Redland Water Water Supply Master Plan

October 2016

Redland WATER

Redland CITY COUNCIL

Version Control

Version Number	Description of Change	Author	Date	Reviewer	Approval
Rev 0	First draft	Lara Harland	November 2013	Matthew Ingerman	Bradley Taylor
Rev 1	Conversion of first draft to Redland Water report format	Matthew Ingerman	November 2014	Bradley Taylor	Bradley Taylor
Rev 2	Updated network modelling for LGIP / Netserv	Lara Harland	October 2016	Matthew Ingerman	Bradley Taylor

Table of Contents

Executive Summary **14**
1. Introduction **17**
1.1 Background 17
1.2 Previous Planning 17
1.2.1 System Reliability Modelling 18
1.2.2 Hydraulic Model 18
1.2.3 Redland Water – Water Supply System Fire Flow Review 18
1.2.4 Seqwater – Water Security Program 18
1.2.5 Seqwater – Eastern Area Network – Long Term Planning Report 18
1.3 Pressure and Leakage Management Project Outcomes 18
1.4 Links to Redland City Council Corporate Plan 21
1.5 Purpose of the Master Plan 21
1.6 Options assessment 22
1.6.1 Do nothing 22
1.6.2 Existing Asset Options 22
1.6.3 Non-infrastructure alternatives 22
1.6.4 New-infrastructure options 22
1.7 Assumptions 23
1.8 Water Quality 23
1.9 Format of the Master Plan 23
2. Standards of Service **26**
3. Demand Assessment **28**
3.1 Demand Model 28
3.2 Planning Scheme 28
3.3 Priority Infrastructure Area 28
3.4 Water Supply Service Areas 28
3.5 Adopted Demands 29
3.6 Bulk Water Infrastructure Sizing and Augmentation 31
3.6.1 Bulk Water Source 31
3.6.2 Bulk Water Treatment 31
3.6.3 Bulk Water Transport 31
3.6.4 Bulk Water Storage 31
3.7 Fire Flow Demand 31
3.7.1 Existing Demand Fire Flow Requirements 32
3.7.2 Ultimate Demand Fire Flow Requirements 32
4. Model Set Up **33**
4.1 Demand Assignment 33
4.2 Diurnal Patterns 33
4.3 Pipe Friction Factors 34
5. Augmentation Philosophy **38**
6. 101 Russell Island East **39**
6.1 DMA Topography and Land Use 39
6.2 Previous Planning 39
6.3 Current System Configuration and Source of Supply 39
6.4 Existing System Performance at Ultimate (2036) Demands 39
6.4.1 Peak Hour 39
6.4.2 MD Minimum Hour 39
6.4.3 Fire Flow 40
6.4.4 Water Quality 40
6.5 Proposed Augmentations 40
6.5.1 Peak Hour 40
6.5.2 Fire Flow 40
6.6 Augmentation Timing 40
6.6.1 Existing System at 2016 Demands 40
7. 102 Russell Island West **46**
7.1 DMA Topography and Land Use 46
7.2 Previous Planning 46
7.3 Current System Configuration and Source of Supply 46
7.4 Existing System Performance at Ultimate Demands 46
7.4.1 Peak Hour 46

7.4.2 MD Minimum Hour 46
7.4.3 Fire Flow 46
7.4.4 Water Quality 47
7.5 Proposed Augmentations 47
8. 103 Karragarra Island 52
8.1 DMA Topography and Land Use 52
8.2 Previous Planning 52
8.3 Current System Configuration and Source of Supply 52
8.4 Existing System Performance at Ultimate Demands 52
8.4.1 Peak Hour 52
8.4.2 MD Minimum Hour 52
8.4.3 Fire Flow 52
8.4.4 Water Quality 52
8.5 Proposed Augmentations 52
9. 104 Lamb Island 57
9.1 DMA Topography and Land Use 57
9.2 Previous Planning 57
9.3 Current System Configuration and Source of Supply 57
9.4 Existing System Performance at Ultimate Demands 57
9.4.1 Peak Hour 57
9.4.2 MD Minimum Hour 57
9.4.3 Fire Flow 57
9.4.4 Water Quality 57
9.5 Proposed Augmentations 57
10. 105 Macleay Island 62
10.1 DMA Topography and Land Use 62
10.2 Previous Planning 62
10.3 Current System Configuration and Source of Supply 62
10.4 Existing System Performance at Ultimate Demands 62
10.4.1 Peak Hour 62
10.4.2 MD Minimum Hour 62
10.4.3 Fire Flow 62
10.4.4 Water Quality 62
10.5 Proposed Augmentations 63
10.5.1 Peak Hour 63
10.5.2 Fire Flow 63
10.6 Augmentation Timing 63
10.6.1 Existing System at 2016 Demands 63
10.6.2 Existing System at 2021 Demands 63
10.6.3 Existing System at 2026 Demands 63
10.6.4 Existing System at 2031 Demands 63
11. 106 Serpentine Creek Road 69
11.1 DMA Topography and Land Use 69
11.2 Previous Planning 69
11.3 Current System Configuration and Source of Supply 69
11.4 Existing System Performance at 2036 Demands 69
11.4.1 Peak Hour 69
11.4.2 MD Minimum Hour 69
11.4.3 Fire Flow 70
11.4.4 Water Quality 70
11.5 Proposed Augmentations 70
11.5.1 Peak Hour 70
11.5.2 Fire Flow 71
11.6 Augmentation Timing 71
11.6.1 Existing System at 2016 Demands 71
12. 201 Heinemann Road 78
12.1 DMA Topography and Land Use 78
12.2 Previous Planning 78
12.3 Current System Configuration and Source of Supply 78
12.4 Existing System Performance at Ultimate Demands 78
12.4.1 Peak Hour 78
12.4.2 Fire Flow 78
12.4.3 PD Minimum Hour 78

12.4.4 Water Quality 79
12.5 Proposed Augmentations 79
12.5.1 Peak Hour 79
12.5.2 Fire Flow 79
12.6 Augmentation Timing 79
12.6.1 Existing System at 2016 Demands 79
13. 202 Boundary Street 85
13.1 DMA Topography and Land Use 85
13.2 Previous Planning 85
13.3 Current System Configuration and Source of Supply 85
13.4 Existing System Performance at Ultimate Demands 85
13.4.1 Peak Hour 85
13.4.2 MD Minimum Hour 85
13.4.3 Fire Flow 85
13.4.4 Water Quality 86
13.5 Proposed Augmentations 86
13.5.1 Peak Hour 86
13.5.2 Fire Flow 86
13.6 Augmentation Timing 86
13.6.1 Existing System at 2016 Demands 86
14. 203 Benfer Road 92
14.1 DMA Topography and Land Use 92
14.2 Previous Planning 92
14.3 Current System Configuration and Source of Supply 92
14.4 Existing System Performance at Ultimate Demands 92
14.4.1 Peak Hour 92
14.4.2 MD Minimum Hour 92
14.4.3 Fire Flow 92
14.4.4 Water Quality 93
14.5 Proposed Augmentations 93
14.5.1 Peak Hour 93
14.5.2 Fire Flow 93
14.6 Augmentation Timing 94
14.6.1 Existing System at 2016 Demands 94
14.6.2 2021 Demands with 2016 Augmentations 94
14.6.3 2026 Demands with 2021 Augmentations 94
15. 204 Bunker Road South 101
15.1 DMA Topography and Land Use 101
15.2 Previous Planning 101
15.3 Current System Configuration and Source of Supply 101
15.4 Existing System Performance at Ultimate Demands 102
15.4.1 Peak Hour 102
15.4.2 Fire Flow 102
15.4.3 Water Quality 103
15.5 Proposed Augmentations 103
15.5.1 Peak Hour 103
15.5.2 MD Minimum Hour 103
15.5.3 Fire Flow 104
15.6 Augmentation Timing 104
15.6.1 Existing System at 2016 Demands 104
15.6.2 Existing System at 2021 Demands 105
16. 205 Victoria Point 112
16.1 DMA Topography and Land Use 112
16.2 Previous Planning 112
16.3 Current System Configuration and Source of Supply 112
16.4 Existing System Performance at Ultimate Demands 112
16.4.1 Peak Hour 112
16.4.2 MD Minimum Hour 112
16.4.3 Fire Flow 113
16.4.4 Water Quality 113
16.5 Proposed Augmentations 113
17. DMAs 206, 207 & 212 Mt Cotton 118
17.1 DMA Topography and Land Use 118

17.1.1 206 Mt Cotton Village ... 118
17.1.2 207A Mt Cotton Booster Pump ... 118
17.1.3 207B Mt Cotton High Level Zone ... 118
17.1.4 212 Mt Cotton Road ... 118
17.2 Previous Planning ... 118
17.3 Current System Configuration and Source of Supply ... 119
17.3.1 206 Mt Cotton Village ... 119
17.3.2 207A Mt Cotton Booster Pump ... 119
17.3.3 207B Mt Cotton High Level Zone ... 119
17.3.4 212 Mt Cotton Road ... 119
17.4 Existing System Performance at Ultimate Demands ... 119
17.4.1 Peak Hour ... 119
17.4.2 MD Minimum Hour ... 119
17.4.3 Fire Flow ... 120
17.4.4 Water Quality ... 120
17.5 Proposed Augmentations ... 120
18. 208 Mt Cotton Trunk and 209 Duncan Road ... 125
18.1 DMA Topography and Land Use ... 125
18.2 Previous Planning ... 125
18.3 Current System Configuration and Source of Supply ... 125
18.4 Existing System Performance at Ultimate Demands ... 125
18.4.1 Peak Hour ... 125
18.4.2 MD Minimum Hour ... 126
18.4.3 Fire Flow ... 126
18.4.4 Water Quality ... 126
18.5 Proposed Augmentations ... 127
18.5.1 Peak Hour ... 127
18.5.2 Fire Flow ... 127
18.6 Augmentation Timing ... 127
18.6.1 Existing System at 2016 Demands ... 127
19. 210 Thornlands ... 138
19.1 DMA Topography and Land Use ... 138
19.2 Previous Planning ... 138
19.3 Current System Configuration and Source of Supply ... 138
19.4 Existing System Performance at Ultimate Demands ... 139
19.4.1 Peak Hour ... 139
19.4.2 MD Minimum Hour ... 140
19.4.3 Fire Flow ... 140
19.4.4 Water Quality ... 141
19.5 Proposed Augmentations ... 141
19.5.1 Peak Hour ... 141
19.5.2 Fire Flow ... 141
19.6 Augmentation Timing ... 142
19.6.1 Existing System at 2016 Demands ... 142
19.6.2 2021 Demands with 2016 Augmentations ... 144
20. 301 Howletts Road ... 150
20.1 DMA Topography and Land Use ... 150
20.2 Previous Planning ... 150
20.3 Current System Configuration and Source of Supply ... 150
20.4 Existing System Performance at Ultimate Demands ... 150
20.4.1 Peak Hour ... 150
20.4.2 MD Minimum Hour ... 150
20.4.3 Fire Flow ... 150
20.4.4 Water Quality ... 151
20.5 Proposed Augmentations ... 151
21. W004 Alexandra Hills LLZ ... 156
21.1 DMA Topography and Land Use ... 156
21.2 Previous Planning ... 156
21.3 Current System Configuration and Source of Supply ... 156
21.4 Possible Future Configuration and Source of Supply ... 156
21.5 Existing System Performance at Ultimate Demands ... 156
21.5.1 Peak Hour ... 156
21.5.2 MD Minimum Hour ... 157

21.5.3 Fire Flow 157
21.5.4 Water Quality 158
21.6 Proposed Augmentations 158
21.6.1 Peak Hour 158
21.6.2 Fire Flow 158
21.7 Augmentation Timing 158
21.7.1 Existing System at 2016 Demands 158
21.7.2 2021 Demands with 2016 Augmentations 159
21.7.3 2026 Demands with 2016 Augmentations 159
22. 308 Alexandra Hills High Level Zone 172
22.1 DMA Topography and Land Use 172
22.2 Previous Planning 172
22.3 Current System Configuration and Source of Supply 172
22.4 Existing System Performance at Ultimate Demands 172
22.4.1 Peak Hour 172
22.4.2 MD Minimum Hour 172
22.4.3 Fire Flow 172
22.4.4 Water Quality 173
22.5 Proposed Augmentations 173
23. 401 Amity Point 178
23.1 DMA Topography and Land Use 178
23.2 Previous Planning 178
23.3 Current System Configuration and Source of Supply 178
23.4 Existing System Performance at Ultimate Demands 178
23.4.1 Peak Hour 178
23.4.2 MD Minimum Hour 178
23.4.3 Fire Flow 178
23.4.4 Water Quality 178
23.5 Proposed Augmentations 179
23.5.1 Peak Hour 179
23.5.2 Fire Flow 179
23.6 Augmentation Timing 179
23.6.1 Existing System at 2016 Demands 179
24. 402 Dunwich 185
24.1 DMA Topography and Land Use 185
24.2 Previous Planning 185
24.3 Current System Configuration and Source of Supply 185
24.4 Existing System Performance at Ultimate Demands 185
24.4.1 Peak Hour 185
24.4.2 MD Minimum Hour 186
24.4.3 Fire Flow 186
24.4.4 Water Quality 187
24.5 Proposed Augmentations 187
25. 403 Point Lookout 192
25.1 DMA Topography and Land Use 192
25.2 Previous Planning 192
25.3 Current System Configuration and Source of Supply 192
25.4 Existing System Performance at Ultimate Demands 192
25.4.1 Peak Hour 192
25.4.2 MD Minimum Hour 193
25.4.3 Fire Flow 193
25.4.4 Water Quality 193
25.5 Proposed Augmentations 193
26. Proposed Works 198
26.1 Interaction with Renewal Program 199
27. Cost Estimates 201
27.1 Methodology 201
27.1.1 Base Year for Costs 201
27.1.2 Base Rates (for pipelines) 201
27.1.3 Soil Type Adjustment Factor (for pipelines) 201
Development Density of site (for pipelines) 202
27.1.4 Submarine Adjustment Factor (for pipelines) 203
27.1.5 Island Adjustment Factor 203

27.1.6 Adjustment for Subsidies 204
27.1.7 Risk Management Contingency Allowance 204
27.1.8 Administrative Costs 205
27.2 Summary of Costs 205
27.2.1 Augmentation Costs 205
28. Conclusions and Recommendations 208
28.1 Summary of Findings and Conclusions 208
28.2 Recommendations 208
28.2.1 Demand Projections 208
28.2.2 Major Trunk Network Augmentations Required 208
28.2.3 Fire Flow Augmentations 208
28.2.4 Water Quality 208
28.2.5 DMA Operations 209
28.3 Seqwater Liaison 209
28.4 Summary Recommendations 209
29. References 210
Appendix A DMA Names and Numbers A-1
Appendix B Pressure Loss through Modulated PRVs B-1
Appendix C Building Class Descriptions C-1
Appendix D DEWS Guideline Extract D-1
Appendix E Landuse Codes and Adopted Fire Flow E-1
Appendix F Planning Scheme Zones and Adopted Fire Flows F-1

List of Tables

Table 1.1 – MUID Naming Convention 22
Table 2.1 – Water Supply Design Criteria 26
Table 3.1 – Adopted Demands Equivalent Persons by ICS zone 29
Table 3.2 – Adopted Demands by DMA 29
Table 4.1 – Adopted Diurnal Patterns for the Zone Description 33
Table 4.2 – Adopted Diurnal Patterns for the Zone Description 34
Table 4.3 – Adopted Diameters 35
Table 6.1 – PRV Modulation Profile DMA 101 39
Table 7.1 – PRV Modulation Profile DMA 102 46
Table 11.1 - DMA 106 2036 Fire Flow Issues 70
Table 11.2 - DMA 106 2036 Proposed Fire Flow Augmentations 71
Table 11.3 - DMA 106 2016 Available FF without augmentation 71
Table 12.1 - DMA 201 2036 Fire Flow Issues 78
Table 12.2 - DMA201 2036 Proposed Fire Flow Augmentations 79
Table 12.3 - DMA 201 2016 Fire Flow Issues 79
Table 13.1 - DMA 202 2036 Fire Flow Issues (PRV42m) 85
Table 13.2 - DMA 202 2036 Fire Flow Issues (PRV38m) 86
Table 13.3 - DMA 202 2016 Fire Flow Issues (PRV38m) 87
Table 14.1 - DMA203 2036 Fire Flow Issues 93
Table 14.2 - DMA203 2036 Proposed Fire Flow Augmentations (PRV 60m) 93
Table 14.3 - DMA203 2016 Fire Flow Results Summary (PRV 60) 94
Table 14.4 - DMA203 2021 Fire Flow Results Summary (PRV 60m) 94
Table 14.5 - DMA203 2021 Fire Flow Results Summary (PRV 60m) 94
Table 15.1 - DMA204 2036 PH Results Summary (PRV = 64m) 102
Table 15.2 - DMA204 2036 FF Results Summary (PRV = 64m) 102
Table 15.3 - DMA214 2036 FF Results Summary 104
Table 15.4 - DMA204 2016 FF Results Summary (PRV = 64m) 104
Table 17.1 - DMA206, 207 and 212 PH Results Summary 119
Table 17.2 - DMA206, 207 and 212 MD Minimum Hour Results Summary 119
Table 17.3 - DMA206, 207 & 212 Fire Flow analysis timing (2/3PH) 120
Table 17.4 - Mt Cotton FF Results Summary 120
Table 18.1 - DMA208 and 209 PH Results Summary 125
Table 18.2 - DMA208 and 209 MD Minimum Hour Results Summary 126
Table 18.3 - DMA208 and 209 FF Results Summary 126
Table 18.4 - DMA208 2036 Proposed Fire Flow Augmentations 127
Table 18.5 - DMA208 2016 Fire Flow Results 127
Table 19.1 - DMA210 2016 Proposed Headloss Augmentations 139
Table 19.2 - DMA210 FF Results Summary 140
Table 19.3 - DMA210 2036 Proposed Fire Flow Augmentations (19:30) 141
Table 19.4 - DMA210 2036FF with Proposed Fire Flow Augmentations 141
Table 19.5 - DMA210 2016 FF Results Summary 143
Table 19.6 - DMA210 2016 Proposed Fire Flow Augmentations (06:30) 143
Table 20.1 - DMA301 2036 FF Results 150
Table 21.1 - W004 2036 FF Results 157
Table 21.2 - W004 2036 Proposed Fire Flow Augmentations 158
Table 21.3 - W004 2016 FF Results 159
Table 21.4 - W004 2016 Fire Flow Augmentations 159
Table 21.5 - W004 2026 Fire Flow Augmentations 160
Table 22.1 - DMA308 2036 FF Results 173
Table 23.1 - DMA401 2036 Fire Flow Augmentations 179
Table 24.1 - DMA402 2036 FF Results 186
Table 25.1 - DMA402 2036 FF Results 193
Table 26.1 - Summary of Proposed Augmentations 198
Table 27.1 – Adopted Soil Types 201
Table 27.2 – Adopted Density 203
Table 27.3 – Island Adjustment Factors 204
Table 27.4 – Future Augmentation Costs 205

List of Figures

Figure 1-1 – Redland Water Infrastructure Leakage Index 19
Figure 1-2 – Consumption Trends 20
Figure 1-3 – Water main breaks (no. per 100km of water main) 20
Figure 1-4 – Real losses (L/service connection/day) 21
Figure 1-5 – Redland Water Supply System Configuration 24
Figure 1-6 – Water Supply ICS Zones 25
Figure 4-1 - Diurnal Patterns 34
Figure 5-1 - Example augmentation connecting dead ends 38
Figure 5-2 - Example where existing main is to be upsized due to age of existing main 38
Figure 5-3 - Example where main is augmented with a parallel main 38
Figure 6-1 - 101 Russell Island East Topography 41
Figure 6-2 - 101 Russell Island East Planning Scheme 42
Figure 6-3 - 101 Russell Island East Existing System with 2036 PH Demands 43
Figure 6-4 - 101 Russell Island East Existing System 2036 FF Results 44
Figure 6-5 - 101 Russell Island East 2036 FF Results with Augmentations 45
Figure 7-1 - 102 Russell Island West Topography 48
Figure 7-2 - 102 Russell Island West Planning Scheme 49
Figure 7-3 - 102 Russell Island West Existing System with 2036 PH Demands 50
Figure 7-4 - 102 Russell Island West Existing System 2036 FF Results 51
Figure 8-1 - 103 Karragarra Island Topography 53
Figure 8-2 - 103 Karragarra Island Planning Scheme 54
Figure 8-3 - 103 Karragarra Island Existing System with 2036 PH Demands 55
Figure 8-4 - 103 Karragarra Island Existing System 2036 FF Results 56
Figure 9-1 - 104 Lamb Island Topography 58
Figure 9-2 - 104 Lamb Island Planning Scheme 59
Figure 9-3 - 104 Lamb Island Existing System with 2036 PH Demands 60
Figure 9-4 - 104 Lamb Island Existing System 2036 FF Results 61
Figure 10-1 - 105 Macleay Island Topography 64
Figure 10-2 - 105 Macleay Island Planning Scheme 65
Figure 10-3 - 105 Macleay Island Existing System with 2036 PH Demands 66
Figure 10-4 - 105 Macleay Island Existing System 2036 FF Results 67
Figure 10-5 - 105 Macleay Island 2036 FF Results with Augmentations 68
Figure 11-1 - 106 Serpentine Creek Topography 72
Figure 11-2 - 106 Serpentine Creek Planning Scheme 73
Figure 11-3 - 106 Serpentine Creek Existing System with 2036 PH Demands 74
Figure 11-4 –106 Serpentine Creek Existing System 2036 FF Results 75
Figure 11-5 –106 Serpentine Creek 2036 FF Results with Augmentations 76
Figure 11-6 – Redland Bay State School Critical Junctions 77
Figure 12-1 - 201 Heinemann Road Topography 80
Figure 12-2 - 201 Heinemann Road Planning Scheme 81
Figure 12-3 - 201 Heinemann Road Existing System with 2036 PH Demands 82
Figure 12-4 - 201 Heinemann Road Existing System 2036 FF Results 83
Figure 12-5 - 201 Heinemann Road 2036 FF Results with Augmentations 84
Figure 13-1 - 202 Boundary Street Topography 88
Figure 13-2 - 202 Boundary Street Planning Scheme 89
Figure 13-3 - 202 Boundary Street Existing System with 2036 PH Demands 90
Figure 13-4 - 202 Boundary Street Existing System 2036 FF Results 91
Figure 14-1 - 203 Benfer Road Topography 95
Figure 14-2 - 203 Benfer Road Planning Scheme 96
Figure 14-3 - 203 Benfer Road Existing System with 23036 PH Demands 97
Figure 14-4 - 203 Benfer Road Existing System 2036 FF Results 98
Figure 14-5 - DMA203 2036 Pressures at 12:00 with 30L/s at J14733 99
Figure 14-6 - 203 Benfer Road 2036 FF Results with Augmentations 100
Figure 15-1 - 204 Bunker Road South Topography 106
Figure 15-2 - 204 Bunker Road South Planning Scheme 107
Figure 15-3 - 204 Bunker Road South Existing System with 2036 Demands 108
Figure 15-4 - 204 Bunker Road South Existing System 2036 FF Results 109
Figure 15-5 - 204 Bunker Road South 2036 PH Results with Augmentations 110
Figure 15-6 - 204 Bunker Road South 2036 FF Results with Augmentations 111
Figure 16-1 - 205 Victoria Point Topography 114

Figure 16-2 - 205 Victoria Point Planning Scheme 115
Figure 16-3 - 205 Victoria Point Existing System with 2036 PH Demands 116
Figure 16-4 - 205 Victoria Point Existing System 2036 FF Results 117
Figure 17-1 -206, 207 & 212 Mt Cotton Topography 121
Figure 17-2 -206, 207 & 212 Mt Cotton Planning Scheme 122
Figure 17-3 -206, 207 & 212 Mt Cotton Existing System with 2036 PH Demands 123
Figure 17-4 - DMA206, 207 & 212 Mt Cotton Existing System 2036 FF results 124
Figure 18-1 - 208 and 209 Topography 128
Figure 18-2 - 208 and 209 Planning Scheme 130
Figure 18-3 - 208 and 209 Existing System with 2036 PH Demands 132
Figure 18-4 - 208 and 209 Existing System 2036 FF Results 134
Figure 18-5 - 208 and 209 2036 FF Results with Augmentations 136
Figure 19-1 - Ingham's demand pattern 139
Figure 19-2 - PRV210 2036 Inflow 140
Figure 19-3 - PRV210 2016 Inflow 142
Figure 19-4 - PRV210 2016 Pressures (PRV set at 54.5 m) 143
Figure 19-5 - 210 Thornlands Topography 145
Figure 19-6 - 210 Thornlands Planning Scheme 146
Figure 19-7 - 210 Thornlands Existing System 2036 PH Demands (PRV = 44.1m) 147
Figure 19-8 - 210 Thornlands Existing System 2036 FF Results (PRV = 48.3m) 148
Figure 19-9 - 210 Thornlands 2036 FF Results with Augmentations (PRV = 53.8 m) 149
Figure 20-1 - 301 Howletts Road Topography 152
Figure 20-2 - 301 Howletts Road Planning Scheme 153
Figure 20-3 - 301 Howletts Road Existing System with 2036 PH Demands 154
Figure 20-4 - 301 Howletts Road Existing System 2036 FF Results 155
Figure 21-1 - W004 Alexandra Hills LLZ Topography 161
Figure 21-2 - W004 Alexandra Hills LLZ Planning Scheme 163
Figure 21-3 - W004 Alexandra Hills LLZ Existing System with 2036 PH Demands (1 Capalaba BP) 165
Figure 21-4 - W004 Alexandra Hills LLZ Existing System with 2036 PH Demands (No Capalaba BPs) 167
Figure 21-5 - W004 2036 Fire Flow Results 169
Figure 21-6 - W004 2036 Fire Flow Results with Augmentations 171
Figure 22-1 - 308 Alexandra Hills HLZ Topography 174
Figure 22-2 - 308 Alexandra Hills HLZ Planning Scheme 175
Figure 22-3 - 308 Alexandra Hills HLZ Existing System with 2036 PH Demands 176
Figure 22-4 - 308 Alexandra Hills HLZ Existing System 2036 FF Results 177
Figure 23-1 - 401 Amity Point Topography 180
Figure 23-2 - 401 Amity Point Planning Scheme 181
Figure 23-3 - 401 Amity Point Existing System with 2036 Demands 182
Figure 23-4 - 401 Amity Point 2036 FF Results 183
Figure 23-5 - 401 Amity Point 2036 FF Results with Augmentations 184
Figure 24-1 -402 Dunwich Topography 188
Figure 24-2 -402 Dunwich Planning Scheme 189
Figure 24-3 -402 Dunwich Existing System with 2036 Demands 190
Figure 24-4 -402 Dunwich Existing System 2036 FF Results 191
Figure 25-1 - 403 Point Lookout Topography 194
Figure 25-2 - 403 Point Lookout Planning Scheme 195
Figure 25-3 - 403 Point Lookout Existing System with 2036 PH Demands 196
Figure 25-4 - 403 Point Lookout Existing System 2036 FF Results 197
Figure 26-1 - Interaction of Renewals Program and future pipe augmentations 200
Figure 27-1 - Redland City Adopted Soils 207

Notation and Abbreviations

AC	Asbestos Cement
AD	Average Day Demand
AHD	Australian Height Datum
AHR	Alexandra Hills Reservoir complex
BRN	Bunker Road North (control valve in the gravity trunk main between HRR and AHR)
BWL	Bottom Water Level
CMP	Critical Monitoring Point
CV	Control Valve
CWS	Clear Water Storage
DMA	District Meter Area
DNRM	Department of Natural Resources and Mines
DSS	Desired Standards of Service
EP	Equivalent Person
EPI	Eastern Pipeline Interconnector
FF	Fire Flow
FCV	Flow Control Valve
FF DSS	Fire Flow Desired Standards of Service in the (NRW) Planning Guidelines for Water Supply and Sewerage – Chapter 6 – Network Modelling (June 2007 version)
GCW	Gold Coast Water
GIS	Geographical Information System
HLZ	High Level Zone
HRR	Heinemann Road Reservoir complex
IDM	Infrastructure Demand Model
ICS	Infrastructure Charges Schedule
LLZ	Low Level Zone
NRW	Department of Natural Resources and Water
PASS	Potential Acid Sulphate Soils
PH	Peak Hour (peak diurnal flow on the Maximum Day)
PIP	Priority Infrastructure Plan
MCR	Mount Cotton Reservoir
MD	Maximum Day Demand
MDA	Major Development Area
MDMM	Mean Day Maximum Month Demand
MSCL	Mild Steel Cement Lined
MUID	Mike Urban Identification Number
NSI	North Stradbroke Island
PLMP	Pressure and Leakage Management Program
PRV	Pressure Reducing Valve

QAO	Queensland Audit Office
RCC	Redland City Council
RCP	Redland City Plan
RPS	Redland Planning Scheme
SEQ	South East Queensland
SMBI	Southern Moreton Bay Islands (Russell, Macleay, Karragarra and Lamb Island's)
TWL	Top Water Level
WEMP	Water Efficiency Management Plan
U/S	Up Stream
WSZ	Water Supply Zone
WTP	Water Treatment Plant

Executive Summary

As part of the development of the Redland City Council Local Government Infrastructure Plan and the Redland Water Netserv Plan, the Redland Water, Water Supply Master Plan has been reviewed and updated. This updated version of the Master Plan takes inputs from the draft Redland City Plan, including new population projection information and new employment growth information and assesses their impact on the water supply network at the 2036 planning horizon. This Master Plan builds on the strategies that were proposed in the 2011 version of the plan following the completion of the Pressure and Leakage Management Program in Redlands.

