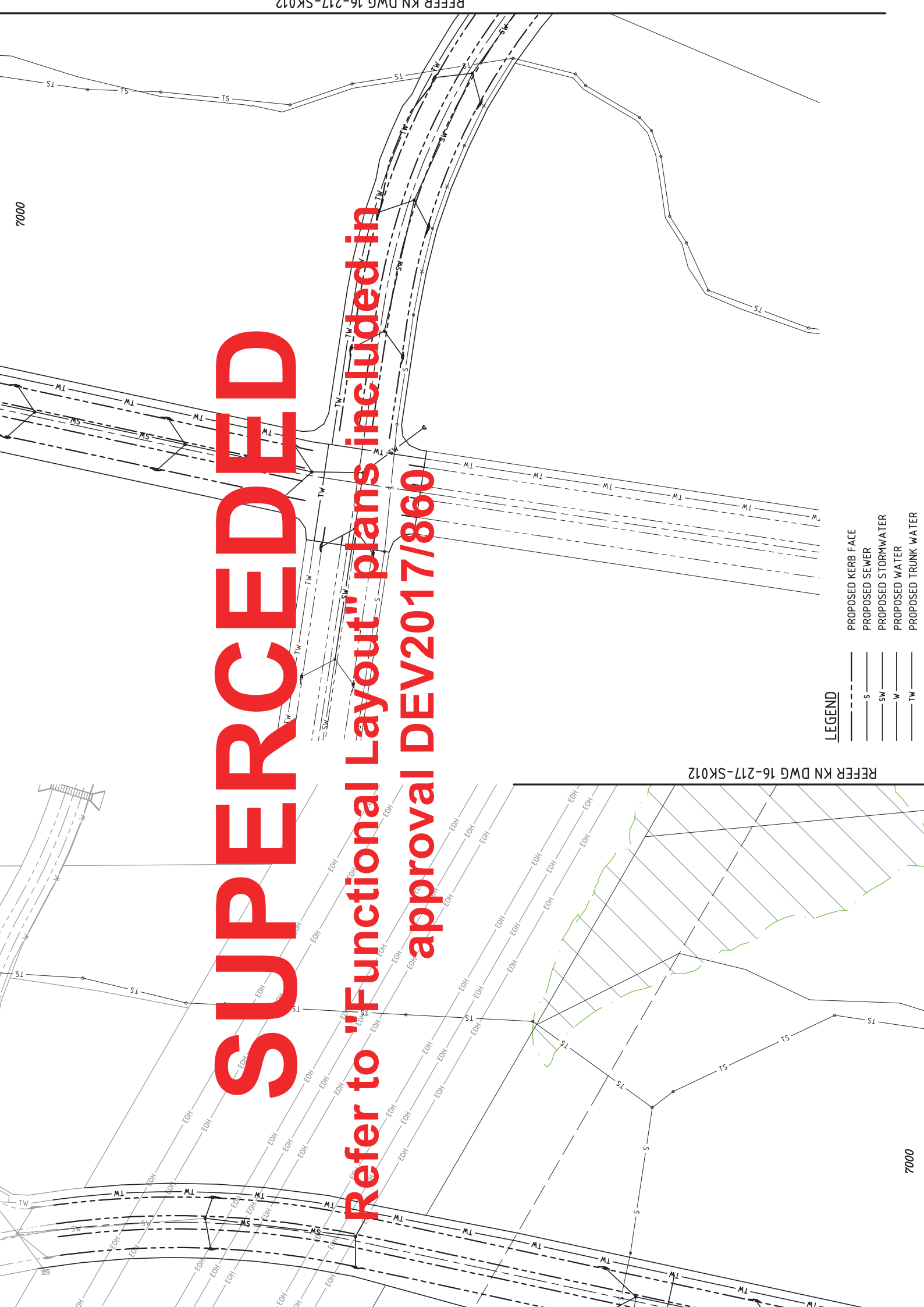
* DENOTES CAR PARKING NOT
CONTINUOUS ALONG STREET.
VERGE WIDTH ADJUSTS
WITH/WITHOUT CAR PARKING

F SECTION
4.5/6.7 SCALE 1:100



Refer to "Functional Layout" plans included in approval DEV2017/860





SUPERCEDED

Refer to "Functional Layout" plans included in approval DEV2017/860

LEGEND

- PROPOSED KERB FACE
- PROPOSED SEWER
- PROPOSED STORMWATER
- PROPOSED WATER
- PROPOSED TRUNK WATER

REFER KN DWG 16-217-SK012

7000

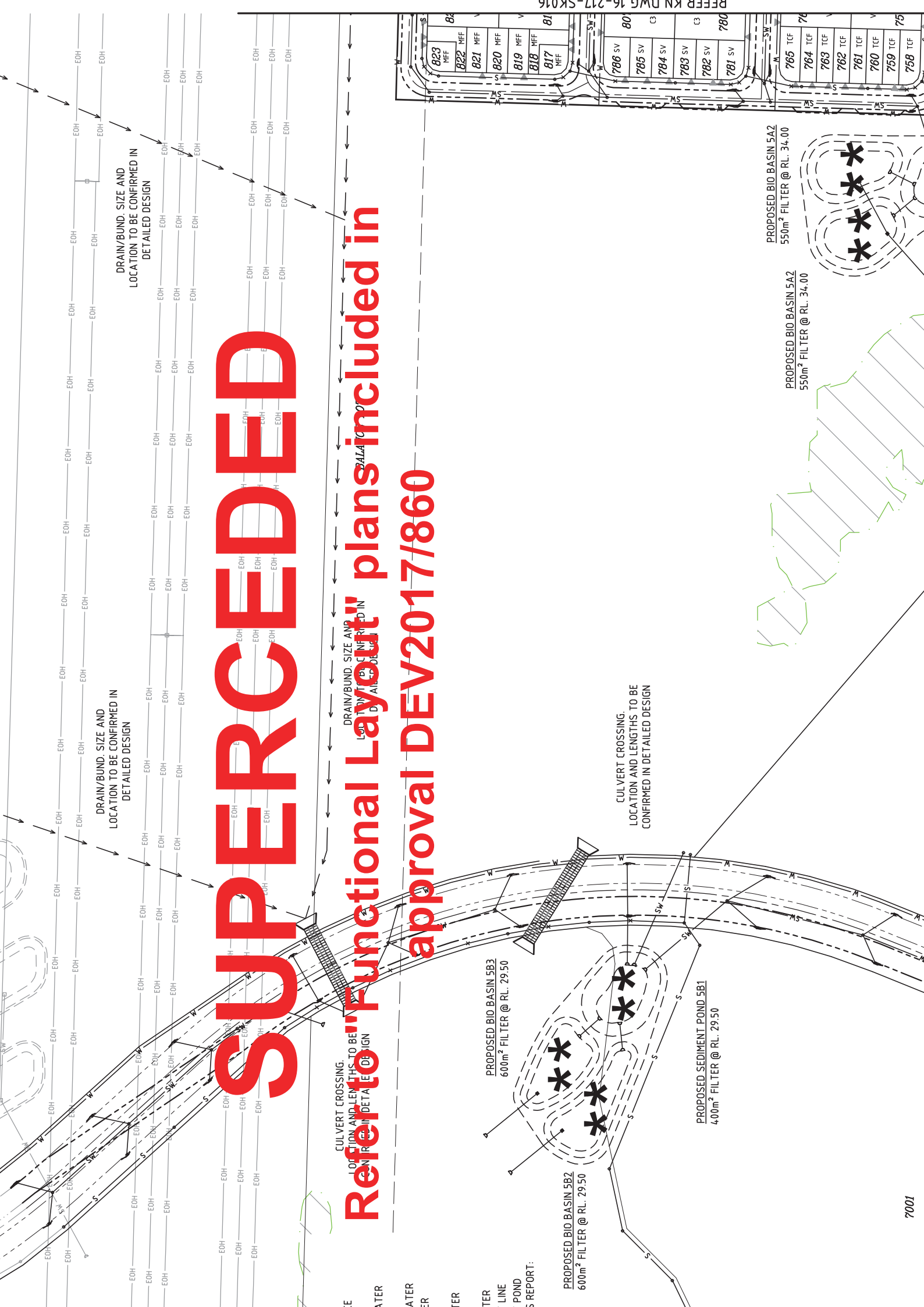
7000

Refer to "Functional Layout" plans included in approval DEV2017/860



PROPOSED KERB FACE
PROPOSED SEWER
PROPOSED STORMWATER
PROPOSED WATER
PROPOSED TRUNK WATER

CULVERT CROSSINGS.
LOCATION AND LENGTHS TO BE
CONFIRMED IN DETAILED DESIGN.