Key Changes

Since the completion of the previous version of the Water Supply Master Plan a number of new development areas have commenced in Redland City – South East Thornlands and Kinross Road in particular. The previous Master Plan demand projections were based on the Redland Planning Scheme and demand rate of 300L/EP/day. This version of the Master Plan adjusts that demand rate down to 230L/EP/day (including leakage component) in line with current consumption trends.

Exclusions

The full demand from PDAs and Emerging Communities zoned land within the draft Redland City Plan has not been considered within the 2036 planning horizon of this report. The full extent of the demand growth in these areas is not included in the IDM and reference needs to be made to the connection policy in the Netserv Plan with respect to allowable demands in these areas. No trunk network augmentations are considered for these areas and are therefore not included in any financial modelling or infrastructure charges calculations.

Major Trunk Network Augmentations

The major trunk main augmentations identified in this report are:

- the extension of the trunk main along Kinross Road, from the section constructed by Redland Water along Boundary Road to the section constructed by the developer of estate including East Ridge Road; and
- duplication of part of the trunk main servicing the Amity Point township on North Stradbroke Island.

It is identified that the Thornlands DMA (PRV 210) will require an upgrade to minimise the loss of pressure through the bypass arrangement and PRV itself as demand increases on the network.

Detailed planning studies on the timing and detail of these trunk augmentations are recommended before the timing triggers identified in this report are met.

Fire Flow Augmentations

This Master Plan has identified a number of augmentations for the water supply network in order to maintain adequate fire flow provision. Some of these augmentations will need to be incorporated into future development approvals for the areas of concern. Coordination of this with RCC Engineering Assessment Team in the conditioning of developments will be required. It is recommended that the actual performance of the water supply network at some of these key locations be monitored over time to confirm timing of the augmentations and to assess the validity of the theoretical model versus the actual network performance.

North Stradbroke Island Demand Projections

Demand projections for the townships on North Stradbroke Island can be improved by the use of detailed projections for each township rather than the whole of city approach used for this report. When the potential impacts of the end of mining on the island are known, it is recommended that water supply planning for each of townships is reviewed.

Water Quality

This Master Plan has attempted to address water quality issues in the consideration of the augmentations proposed, but in order to better understand nature of the network configuration on water quality, a detailed study of the water quality kinetics in the Redland Water distribution system needs to be undertaken. This potential project could build on the work of the regional bulk network water quality model recently completed by the SEQ Water Partnership. Continued system quality monitoring and proactive maintenance procedures like regular flushing dead ends will continue to be critical to maintaining good water quality in the water supply network.

PRV / DMA Operations

Modelling undertaken for this report has identified a number of PRV settings that may need slight modification into the future to continue to meet the desired standards of service. Regular field tests of the available flows and pressures should be undertaken within DMAs to confirm requirement and timing of these changes. In some cases PRV modulation is potentially required. Investigations into the optimum method of operating the PRV and any flow modulation unit are recommended.

Seqwater Liaison

Seqwater will need to be advised of the outcomes of this study, particularly in relation to the following items:

- Confirmation that the Mt Cotton Trunk Main system will continue to not be operated in a north to south direction. In addition the HGL at the offtake point for the Thornlands DMA will need to be confirmed in respect to the value currently included in the Operating Protocols.
- Consider undertaking a joint planning study using a Redland 'all-pipes' model to assess some of the options proposed in the draft Eastern Area Planning Report.
- Continue to work with Seqwater through the Operating Protocols and the Seqwater planning processes to ensure that it is known that the use of the Capalaba WTP High Lift Pumps are required at peak hour at 2036 to provide suitable pressures to some areas in the Alexandra Hills LLZ during peak demands.
- Continue to operate the Bunker Road North valve and its subsequent main to ensure that water quality problems due to non-use do not eventuate, noting that this also significantly assists with managing water quality outcomes in the Alexandra Hills Water Supply Zone by allowing mixing of water from North Stradbroke Island Water Treatment Plan and the Capalaba Water Treatment Plant.

Estimated Costs

Cost estimates have been completed based on the rates used for the 2012 Redland Water Asset Revaluation with indexing to 2016 values and are detailed in Section 27.

A summary of the costs are included on the table on the next page.

Recommendations

It is recommended that:

- The augmentation strategies detailed in this report are adopted for the purpose of input into the Local Government Infrastructure Plan and the Netserv Plan.
- The proposed augmentations should also form the basis of the next revision of the capital work program.
- A formal joint study is proposed to resolve the unresolved components of the Seqwater Eastern Area Long Term Planning Report.

DMA	MUID	ICS Zone	Dia (mm)	Length (m)	Reason	Cost
2016						
DMA101	PIP_AUG44	SMBI Zone	100	58	Fire Flow	$17,000
DMA106	FF_AUG_106_P1	Heinemann Rd Zone	158	307	Fire Flow	$93,000
	FF_AUG_106_P2	Heinemann Rd Zone	150	850	Fire Flow	$209,000
	PIP_NEWAUG4	Heinemann Rd Zone	150	140	Fire Flow	$40,000
	PIP_NEWAUG9	Heinemann Rd Zone	150	250	Fire Flow	$72,000
	PIP_AUG6	Heinemann Rd Zone	209	400	Fire Flow	$144,000
	PIP9705	Heinemann Rd Zone	157	151	Fire Flow	$37,000
DMA201	PIP_AUG51	Heinemann Rd Zone	200	325	Fire Flow	$108,000
DMA203	PIP_IC9_Opt2	Heinemann Rd Zone	259	403	Fire Flow	$197,000
DMA208	PIP_NEWAUG8	Mt Cotton Zone	150	160	Fire Flow	$39,000
	PIP_NEWAUG6	Mt Cotton Zone	150	136	Fire Flow	$33,000
DMA210	PIP_NEWAUG1	Mt Cotton Zone	150	91	Fire Flow	$26,000
	PIP_NEWAUG2_Opt2_P1	Mt Cotton Zone	150	96	Fire Flow	$28,000
DMA401	PIP_NEWAUG14_P1	Amity Zone	200	1101	Fire Flow	$617,000
	PIP_NEWAUG14_P2	Amity Zone	200	718	Fire Flow	$381,000
	Install Hydrant	Amity Zone	-	-	Fire Flow	$5,000
W004	FF_AUG_305_P10	Alex Hills Zone	158	231	Fire Flow	$67,000
	FF_AUG_305_P15	Alex Hills Zone	158	164	Fire Flow	$47,000
	PIP_AUG11_Opt1	Alex Hills Zone	100	219	Fire Flow	$43,000
	PIP_AUG12	Alex Hills Zone	100	4	Fire Flow	$1,000
	PIP_AUG29	Alex Hills Zone	100	117	Fire Flow	$47,000
	PIP_NEWAUG10	Alex Hills Zone	100	89	Fire Flow	$37,000
2021						
DMA208	PIP_IC14A	Mt Cotton Zone	300	313	Headloss	$172,000
	PIP_IC13_P1	Mt Cotton Zone	300	212	Headloss	$116,000
	PIP_IC13_P2	Mt Cotton Zone	300	573	Headloss	$315,000
DMA210	Upgrade PRV210	Mt Cotton Zone	250	N/A	Peak Hour & Fire Flow	$105,000
DMA214	Install PRV214	Heinemann Rd Zone	200	N/A	Peak Hour & Fire Flow	$91,000
2026						
W004	PIP_AUG30	Alex Hills Zone	150	62	Fire Flow	$23,000
2031						
DMA105	PIP_AUG46	SMBI Zone	104	284	Fire Flow	$83,000

1. Introduction

The Redland City Council water supply network supplies potable water to approximately 96% of the population on the mainland, the Southern Moreton Bay Islands of Russell Island, Macleay Island, Lamb Island and Karragarra Island and Coochiemudlo Island as well as separate water supply schemes for each of the North Stradbroke Island (NSI) townships of Dunwich, Amity Point and Point Lookout.

The majority of the city is connected to the scheme supplied by Seqwater's Water Treatment Plants (WTPs) at Capalaba and NSI. A third source is available for the mainland scheme via Seqwater's Eastern Pipeline Interconnector (EPI). Water for the Capalaba WTP is sourced from the Leslie Harrison Dam while water from the NSI WTP can be sourced from either Herring Lagoon or a series of bores on the island. Water from the EPI can be sourced from a number of WTPs depending on the operating regime of the broader SEQ water supply scheme. The most likely supply source for the EPI in easterly flow direction is water from the Mount Crosby WTP.

The WTPs that supply Redland City are owned and operated by Seqwater. Seqwater also own and operate all mainland reservoirs and the trunk mains that supply these reservoirs. Seqwater's long term planning commences with the Water Security Program – *Water for Life*. The focus of the Water Security Program is the supply volume side of the equation. Subsequent detailed reports are being prepared – "Long-term Master Plans" – which focus of the transport side of the Seqwater business.

The outcomes of this plan in terms of network augmentations to service growth form part of the Redland Water Netserv Plan and will be used as part of RCC's Local Government Infrastructure Plan (LGIP).

1.1 Background

Redland Water is a commercial business unit of RCC and recommenced operations on 1 July 2012, after the two (2) years that Allconnex Water was the water and sewerage service provider in Redland City. Redland Water's primary functions are to provide its customers with safe, reliable and high quality water services, as well as to collect and treat wastewater. RW is also responsible for charging customers for water and wastewater services.

Redland Water performs a distribution and retail role for water supply in Redland City. Seqwater as the bulk water authority treats and transports bulk water to bulk water supply points within Redland City. The ownership breakdown of trunk assets is shown on Figure 1-5. Bulk Water Supply Points are documented in the Supply Contract between Redland City Council and Seqwater and the Operating Protocols (requirement under the Bulk Water Supply Code) between Redland City Council and Seqwater.

1.2 Previous Planning

The most recent whole of system planning document is the Water Supply Network Master Plan Northern District Revision 3 May 2011. That Master Plan contains details of the basis of the network modelling and the network configuration ("open network" versus partially closed DMA network). At the time of preparation of that version of the plan, Redland Water was participating in regional drought management activities including the Pressure and Leakage Management Program (PLMP). The PLMP resulted in a number of pressure managed District Meter Areas (DMAs) being formed in the southern part of the service area. The layout of the water supply zones (WSZs) and DMAs can be seen in Figure 1-6.

Since the preparation of the previous version of the Master Plan, the capital works program identified within it has been progressively built subject to actual demand triggers for construction being met and budgetary approval. No other whole of system planning reviews have been undertaken since that time. Reviews of individual planned augmentations have been undertaken to ensure that demand triggers have been met before funding submissions are made.

Prior to completion of that Master Plan, Redland Water undertook a complete rebuild of its water supply network model using DHI's software Mike Urban. This new model was a significant improvement on the preceding one in terms of the extent of network elements included and accuracy of their attributes. The data collected as part of the PLMP has also given a good density of network pressure information and reasonable density of network flow information on which the verification of the model has been completed. Model verification information is contained in the individual District Meter Area (DMA) reports prepared as part of the PLMP and referenced in **Section 29**. Where there is no DMA Report the verification is included in the Model Verification Report (Allconnex Water, April 2011b).

The background reports used in the preparation of this version of the Master Plan include:

1.2.1 System Reliability Modelling

The report, *Redland Water Reliability of Mainland Water Supply Distribution System, April 2015*, assessed the reliability of the distribution network for the mainland scheme against risk of failure in the system compared to an acceptable probability of failure to the affected area.

Key findings of this report were that all supply areas could be provided with secondary supplies by re-opening of DMA boundary valves. However there are two areas that do not have the ability to do this – the DMA that includes the supply to Coochiemudlo Island and Howletts Road Booster Pump zone.

Failures in the supply of the DMA up to the submarine pipeline from the mainland to Coochiemudlo Island can also be addressed by opening boundary valves to the adjoining DMA. There is only a single submarine main to Coochiemudlo Island itself but the risk of failure of the submarine main is considered to be less that the acceptable risk of failure for the island community. No direct augmentation options were considered in this Master Plan for this area as a result of the reliability modelling.

The Howletts Road Booster pump zone could be supplied with emergency supply pressures via a non-return valve connection/s in the event of a pump station failure. This approach has been adopted in this report as the preferred network arrangement for the zone to ensure that fire flow augmentations are limited to the most efficient options possible.

1.2.2 Hydraulic Model

Redland Water has used its Mike Urban hydraulic model for the preparation of this Master Plan. Details of the verification of the hydraulic model can be found in the individual DMA reports prepared as part of the PLMP and referenced in **Section 29** Where there is no DMA Report the verification is included in the Model Verification Report (Allconnex Water, April 2011b).

1.2.3 Redland Water – Water Supply System Fire Flow Review

The report *Redland Water – Water Supply System Fire Flow, July 2009,* was used as an input to identify areas of concern to be looked at with respect to fire flow provision. Where possible fire flow demands and required augmentations have been considered in this report.

1.2.4 Seqwater – Water Security Program

Seqwater completed and released the first version of the Water Security Program as part of the 'Water for Life' plan on 6 July 2015. The Water Security Program sets out a blueprint for the secure delivery of bulk water to South East Queensland. Using demand forecasts developed in conjunction with distribution / retail entities (like Redland City Council), the Water Security Program assesses the likely timing of augmentations of the bulk water supply assets. The conclusions from the Water Security Program most relevant to this report are that the next bulk water source is likely to be required sometime after 2030, and is most likely to not be in the Redland City Council (Eastern Area network) of Seqwater's system. Seqwater are presently working on the second version of the plan due for release in 2017.

1.2.5 Seqwater – Eastern Area Network – Long Term Planning Report

Seqwater have provided the *Eastern Network Draft Long Term Planning Report Rev B, 26 June 2015* which is intended to establish a 30 year investment strategy for the network assets (Water Treatment Plants, Reservoirs, Pump Stations and bulk water pipelines) in the Redland area. Their preferred strategy is broken down into a series of investigations and recommended actions on short, medium and long-term timelines.

Key outcomes from the Seqwater report that impact on the time horizon of this report are that no significant changes are planned for the bulk water network assets.

Further work will however be required subsequent to this Master Plan to asses some of the issues that were identified in the Seqwater report, using the Redland 'all pipes' model rather than just the Seqwater bulk model (e.g. water quality modelling from Ney Road to Alexandra Hills reservoir complex, or assessing the impacts of mains replacement options in the Redland network).

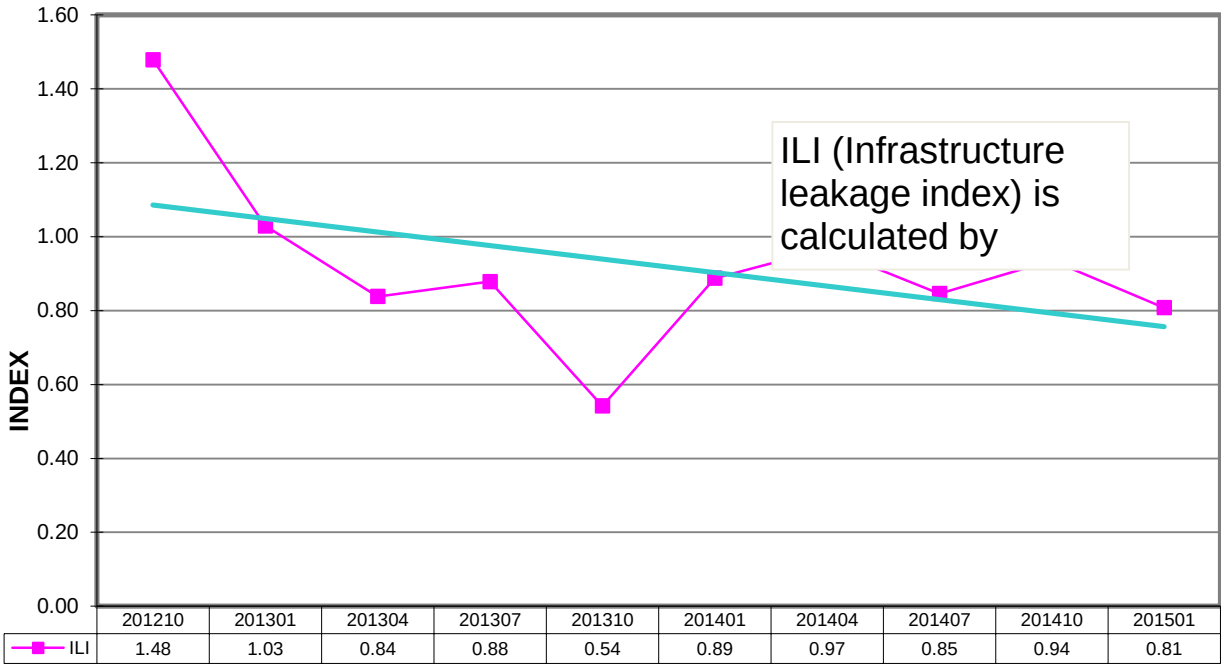
1.3 Pressure and Leakage Management Project Outcomes

International best practice for the measurement of water savings generated in DMAs is generally done on a DMA specific basis. Reporting at this level and data collection system maintenance stalled during the Allconnex Water period, so at the moment it is only possible to report on an RCC-wide basis.

Using a whole of network water balance does not necessarily exclude other factors at play over this time period such as reduced consumption due to restrictions and other demand management strategies such as Water Efficiency Management Plans (WEMPs) or in fact increased consumption during times of drought or other emergent situations like flooding and associated clean-up works, but it none the less does show a trend in the leakage of the network.

Using this above referenced (IWA) methodology, it can be seen in Figure 1-1 and Figure 1-2, that the current leakage trends and consumption trends appear relatively static (data smoothing across consumption periods considered). Note that due to missing data before 2012, trend information is shown only from July 2012 since Redland Water recommenced operations.

Figure 1-1 – Redland Water Infrastructure Leakage Index

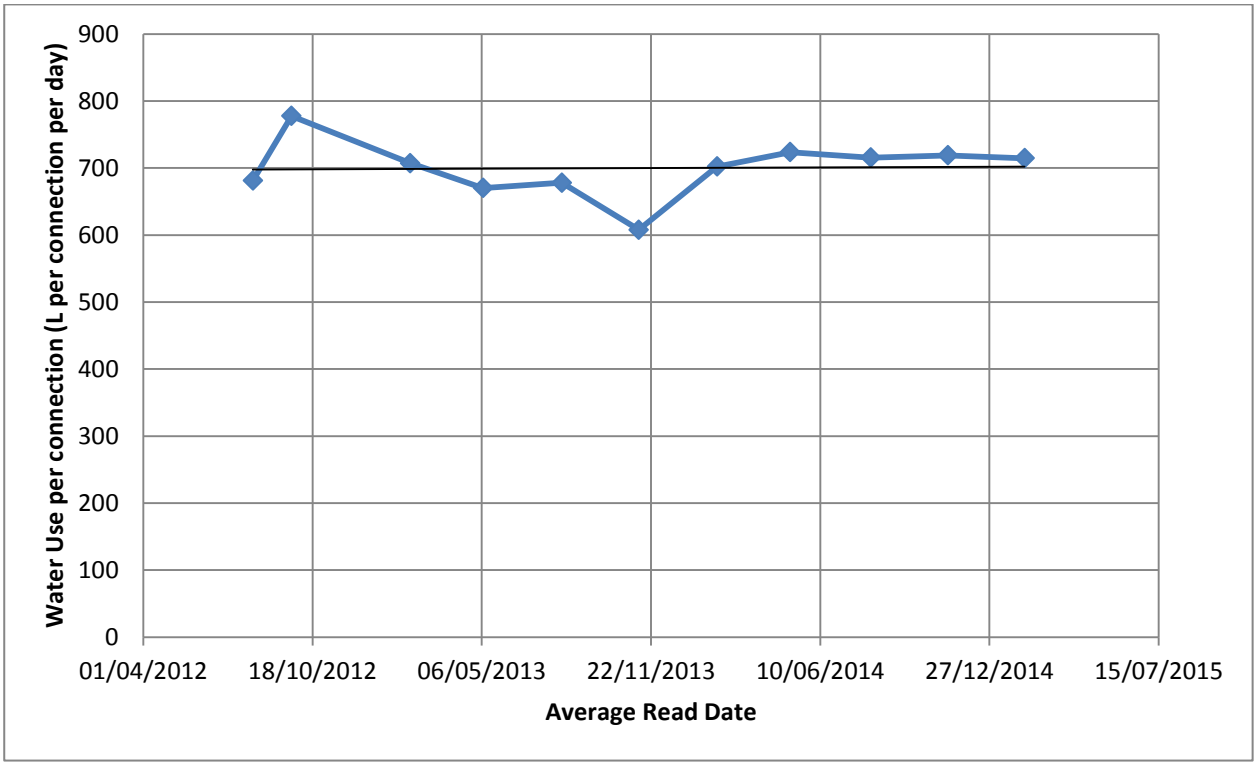


	201210	201301	201304	201307	201310	201401	201404	201407	201410	201501
ILI	1.48	1.03	0.84	0.88	0.54	0.89	0.97	0.85	0.94	0.81

TIME

Redland Water is presently working on reporting mechanisms through the Business Intelligence (BI) software system to report regularly on water losses at a water supply scheme level.

Figure 1-2 – Consumption Trends



Other relevant asset condition indicators for the water supply network are 'water main breaks' and 'real water losses'. The following figures are generated from information in *Queensland's Urban Potable Water and Sewerage Benchmarking Report 2014/15*, produced by qldwater.

Figure 1-3 – Water main breaks (no. per 100km of water main)

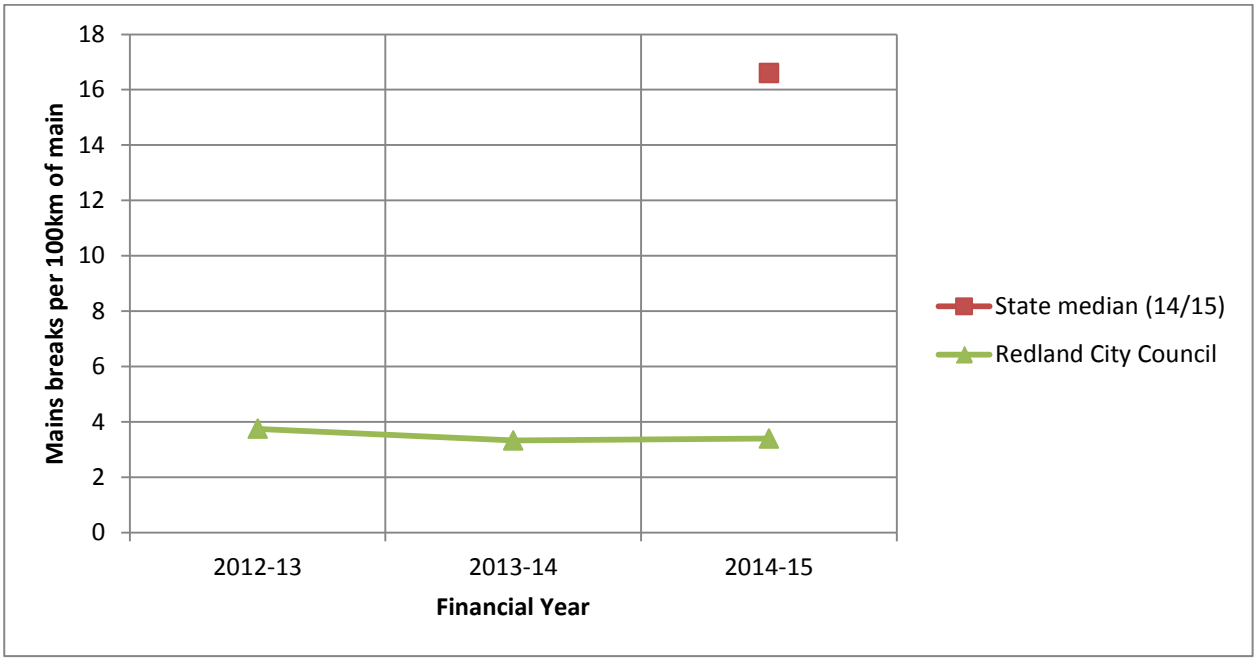
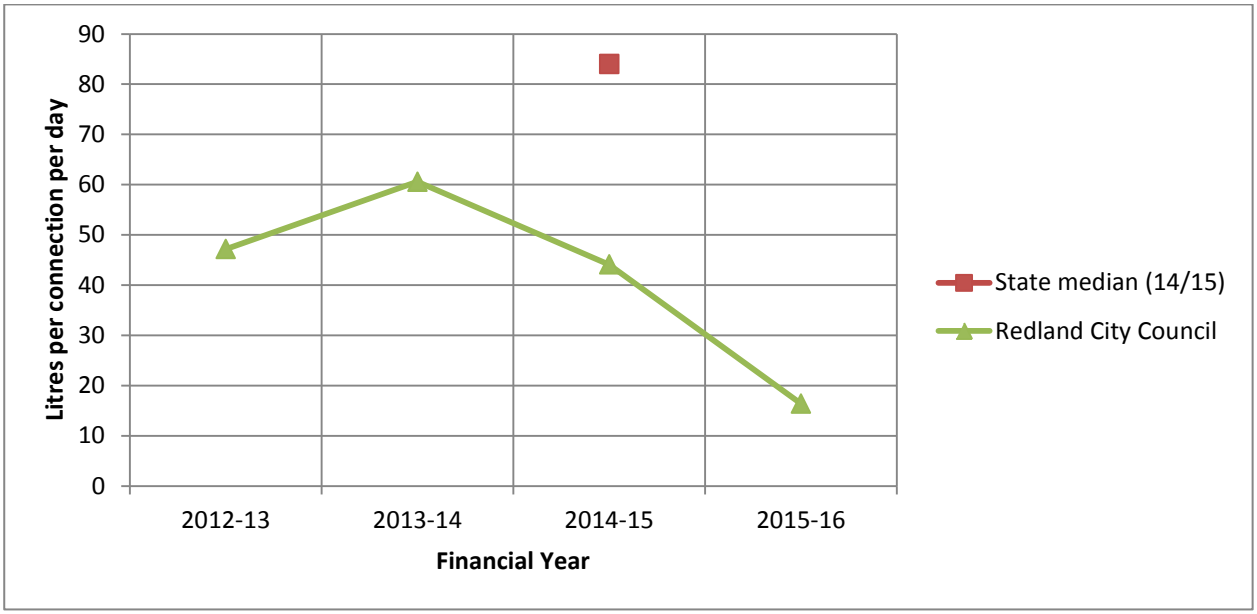


Figure 1-4 – Real losses (L/service connection/day)



Both Figure 1-3 and Figure 1-4 indicate that the Redland City Council water supply system is in comparatively good condition.

1.4 Links to Redland City Council Corporate Plan

As shown in Appendix 1 of the Redland City Council Corporate Plan 2015 – 2020, Redland Water's primary objective is to provide safe drinking water and wastewater collection, treatment, reuse and disposal while:

1. meeting Redland Water Customer Service Standards and the Customer Water and Wastewater code
2. protecting the health and safety of its workers and the community
3. preventing adverse impacts on the natural environment and the community.

This report supports the provision of a continuous supply of clean drinking water at an adequate pressure and flow rate for household and business needs and the planning and construction and maintenance of infrastructure and assets – (reference the Significant Business Activity services listed in the Corporate Plan).

Of the key Redland City Council documents listed in Appendix 3 of the Corporate Plan, this Master Plan report directly supports the Preparation of the Local Government Infrastructure Plan.

1.5 Purpose of the Master Plan

The purpose of this Master Plan is to review the proposed network augmentations relative to the growth pattern provided in the Redland City Plan out to the year 2036, current network operating philosophy and any mooted changes coming out of Seqwater's Water Security Program. Where possible a review of the proposed augmentations against the current renewals plan has also been conducted.

The output from this report is expected to form the basis for the future detailed planning of the water supply network in Redland. The focus for this report has been to identify the trunk network augmentations required, but where appropriate, recommendations are made about the general or schematic form that reticulation augmentations (including future development layouts) should take. It is expected that for development reticulation, the developer will undertake detailed network modelling to determine the appropriate network sizes and the requirement for any reticulation network augmentations. The intent of this Master Plan should be considered when sizing the new development reticulation pipework.

To assist the utilisation of the outputs from this report in future reports, the following naming methodology has been adopted for the proposed augmentations.

The infrastructure has been divided into four (4) basic categories:

Table 1.1 – MUID Naming Convention

Prefix to MUID	Description
PIP_ICXX *Eg PIP_IC24*	**Mainland & SMBI** - Augmentations that are greater than 300mm dia and are therefore part of the infrastructure charges
	NSI Townships - Mains connecting WTPs to reservoir complexes or township boundaries, and mains connecting reservoir complexes and high level zones (either pump boosted zones or elevated reservoir zones).
PIP_AUGXX *Eg PIP_AUG42* *or PIP_NEWAUG42*	**Mainland & SMBI** - Augmentations that are less than 300mm dia that is not require to directly service new connections, but are needed to meet the future demands.
	NSI Townships - Mains that are not considered to be PIP_IC mains.
PIP_XXXXX *Eg PIP12574*	Infrastructure that will be built as part of future developments as part of the reticulation. This infrastructure is included so the needed cross connections can be included in future development applications.
FF_AUG_XXX_XX *Eg FF_AUG_204_P3*	Augmentations required for fire flow provision, where in the example provided 204 represents the DMA number and P3 represents the third pipe augmentation in that DMA.

1.6 Options assessment

Redland Water's option assessment must consider:

- Do nothing
- Existing Asset Options – (Modification to the existing network operations to defer expenditure)
- Non-infrastructure alternatives e.g. demand management
- New infrastructure options

The following sub-sections detail the way in which each of these options are considered throughout this report.

1.6.1 Do nothing

With the increase in demand that this report assesses against the current network, the do nothing option will result in a failure to meet service standards. It may be possible at some point in the future to adjust (reduce) the service standards so that service standards are met and no augmentations are required.

1.6.2 Existing Asset Options

This report assesses the network configuration when looking at ways of addressing network service standards failures. This might come in the form of increasing the operating pressure within a pressure managed DMA, or an amendment to a DMA boundary to remove a part of the DMA network unable to meet service standards and including it in an adjoining DMA.

1.6.3 Non-infrastructure alternatives

This report assesses the water supply network's ability to cater for an increase in demand which is primarily driven through growth. There is a small component of the demand growth associated with a presumed "bounce-back" in the demand from the millennium drought. Redland Water will be participating in regional demand management activities as outlined in the Seqwater water security program. The success or otherwise of these demand management activities are not considered within this report. The network augmentations recommended in this report will become input into the Redland Water capital works program where an assessment of the current demands are made each year to confirm if the triggers for the construction of the augmentations are being met.

1.6.4 New-infrastructure options

The main outcome of this report is a list of proposed network augmentations required to ensure the network meets the service standards at the project demands. Where multiple augmentation options are available they will be considered within the options assessment within each DMAs section of the report.

1.7 Assumptions

The following assumptions have been made in the preparation of this report:

- That the design criterion for demand per Equivalent Person (EP) remains at a constant 230L/EP/day (including non-revenue water) for the duration of the planning horizons considered in this report. Detailed analysis of current and future water consumption will need to be undertaken in coming years to determine if this remains an appropriate figure and to determine the timing of construction of augmentations. It is acknowledged that any change to the 'per EP' demand is likely to only result in a change in the timing of the infrastructure, not the actual infrastructure required.
- Bulk water supply sources and transport trunk infrastructure will remain essentially as currently installed and operational.
- DMAs and their associated PRVs will remain an integral part of the water supply network, particularly for leakage reduction. In analysing the DMAs controlled by PRVs in this report, we have allowed for a headloss through the PRV of 6m when it is fully open. This is the headloss that manufacturers recommend as a minimum drop across the PRV to ensure that the PRV and the associated modulation systems work adequately. More details of this assumption can be seen in Appendix B.

1.8 Water Quality

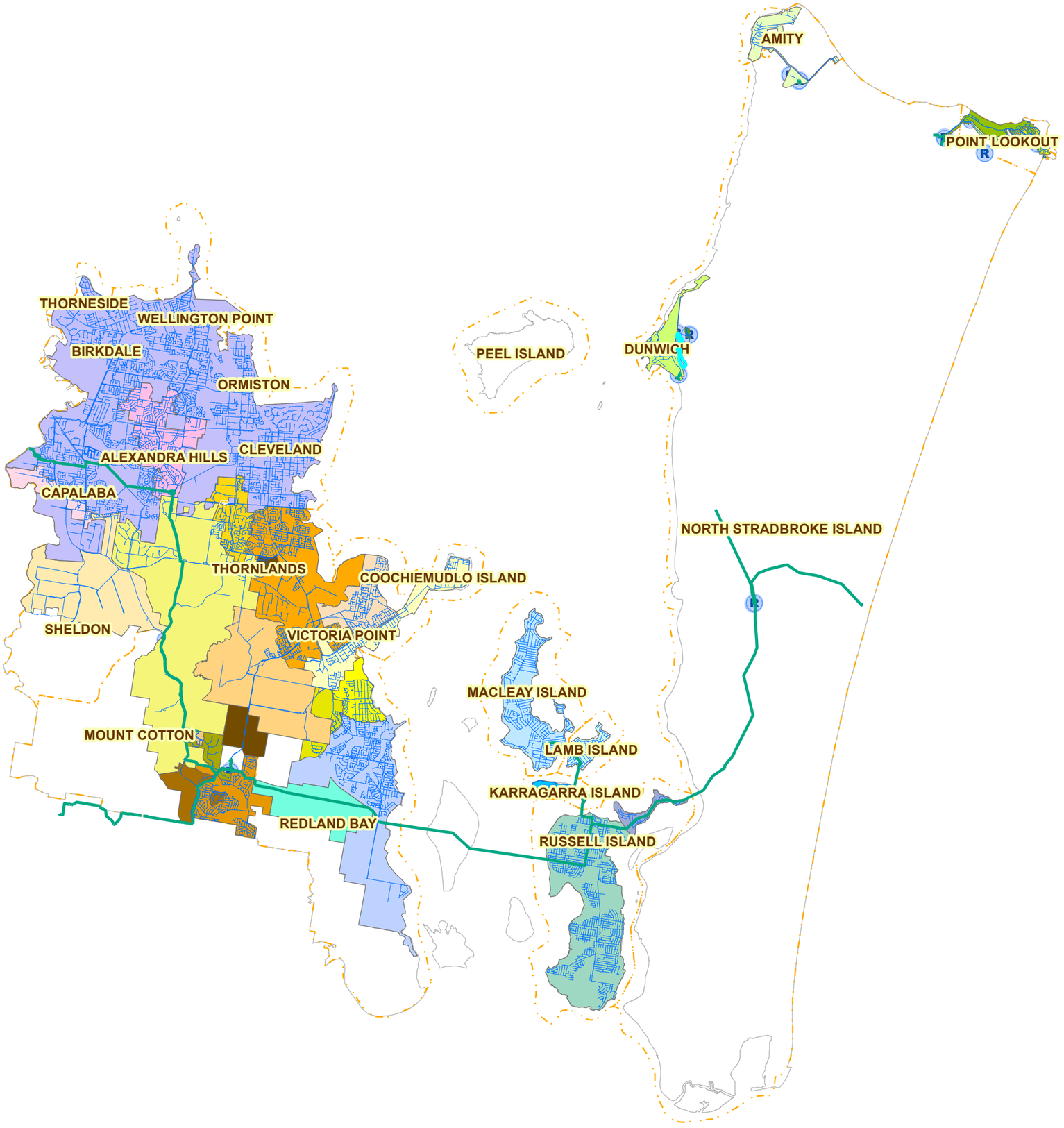
This report also begins to address water quality considerations at the whole of city level. Water Quality considerations are focused on a review of the water age modelling that has been undertaken for the Drinking Water Quality Management Plan (DWQMP). Although water age can be a poor surrogate for water quality in the case of blended water sources, it does provide a direct comparison of the residence time in the network for the various zones. Where augmentations for peak hour pressure or fire flow provision are made, options which also improve water quality are considered more favourably.

1.9 Format of the Master Plan

The remainder of this report is divided into 28 sections, the first four, Standards of Service, Demand Assessment, Model Set Up and Augmentation Philosophy being relevant to all sections of the water supply network and the subsequent 20 sections being DMA specific discussions which include the following topics:

- DMA Topography and Land Use;
- Previous Planning;
- Current System Configuration;
- Existing System Performance at Ultimate Demands;
- Proposed New Infrastructure Augmentations (refer to Section 1.6):
    a. Options 1 (where applicable)
    b. Option 2 (where applicable)
    c. Option 3 (where applicable)
- Augmentation timing
- Recommendations for the DMA operation and configuration and Further Work

The final four sections include a summary of the proposed works, cost estimates, conclusions and recommendations and references.



Legend

- Seqwater Trunk Mains
- Redland Water Distribution and Reticulation Mains

Water Supply Zones

DMA Boundary

- W004 Alexandra Hills LLZ
- 101 Russell Island East
- 102 Russell Island West
- 103 Karragarra Island
- 104 Lamb Island
- 105 Macleay Island
- 106 Serpentine Ck
- 108 NSI to Heinemann Rd Trunk
- 201 Heinemann Rd
- 202 Boundary St
- 203 Benfer Rd
- 204 Bunker Rd South
- 205 Victoria Point
- 206 Mt Cotton Village
- 207A Mt Cotton Booster Pump
- 207B Mt Cotton Res HLZ
- 208 Mt Cotton Trunk
- 209 Duncan Rd Booster Pump
- 210 Thornlands
- 212 Mt Cotton Road
- 213 Heinemann Rd Trunk
- 250 Heinemann Rd to Alexandra Hills Trunk
- 301 Howletts Rd
- 308 Alexandra Hills HLZ
- 401 Amity Pt
- 402 Dunwich
- 402A Illawong Crescent HLZ
- 402B Tazi Reservoir HLZ
- 403 Point Lookout LLZ
- 403A Booran St HLZ
- 403BTramican St HLZ
- Unserviced Area

R Reservoir

P Pump Station

Suburbs

RCC Outline

N W E S

Issue	Date	By	Chkd	Appd
D1	14/10/2016	MI	MI	BT

Kilometers

0 1 2 3 4 5

Redland CITY COUNCIL

Redland Water
PO Box 21
Cleveland QLD 4163

Job Title
Water Supply Master Plan Review

Drawing Title
Redland City Concil
Water Supply System Configuration

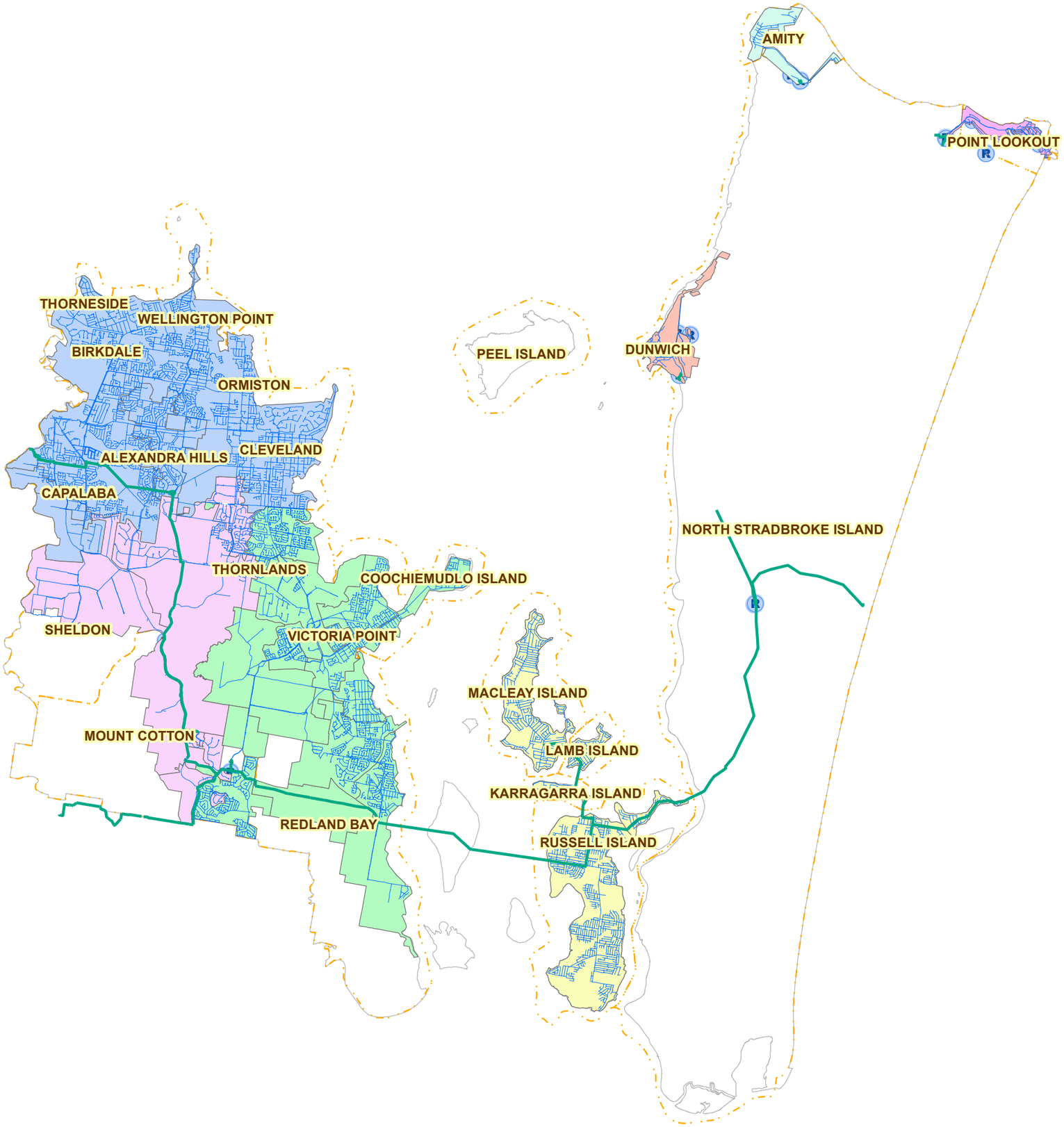
Scale at A3	Drawing Status
1:150,000	**Issue V1**

Coordinate System
GDA 1994 MGA Zone 56

Date of Print	Drawing No
14/10/2016	**001**

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure1_5_Redland _WS_System.mxd

Disclaimer: © Redland City Council, Queensland 2016 or © State of Queensland 2016.
No Warranty given in relation to the data (including accuracy, reliability, completeness, currency or suitability) and no liability accepted (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data.
Data must not be used for direct marketing or be used in breach of privacy laws.



Legend

- Seqwater Trunk Mains
- Redland Water Distribution and Reticulation Mains

PIP_Proposed_Water_Zones

- <all other values>

ICS_Zone

- Alexandra Hills ICS Zone
- Amity Point ICS Zone
- Dunwich ICS Zone
- Heinemann Road ICS Zone
- Mount Cotton ICS Zone
- Point Lookout ICS Zone
- Southern Moreton Bay Islands ICS Zone
- Reservoir
- Pump Station
- Suburbs
- RCC Outline

N W E S

Issue	Date	By	Chkd	Appd
D1	14/10/2016	MI	MI	BT

Kilometers
0 1 2 3 4 5

Redland CITY COUNCIL

Redland Water
PO Box 21
Cleveland QLD 4163

Job Title
Water Supply Master Plan Review

Drawing Title
Redland City Concil
Water Supply System ICS Zones

Scale at A3	Drawing Status
1:150,000	Issue V1

Coordinate System
GDA 1994 MGA Zone 56

Date of Print	Drawing No
14/10/2016	001

G:\Redland\Water&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure1_6_Water_Supply_ICS_Zones.mxd

Disclaimer: © Redland City Council, Queensland 2016 or © State of Queensland 2016.
No Warranty given in relation to the data (including accuracy, reliability, completeness, currency or suitability) and no liability accepted (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data.
Data must not be used for direct marketing or be used in breach of privacy laws.

2. Standards of Service

There are no significant departures for a large number of the design criteria, relative to the desired standards of service and design criteria contained within the previous master plan (*Water Supply Network Master Plan Northern District, Allconnex Water, May 2011*). The biggest change is the adjustment of the average day demand from 300L/EP/day to 230L/EP/day (including NRW). This change brings the forecast consumption in line with currently observed trends while still leaving an allowance for any further bounce back in consumption that may be experienced.

The remaining proposed Desired Standards of Service for the Redland water supply network are in accordance with those outlined in the SEQ D&C Code. Table 2.1 below sets out some of the key design criteria. The complete SEQ D&C Code can be found at:

http://www.seqcode.com.au/seq-water-supply-code/

Table 2.1 – Water Supply Design Criteria

Item	Description / Key Performance Measure	Desired Level of Service Design Criteria		
1	Average Day Demand (AD) per EP, excluding NRW (Note: EP/ET conversion rate provided in separate tables from Water Service Provider)	215 L/EP/d [1]		
2	Estimated Non-Revenue Water (NRW)	15 L/EP/d [1]		
3	Peaking Factors	Low and Med Density Res	High Density Res	Commercial/Industrial
	MDMM/AD	1.5	1.5	1.5
	PD/AD	2	2	2
	PH/PD	2	1.75	1.4
	PH/AD	4	3.5	2.8
4	Pressure (minimum SERVICE pressure at property boundary Urban and Rural) – Operating conditions (PH)	22m		
5	In areas defined by the SP, properties with domestic private booster pumps	12m at the suction side of private booster		
6	Maximum SERVICE Pressure	55m		
7	Emergency fire operating conditions (Minimum Residual Mains Pressures)	12m (in the main) at the flowing hydrant 6m on mains with customer connection Positive pressure throughout		
8	Fire Fighting Rural and Small Communities (Definitions as per Glossary of SEQ D&C code)	Rural Residential only: 7.5L/s for 2 hours Rural Commercial: 15L/s for 2 hours		
9	Urban	Detached Res (<= 3 stories): 15Ls for 2hrs w background Demand Multi storey Res (=> 4 levels): 30L/s for 4 hours w background Demand Commercial/Industrial buildings: 30L/s for 4 hours w background Demand Risk Hazard Buildings – assessed on needs basis		
10	Background Demand	Res(Detached/ Multi story): Highest of 2/3 PH or AD Commercial/Industrial: PH demand (between 10am and 4pm) (single fire event only)		
11	Reservoir storage—operational capacity (Min Operating Storage – four consecutive hours of demand)	GROUND LEVEL RESERVOIR: 3 x (PD – MDMM) + Emergency Storage (Emergency Storage - Greater of 4 hrs at MDMM or 0.5 ML. For less than 1000 EP, 150 kL)		
12		ELEVATED RESERVOIR: 6 x (PH – 1/12 MDMM)+150kL fire storage In supply zones where 8xPH is less than or equal to MDMM the following equation is used (2xPH)+150kL fire storage		
13	Reservoir Pump Servicing Requirements	MDMM over 20 hrs		

Item	Description / Key Performance Measure	Desired Level of Service Design Criteria
14	Ground level reservoir – Duty Pump	
15	Elevated reservoir – Duty Pump	Capacity (L/s) = Peak Hour (L/s)
16	Standby pump capacity	Match largest single pump unit capacity
17	Pipeline Capacity Requirements	Transport MDMM in 20 hrs Reticulation mains; Maintain pressure for Peak Hour and fire flow performance
18	Pipe Friction Losses Hazen Williams Friction Factors Based on the preferred material types outlined in the SEQ Water Supply Code (as amended). Any variation from these material types needs to be subject to further investigation.	<=150, C=100 >150 -300mm, C=110
19	Maximum Allowable Headloss (PH) (m/km)	5m/km for DN<=150 3m/km for DN>=200
20	Maximum allowable velocity	2.5m/s

Notes:

1. Design Criteria 1 & 2 are the only ones in Table 2.1 that alter from that in the current version of the SEQ W&S D&C Code. These changes have been made in line with the current consumption trends in Redland City Council.

3. Demand Assessment

3.1 Demand Model

In 2013, Redland Water commissioned the production of a revised Infrastructure Demand Model (IDM). The revised IDM was prepared using baseline water consumption data from 2011 aligned to the 2011 Census counts, plus population projections aligned to the early stages of the Redland City Plan 2015. These inputs came in the form of GIS based population projections and tabular projections of employment and non-residential floor area projections. In 2016, a finalised set of population projections and employment projections prepared by Urbis, in line with the draft Redland City Plan were provided, which Redland Water used to prepare its 2016 IDM.

The IDM uses the population projections to determine the residential demand projections for the city while the employment projections are converted to an equivalent person (EP) demand and these are used to determine the non-residential (e.g. commercial and industrial) demands for the city.

3.2 Planning Scheme

As identified above, the draft Redland City Plan 2015 has been used for the calculation of the demands in the plan. Using conversion rates for various land uses, the IDM is able to calculate the "Ultimate EP" per parcel. The allowable land uses under the planning scheme have also been used to identify appropriate locations for cross-connections between mains that need augmentation in order to continue to meet desired standards of service.

3.3 Priority Infrastructure Area

The Priority Infrastructure Area (PIA) for Redland City Council is the area to accommodate urban growth up to 2027.

Key development areas not included in the PIA are:

- Redland Bay South Investigation Area (known as Shoreline through the development application submitted in 2014)
- Toondah Harbour Priority Development Area (PDA)
- Weinam Creek PDA.

Other potential development areas that are presently not included in the PIA are:

- Double Jump Road / Clay Gully Creek Road area (shown in the City Plan as an Emerging Community).

All of these four areas have potential to significantly increase the demands on key water supply infrastructure.

Redland Water's IDM does make allowance for some demand from the all four of the areas listed above as there are parcels within these areas currently connected to the water supply network (and in some cases the wastewater collection network). The full extent of the demand growth in these areas is not included in the IDM and reference needs to be made to the connection policy in the Netserv Plan with respect to allowable demands in these areas. No trunk network augmentations are considered for these areas and are therefore not included in any financial modelling or infrastructure charges calculations.

3.4 Water Supply Service Areas

A requirement of Redland Water as a Water Service Provider (WSP) under the South-east Queensland Water (Distribution and Retail Restructuring) Act 2009 is to have a Water Netserv Plan that shows its current and future Water Supply Service Area. These maps can be seen at:

http://www.redland.qld.gov.au/EnvironmentWaste/Water/Documents/Netserv%20Part%20A_AUG2014.pdf

The service area is generally consistent with the Priority Infrastructure Area (PIA). There are some areas that are added though where Redland Water presently supplies water, and some areas that are not included in the service area where it is economically not viable to construct the infrastructure to service the area.