SUPERCEDED

Refer to "Functional Layout" plans included in approval DEV2017/860

DRAIN/BUND, SIZE AND
LOCATION TO BE CONFIRMED IN
DETAILED DESIGN

DRAIN/BUND, SIZE AND
LOCATION TO BE CONFIRMED IN
DETAILED DESIGN

CULVERT CROSSING.

LOCATION AND LENGTHS TO BE
CONFIRMED IN DETAILED DESIGN

CULVERT CROSSING.
LOCATION AND LENGTHS TO BE
CONFIRMED IN DETAILED DESIGN

PROPOSED BIO BASIN 5B3
600m² FILTER @ RL. 29.50

PROPOSED BIO BASIN 5B2
600m² FILTER @ RL. 29.50

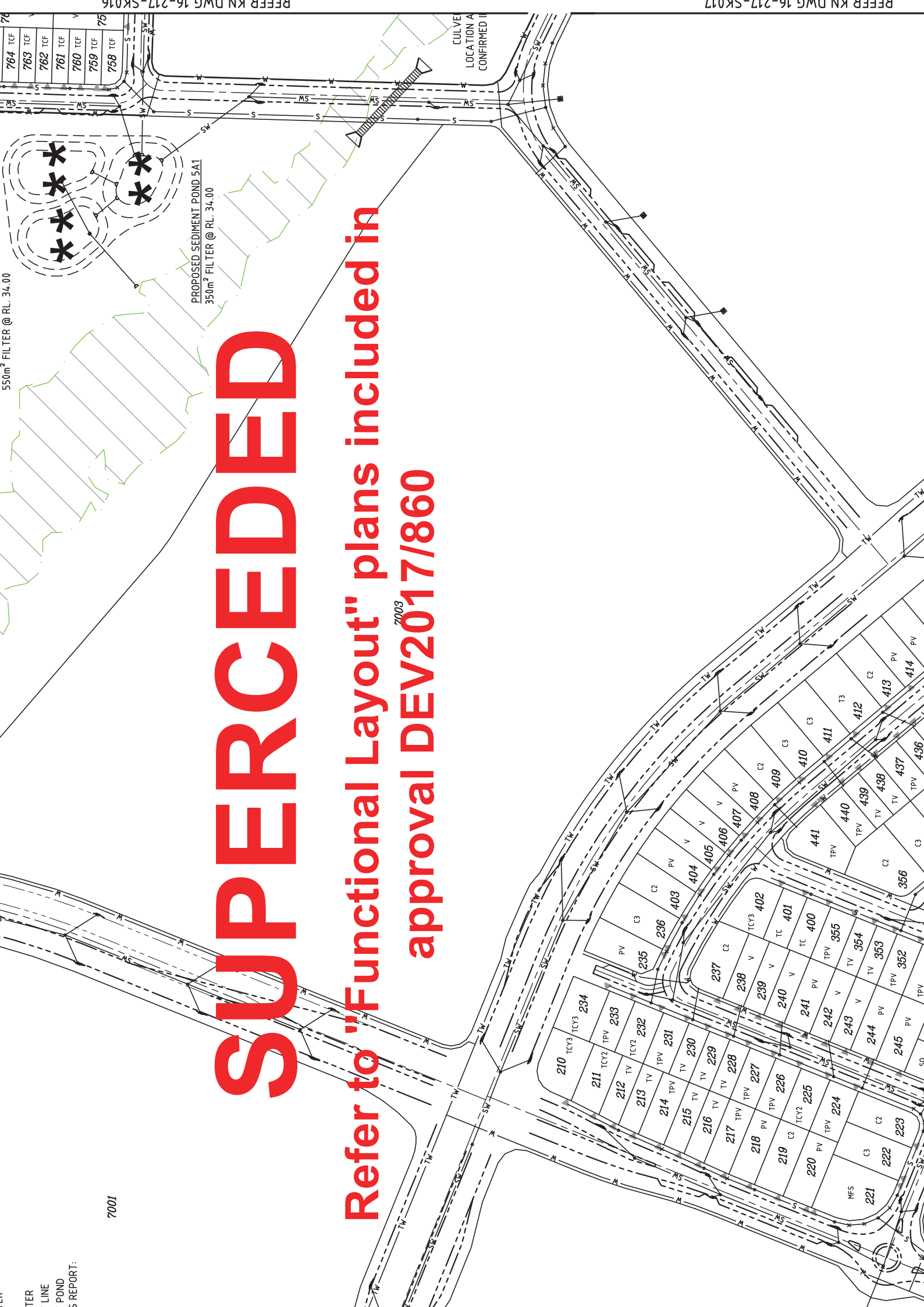
PROPOSED SEDIMENT POND 5B1
400m² FILTER @ RL. 29.50

PROPOSED BIO BASIN 5A2
550m² FILTER @ RL. 34.00

PROPOSED BIO BASIN 5A2
550m² FILTER @ RL. 34.00

REFER KN DWG 15-217-SK015

823	MFF	822	MFF	820	MFF	819	MFF	818	MFF	817	MFF	806	SV	805	SV	804	SV	803	SV	802	SV	801	SV	780	SV	765	TCF	764	TCF	763	TCF	762	TCF	761	TCF	760	TCF	759	TCF	758	TCF
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	-----	----	-----	----	-----	----	-----	----	-----	----	-----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----



SUPERCEDED

Refer to "Functional Layout" plans included in
approval DEV2017/860

7001

TER
LINE
POND
S REPORT:

BEFER KN DWG 16-217-SK016

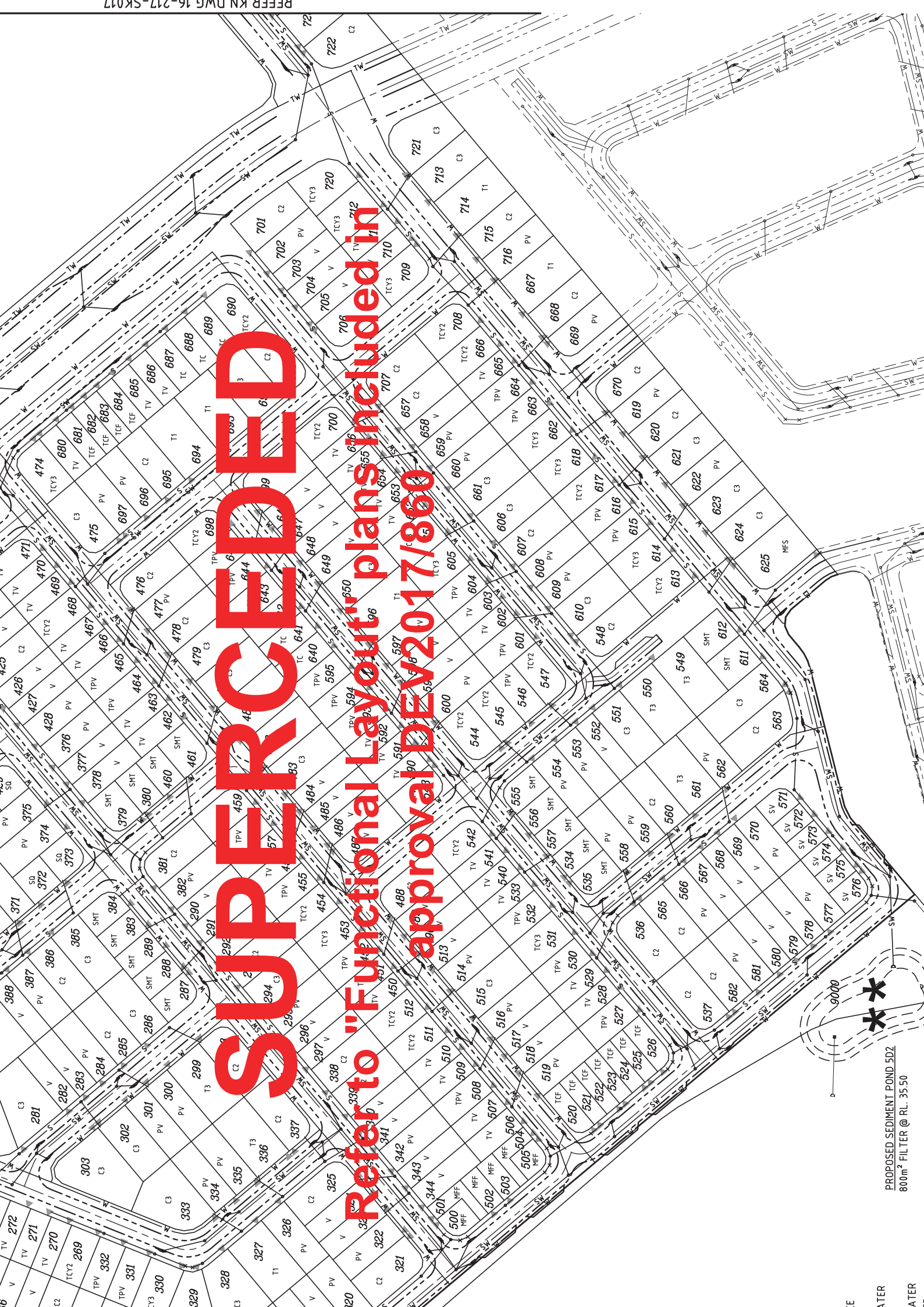
CULVER
LOCATION A
CONFIRMED I

PROPOSED SEDIMENT POND 5A1
350m² FILTER @ RL. 34.00

550m² FILTER @ RL. 34.00

SUPERCEDDED

Refer to "Functional Layout" plans included in approval DEV2017/800



SUPPRESSED

Refer to "Functional Layout" plans included in

approval DEV2017/860

DRAIN/BUND, SIZE AND
LOCATION TO BE CONFIRMED IN
DETAILED DESIGN

LEGEND

- PROPOSED KERB FACE
- PROPOSED SEWER
- PROPOSED STORMWATER
- PROPOSED WATER
- PROPOSED TRUNK WATER
- FUTURE TRUNK SEWER
- EXISTING SEWER

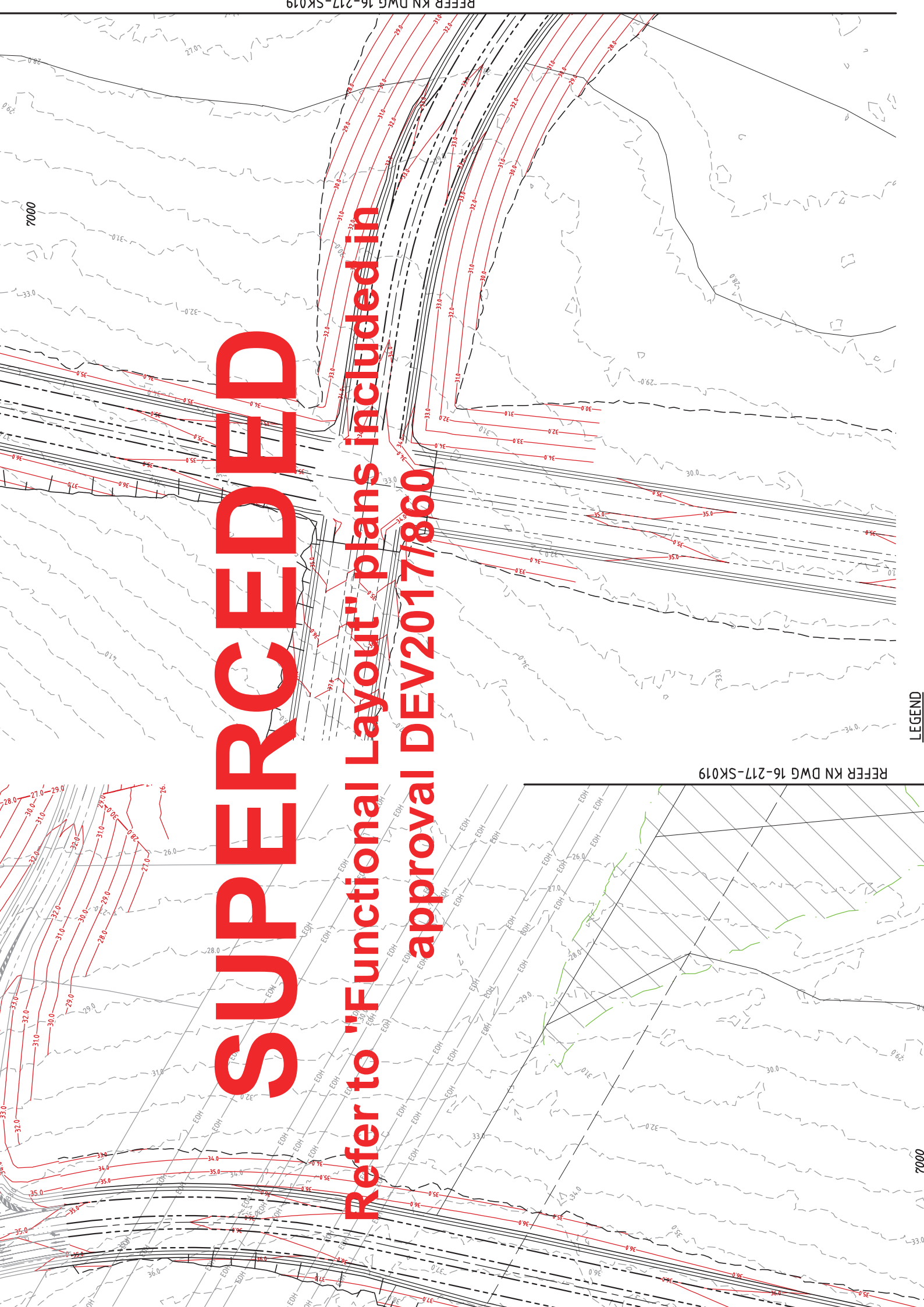
BALANCE LOT

CULVERT CROSSING.
LOCATION AND LENGTHS TO BE
CONFIRMED IN DETAILED DESIGN

Refer to "Functional Layout" plans included in approval DEV2017/860



- PROPOSED KERB FACE
PROPOSED SEWER
PROPOSED STORMWATER
PROPOSED WATER
PROPOSED TRUNK WATER
FUTURE TRUNK SEWER
EXISTING SEWER



SUPERCEDED

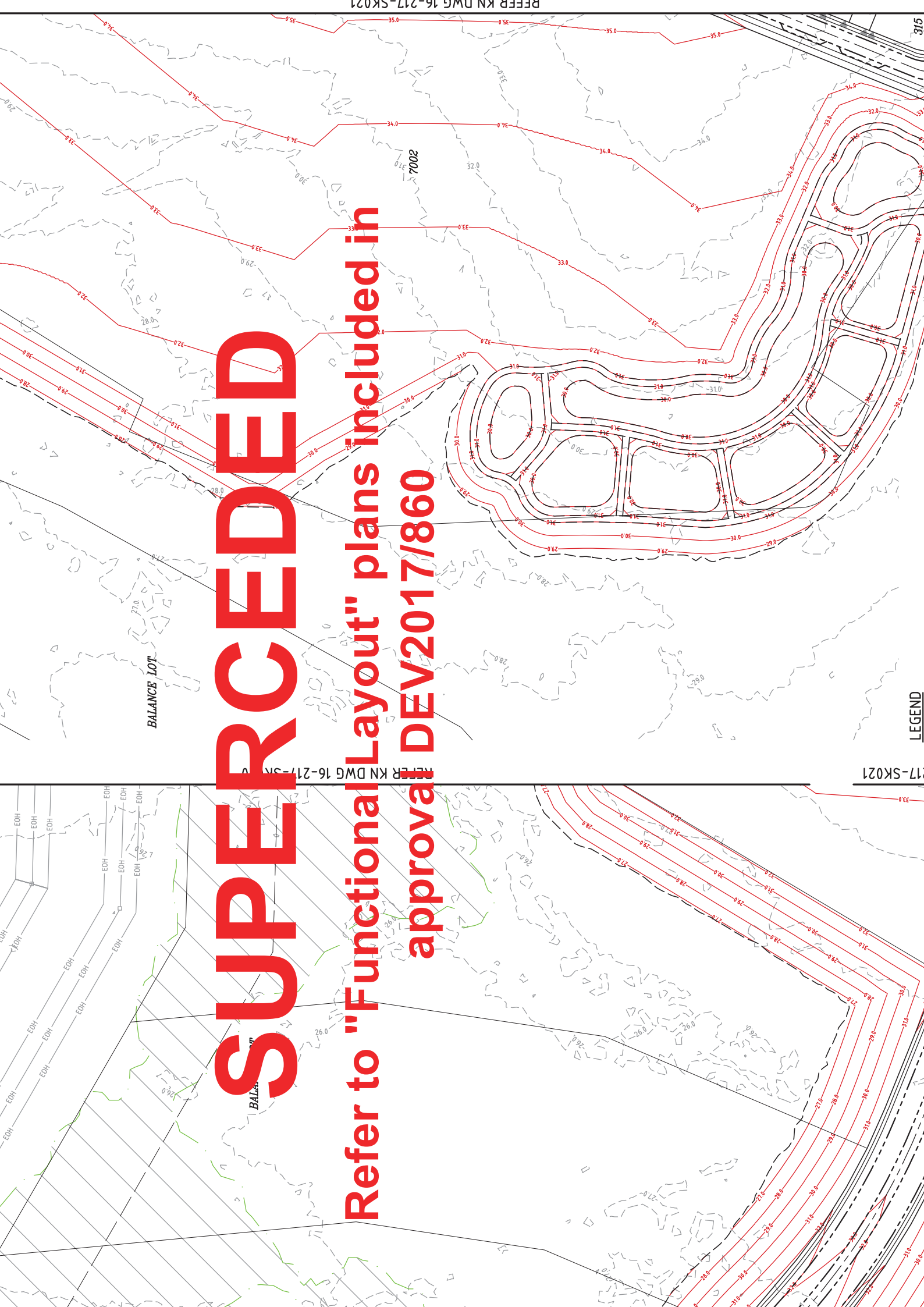
**Refer to "Functional Layout" plans included in
approval DEV20171860**