For the complete understanding of the Service Areas, the Netserv Plan Connection Policy must also be read and complied with.

3.5 Adopted Demands

The adopted demands in EP for each ICS zone, at each planning horizon in the new Redland IDM, are shown in Table 3.1 with the DMA breakdown shown in Table 3.2.

Table 3.1 – Adopted Demands Equivalent Persons by ICS zone

Water Supply IC Zone	2011	2016	2021	2026	2031	2036
Alexandra Hills	85,963	89,613	93,713	97,959	101,712	102,719
Heinemann Road	44,025	47,714	52,069	55,198	57,362	58,047
Mt Cotton	20,401	21,165	21,890	22,965	23,961	24,250
Southern Moreton Bay Islands	5,442	6,804	8,153	9,511	10,855	12,148
Mainland Sub-Total	**155,830**	**165,296**	**175,825**	**185,633**	**193,891**	**197,165**
Amity Point	803	841	885	903	935	935
Dunwich	1,277	1,372	1,575	1,607	1,633	1,636
Point Lookout	1,485	1,485	1,485	1,485	1,485	1,485
Total All Zones	**159,394**	**168,994**	**179,770**	**189,628**	**197,942**	**201,220**

Table 3.2 – Adopted Demands by DMA

DMA	2036 Demand (EPs)	AD Demand (ML/day)	MDMM Demand (ML/day)	MD Demand (ML/day)
Alexandra Hills Reservoir Complex				
Alexandra Hills LLZ DMA	89,720	20.64	30.28	39.93
Howletts Road HLZ DMA	1,403	0.32	0.47	0.62
Alexandra Hills DMA (Elevated Tower)	11,596	2.67	3.91	5.16
Alexandra Hills Total	**102,719**	**23.63**	**34.67**	**45.71**
Heinemann Road Reservoir Complex				
Serpentine Creek DMA	12,848	2.96	4.34	5.72
NSI to Heinemann Road Trunk - Water Supply	300	0.07	0.10	0.13
Heinemann Road DMA	2,269	0.52	0.77	1.01
Boundary Street DMA	3,937	0.91	1.33	1.75
Benfer Road DMA	6,357	1.46	2.15	2.83
Bunker Road South DMA	19,751	4.54	6.67	8.79
Victoria Point DMA	6,336	1.46	2.14	2.82
Mount Cotton Village DMA	5,263	1.21	1.78	2.34
Heinemann Road Trunk - Water Supply	525	0.12	0.18	0.23
Heinemann Road to Alexandra Hills Trunk - Water	461	0.11	0.16	0.20

DMA	2036 Demand (EPs)	AD Demand (ML/day)	MDMM Demand (ML/day)	MD Demand (ML/day)
Supply				
Heinemann Road Total	**58,047**	**13.35**	**19.59**	**25.83**
Mount Cotton				
Mt Cotton Booster Pump Zone DMA	122	0.03	0.04	0.05
Mt Cotton Res HLZ DMA	350	0.08	0.12	0.16
Mount Cotton DMA	13,071	3.01	4.41	5.82
Duncan Road HLZ DMA	2,024	0.47	0.68	0.90
Thornlands DMA	8,150	1.87	2.75	3.63
Mount Cotton Road DMA	533	0.12	0.18	0.24
Mount Cotton Total	**24,250**	**5.58**	**8.18**	**10.79**
Southern Moreton Bay Islands				
Russell Island East DMA	397	0.09	0.13	0.18
Russell Island West DMA	6,130	1.41	2.07	2.73
Karragarra Island DMA	234	0.05	0.08	0.10
Lamb Island DMA	678	0.16	0.23	0.30
Macleay Island DMA	4,708	1.08	1.59	2.10
Southern Moreton Bay Islands Total	**12,148**	**2.79**	**4.10**	**5.41**
Amity Point				
Amity DMA	935	0.21	0.32	0.42
Amity Point Total	**935**	**0.21**	**0.32**	**0.42**
Dunwich				
Dunwich DMA	1,337	0.31	0.45	0.60
Illawong Crescent Reservoir HLZ DMA	129	0.03	0.04	0.06
Tazi Reservoir HLZ DMA	169	0.04	0.06	0.08
Dunwich Total	**1,636**	**0.38**	**0.55**	**0.73**
Point Lookout				
Point Lookout DMA	426	0.18	0.25	0.34
Booran Street HLZ DMA	516	0.12	0.17	0.23
Tramican Street HLZ DMA	190	0.04	0.06	0.08
Point Lookout Total	**1,485**	**0.34**	**0.48**	**0.65**

DMA	2036 Demand (EPs)	AD Demand (ML/day)	MDMM Demand (ML/day)	MD Demand (ML/day)
Grand Total	**201,220**	**46.28**	**67.89**	**89.54**

3.6 Bulk Water Infrastructure Sizing and Augmentation

The Seqwater Water Security Program and the Eastern Area Long Term Planning Report set out the planned augmentations to the bulk water supply network in the Redland area. The key outcomes of these reports are summarised below.

3.6.1 Bulk Water Source

Under current Seqwater planning there are no changes planned to the bulk water sources for RCC.

3.6.2 Bulk Water Treatment

No information was provided in the draft Eastern Area Long Term Planning Report on water treatment capacity and supply quality. This report assumes that Seqwater will continue to maintain and upgrade their treatment plants as required to meet quality and quantity standards.

3.6.3 Bulk Water Transport

The Draft Eastern Area Long Term Planning Report recommends that Seqwater investigate acquiring the Bunker Road pipeline from RCC and divesting the Heinemann Road to Mt Cotton and Alexandra Hills pipeline to RCC. The AC pipelines are projected to require renewal in 2020-2029. The renewal of the AC pipelines between MCR and AHR are sized to maintain the existing HGL. It is recommended that Seqwater and RCC investigate if a reduced HGL between MCR and AHR is possible which would allow reduced renewal costs. Given this report only has a planning horizon of 2036 as opposed to the Seqwater report of 2045, some of the triggers that consultants GHD identified may not have been hit. Some preliminary modelling by Redland Water has however identified that a duplication of the in-out main to the Mount Cotton reservoir does alleviate some of the headloss concerns in the western trunk system. It is recommended that more detailed modelling be undertaken in the Redland all-pipes model at the 2045 planning horizon be undertaken to fully optimise the proposed augmentations in this part of the system.

The Eprapah Creek Pump Station is nominated for decommissioning. This does not have an effect on the planning undertaken in this report as its current only available operating mode is for emergency supply to the south.

3.6.4 Bulk Water Storage

No changes from the existing infrastructure are planned for Seqwater bulk water storages reservoirs. No additional reservoir storages are currently planned in the Redland network (for the North Stradbroke Island townships). There is potential for some significant changes to the planning assumptions for these townships which may require a reassessment of the need for additional bulk water storage in the townships.

3.7 Fire Flow Demand

Fire flow provision requirements for the Redland water supply network were developed and assessed as part of the Pressure and Leakage Management Project. Each land parcel is assigned a fire flow demand based on its land use code for the current demands and for the future demand scenarios a fire flow demand is assigned based on the land use zone.

Table 4 – Summary of fire provisions from the Department of Energy & Water Supply (DEWS) Planning Guidelines for Water Supply and Sewerage April 2010 Chapter 6 amended March 2014, summarises the fire flow provision guidelines – this is what the water supply network is assessed against.

Given the Southern Moreton Bay Islands (SMBI) communities are larger that 500 people but serviced by a rural fire service, confirmation was sought from the regional fire service commander, who advised that only Lamb Island and Karragarra Island should be assessed against the small community fire flow provisions. All other islands have a level of demand that indicates that General Urban Category should be applied.

3.7.1 Existing Demand Fire Flow Requirements

The existing fire flow requirements have been based on the Land Use Codes that were extracted from the property and rating system at the start of the IDM development phase. The adopted fire flow requirement for each Land Use Code is included in Appendix E. Some comments on the reasons for adopting various flow requirements are also included in Appendix E.

3.7.2 Ultimate Demand Fire Flow Requirements

Fire flow requirements for the ultimate demand scenario are based on the demand growth allowed under the City Plan in that area, i.e. residential growth is assessed as residential fire flow requirement while non-residential growth is assessed as commercial fire flow requirement.

4. Model Set Up

The assumptions made in the set up and development of the model, are described below.

4.1 Demand Assignment

The IDM data was attached to the "Water Demand Allocations" table (mw_DemAlloc) based on Land Numbers. The EP for each planning year was then converted to an Average Day demand using the demands discussed in Section 3.5 (215L/EP/day).

The demands were then geocoded to junctions. The demands were geocoded using the “To node by nearest Pipe” function in Mike Urban. This means a point on the pipe closest to the demand point is determined and the demand is then added to the node nearest to the point selected on the pipe. This methodology does assign demands to junctions on Trunk mains, so these were manually moved to the most representative junction for the demand point.

When all the demand points are connected to a junction there is usually more than one demand point at each junction so the demands are “Aggregated” based on the type of demand. The adopted demand types for the Mike Urban model are described in Table 4.1.

4.2 Diurnal Patterns

The development type proposed in the Redland City Plan was used to allocate the diurnal patterns. The patterns adopted in the Mike Urban model for each "Zone Description" matched to the new Redland City Plan zone descriptions are shown in Table 4.1.

The Inghams factory in Cleveland also has a very high water demand and it is known that the majority of the demand occurs between 10:00 pm and 4:00 am so different demand curve has been adopted for this lot. This is described in more detail in Section 19.3.

Table 4.1 – Adopted Diurnal Patterns for the Zone Description

Zone Description	Diurnal Pattern
Character Residential	RES_SEQ
Community Facilities	COM_SEQ
Conservation	COM_SEQ
Conservation - RES*	RES_SEQ
District Centre	COM_SEQ
Emerging Communities	RES_SEQ
Environmental Management	COM_SEQ
Local Centre	COM_SEQ
Low Density Residential	RES_SEQ
Low Impact Industry	COM_SEQ
Low-medium Density Residential	RES_SEQ
Major Centre	COM_SEQ
Medium Density Residential	RES_SEQ
Medium Impact Industry	COM_SEQ
Mixed Use	COM_SEQ
Neighbourhood Centre	COM_SEQ
Principal Centre	COM_SEQ
Recreation and Open Space	COM_SEQ
Rural	COM_SEQ

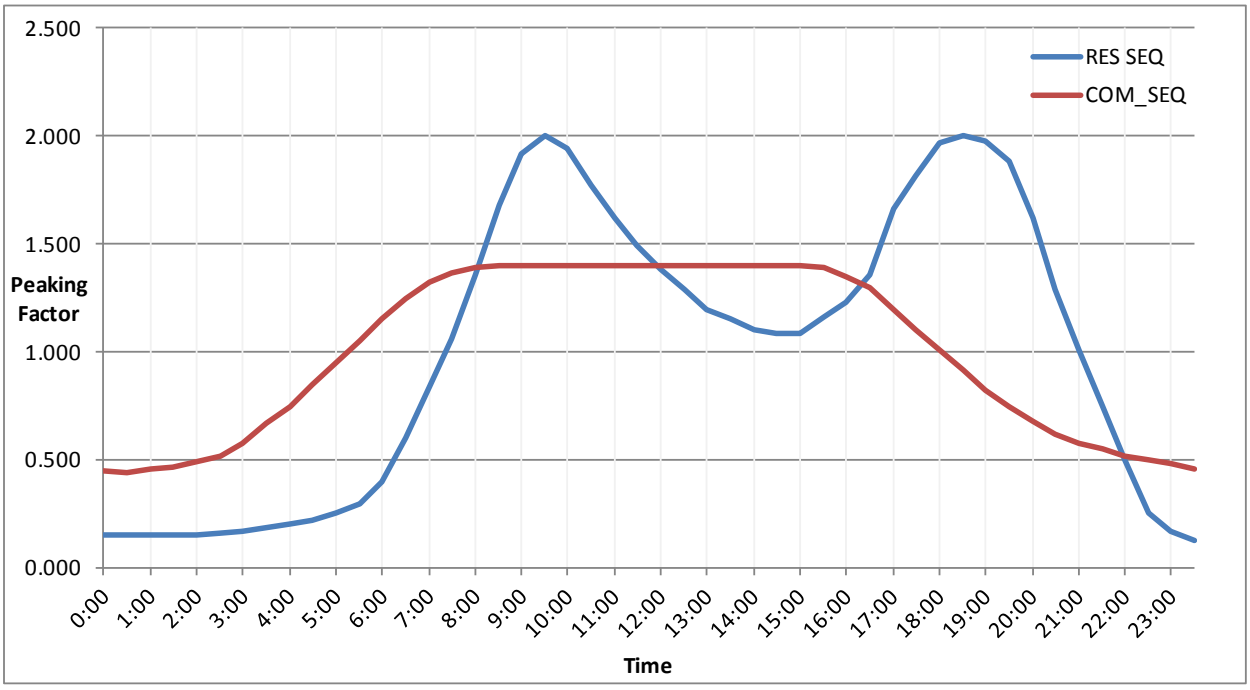
Zone Description	Diurnal Pattern
Rural - RES*	RES_SEQ
Specialised Centre	COM_SEQ
Tourist Accommodation	RES_SEQ
Waterfront and Marine Industry	COM_SEQ
Inghams	INGHAMS

*Note: *For areas zoned Conservation, Environmental Protection and Rural that currently have single dwellings.*

In the previous Master Plan report a different pattern had been adopted for the island communities because it was expected that the peak is earlier and later (likely to be because of the extra travel time when travelling to the mainland), however in this report a single residential diurnal pattern has been adopted. This is in-line with the approach taken in the Seqwater Eastern Network Long Term Planning Report.

The adopted patterns are shown on Figure 4-1. Peak Hour is now at 9:00 AM due to the new curves as the peak Commercial demand lines up with the Peak Residential demand at 9:00 AM.

Figure 4-1 - Diurnal Patterns



Non-revenue water demands have been distributed using the Mike Urban software. The methodology adopted was the *Method of Pipe Lengths.* The software automatically proportions the total network demand (demand per meter of pipe) to the junctions based upon the pipe length between the junctions. The diurnal pattern adopted for Non-revenue Water is NRW, which has a constant value of 1.

4.3 Pipe Friction Factors

The Hazen Williams formula has been used in the model with the following pipe friction factors installed initially. Where the model verification has shown that these friction factors are not appropriate they have been adjusted accordingly.

Table 4.2 – Adopted Diurnal Patterns for the Zone Description

Diameter (mm)	Adopted 'C' Value
≤ 150	100
200 – 300	110

Diameter (mm)	Adopted 'C' Value
> 300	120

The adopted internal pipe diameters are included Table 4.3.

Table 4.3 – Adopted Diameters

Material	Nominal Diameter	Adopted Internal Diameter
AC	20	20
	25	25
	30	30
	40	40
	63	63
	80	75.2
	100	96.5
	150	141.7
	200	186.4
	225	209.3
	250	231
	300	279.4
uPVC & UPVC	15	17.8
	20	22.4
	25	28.1
	32	35.4
	40	40.5
	50	50.5
	63	63
	65	63.2
	80	81.1
	100	104.4
	150	146.5
	200	207.9
	225	231
	250	258.8
	300	291.2
	350	328.2
	375	369.8
	400	416
	450	462.3
	500	517.8
	575	582.5
	600	600

Material	Nominal Diameter	Adopted Internal Diameter
PVC-M	100	107.5
	125	131.5
	150	150.4
	175	188.2
	200	211.7
	225	235.3
	250	263.7
	300	296.6
	375	376.9
	450	471.3
	500	527.9
	575	593.9
DICL & CICL	80	70
	100	96
	150	149
	200	204
	225	229
	250	256
	300	313
	375	388
	450	467
	500	518
	600	623
	750	778
OPVC	63	63
	80	80
	100	114.9
	150	167.9
	200	219.1
	225	244.7
	250	270
	300	325.9
MSCL	80	77.9
	100	102.3
	150	154.1
	200	206.4
	450	438.2
	500	489
	550	539.8
	575	575

Material	Nominal Diameter	Adopted Internal Diameter
	600	590.6
	675	675
	750	743
	900	895.4
MDPE & POLY	25	19
	32	24
	40	31
	50	38
	63	48
	75	58
	90	69
	110	84
	125	96
	140	108
	150	150
	160	123
	200	154
	225	173
	280	215
	300	300
	315	242
GRP	350	364.8
	375	375
	400	141.5
COPPER	32	30.2
	35	35
	60	60
	65	61.9

5. Augmentation Philosophy

When determining network augmentations, the preferred approach to rectify identified deficiencies is to:

1. Connect dead-ends;
2. If existing main that has been determined to be deficient is also approaching the end of its useful life, then the preferred option is to remove and replace the existing main with a larger pipe;
3. Augment the existing main with a parallel main.

Figure 5-1 - Example augmentation connecting dead ends

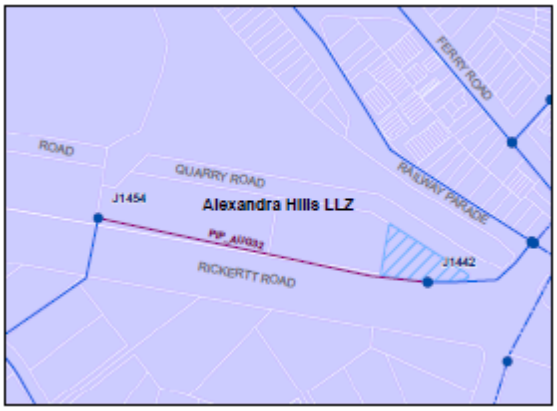


Figure 5-2 - Example where existing main is to be upsized due to age of existing main

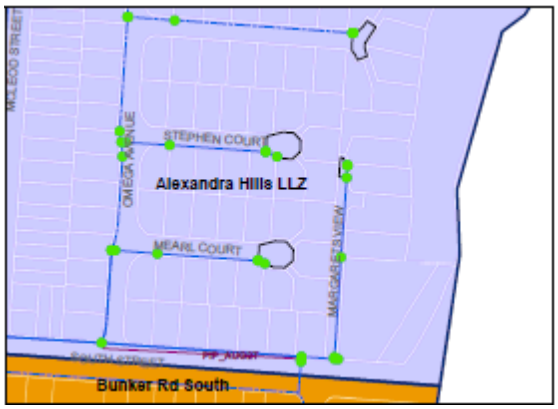


Figure 5-3 - Example where main is augmented with a parallel main



6. 101 Russell Island East

6.1 DMA Topography and Land Use

The Russell Island East DMA is generally flat consisting of low coastal areas with elevations ranging from less than 5m to 15 m AHD. The topography of the Russell Island East DMA is shown on Figure 6-1.

As shown on Figure 6-2 the landuse in the area is predominantly Character Residential with large areas of Conservation and Rural.

6.2 Previous Planning

The Russell Island East DMA has had minimal changes since the completion of the PLMP and the last version of the Master Plan, except for a reduction in the setting of the PRV. Previous planning has found that an augmentation is needed to meet the fire flow DSS (PIP_AUG44).

6.3 Current System Configuration and Source of Supply

The Russell Island East DMA is fed from the 750mm trunk main that runs from NSI to the Heinemann Road Reservoir. There is a pressure reducing valve and flow meter at the off-take which is located on Canaipa Point Drive.

The PRV was provided with a flow modulation controller as part of the PLMP. The initial modulation profile is shown in Table 6.1.

Table 6.1 – PRV Modulation Profile DMA 101

Flow (L/s)	PRV Setting (m)	Comments
0 – 0.1	Fully Open	This is a safety contingency in the event the flow meter fails.
0.1 - 11	36m	This is sufficient to meet the MH Demands (and is the limit of the PRV)
>11 L/s	56 m	This is to provide 15L/s FF to 2_2554 at the end of Tenanne St and surrounding area. This is 3m above the setting used prior to Pressure Management.
-	-	As the PH flow is around 3L/s as demand increases could look at increasing the PRV setting.

Lack of equipment reliability has resulted in the removal of the modulation unit at 101. With current demands below planning demands, to balance the need for pressure reduction to remain in place to limit system and customer leakage and pressure damage, the outlet pressure for the PRV is currently operating at 37 m. Regular field checks of the available fire flow should be conducted to check its availability.

6.4 Existing System Performance at Ultimate (2036) Demands

6.4.1 Peak Hour

Peak Hour is at 09:00 and at this time the flow into the DMA is 3.5 L/s. With the PRV set at 59 m, the minimum pressure in the system is 54.7 m at 101CMP1. The peak hour results are shown on Figure 6-3.

6.4.2 MD Minimum Hour

The smallest flow into the system is at 23:00 with a flow of just 0.4L/s. The maximum pressure at this time is 68.7 m at 2_2556. This is above the DSS for maximum service pressure of 55m. To achieve this DSS without modulating the PRV will require significant augmentations to meet the DSS for fire flow. It is proposed to monitor the DMA and if issues arise due to the high pressure re-initiate the PRV modulation.

Note that the low flow results are very similar to the PH results. This is because the PH flows are very low so even at PH there are minimal little friction losses.

6.4.3 Fire Flow

The fire flow scenario was run at 15:30 which is 2/3 PH. With the PRV set at 59m, all areas a meet the DSS for fire flow except for the end of Tenanne Street (2_2554) and Bay Drive (2_2555) which have available fire flow of 13.5 L/s and 14.5 L/s respectively.

The fire flow results are shown on Figure 6-4.

6.4.4 Water Quality

The water age in this zone ranges from 1 to 6 days with only a few cul-de-sacs having retention times up to 6 days.

Opportunities to improve water quality outcomes in this DMA are fairly limited in terms of infrastructure based solutions (e.g. elimination of dead ends). Continued system quality monitoring and proactive maintenance procedures like regular flushing dead ends will continue to be critical to maintaining good water quality in this DMA.

6.5 Proposed Augmentations

6.5.1 Peak Hour

There are no peak hour augmentations needed.

6.5.2 Fire Flow

It is proposed to construct the previously identified PIP_AUG44 along Remart Street (58m of 100mm dia main). When this is built the available FF is 15.1 and 16.1 L/s for 2_2554 and 2_555 respectively. The Fire Flow results with the augmentation are shown on Figure 6-5. There is an alternate option along a new opened road reserve between Tenanne Street and Bay Drive (at the north-western end of each road) which has the potential to eliminate two dead ends as well as improve fire flow provision. It is recommended that this water main be considered for coordinated construction with the road and its priority be assessed based on its need to address fire flow provisions while also allowing maintenance of a low PRV outlet pressure thereby improving leakage outcomes.

Investigations into the optimum method of operating the PRV and any flow modulation unit are recommended.

6.6 Augmentation Timing

6.6.1 Existing System at 2016 Demands

The population model does not include any growth in this DMA from 2016 to 2031, so the EPs in the DMA are the same at 338.9 EP for both scenarios. The augmentation is therefore required in 2016.