REFER KN DWG 16-217-SK019

LEGEND

SUPERCEDED

**Refer to "Functional Layout" plans included in
approval DEV2017/860**



17-SK021

LEGEND

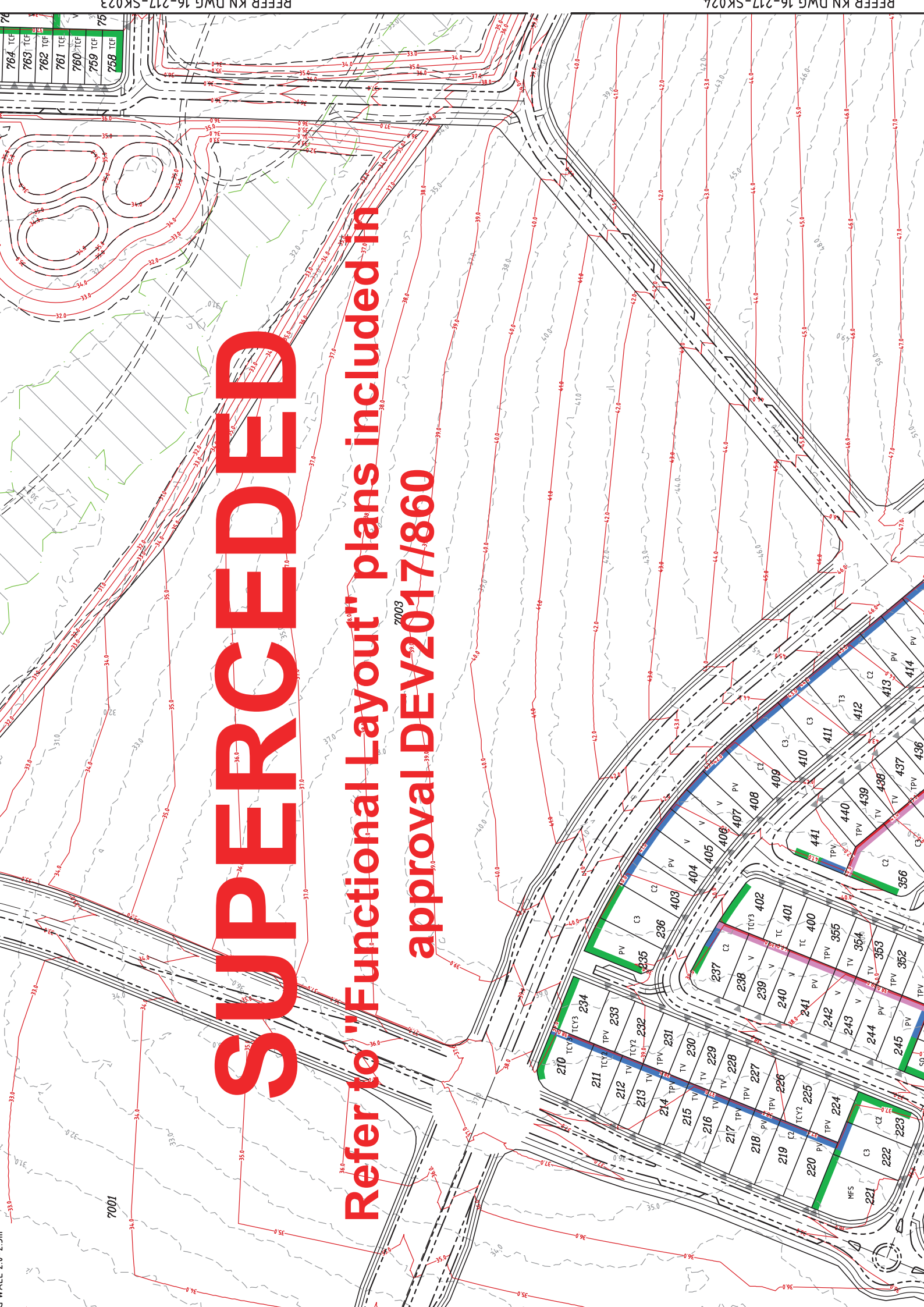
315

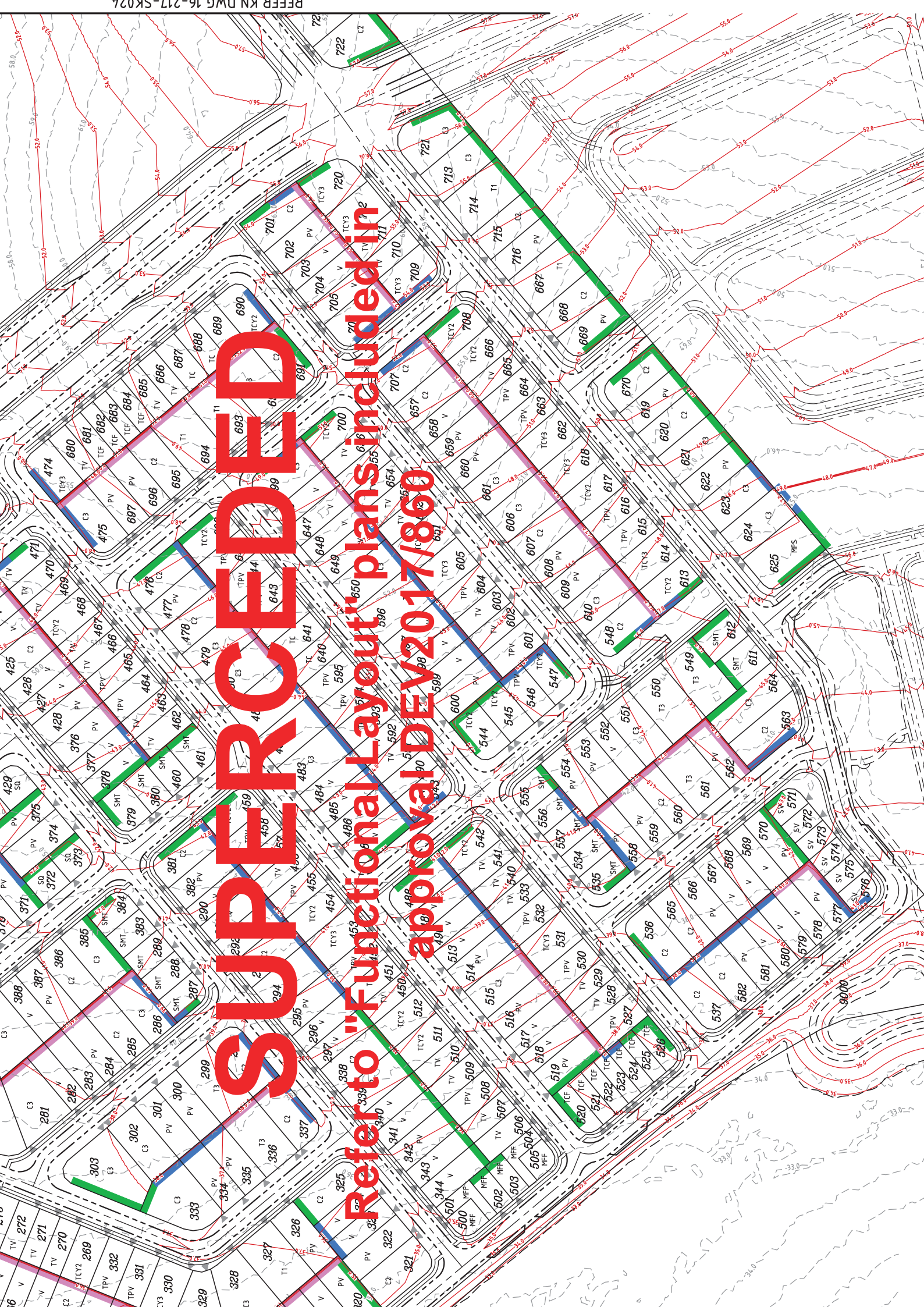
SUPERCEDED

**Refer to "Functional Layout" plans included in
approval DEV2017/860**

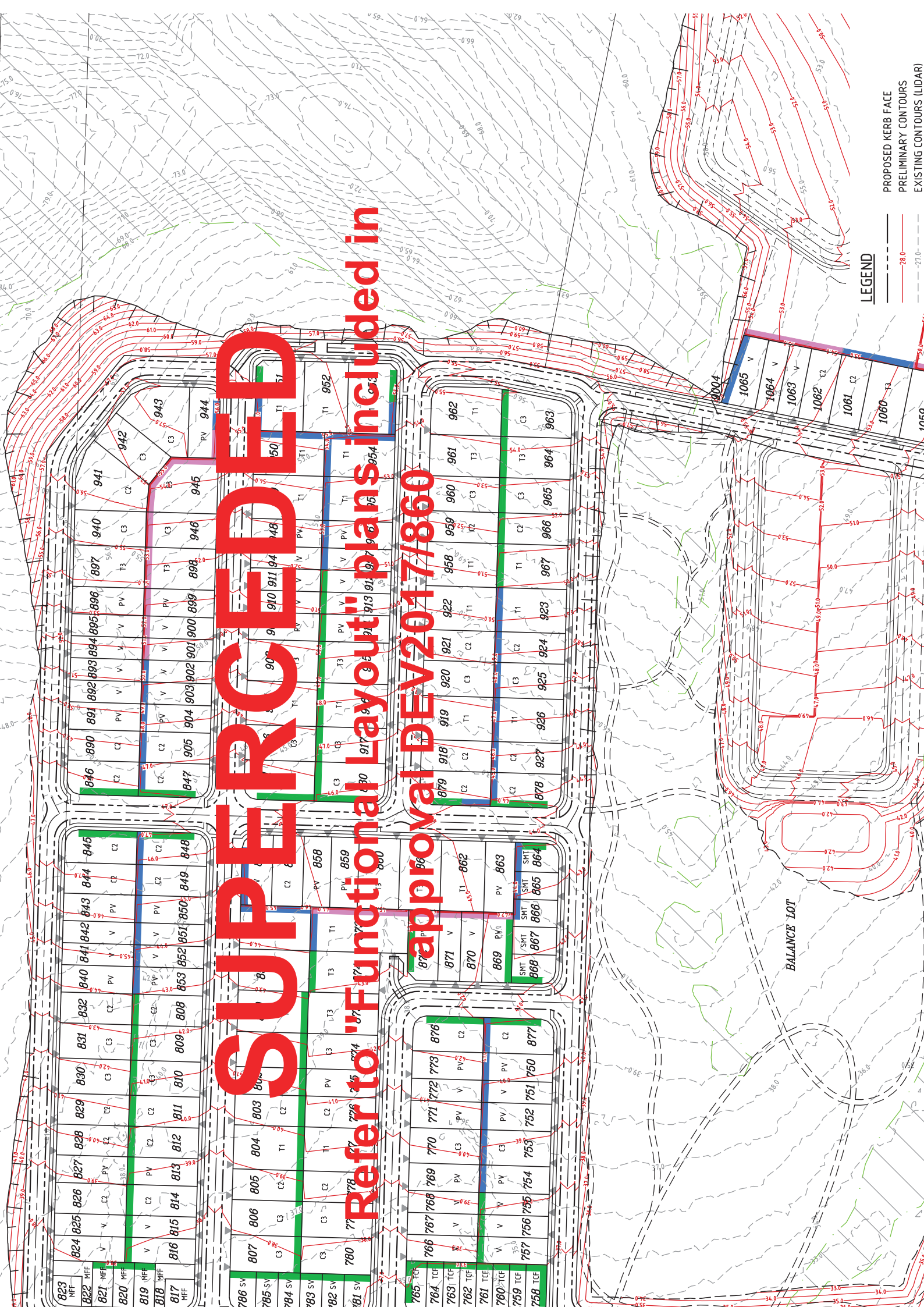


Refer to "Functional Layout" plans included in approval DEV2017/860





SUPERCEDED
Refer to "Functional Layout" plans included in
approval DEV2017/860



SUPERCEDED

Refer to "Functional Layout" plans included in approval DEV2017/860

LEGEND

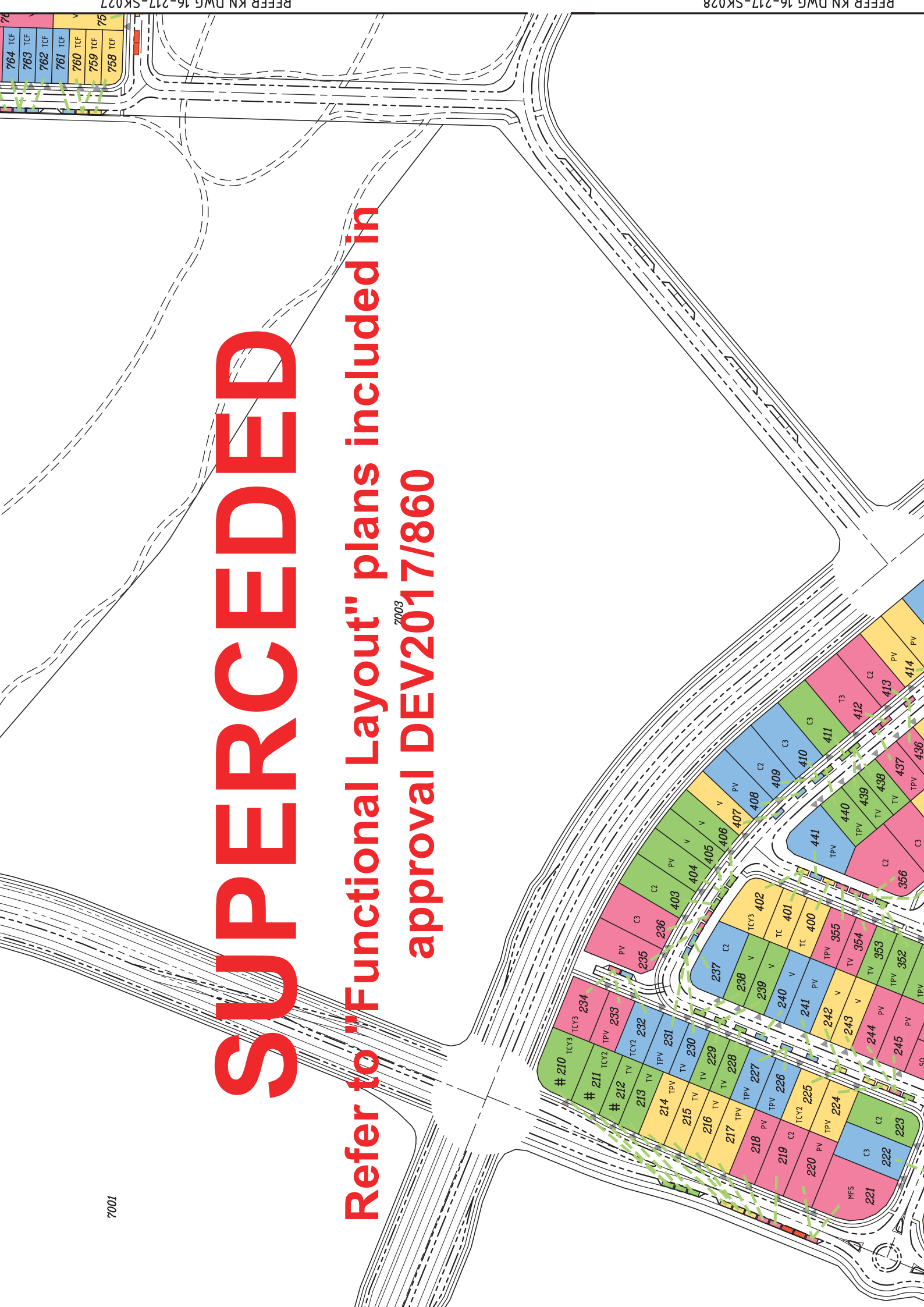