Legend

AZP Logger
CMP Logger
Russell Island East
Existing DMA Boundaries
5m Contours

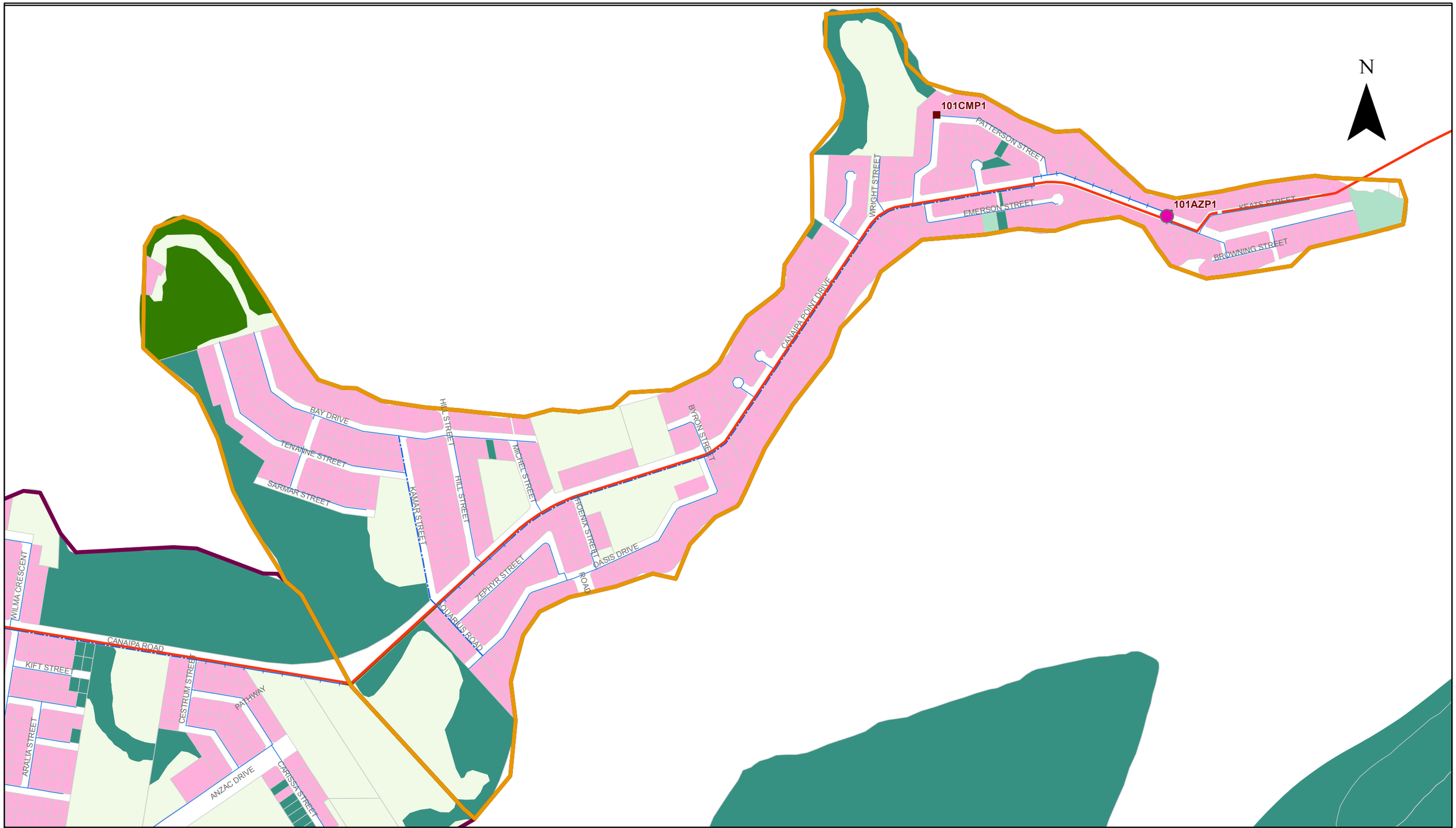
Diameter

63 80 100 150 200 225 250 300 375 450 500 525 600 675 691 750 900

0 125 250 500 750 1,000 1,250 Meters

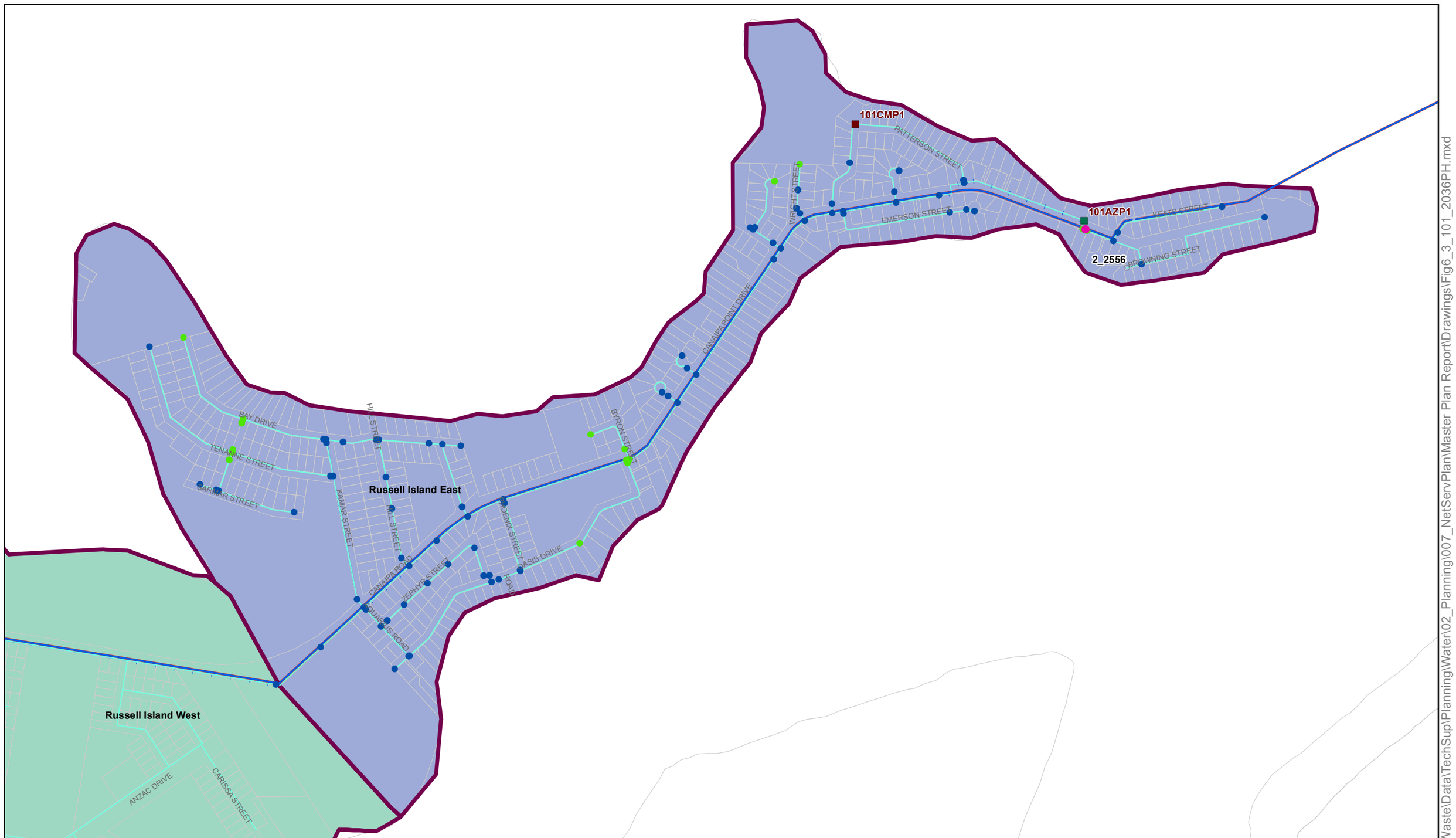
FIGURE 6.1
101 Russell Island East Topography

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig6.1_101_Topography.mxd
Rev 0 24 May 2016



G:\Redland\Water&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlanMaster Plan Report\Drawings\Fig6_2_101_Planning_Scheme.mxd
Rev 0 24 May 2016

FIGURE 6.2
101 Russell Island East Planning Scheme



G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig6_3_101_2036PH.mxd
Rev0 24 May 2016

FIGURE 6.3
101 Russell Island East DMA
Existing System with 2036 PH Demands (PRV = 36 m)

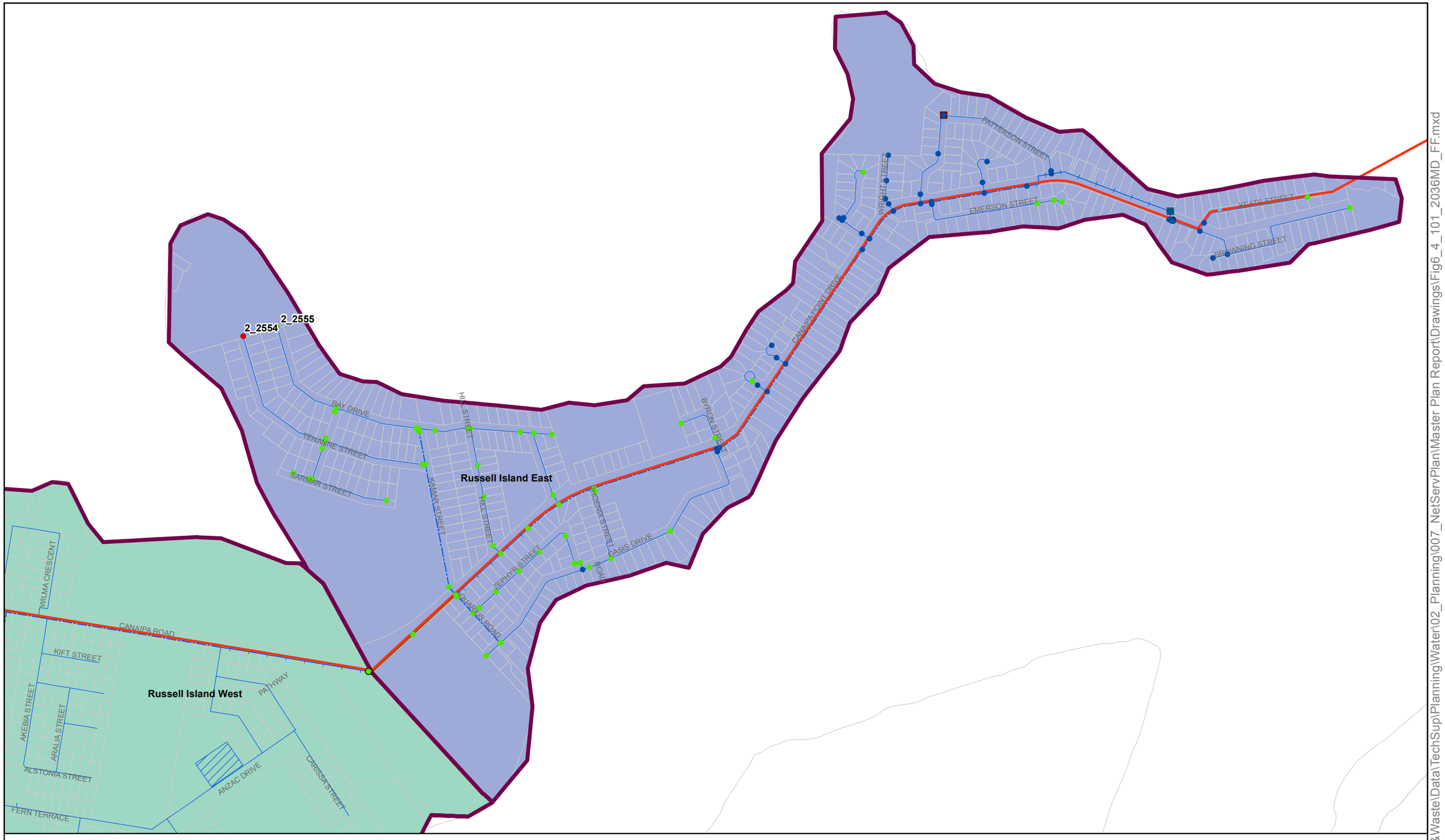


FIGURE 6.4
101 Russell Island East DMA
Existing System 2036 FF Results (PRV = 59m)

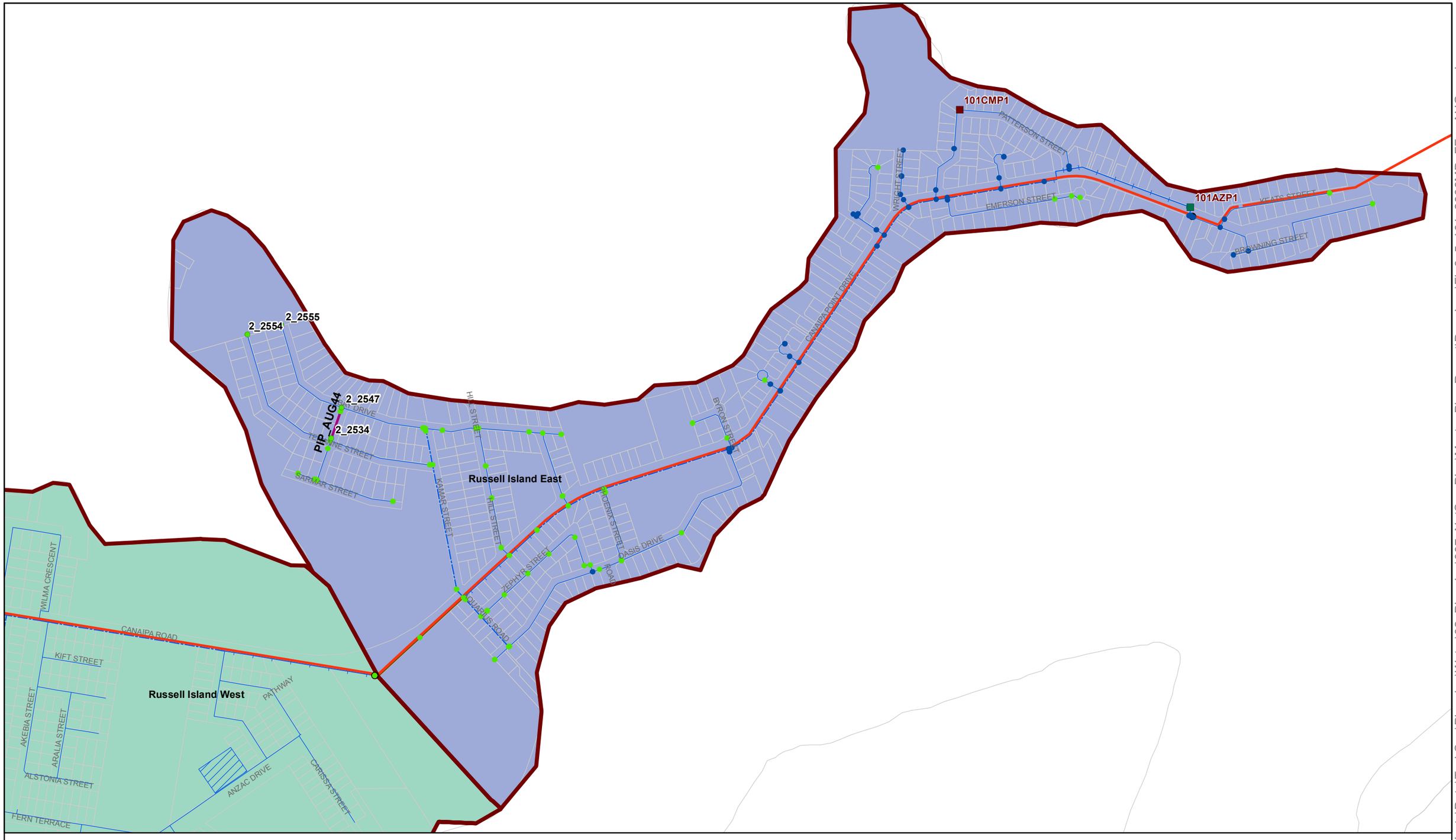


FIGURE 5.5
101 Russell Island East DMA
2036 FF Results with Augmentations (PRV = 59m)

7. 102 Russell Island West

7.1 DMA Topography and Land Use

The Russell Island West DMA has varying topography with elevations ranging from less than 5m up to 45m AHD. The topography of the Russell Island West DMA is shown on Figure 7-1.

As shown on Figure 7-2 the land use in the area is predominantly Character Residential with large areas of Conservation and Rural. There are road reserves in some of the Conservation area, however these are low lying areas which can't be developed and are therefore not planned to be serviced with reticulated water supply.

7.2 Previous Planning

The Russell Island West DMA has had minimal changes since the completion of the PLMP and the last version of the Master Plan, except for a reduction in the setting of the PRV. Previous planning has found that an augmentation is needed to meet the fire flow DSS (PIP_AUG45).

7.3 Current System Configuration and Source of Supply

The Russell Island West DMA is fed from the 750mm trunk main that runs from NSI WTP to the Heinemann Road Reservoirs. There is a pressure reducing valve and flow meter at the off-take which is located on High Street just north of Channel Street.

The PRV was provided with a flow modulation controller as part of the PLMP. The initial modulation profile is shown in Table 7.1.

Table 7.1 – PRV Modulation Profile DMA 102

Flow (L/s)	PRV Setting (m)	Comments
0 – 0.1	Fully Open	This is a safety contingency in the event the flow meter fails.
0.1 – 12	50m	This Setting is suitable for the MH scenario
>12 L/s	61m	This is required to provide sufficient FF to 2_1773 at the time of minimum night flows
>30	65m	The PRV needs to be set at 65m m to provide sufficient flow to the area in High St.

Lack of equipment reliability has resulted in the removal of the modulation unit at 102. With current demands below planning demands, to balance the need for pressure reduction to remain in place to limit system and customer leakage and pressure damage, the outlet pressure for the PRV is currently operating at 50 m. Regular field checks of the available fire flow should be conducted to check its availability.

7.4 Existing System Performance at Ultimate Demands

7.4.1 Peak Hour

Peak Hour is at 09:00 and at this time the flow into the DMA is 68.6 L/s. When the PRV is set at 61 m, the minimum pressure in the system is 102CMP m at 30.6 m. The results are shown on Figure 7-3.

7.4.2 MD Minimum Hour

The smallest flow into the system is at 23:00 with a flow of 12.4L/s. The maximum pressure at this time is 76.7 m at J15902. This is above the DSS for maximum service pressure of 55m. To achieve this DSS without modulating the PRV significant augmentations will be needed to meet the DSS for fire flow. It is proposed to monitor the DMA and if issues arise due to the high pressure re-initiate the PRV modulation.

7.4.3 Fire Flow

The fire flow scenario was run at 07:00 which is 2/3 PH. As shown on Figure 7-4 with the PRV set at 61m, all areas meet the DSS for fire flow.

7.4.4 Water Quality

Water quality modelling for the DWQMP shows that in the extremities of the system water age ranges from 7 to 20 days with the majority of the long detention times being in the southern areas where there are many dead ends.

Opportunities to improve water quality outcomes in this DMA are fairly limited in terms of infrastructure based solutions (e.g. elimination of dead ends). Continued system quality monitoring and proactive maintenance procedures like regular flushing dead ends will continue to be critical to maintaining good water quality in this DMA.

7.5 Proposed Augmentations

There are no augmentations proposed for this DMA. Investigations into the optimum method of operating the PRV and any flow modulation unit are recommended.

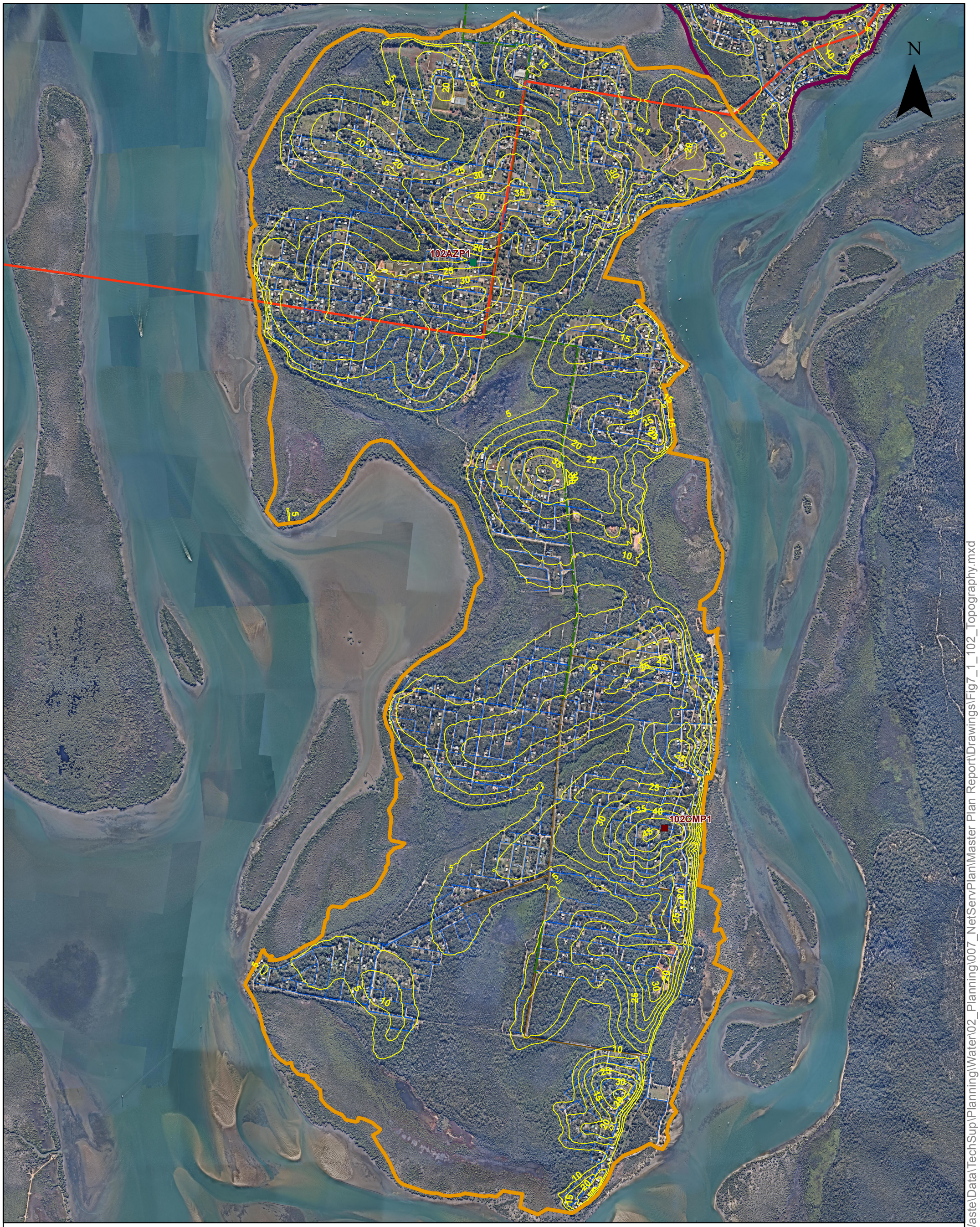


FIGURE 7.1
101 Russell Island West Topography

N

102AZP1

102CMP1

Legend

- AZP Logger
- CMP Logger
- PRV and Meter Site
- Russell Island West
- Existing DMA Boundaries

Diameter

63, 80, 100, 150, 200, 225, 250, 300, 375, 450, 500, 525, 600, 675, 691, 750, 900

Residential Zones
- Character Residential

Centre Zones
- Local Centre
- Neighbourhood Centre

Recreation Zones
- Recreation and Open Space

Environmental Zones
- Environmental Management
- Conservation

Industry Zones
- Low Impact Industry

Other Zones
- Community Facilities
- Rural

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 7.2
102 Russell Island West Planning Scheme

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig7_2_102_Planning_Scheme.mxd
Rev0 24 May 2016

2_2546 2_2547
2_2533
2_2522
2_2531 2_2517
Russell Island East
BAY DRIVE
OASIS DRIVE
N
2_2132
102AZP1
Russell Island West
102CMP1
J15902
0 250 500 1,000 1,500 2,000 Meters

Legend

Residual Pressure (m)
- < 22 m
- 22 - 60 m
- > 60 m

Headloss (m/1000m)
- 0 - 1
- 1 - 2
- 2 - 5
- 5 - 10
- >10

- AZP Logger
- CMP Logger
- DMA Boundary Valve
- PRV and Meter Site

DMA Boundary
- 101 Russell Island East
- 102 Russell Island West
- 103 Karragarra Island
- 104 Lamb Island
- 105 Macleay Island
- Existing DMA Boundaries

FIGURE 6.4
102 Russell Island West DMA
Existing System with 2036 PH Demands (PRV = 53 m)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig7_3_102_2036PH.mxd
Rev0 24 May 2016

Russell Island East

Russell Island West

102AZP1

102CMP1

N

0 250 500 1,000 1,500 Meters

Legend

Available FF (L/s)
- < 15
- 15 - 30
- > 30

AZP Logger
CMP Logger
DMA Boundary Valve
PRV and Meter Site

Diameter
63, 80, 100, 150, 200, 225, 250, 300, 375, 450, 500, 525, 600, 675, 691, 750, 900

DMA Boundary
- 101 Russell Island East
- 102 Russell Island West
- 103 Karragarra Island
- 104 Lamb Island
- 105 Macleay Island
- Fire Flow 30 L/s

FIGURE 7.4
102 Russell Island West DMA
Existing System 2036 FF Results (PRV = 61 m)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig7_4_102_2036MD_FF0700_PRV61.mxd
Rev0 24 May 2016

8. 103 Karragarra Island

8.1 DMA Topography and Land Use

Karragarra Island has relatively flat topography with elevations ranging from less than 5m to 10 m AHD. The topography of Karragarra Island is shown on Figure 8-1.

As shown on Figure 8-2 the landuse in the area is predominantly Character Residential with some areas of Rural and Conservation.

8.2 Previous Planning

The Karragarra DMA has had minimal changes as a result of the PLMP except for a reduction in the setting of the PRV.

Planning undertaken for the PIP / ICS was based on the original configuration for this area and did not include any augmentations. Planning work undertaken as part of the PLMP only looked at the modulation profile needed to provide a reduced pressure and still meet the DSS for fire flow.

8.3 Current System Configuration and Source of Supply

The Karragarra DMA is fed from a 450mm dia submarine pipe which comes off the 750mm dia trunk main from the NSI WTP to Heinemann Road Reservoirs. There is a pressure reducing valve and flow meter at the off-take which is located on Treasure Island Avenue.

The PRV is set at 31 m and is not modulated.

8.4 Existing System Performance at Ultimate Demands

8.4.1 Peak Hour

Peak Hour is at 09:00 and at this time the flow into the DMA is 2.2 L/s. When the PRV is set at 31 m, the minimum pressure in the system is 103CMP m at 26.5 m. The PH results are shown on Figure 8-3.

8.4.2 MD Minimum Hour

The smallest flow into the system is at midnight with a flow of 0.3L/s. The maximum pressure at this time is 36 m at 103AZP1. This is below the DSS for maximum service pressure of 55m.

8.4.3 Fire Flow

The fire flow scenario was run at 12:00 which is 2/3 PH. As shown on Figure 8-4, with the PRV set at 31m, all areas meet the DSS for fire flow of 7.5L/s. The minimum available FF is 18.6 L/s at J13926. There are no commercial areas on Karragarra Island.

8.4.4 Water Quality

The water age in this zone ranges from 1 to 6 days with eastern and western extremities having retention times up to 6 days.

Opportunities to improve water quality outcomes in this DMA are fairly limited in terms of infrastructure based solutions (e.g. elimination of dead ends). Continued system quality monitoring and proactive maintenance procedures like regular flushing dead ends will continue to be critical to maintaining good water quality in this DMA.

8.5 Proposed Augmentations

There are no augmentations proposed for this DMA.