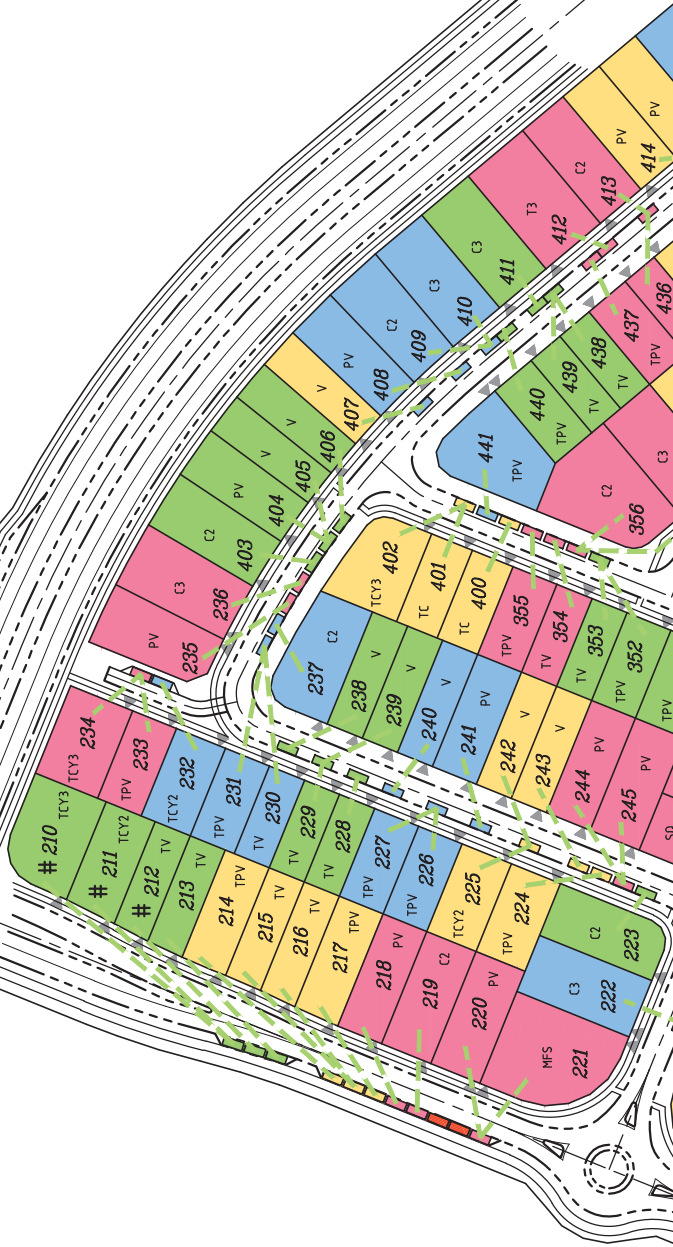
- PROPOSED KERB FACE
- PRELIMINARY CONTOURS
- EXISTING CONTOURS (LIDAR)

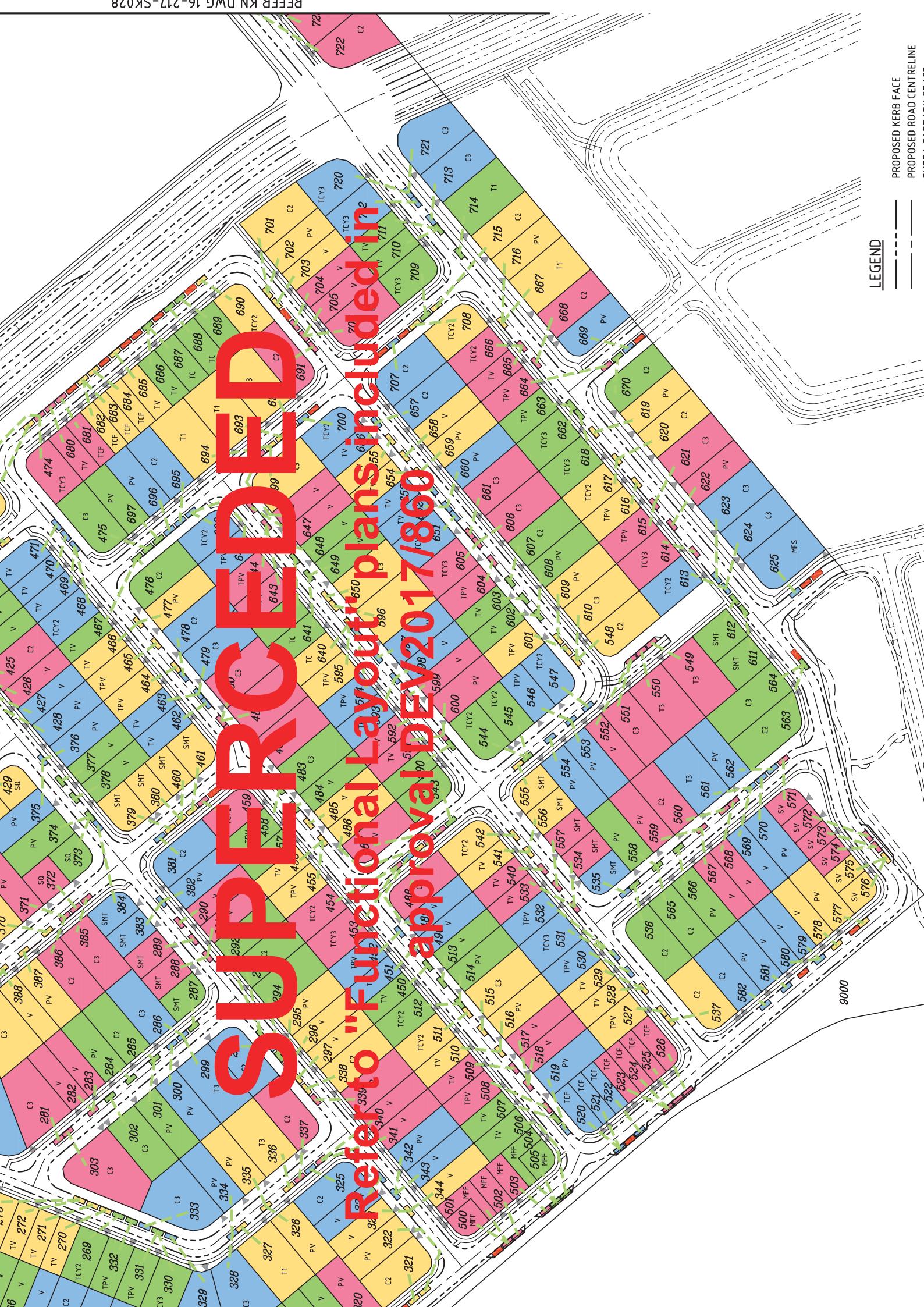
Refer to "Functional Layout" plans included in approval DEV20171860

PROPOSED KERB FACE
PRELIMINARY CONTOURS
EXISTING CONTOURS (LIDAR)