N

103CMP1

103AZP1

Legend

AZP Logger

CMP Logger

Karragarra Island

Existing DMA Boundaries

5m Contours

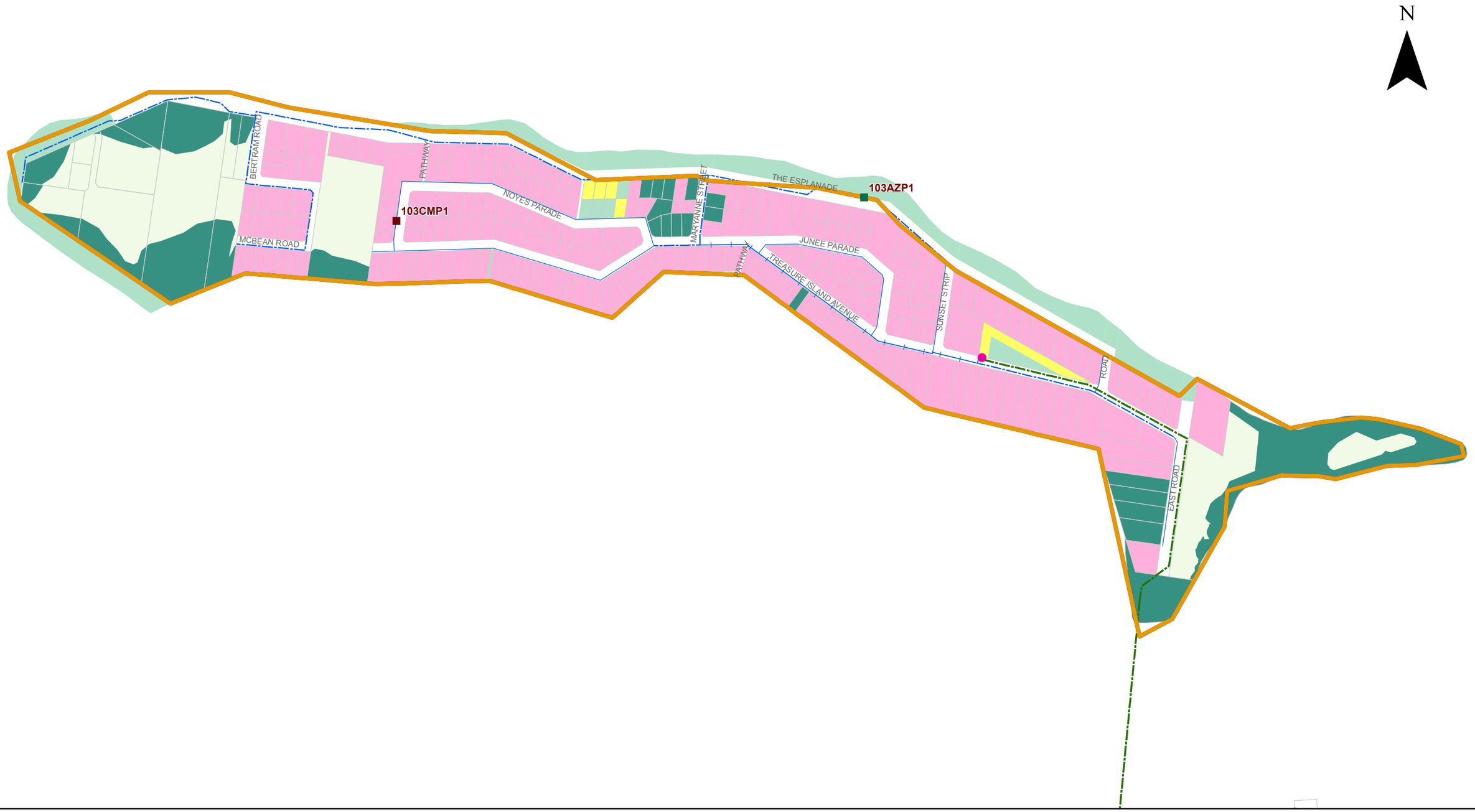
Diameter

63 80 100 150 200 225 250 300 375 450 500 525 600 675 691 750 900

0 125 250 500 750 1,000 1,250 Meters

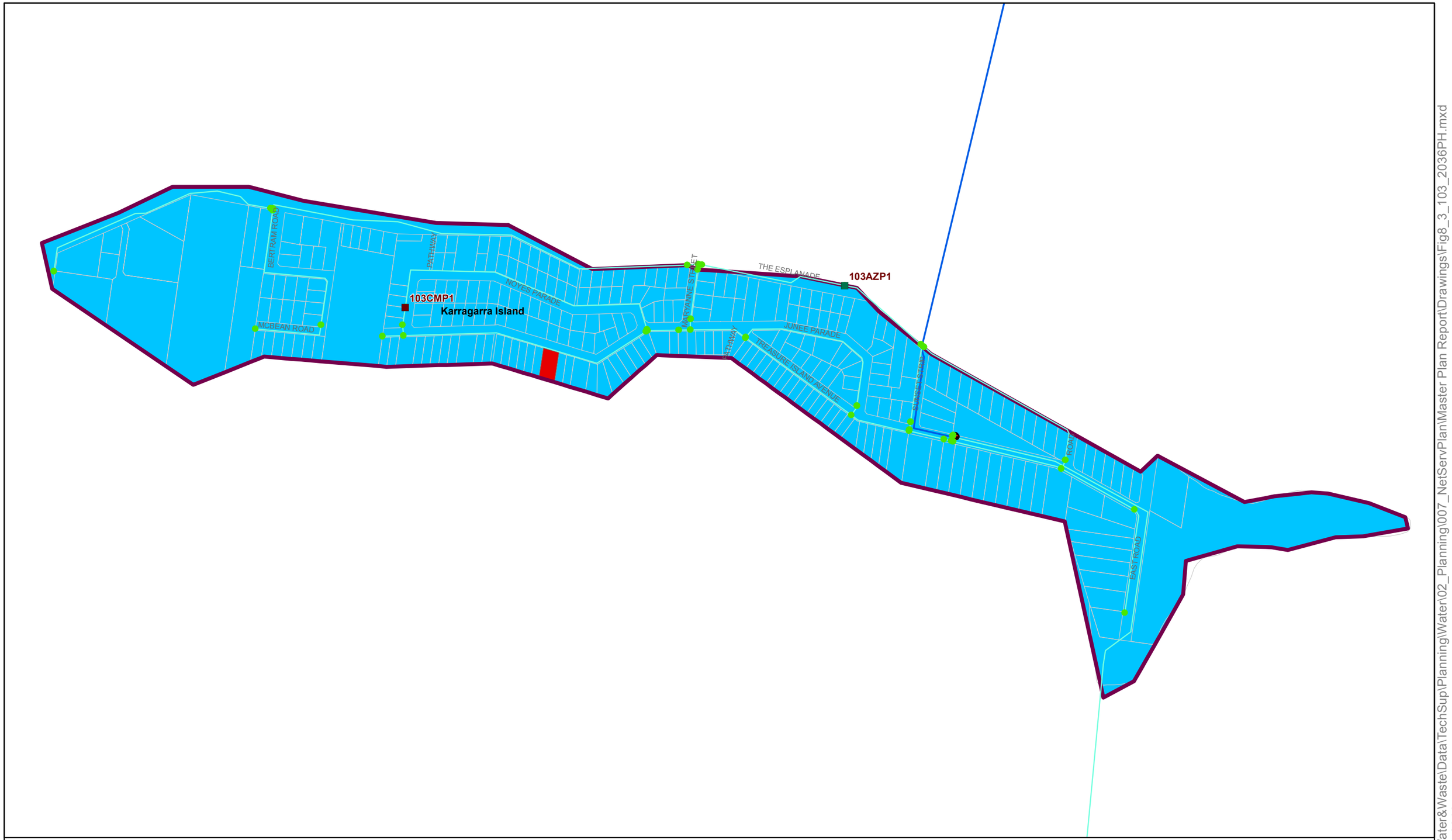
FIGURE 8.1
103 Karragarra Island Topography

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig8_1_103_Topography.mxd
Rev0 24 May 2016



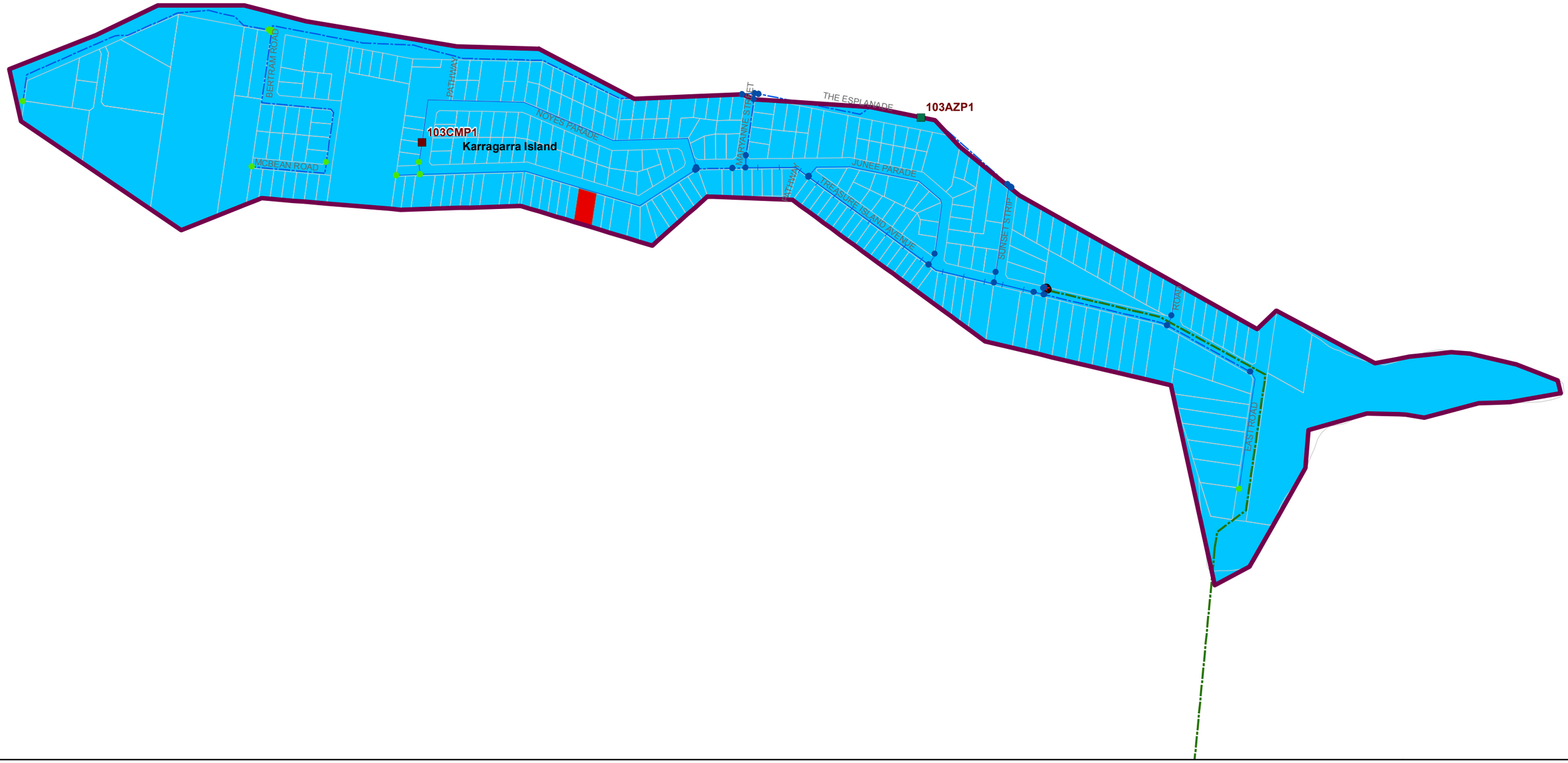
G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig8_2_103_Planning_Scheme.mxd
Rev0 24 May 2016

FIGURE 8.2
103 Karragarra Island Planning Scheme



G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig8_3_103_2036PH.mxd
Rev0 24 May 2016

FIGURE 8.3
103 Karragarra Island DMA
Existing System with 2036 PH Demands (PRV = 31 m)



G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig8_4_103_2036MD_FF1200_PRV31.mxd
Rev0 24 May 2016

FIGURE 8.4
101 Karragarra Island DMA
Existing System 2036 FF Results (PRV = 31m)

9. 104 Lamb Island

9.1 DMA Topography and Land Use

Lamb Island DMA has relatively flat topography with elevations ranging from less than 5m to 20 m AHD. The topography of Lamb Island is shown on Figure 9-1.

As shown on Figure 9-2 the landuse in the area is predominantly Character Residential with some areas of Rural, Conservation and Recreation and Open Space.

9.2 Previous Planning

The Lamb Island DMA has had minimal changes as a result of the PLMP except for a reduction in the setting of the PRV.

Planning undertaken for the PIP / ICS was based on the original configuration for this area and did not include any augmentations. Planning work undertaken as part of the PLMP only looked at the modulation profile needed to provide a reduced pressure and still meet the DSS for fire flow.

9.3 Current System Configuration and Source of Supply

The Lamb Island DMA is fed from the 750mm dia trunk main from the NSI WTP to Heinemann Road Reservoirs, via a 450mm submarine main from Russell Island to Karragarra Island and a 375mm submarine main from Karragarra Island to Lamb Island. There is a 150 mm pressure reducing valve and flow meter at the off-take which is located at the western end of Nectar Street.

The PRV is set at 39 m and is not modulated.

9.4 Existing System Performance at Ultimate Demands

9.4.1 Peak Hour

Peak Hour is at 09:00 and at this time the flow into the DMA is 7 L/s. When the PRV is set at 39 m, the minimum pressure in the system is 23.2 m at J15997. 104CMP1 has a pressure of 25.5m. The PH results are shown on Figure 9-3.

9.4.2 MD Minimum Hour

The smallest flow into the system is at 23:00 with a flow of 0.95 L/s. The maximum pressure at this time is 46 m at 2_2488. This is below the DSS for maximum service pressure of 55m.

9.4.3 Fire Flow

The fire flow scenario was run at 12:30 which is 2/3 PH. With the PRV set at 39m, all areas meet the DSS for fire flow of 7.5L/s and 15L/s. The minimum available FF is 17.1 L/s at J16038. The results are shown on Figure 9-4.

9.4.4 Water Quality

The water age in this zone ranges from 1 to 6 days with the north eastern extremities having retention times up to 6 days.

Opportunities to improve water quality outcomes in this DMA are fairly limited in terms of infrastructure based solutions (e.g. elimination of dead ends). Continued system quality monitoring and proactive maintenance procedures like regular flushing dead ends will continue to be critical to maintaining good water quality in this DMA.

9.5 Proposed Augmentations

There are no augmentations proposed for this DMA.



Legend

- AZP Logger
- CMP Logger
- Lamb Island
- Existing DMA Boundaries
- 5m Contours

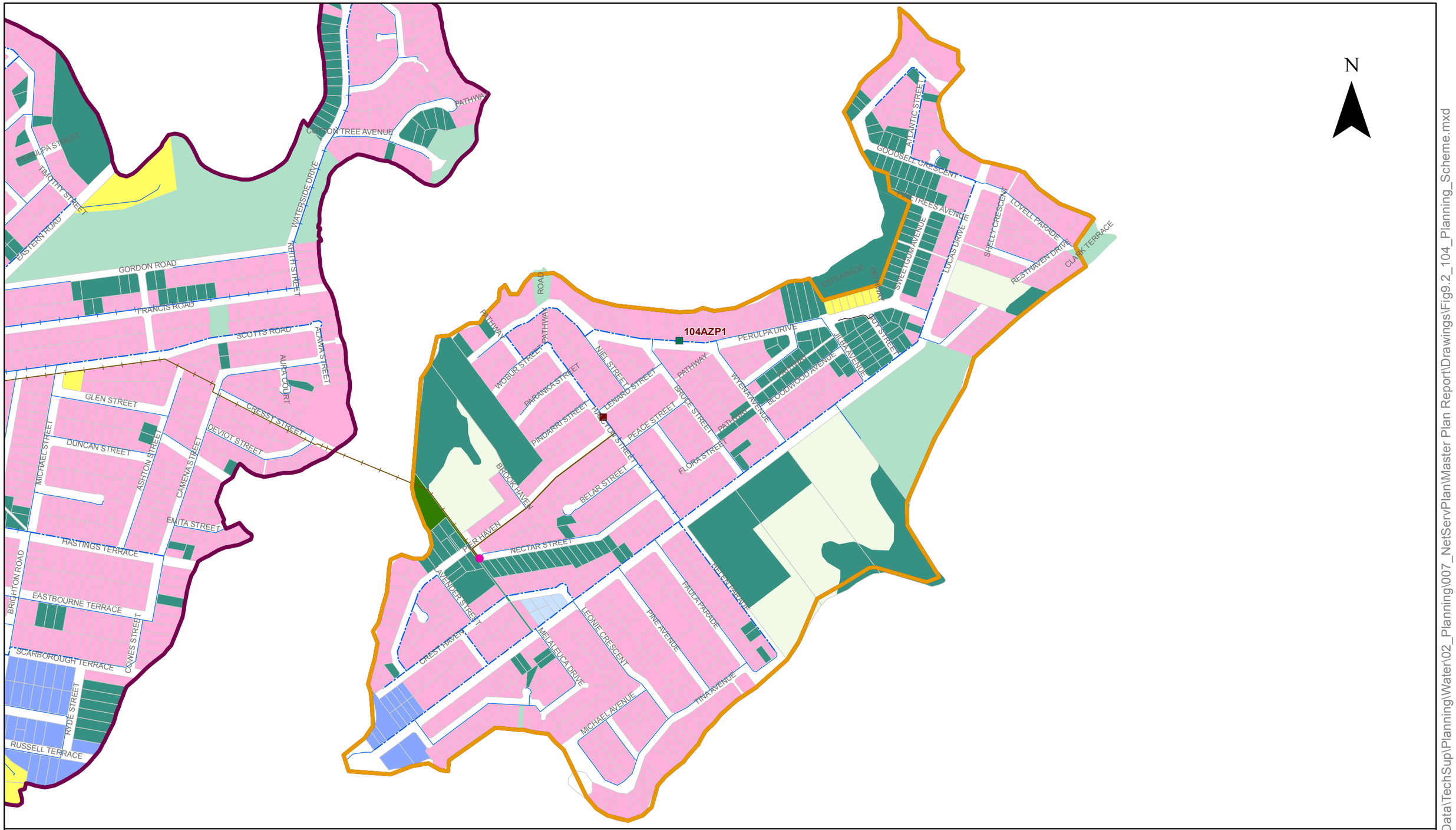
Diameter

63, 80, 100, 150, 200, 225, 250, 300, 375, 450, 500, 525, 600, 675, 691, 750, 900

0 125 250 500 750 1,000 1,250 Meters

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig9_1_104_Topography.mxd
Rev0 24 May 2016

FIGURE 9.1
104 Lamb Island Topography



G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig9.2_104_Planning_Scheme.mxd
Rev0 26 May 2016

FIGURE 9.2
104 Lamb Island Planning Scheme

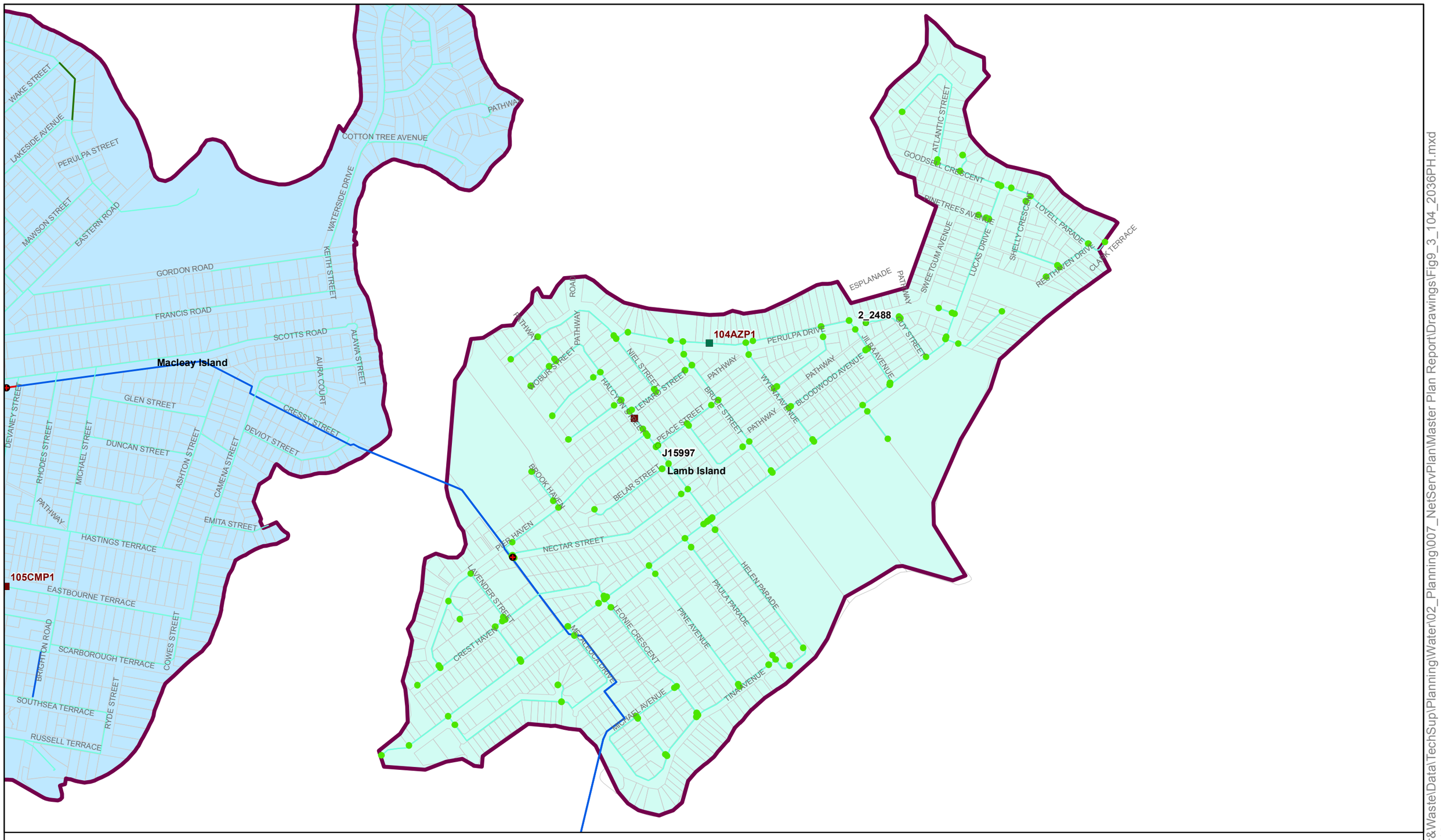
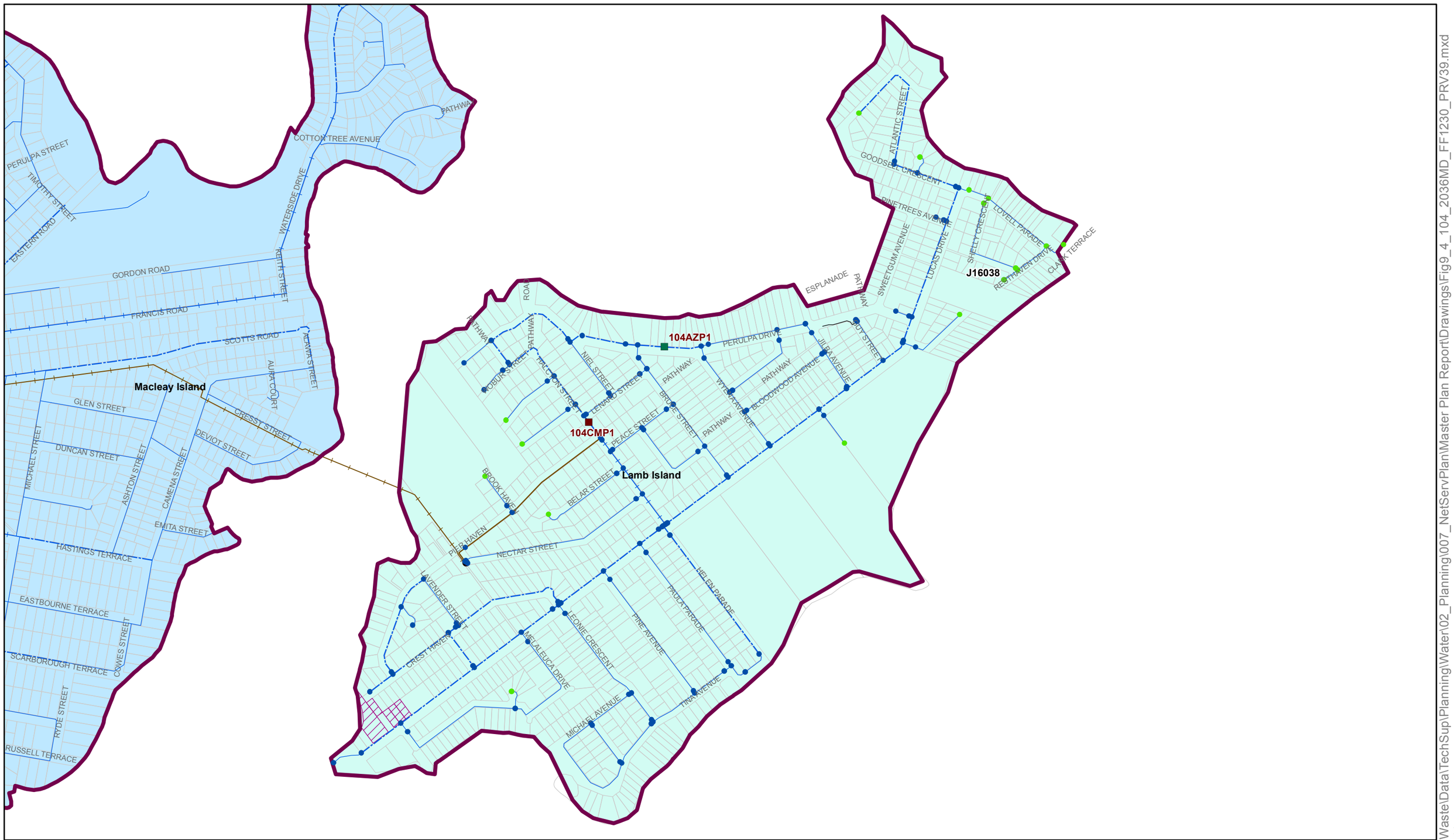


FIGURE 9.3
103 Lamb Island DMA
Existing System with 2036 PH Demands (PRV = 39 m)



Legend

Available FF (L/s)
- < 15
- 15 - 30
- > 30

PRV and Meter Site
AZP Logger
CMP Logger
DMA Boundary Valve
Existing DMA Boundaries
Fire Flow 15 L/s

Diameter
63, 80, 100, 150, 200, 225, 250, 300, 375, 450, 500, 525, 600, 675, 691, 750, 900

DMA Boundary
- 101 Russell Island East
- 102 Russell Island West
- 103 Karragarra Island
- 104 Lamb Island
- 105 Macleay Island

0 100 200 400 600 800 1,000 Meters

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig9_4_104_2036MD_FF1230_PRV39.mxd
Rev0 31 March 2011

FIGURE 9.4
104 Lamb Island DMA
Existing System 2036 FF Results (PRV = 39m)

10. 105 Macleay Island

10.1 DMA Topography and Land Use

Macleay Island DMA has relatively flat topography with elevations ranging from less than 5m to 25 m AHD. The topography of Macleay Island is shown on Figure 10-1.

As shown on Figure 10-2 the landuse in the area is predominantly Character Residential with some large areas of Conservation.

10.2 Previous Planning

The Macleay Island DMA has had minimal changes as a result of the PLMP except for a reduction in the setting of the PRV.

Planning undertaken for the PIP / ICS was based on the original configuration for this area and did not include any augmentations. Planning work undertaken as part of the PLMP only looked at the modulation profile needed to provide a reduced pressure and still meet the DSS for fire flow.

10.3 Current System Configuration and Source of Supply

The Macleay Island DMA is fed from the 750mm dia trunk main from the NSI WTP to Heinemann Road Reservoirs, via a 450mm dia submarine main from Russell Island to Karragarra Island, a 375mm dia submarine main from Karragarra Island to Lamb Island and a 300mm dia submarine main from Lamb Island to Macleay Island. There is a 200 mm pressure reducing valve and a flow meter at the off-take which is located at the western end of Scotts Road.

The PRV is not modulated. The outlet pressure was originally set at 35 m but following pressure complaints, it was increased to 40m to ensure that service standards continued to be met.

10.4 Existing System Performance at Ultimate Demands

10.4.1 Peak Hour

Peak Hour is at 09:00 and at this time the flow into the DMA is 44 L/s. When the PRV is set at 40 m, the minimum pressure in the system is 28.5 m at 105CMP1. The results are shown graphically on Figure 10-3.

10.4.2 MD Minimum Hour

The smallest flow into the system is at 23:00 with a flow of 6.1 L/s. The maximum pressure at this time is 55.5 m at J14256. This is just above the DSS for maximum service pressure of 55m which is considered acceptable.

10.4.3 Fire Flow

The fire flow scenario was run at 15:00 which is 2/3 PH. With the PRV set at 40m, all areas have an available fire flow above 15 and 30L/s except for:

- J14451 with an available flow of 14.4 L/s. PIP_AUG46 is due for construction in 2022 when this is constructed the available flow is 31.9L/s.
- Junction 105 in the car park at the ferry terminal which is shown as commercial development and has an available FF of 27 L/s. This is considered acceptable as the hydrant is only in the middle of the car park and all other junctions in the area have an available FF of 30L/s or greater.

The fire flow results are shown on Figure 10-4.

10.4.4 Water Quality

The water age in this zone ranges from 1 to 8 days with the dead end extremities having retention times up to 8 days.

Opportunities to improve water quality outcomes in this DMA are fairly limited in terms of infrastructure based solutions (e.g. elimination of dead ends). Continued system quality monitoring and proactive maintenance procedures like regular flushing dead ends will continue to be critical to maintaining good water quality in this DMA.

10.5 Proposed Augmentations

10.5.1 Peak Hour

There are no peak hour augmentations needed.

10.5.2 Fire Flow

It is proposed to construct the previously identified PIP_AUG46 along Cabriolet Crescent (284m of 100mm dia main). When this is built the available FF is 31.9 L/ at J14451.

The proposed augmentation is shown on Figure 10-5.

10.6 Augmentation Timing

10.6.1 Existing System at 2016 Demands

In 2016 the FF at J14451 is 14.7 L/s therefore OK so the augmentation is not needed before 2016.

10.6.2 Existing System at 2021 Demands

In 2021 the FF at J14451 is 14.6 L/s therefore OK so the augmentation is not needed before 2021.

10.6.3 Existing System at 2026 Demands

In 2026 the FF at J14451 is 14.5 L/s therefore OK so the augmentation is not needed before 2026.

10.6.4 Existing System at 2031 Demands

In 2031 the FF at J14451 is 14.4 L/s therefore the augmentation is needed by 2031.

N

105AZP1

105CMP1

104AZP1

104CMP1

Legend

AZP Logger

CMP Logger

Macleay Island

Existing DMA Boundaries

5m Contours

Diameter

63 80 100 150 200 225 250 300 375 450 500 525 600 675 691 750 900

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 10.1
105 Macleay Island Topography

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawingss\Fig10_1_105_Topography.mxd
Rev0 27 May 2016

N

RIO STREET
RAY STREET
CROSS STREET
PAPAYA STREET
KIM CRESCENT
DALPURA STREET
TINGARA STREET
KARDINYA STREET
ILYA STREET
COMOOL STREET
LEANNE STREET
CATHY STREET
JANE STREET
ROSEBERRY STREET
TUKKERI STREET
WARAMA STREET
BARACOOTA STREET
MORWONG STREET
BARRAMUNDI STREET
WIRRALEE STREET
COAST ROAD
UNDINE STREET
WANDA STREET
WHARF STREET
KARRAWARRA STREET
NUNKERI DRIVE
KYLO LANE
NOOSIE STREET
NEON MUCKLE STREET
PARAKEET STREET
SWALLOW ROAD
SANDPIPER PARADE
CENTRAL ROAD
UDARA DRIVE
ORION STREET
MARINE STREET
IAN STREET
DOUBLE BAY STREET
ROAD
VINE STREET
PECAN STREET
HAMILTON PARADE
CHARLES TERRACE
ROBIN STREET
KEVIN STREET
ARTHUR STREET
ALEXANDER STREET
CURLEW STREET
PELICAN STREET
GEORGE STREET
FLORENCE STREET
TIMOTHY STREET
WAKE STREET
LAKESIDE AVENUE
MAUDSON STREET
EASTERN ROAD
PATHWAY
KENT STREET
GORDON ROAD
FRANCIS ROAD
COOEE CRESCENT
SCOTTS ROAD
LONGERA STREET
COOEE STREET
COLUMBIA STREET
PATHWAY
TRENGROM TERRACE
PATHWAY
ASHTON STREET
CAMENA STREET
HASTINGS TERRACE
EASTBOURNE TERRACE
WESTERN ROAD
ROAD
SOUTHSEA TERRACE
BRIGHTON ROAD
RYDE STREET
COWES STREET
CLIFF TERRACE
ATLANTIC STREET
PERULLA DRIVE
NET STREET
PATHWAY
TRUCK STREET
HAVEN
FOREST HAVEN
LEONARDIS DRIVE
MELALEUCA DRIVE
LEONARDIS CRESCENT
PAULA PARADE
PINE AVENUE
TINA AVENUE

Legend

PRESSURE REDUCING
AZP Logger
CMP Logger
Macleay Island DMA
Existing DMA Boundaries

Diameter
63, 80, 100, 150, 200, 225, 250, 300, 375, 450, 500, 525, 600, 675, 691, 750, 900

Residential Zones
Character Residential

Centre Zones
Local Centre
Neighbourhood Centre

Recreation Zones
Recreation and Open Space

Environmental Zones
Environmental Management
Conservation

Industry Zones
Low Impact Industry

Other Zones
Community Facilities
Rural

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 10.2
105 Macleay Island Planning Scheme

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig10_2_105_Planning_Scheme.mxd
Rev0 27 May 2016

N

RIO STREET
RAY STREET
CROSS STREET
PAPAYA STREET
KIM CRESCENT
DALBURA STREET
TINGARA STREET
KARDINIA STREET
ILYA STREET
DOMOOL STREET
LEANNE STREET
CATHY STREET
JANE STREET
ROOBERRY STREET
TUKKERI STREET
WARAMA STREET
BARACOOTA STREET
MORWONG STREET
BARRAMUNDI STREET
WIRRALEE STREET
ATTUNGA STREET
DINJERRA STREET
EUMINA STREET
COAST ROAD
UNDINE STREET
WANDA STREET
WHARF STREET
KILTO LANE
KARRAWARRA STREET
BUNKERI DRIVE
NOOGIE STREET
NOON-MUCKLE STREET
PARAKEET STREET
SWALLOW ROAD
SANDPIPER PARADE
UDARA DRIVE
ORION STREET
MARINE STREET
JAN STREET
CENTRAL ROAD
J14451
105AZP1
ROAD
VINE STREET
HAMILTON PARADE
ROBIN STREET
CHARLES TERRACE
ARTHUR STREET
ALEXANDER STREET
PECAN STREET
BETTY STREET
Macleay Island
J14256
DOUBLE BAY STREET
TIMOTHY STREET
GEORGE STREET
FLORENCE STREET
WAKE STREET
LAKESIDE AVENUE
MAWSON STREET
EASTERN ROAD
KEITH STREET
GORDON ROAD
FRANCIS ROAD
COOPER CRESCENT
SCOTTS ROAD
COLUMBIA STREET
PATHWAY
FRENCHEM TERRACE
WESTERN ROAD
DOVER STREET
HASTINGS TERRACE
EASTBOURNE TERRACE
105CMP1
SOUTHSEA TERRACE
BRIGHTON ROAD
RYDE STREET
CLIFF TERRACE
ASHTON STREET
CAMENA STREET
DONIES STREET
105
PATHWAY
104AZP1
2_2488
NIEL STREET
BRUCE STREET
PERULPA DRIVE
LUCAS DRIVE
104CMP1
J15997
Lamb Island
PIER HAVEN
CREST HAVEN
HELEN PARADE
PAULA PARADE
PINE AVENUE
LEONIE CRESCENT
MELALEUCA DRIVE
TINA AVENUE

Legend

Residual Pressure (m)
- < 22 m
- 22 - 60 m
- > 60 m

Headloss (m/1000m)
- 0 - 1
- 1 - 2
- 2 - 5
- 5 - 10
- >10

- AZP Logger
- CMP Logger
- PRV and Meter Site
- DMA Boundary Valve

Diameter
- 63
- 80
- 100
- 150
- 200
- 225
- 250
- 300
- 375
- 450
- 500
- 525
- 600
- 675
- 691
- 750
- 900

DMA Boundary
- 101 Russell Island East
- 102 Russell Island West
- 103 Karragarra Island
- 104 Lamb Island
- 105 Macleay Island
- Existing DMA Boundaries

0 250 500 1,000 1,500 2,000 Meters

FIGURE 10.3
105 Macleay Island DMA
Existing System with 2036 PH Demands (PRV = 35 m)

G:\RedlandWater&Waste\DataTechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig10.3_105_2036PH.mxd
Rev0 27 May 2016

N

J14451
105AZP1
Macleay Island
J14256
105CMP1
105
104AZP1
104CMP1
J15997
Lamb Island
2_2488

Legend

Available FF (L/s)
- < 15
- 15 - 30
- > 30

- AZP Logger
- CMP Logger
- DMA Boundary Valve
- PRESSURE REDUCING

Diameter
63, 80, 100, 150, 200, 225, 250, 300, 375, 450, 500, 525, 600, 675, 691, 750, 900, Fire Flow 30 L/s

DMA Boundary
- 101 Russell Island East
- 102 Russell Island West
- 103 Karragarra Island
- 104 Lamb Island
- 105 Macleay Island
- Existing DMA Boundaries

0 250 500 1,000 1,500 Meters

FIGURE 10.4
105 Macleay Island DMA
Existing System 2036 FF Results (PRV = 35 m)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\105 Macleay Island DMA\03_Master_Plan\Drawings\Fig10.4_105_ULTMD_FF0530_PRV35.mxd
Draft 8 December 2010

N

105AZP1

104AZP1

104CMP1

105CMP1

PIP_AUG46

J14451

J14256

J15997

2_2488

105

Macleay Island

Lamb Island

Legend

Available FF (L/s)
- < 15
- 15 - 30
- > 30

- AZP Logger
- CMP Logger
- DMA Boundary Valve
- Fire Flow 30 L/s

Diameter
63, 80, 100, 150, 200, 225, 250, 300, 375, 450, 500, 525, 600, 675, 691, 750, 900, 2031

Proposed Augmentations

DMA Boundary
- 101 Russell Island East
- 102 Russell Island West
- 103 Karragarra Island
- 104 Lamb Island
- 105 Macleay Island
- Existing DMA Boundaries

0 250 500 1,000 1,500 Meters

FIGURE 10.5
105 Macleay Island DMA
2036 FF Results with Augmentations (PRV = 35 m)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig10_5_105_2036MD_FF1500_wAUG_PRV40 Rev0 27 May 2016

11. 106 Serpentine Creek Road

11.1 DMA Topography and Land Use

The Serpentine Creek Road DMA generally consists of low coastal areas (approximately 20m AHD) rising to higher elevation areas in the western part of the DMA (approximately 35m AHD). The two areas mentioned above are divided by Weinam Creek which traverses the DMA in a north-easterly direction.

The topography of the Serpentine Creek Road DMA is shown on Figure 11-1.

As shown on Figure 11-2, the northern part of Serpentine Creek DMA is predominantly Low Density and Low-medium Density Residential with some Medium Density Residential and Commercial and Industrial areas. The southern part of the DMA is predominantly "Investigation Zone".

11.2 Previous Planning

The area covered by this DMA was originally included in the Victoria Point PRV zone. This zone was essentially an open network supplied by three PRVs. Planning undertaken for the PIP / ICS determined augmentations on the basis of this zone configuration and included connections to the trunk mains leaving HRR complex to the north through Giles Road (into the north-western corner of this DMA).

Planning work undertaken as part of the PLMP originally had the Serpentine Creek Road DMA split between east and west using the two existing mains running north-south along Collins Street. Detailed fire flow modelling determined that the value (ability to reduce pressure in the lower coastal areas and therefore save additional water) in splitting the DMA in this fashion was unviable as dual feeds were required into each DMA and available pressure reductions were not significantly greater, than the combined DMA. As part of the PLMP it was then decided to maintain the Serpentine Creek Road DMA area as one DMA.

Augmentations have been constructed since the PLMP in accordance with the previous master planning document. The most important augmentations constructed in this zone are the mains around School of Arts Road and German Church Road which are designed to increase peak hour pressure in the north-western corner of the DMA. Further fire flow augmentations have been constructed, but the bulk of the new infrastructure constructed is developer donated reticulation infrastructure.

11.3 Current System Configuration and Source of Supply

The Serpentine Creek Road DMA is located in the southern coastal suburb of Redland Bay. The DMA nominally extends from Pitt Street in the north to Scenic Road in the south. It encompasses the most southerly parts of the Redland City Council that are connected to the water supply network and sources its water from an off-take from Seqwater's 750mm main between NSI WTP and the HRR complex. The PRV was originally modulated on the basis of an outlet pressure of 54m when flow into the DMA is above 15L/s and 49m outlet pressure when the flow into the DMA is less than 15L/s.

Due to the lack of reliability of the flow modulation control units and the increase baseline demand (due to the increased number of connections being brought on line), the modulation profile has been removed from this DMA and a fixed outlet pressure of 58m head has been applied.

11.4 Existing System Performance at 2036 Demands

11.4.1 Peak Hour

Peak Hour is at 09:00 and at this time the flow into the DMA is 126.8 L/s.

When the PRV is set at 58 m, the minimum pressure in the zone is 21.3 m at J10730. To meet the minimum DSS for pressure the PRV needs to be set at 59 m. The results are shown graphically on Figure 11-3.

11.4.2 MD Minimum Hour

The smallest flow into the system is at 23:00 with a flow of 11.8 L/s. With the PRV set at 59m, the maximum pressure at this time is 68.8 m at J14239. This is above the DSS for maximum service pressure of 55m. To achieve this DSS without modulating the PRV significant augmentations will be needed to meet the DSS for fire flow. It is proposed to monitor the DMA and if issues arise due to the high pressure re-initiate the PRV modulation.

11.4.3 Fire Flow

The fire flow scenario was run at 12:00 which is 2/3 PH. With the PRV set at 59m, most areas meet the DSS for fire flow except for those shown in Table 11.1.

Table 11.1 - DMA 106 2036 Fire Flow Issues

Junction	Fire Flow (L/s)	Location	Required Fire Flow (L/s)
J0395	12.6	German Church Road Waste Transfer Station - Daintree Drive Note - There is no hydrant at this location	-
J0396	13.3	German Church Road Waste Transfer Station - Daintree Drive. Note - The adjacent hydrant at 299 has an available FF of 17.4 L/s so between the two hydrants an available FF of 15L/s could be provided.	15
J10839	13.7	German Church Road Waste Transfer Station - Days Road. Note - Even when the flows are distributed over 3 hydrants 30L/s cannot be provided.	30
2_377	19.9	Redland Bay State School - Emperor Drive. Note - This junction is only near the sports fields so a reduced fire flow would be acceptable.	30
J11406	27.5	Redland Bay State School - Gordon Road. Note - The reason a flow of 30L/s cannot be provided is because the pressures in Emperor Drive and Kelby Close drop below 6m with the lowest pressure of 4.2m at 2_373 in Kelby Close (refer Figure 11-6).	30
J11301	17.3	Ferry Terminal - Auster Street Note - The flow cannot be provided from 3 hydrants	30
J14248	19.2	Ferry Terminal -The Esplanade Note - The flow cannot be provided from 3 hydrants	30
J14274	18.4	Ferry Terminal - Ferry Terminal Note - The flow cannot be provided from 3 hydrants	30
J10240	11.5	End of Orchard Road	15

The fire flow results are shown Figure 11-4.

11.4.4 Water Quality

Opportunities to improve water quality outcomes in this DMA are generally being taken up as the “greenfield” development areas in Redland Bay are developed and dead ends are eliminated as developments are connected to the water supply network. The western and southern extremities of the network will need to be regularly flushed due to the lower density of connections on this part of the network. In addition the larger mains such as the 250mm diameter in Main Street Redland Bay, which has been valved off to form the boundary between the Boundary Street DMA and this one, will need to be regularly maintained.

The water age analysis conducted as part of the DWQMP shows that most areas in the zone have a water age less than 2 days, however the area around Bankswood Drive have ages up to 18 days because the area has a single feed and several cul-de-sacs.

Continued system quality monitoring and proactive maintenance procedures across the whole DMA will continue to be critical to maintaining good water quality in this DMA.

11.5 Proposed Augmentations

11.5.1 Peak Hour

There are no peak hour augmentations needed. The PRV setting just needs to be increased from 58 m to 59 m.

11.5.2 Fire Flow

The augmentations needed to meet the DSS for fire flow and the results with the augmentations are summarised in Table 11.2.

Table 11.2 - DMA 106 2036 Proposed Fire Flow Augmentations

Junction	Location	Proposed Augmentations	Length (m)	Dia (mm)	Available FF (L/s)	Required FF (L/s)
German Church Road Waste Transfer Station						
J0396	Daintree Drive	PIP_NEWAUG9	250	150	19.2	15
J10839	Days Road	PIP_NEWAUG9	-	-	19.7	15
Redland Bay State School						
J11406	Gordon Road	PIP9705 PIP_AUG6	150 400	150 200	40.8	30
2_377	Emperor Drive	PIP9705 PIP_AUG6	-	-	36.4	-
Ferry Terminal						
J11301	Auster Street	FF_AUG_106_P1	310	150	39.4	30
J14248	The Esplanade	FF_AUG_106_P1	-	-	34.3	30
J14274	Ferry Terminal	PIP_NEWAUG4	140	150	30.0	30
Orchard Road						
J10240	End of Orchard Road	FF_AUG_106_P2	850	150	24.2	15

The augmentations are shown on Figure 11-5.

11.6 Augmentation Timing

11.6.1 Existing System at 2016 Demands

The 2016 fire flow results with the PRV set at 59 m are included in Table 11.3. All the augmentations (needed to meet the DSS for fire flow) are needed by 2016.

Table 11.3 - DMA 106 2016 Available FF without augmentation

Junction	Fire Flow (L/s)	Location	Required Fire Flow (L/s)
J0395	13.2	German Church Road Waste Transfer Station - Daintree Drive - No hydrant at this location	-
J0396	13.8	German Church Road Waste Transfer Station - Daintree Drive.	15
J10839	14.3	German Church Road Waste Transfer Station - Days Road	30
2_377	21.1	Redland Bay State School - Emperor Drive. This junction is only near the sports fields so a reduced fire flow would be acceptable.	30
J11406	30.5	Redland Bay State School - Gordon Road	30
J11301	17.8	Ferry Terminal - Auster Street	30
J14248	19.8	Ferry Terminal -The Esplanade	30
J14274	19.3	Ferry Terminal - Ferry Terminal	30
J10240	11.5	End of Orchard Road	15

202AZP1
202CMP1
106AZP1
106CMP1
107CMP1
107AZP1
N

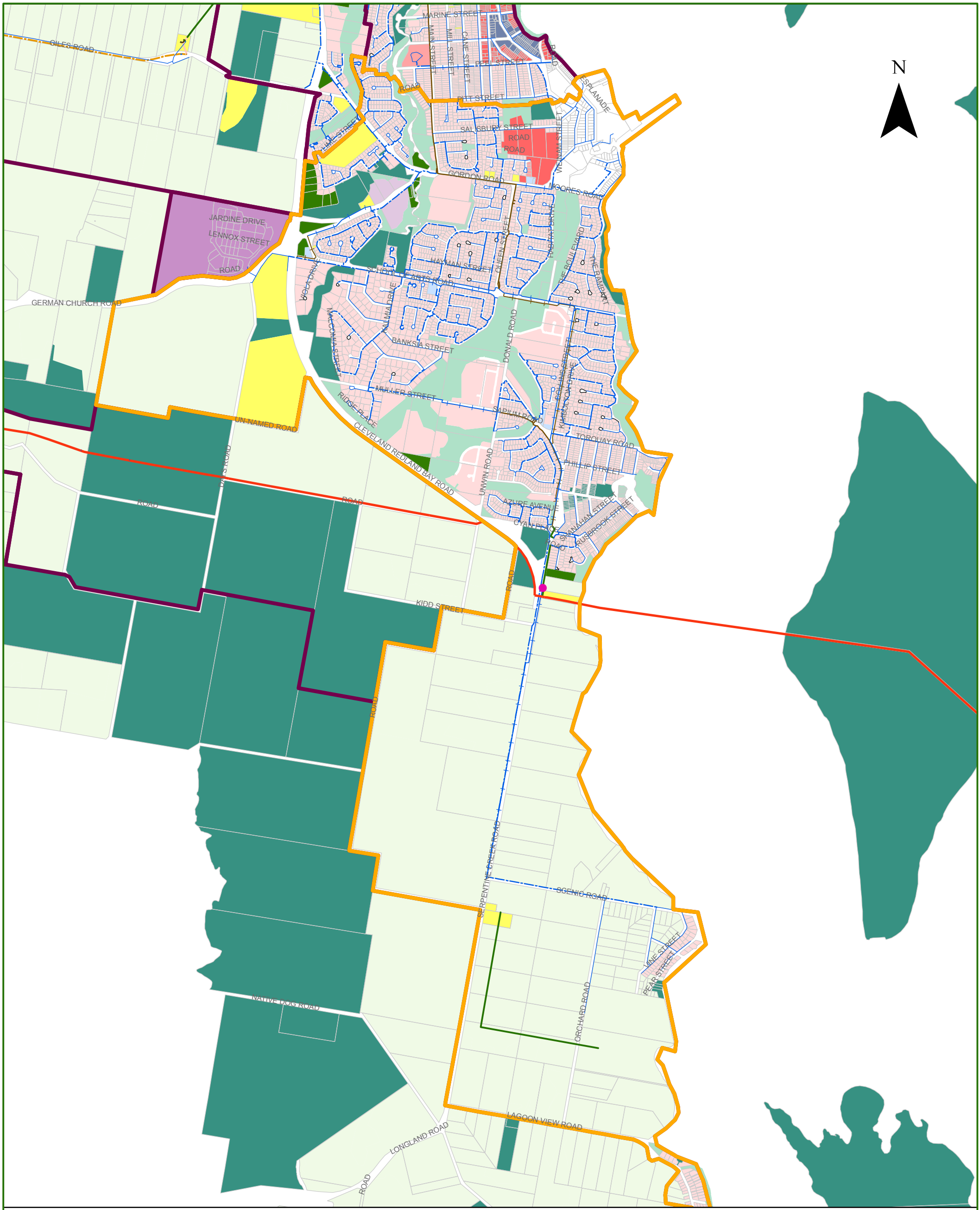
Legend

AZP Logger
CMP Logger
Existing DMA Boundaries
Serpentine Ck Boundary
CONTOURS
63 100 200 250 375 500 600 691 900
80 150 225 300 450 525 675 750

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 11.1
106 Serpentine Ck Topography

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig11_1_106_Topography.mxd
Rev0 23 June 2016



G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig11_2_106_Planning_Scheme.mxd
Rev0 23 June 2016

FIGURE 11.2
Serpentine Ck Planning Scheme

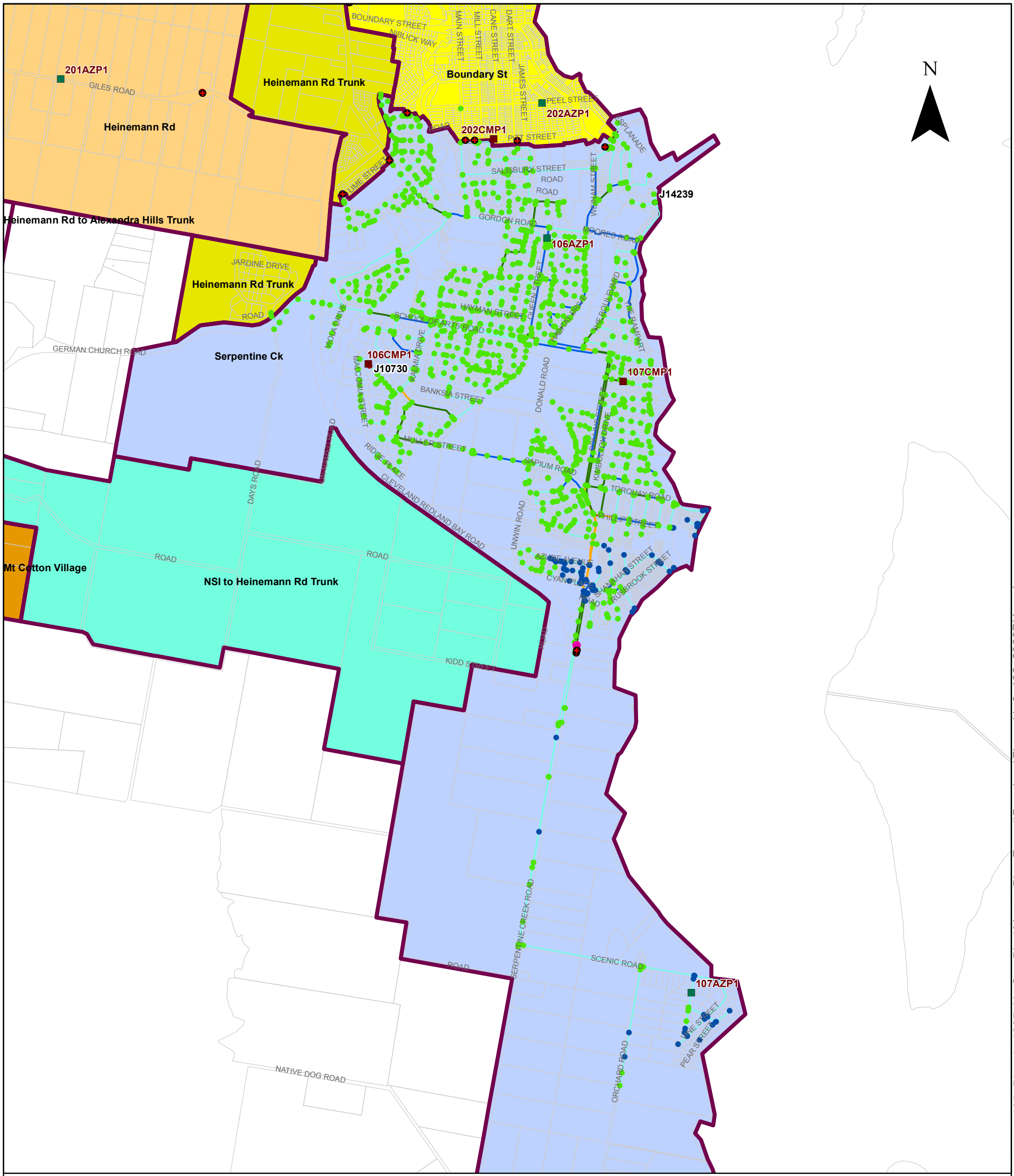


FIGURE 11.3
106 Serpentine Ck DMA
Existing System with 2036 PH Demands (PRV = 58 m)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure11_3_106_2036PH.mxd
Rev1 27 May 2016