SUPERCEDED

Refer to "Functional Layout" plans included in
approval DEV2017/860²⁰⁰³





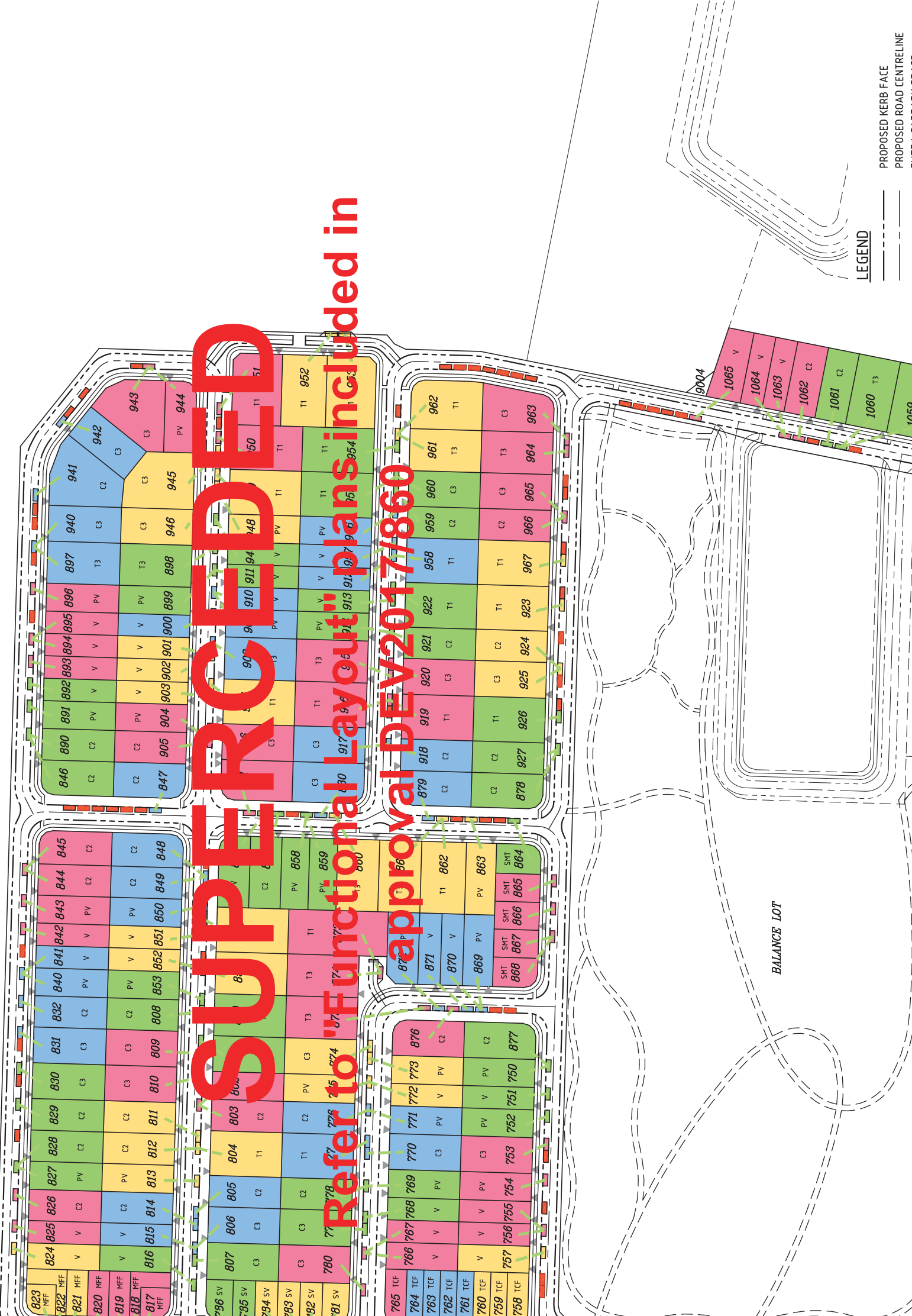
SUPERCEDED

Refer to "Functional Layout" plans included in approval DEV2017/860

LEGEND

- PROPOSED KERB FACE
- PROPOSED ROAD CENTRELINE

SUPPRESSED
Refer to "Functional Layout" plans included in
approval DEV2017/860



Refer to "Functional Layout plans included in approval DEV2017/860



PROPOSED KERB FACE
PROPOSED ROAD CENTRELINE

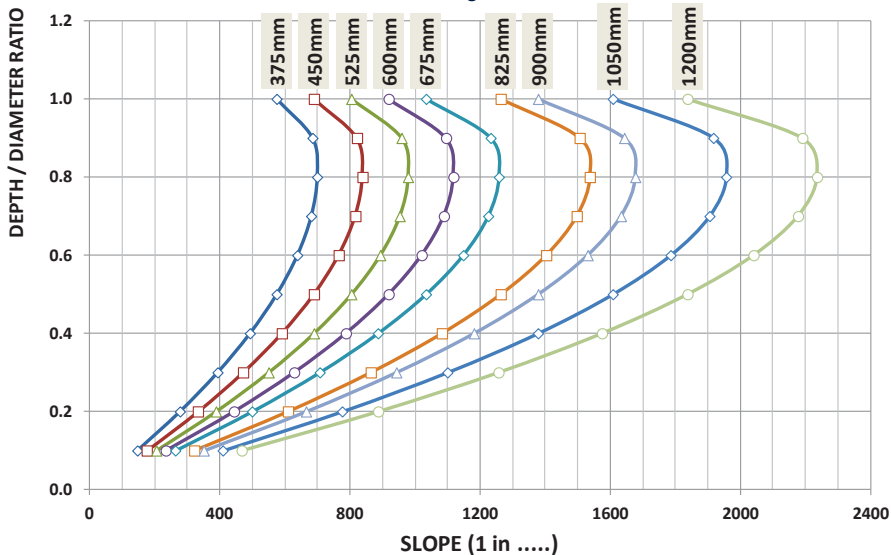
Appendix D: LCC DSOS

WATER NETWORK DSS			
Parameter	Criteria		
Water Demand			
Average Day demand	On demand areas - 190 L/EP/d. Based on 165 L/EP/d + allowance for leakage/losses (25 L/EP/d).		
	Constant flow areas - 150 L/EP/d. Based on 120 L/EP/d + allowance for leakage/losses (30L/EP/d).		
Peaking factors	MDMM/AD	MD/AD	MH/AD
Residential detached	1.3	1.7	3.1
Residential attached	1.3	1.6	2.6
Rural residential	1.3	1.7	CF services 70 L/hr/property
Commercial	1.2	1.3	2.0
Industry	1.2	1.3	1.7
Parks / Open Space	1.2	1.3	1.7
System planning			
Bulk supply and reticulation	3 days of MDMM. Reservoirs to have a net positive inflow and capable of continuous operation and not fall below the emergency level. 3 days of MD. Reservoirs should not fall below the emergency level. 5 days of AD. Reservoirs should fill from empty to full		
Minimum service pressure			
Minimum operating pressure at MH	On demand areas – 22m at the property boundary based on reservoir at minimum operating level (MOL). MOL defined as 15% of storage height or top of emergency storage		
	Constant flow areas – 10m at the property boundary based on reservoir at minimum operating level (MOL) MOL defined as 15% of storage height or top of emergency storage.		
Maximum operating pressure	80 m at the boundary based on the reservoir at TWL		
Target pressure	55 m at the property boundary based on the reservoir level at TWL		
Fire fighting			
System pressure	On demand areas	12 m minimum at property boundary	
	Constant flow areas	no fire service provided	
Fire flow	Constant flow areas	no fire service provided	
	Rural Residential	7.5 L/s for 2 hrs	
	Rural Commercial / Industrial	15 L/s for 2 hrs	
	Residential	15 L/s for 2 hrs	
	Commercial & Industrial	30 L/s for 4 hrs	
	Special risk / hazard	to be advised by Logan City Council	
Background demand	2/3 PH (as per DEWS requirements)		
Reservoir level	Minimum Operating Level (MOL)		
Water quality			
Drinking water quality	Drinking water to comply with the NHMRC Australian Drinking Water Guidelines – 2004.		

WATER NETWORK DSS	
Parameter	Criteria
Reservoir storage	
Ground level storage capacity	3 (MD - MDMM) + (Greater of emergency storage/fire fighting reserve) Emergency Storage = 4 hr MDMM demand in zone or 0.5 ML whichever is greater. Fire Fighting reserve = > 4800EP: • rural residential 108 kL • industry 540 kL • otherwise 216 kL < 4800 EP: • rural residential 54 kL • industry 432 kL • otherwise 108 kL
Elevated storage capacity Guidance Note: In-line pressure booster pumping without high-level storage shall be considered where satisfactory pressures can be provided by gravity flow during low demand periods or booster failure can be mitigated to an acceptable level (risk assessment) and where there is no other feasible means of providing adequate pressure.	6 (PH - 1/12 MDMM) + minimum fire fighting reserve. Fire Fighting reserve = > 4800EP: • rural residential 108 kL • industry 540 kL • otherwise 216 kL < 4800 EP: • rural residential 54 kL • industry 432 kL • otherwise 108 kL
Pumping capacity	
Pump supplying a ground level reservoir	MDMM over 20 hr
Pump supplying an elevated reservoir	$(6PH - \text{operating volume}) / (6 \times 3600)$
Standby pump capacity	To match duty, except where more than one duty pump or as determined by risk assessment
Reticulation booster pumps/pumped system	PH + fire flow

WATER NETWORK DSS						
Parameter		Criteria				
Pipeline assessment & design						
Main capacity	Raw water mains & trunk feeding ground level reservoir : MDMM for a gravity supply and MDMM over 20hrs for a pumped supply Trunk Mains feeding elevated reservoir: capacity of pumps Reticulation Mains: PH + fire flow					
Mains size	Constant flow areas - where mains terminate in short runs such as cu- de-sacs minimum sizes that may be acceptable are: DN 63 up to 150 m from main DN 80 up to 350 m from main					
	On demand areas - minimum reticulation main 100mm in residential areas and 150mm in commercial and industrial areas					
Friction default value	Existing Infrastructure		Future Infrastructure			
	Colebrook White k values (mm)		The design shall be conducted to achieve less than the following head losses: (a) 5 m head/km for ≤DN 150 (CIOD) or ≤DN 180 (ISO). (b) 3 m head/km for ≥DN 200 (CIOD) or ≥DN 250 (ISO). Head loss shall be calculated using computer models or hydraulic formulas.			
	Pipe Material	Pipeline Age (years)				
		< 10			10 to 25	> 25
	Asbestos Cement	0.15			0.3	0.3
	Plastic (UPVC, MDPE, Hobas, etc)	0.06			0.06	0.15
MSCL/DICL	0.3	0.3	0.6			
CICL	0.3	0.3	0.6			
Maximum velocity	2.5 m/s At peak hour for trunk mains and at peak hour including fire flow for reticulation					

WASTEWATER NETWORK DSS	
Parameter	Criteria
Sewage load	
ADWF	165 L/EP/day
PDWF	Use actual flow data; or $\frac{d \times 165}{d \times 0.00191 \times EP} \quad \text{L/EP/d or; L/s}$ Where: $d = 0.01(\log A)^4 - 0.19(\log A)^3 + 1.4(\log A)^2 - 4.66\log A + 7.57$ d = dry weather peaking factor A = gross plan area of development catchment, in hectares Refer to WSAA Sewerage Code of Australia; Part 1 Planning and Design
Containment standard for assessment of existing networks	Network to contain a 1 year ARI storm event, for critical storm duration. This is an overflow containment standard rather than a conveyance standard. For those catchments that fail the standard, mitigation measures such as I/I reduction and wet weather storage should be considered in addition to any capacity increases.
PWWF	Residential 1300 L/EP/d
	For Common Effluent Discharge PWWF = 660 L/EP/d
	Commercial 1300 L/EP/d
	Light Industrial 1000 L/EP/d
	Heavy Industrial 840 L/EP/d
Gravity sewer design	
Flow equation	Colebrook White to be used for all applications – design and modelling
Pipe roughness general	Colebrook White $k = 1.5\text{mm}$
Maximum velocity @ PWWF	3 m/s
Depth of flow @ PWWF - Existing	Up to 1m below MH surface level and no spillage through overflow structures
Depth of flow @ PWWF - Proposed/ new sewers	100% of pipe depth
Depth of flow @ PDWF – existing and new sewers	Maximum 60% of pipe depth
Slime Stripping	It is desirable where gradients permit to achieve slime stripping. A wall shear of 3.85 Pa is required to achieve slime stripping.

WASTEWATER NETWORK DSS		
Parameter	Criteria	
Minimum grades	Diameter	Grades (mm, 1 in X)
	150	180 (80 in last section between last manholes or to an end)
	225	300
	300	400
	375	Minimum Grades are to be based on achieving Self Cleansing Shear Stress of 1.6 Pa at PDWF, refer figure below. 
	450	
	525	
	600	
	675	
	750	
	825	
	900	
	1050	
	1200	
Sewerage pump stations		
Wet well operating requirements	$V \text{ (m}^3\text{)} = \frac{0.9 \times \text{pump rate (L/s)}}{N}$ Where N is the acceptable number of starts per hour Pump Rate (L/s) = capacity of the largest duty pump N = 12 for motors <= 15 kW N = 8 for motors 15kW - 200 kW N = 5 for motors > 200 kW Control levels shall be based on Table 5.1 of WSA04-2005. The minimum depth between duty start and duty off is 100mm and ideally should be 300mm or greater.	
Emergency storage	Emergency storage volume requirement to be based on containment of 2 hours of PDWF. Where actual measured flow data is available then volume should be based on containing 2 hrs measured PDWF provided it takes into account any future growth. Except where otherwise specified to meet the requirements of the overflow risk assessment If there is an overflow pipe - storage in the system is measured between the alarm level and overflow pipe invert level. If there is no overflow pipe - storage is measured between the alarm level and 300mm below the lowest upstream manhole or top of wet well.	
Pump capacity	If PWWF <20L/s, then 2 pumps (duty/standby arrangement) shall be provided, with each pump being capable of delivering PWWF. If PWWF >20L/s and <200L/s, then 2 pumps (duty/duty assist arrangement) shall be provided, with each pump being sized such that the two pumps running in parallel are capable of delivering PWWF. The minimum single pump capacity shall be PDWF. It is desirable that a single pump be sized on C₁ if appropriate, i.e. From DEWS Planning Guidelines. C₁ = 15 x EP-0.1587 minimum 3.5, maximum 6.5. If PWWF >200L/s, then minimum of 3 pumps (duty/duty assist/duty assist/.... arrangement) shall be provided. Minimum single pump capacity shall be PDWF. All pumps operating shall be capable of delivering PWWF with each pump being sized in consultation with LCC.	
Pump operation	VSD shall only be used, subject to special approval from Logan City Council. If approved by Logan City Council, the VSD operating regime shall be selected to ensure sufficient self-cleansing velocities, and shall meet the pump supplier's requirements.	
NPSH	Refer Clause 6.4 of WSA04-2005	

WASTEWATER NETWORK DSS	
Parameter	Criteria
<i>Rising mains</i>	
Flow equation	Colebrook White to be used for all applications
Friction mains	For preliminary design a Colebrook White Roughness (k) of 1 mm is to be used. For detailed design roughness shall be based on velocity and pipe roughness at end of pump design life. However, pumps should be able to operate (not necessarily meet design flow) for Colebrook White roughness's between manufacturers specified roughness for new pipes and 1.0mm
Minimum velocity	Minimum Velocity to be based on achieving Slime Stripping Shear Stress of 3.85 Pa at Single Pump Flow
Maximum velocity	3.0 m/s proposed systems Manufacturer's specifications for new systems
Max detention time	Maximum time of detention in pressure main and SPS wet well is 6 hours [2 hours in wet well and 4 hours in rising main] (based on daily average flows) to minimise potential for odour / hydrogen sulphide generation. Where high retention times are likely to occur, odour / sulphide control measures will be required to the satisfaction of Logan City Council. (Refer WSA 07-2007-1.1 section 3.15)
<i>Reduced infiltration gravity sewers (RIGS)</i>	
As per gravity sewers except	Not permitted without Logan City Council approval
PWWF	Reticulation system to be designed for 1000 L/EP/day Trunk systems to be designed for minimum 1300 L/EP/day
Total PS Capacity	1300L/EP/d
<i>Low pressure sewers / vacuum pumps</i>	
Low pressure sewers / vacuum pumps	Are not preferred and will only be allowed subject to approval from Logan City Council.
<i>Private pump stations and rising mains</i>	
	Private pump stations and rising mains are permitted for single users only and no connection or sharing will be permitted without approval from Logan City Council
<i>Common effluent discharge</i>	
Common effluent discharge (CED)	Not permitted without approval from Logan City Council.