Heinemann Rd Trunk
Heinemann Rd
Heinemann Rd Trunk
NSI to Heinemann Rd Trunk
Boundary St
202AZP1
202CMP1
H127
J11494
J11406
2_377
J14274
J14248
J14239
J11301
106AZP1
J0395
J0396
J10839
S106CMP1 Ck
J10730
107CMP1
107AZP1
J10240
N
SALISBURY STREET
GORDON ROAD
MOORES ROAD
SCHOOLHOUSE ROAD
BANKSIA STREET
DONALD ROAD
MULLER STREET
CLEVELAND REDLAND BAY ROAD
UNWIN ROAD
TORQUAY ROAD
PHILLIPS STREET
SCENIC ROAD
ORCHARD ROAD
PEAR STREET
DAYS ROAD
KIDD SURREY
NATIVE DOG ROAD
ROAD

Legend

Available FF (L/s)
- <15
- 15 - 30
- > 30

- AZP Logger
- CMP Logger
- PRV and Meter Site
- DMA Boundary Valve

Fire Flow 30 L/s

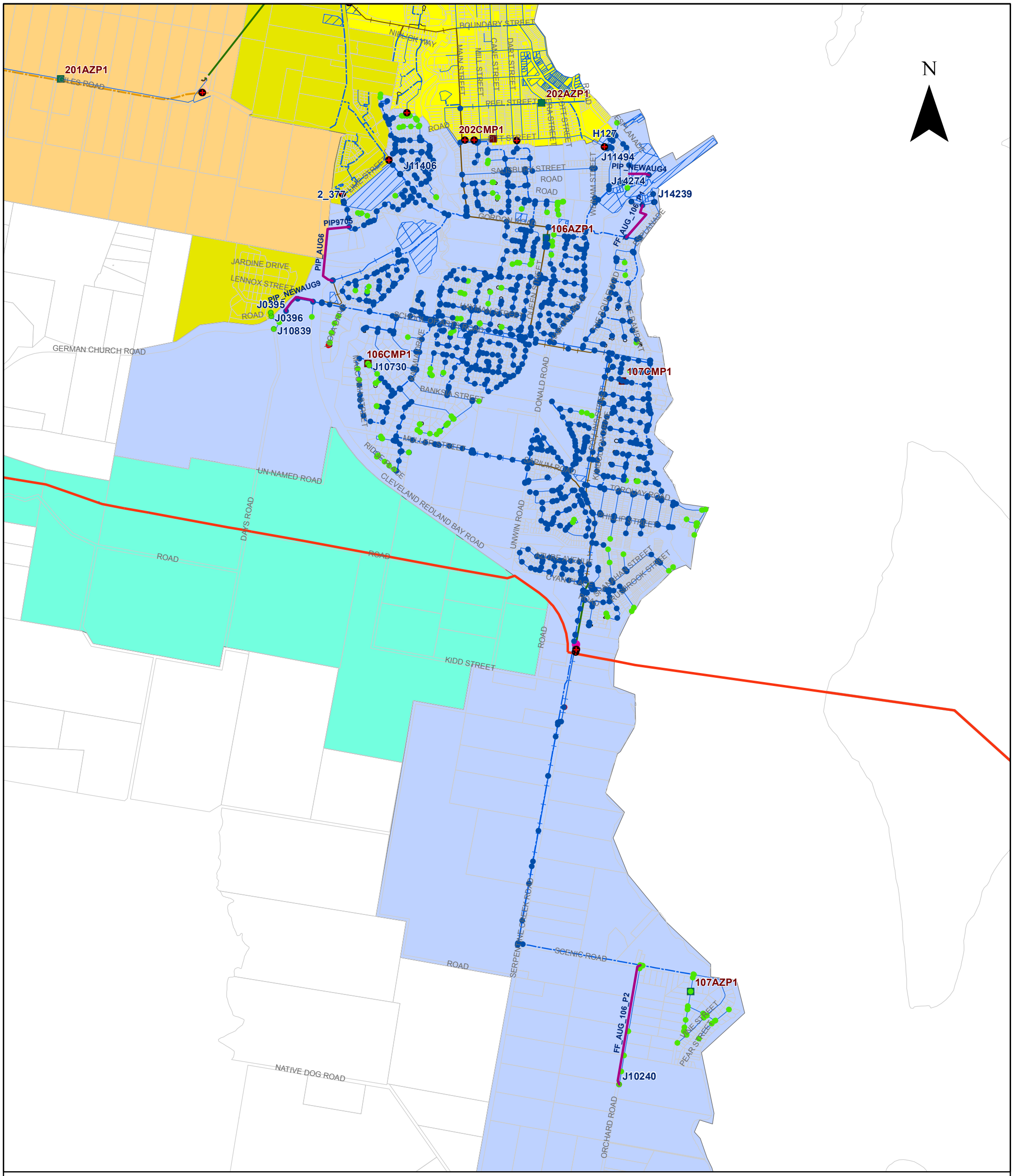
Diameter
- 63
- 80
- 100
- 150
- 200
- 225
- 250
- 300
- 375
- 450
- 500
- 525
- 600
- 675
- 691
- 750
- 900

DMA Boundary
- 106 Serpentine Ck
- 108 NSI to Heinemann Rd Trunk
- 201 Heinemann Rd
- 202 Boundary St
- 206 Mt Cotton Village
- 213 Heinemann Rd Trunk

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 11.4
106 Serpentine Ck DMA
Existing System 2036 FF Results (PRV = 59 m)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure11_4_106_2036<D_FF1200.mxd
Rev0 27 May 2016



Legend

Available FF (L/s)

- < 15
- 15 - 30
- > 30
- PRV and Meter Site

Proposed Augmentations

- 2016
- AZP Logger
- CMP Logger
- Fire Flow 30 L/s

DMA Boundary

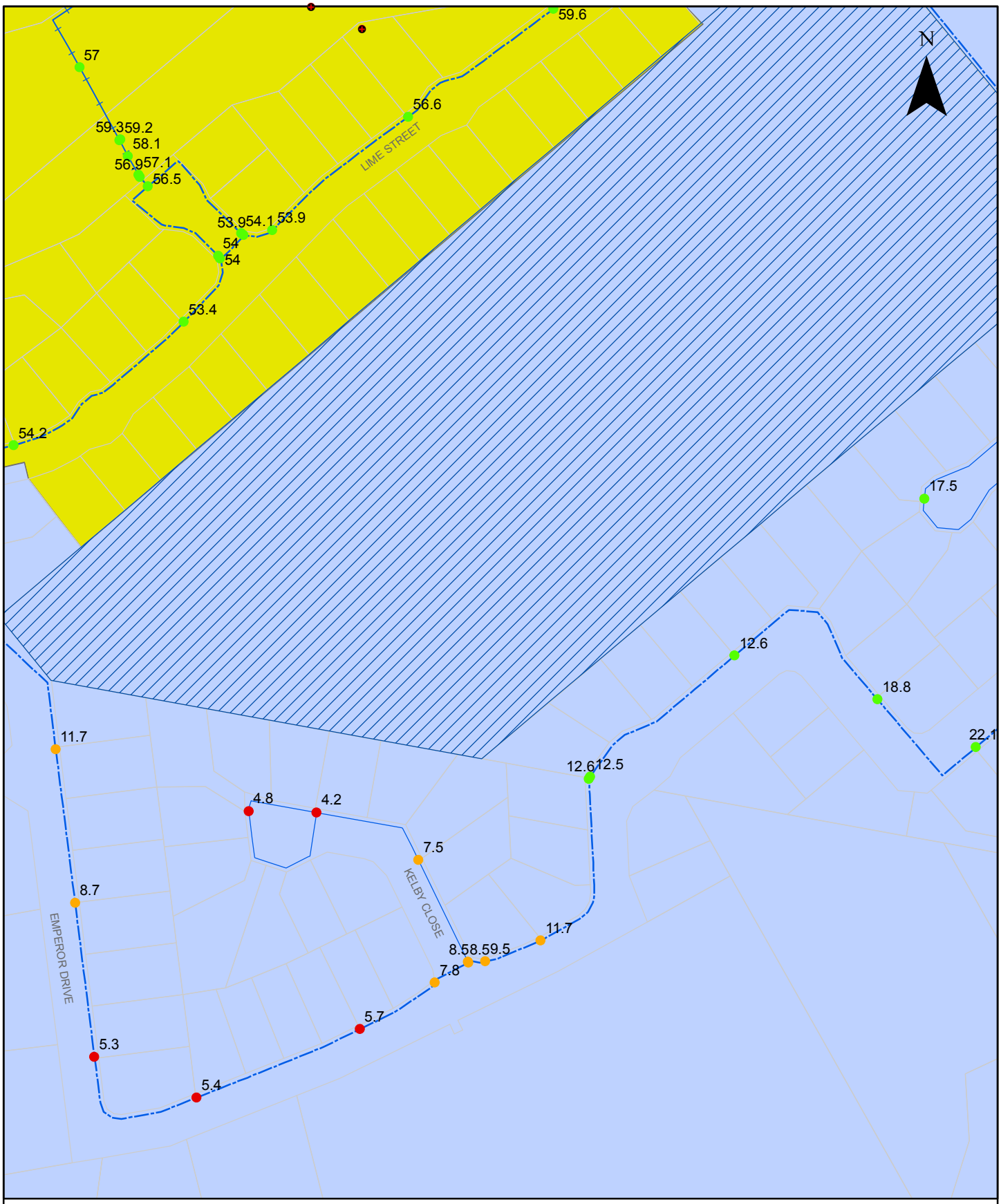
- Serpentine Ck
- 108 NSI to Heinemann Rd Trunk
- 201 Heinemann Rd
- 202 Boundary St
- 213 Heinemann Rd Trunk

Diameter

63, 80, 100, 150, 200, 225, 250, 300, 375, 450, 500, 525, 600, 675, 691, 750, 900

FIGURE 11.5
Serpentine Ck DMA
2036 FF Results with Augmentations (PRV = 59 m)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure11_5_106_2036MD_FF1200_wAUG.mxd
Rev1 31 May 2016



Legend

Residual Pressure (m)

- <6
- 6 - 12
- > 12
- PRV and Meter Site

- Fire Flow (30L/s)
- AZP Logger
- CMP Logger

DMA Boundary

- Serpentine Ck
- 108 NSI to Heinemann Rd Trunk
- 201 Heinemann Rd
- 202 Boundary St
- 213 Heinemann Rd Trunk

Diameter

63, 80, 100, 150, 200, 225, 250, 300, 375, 450, 500, 525, 600, 675, 691, 750, 900

0 10 20 40 60 80 100 Meters

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlanMaster Plan Report\Drawings\Fig11_6_RB_School_CFF_Junctions.mxd
Rev1 31 May 2016

FIGURE 11.6
Redland Bay State School Critical Junctions

12. 201 Heinemann Road

12.1 DMA Topography and Land Use

Heinemann Road DMA is located inland and has elevations ranging from about 10m to 60m AHD. The topography of Heinemann Road is shown on Figure 12-1.

As shown on Figure 12-2, the land use in the area is predominantly Rural, Conservation and Environmental Protection, plus a small pocket of Urban Residential land. This DMA also contains the bulk of the Emerging Communities zoned land north of Double Jump Road. The development of this land is not within the population projections for this report.

12.2 Previous Planning

The Heinemann Road and NSI to Heinemann Road Trunk DMAs are only slightly different to the Heinemann Road water supply zone in the original PIP planning study. The majority of differences are related to the adopted DMA boundaries in the rural areas, which have very little influence on the overall water supply system.

12.3 Current System Configuration and Source of Supply

The Heinemann Road DMA is fed from the Heinemann Rd Reservoir via 675 and 600 mm dia MSCL pipes along Heinemann Rd. The off-take for the DMA comes off the 600mm diameter main at the corner of Heinemann and Double Jump Roads. There is a flow meter located at the off-take, but the DMA is not pressure reduced so there is no PRV.

12.4 Existing System Performance at Ultimate Demands

The analysis was undertaken with Heinemann Road Reservoir at 36% (3.85 m).

12.4.1 Peak Hour

At 9:00 am the flow into the DMA is 18.8 L/s. As shown on Figure 12-3 all areas meet the DSS for PH, with a minimum pressure of 32.7m at 201CMP1.

12.4.2 Fire Flow

2/3 PH is 11.8L/s, the closest time this occurs is at 06:30 when there is a flow of 12.1L/s. As shown on Figure 12-4 one area doesn't meet the DSS for fire flow. These are summarised in Table 12.1.

Table 12.1 - DMA 201 2036 Fire Flow Issues

Junction	Fire Flow (L/s)	Location	Required Fire Flow (L/s)
J7699	12.9	Boundary of DMA208 and DMA201 on Springacre Road Note: When 7.5 L/s is put on J7699 and 301, the available pressure is 4.9 and 6.7 m respectively. Junction 285 has 14.8 L/s and 301 has 13.9 L/s. Junction 118 which is in DMA208 has an available FF of 22.9 L/s at 06:30 which is only 18m from J7699. It is however 95 m from junction 301. It is therefore recommended that an augmentation is put in place.	15

12.4.3 PD Minimum Hour

Minimum hour is at midnight with an inflow of 3.2L/s to the DMA. At midnight the maximum pressure is 66.6 m at junction 284.

12.4.4 Water Quality

The water age analysis conducted as part of the DWQMP shows that most areas in the zone have a water age around 6 days. This is largely due to the Heinemann Road Reservoirs and will gradually improve as development occurs throughout the entire water supply zone.

12.5 Proposed Augmentations

12.5.1 Peak Hour

There are no peak hour augmentations needed.

12.5.2 Fire Flow

The proposed fire flow augmentation is summarised in Table 12.2.

Table 12.2 - DMA201 2036 Proposed Fire Flow Augmentations

Junction	Proposed Augmentations	Length (m)	Dia (mm)	Available FF (L/s)	Required FF (L/s)
Springacre Road					
J7699	PIP_AUG51	325	200	13.5*	15

*Note: * The adjacent hydrant (Junction 301) has an available FF of 15.1L/s and Junction 118 in DMA208 has an available FF of 22.9L/s so this is considered acceptable.*

The fire flow results and locations of the augmentations are shown on Figure 12-5.

12.6 Augmentation Timing

12.6.1 Existing System at 2016 Demands

Fire Flow

In 2016 2/3 PH is 7.1 L/s, the closest inflow is 7.5 L/s at 5:00 am so this has been adopted for the Fire Flow analysis. The results in Table 12.3 show that the issues in Springacre Road and Giles Road occur in 2016.

Table 12.3 - DMA 201 2016 Fire Flow Issues

Junction	Fire Flow (L/s)	Location	Required Fire Flow (L/s)
J7699	13.4	Boundary of DMA208 and DMA201 on Springacre Road Note: When 7.5 L/s is put on J7699 and 301 the pressure is 6.5 and 8.4 respectively which is not sufficient. However because Junction 118 in DMA208 is adjacent to J7699 this is considered acceptable. Junctions 301 and 285 have a pressure of 9.2 and 15.3m respectively with 7.5L/s on them. With 5L/s on 310 and 10L/s on 285 the available pressure is still only 9.4 and 15.3. It is therefore recommended that proposed Augmentation PIP_AUG51 is constructed.	15

It is recommended that the Springacre Road augmentation is completed in 2016.

All augmentations are in place, so no additional modelling was undertaken.



G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawingss\Fig12.1_201_Topography.mxd
Rev0 23 June 2016

FIGURE 12.1
201 Heinemann Road Topography

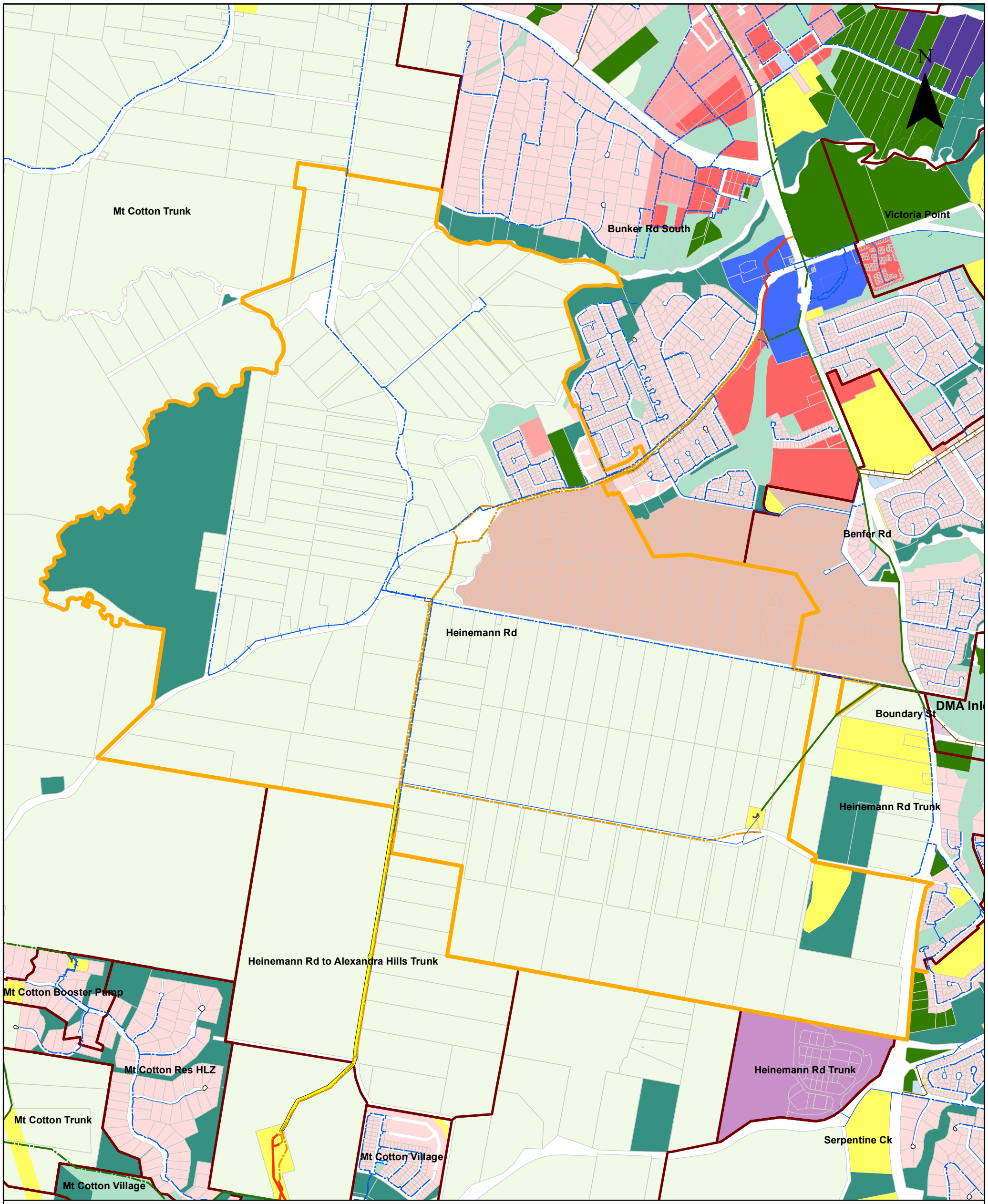


FIGURE 12.2
201 Heinemann Road Planning Scheme

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig12_2_201_Planning_Scheme.mxd
Rev0 31 May 2016

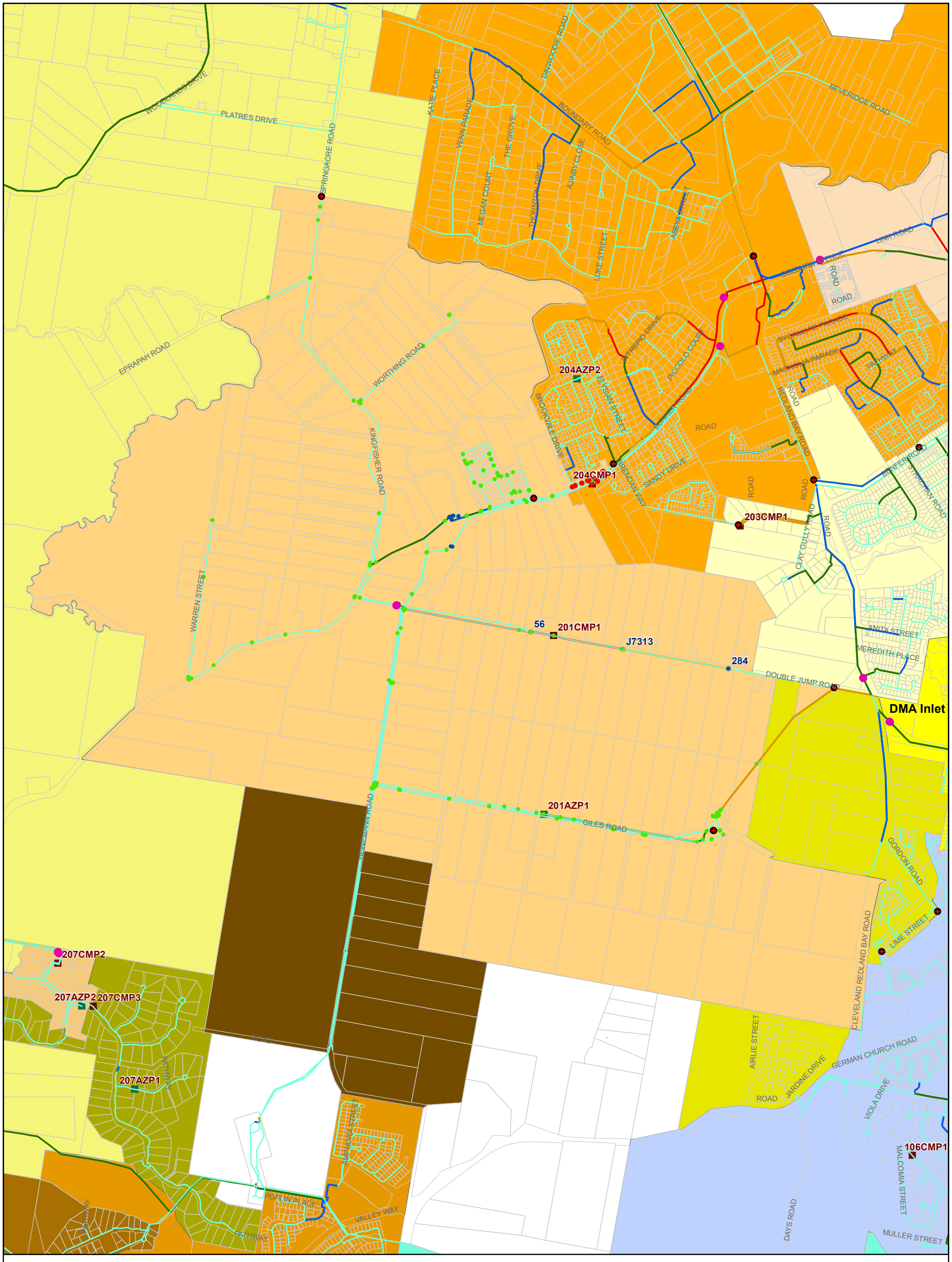


FIGURE 12.3
201 Heinemann Road DMA
Existing System with 2036 PH Demands

G:\RedlandWater&Waste\Data\TechSup\Planning\Projects\56025 Water & Sewerage PIP and ICS\10_PIP_Model_Review\201 Heinemann Road DMA\Drawings\Fig12_4_201_2036PH.mxd
Rev0 31 May 2016

N

J7699
285
204AZP2
J7413
2_116
204CMP1
203CMP1
56
201CMP1
J7313
284
DMA Inlet
H68372
J13323
201AZP1
J7274
J11615
207CMP2
207AZP2
207CMP3
207AZP1
106CMP1

PLATRES DRIVE
MOOLANDS DRIVE
SPRINGACRE ROAD
EPRAPAH ROAD
WORTHING ROAD
KINGFISHER ROAD
WARREN STREET
BOUNDARY ROAD
KATIE PLACE
TWIN PARADE
MEGAN COURT
THE GROVE
THORNTON DRIVE
AUDLEY CLOSE
IKE STREET
BRYANT STREET
BELVEDERE ROAD
LINK ROAD
COLBURN AVENUE
ROAD
SYCAMORE PARADE
MAGNOLIA PARADE
ASHWAY
REDLAND BAY ROAD
GLENBARRY WAY
BROOKVALE DRIVE
PICCOLO COURT
CLAY GULLY ROAD
BRIFFEN ROAD
STRACHAN ROAD
ANITA STREET
MEREDITH PLACE
DOUBLE JUMP ROAD
GORDON STREET
LIMIT STREET
CLEVELAND REDLAND BAY ROAD
AIRLIE STREET
JARDINE DRIVE
GERMAN CHURCH ROAD
VIOLA DRIVE
DAYS ROAD
POINT VILLAGE

Legend

Available FF (L/s)
- < 15
- 15 - 30
- > 30
- AZP Logger
- CMP Logger
- PRV and Meter Site

Diameter
63, 80, 100, 150, 200, 225, 250, 300, 375, 450, 500, 525, 600, 675, 691, 750, 900

DMA Boundary
- 106 Serpentine Ck
- 108 NSI to Heinemann Rd Trunk
- 201 Heinemann Rd
- 202 Boundary St
- 203 Benfer Rd
- 204 Bunker Rd South
- 205 Victoria Point
- 206 Mt Cotton Village
- 207A Mt Cotton Booster Pump
- 207B Mt Cotton Res HLZ
- 208 Mt Cotton Trunk
- 212 Mt Cotton Road
- 213 Heinemann Rd Trunk
- 250 Heinemann Rd to Alexandra Hills Trunk
- Unserviced Area

Fire Flow 30 L/s

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 12.4
201 Heinemann Road DMA
Existing System 2036 FF Results

G:\RedlandWater&Waste\Data\TechSup\Planning\Projects\56025 Water & Sewerage PIP and ICS\Water & Sewerage PIP and ICS\10_PIP_Model_Review\201 Heinemann Road DMA\Drawings\Fig11.3_201_ULTMD_FF0730.mxd
Rev0 31 March 2011

N

J7699
285
204AZP2
J7413
2_116
204CMP1
203CMP1
PIP_AUG51
Upgrade
Flow Meter
201CMP1
DMA Inlet
H68372
J13323
201AZP1
J7274
J11615
207CMP2
207AZP2
207CMP3
207AZP1
106CMP1

WOODLANDS DRIVE
PLATRES DRIVE
SPRINGACRE ROAD
KATIE PLACE
VENN PARADE
MEGAN COURT
THE GROVE
THORNTON DRIVE
DIVISION ROAD
BOUNDARY ROAD
AJNEY GROVE
LIKE STREET
BEVERIDGE ROAD
LINK ROAD
COLDSTREAM AVENUE
ROAD
SHEARMORE PARADE
MACQUARIE PARADE
PATHWAY
EPRAPAH ROAD
WORTHING ROAD
GATEHOUSE WAY
ALFRED DRIVE
PICCADILLY COURT
BROOKFIELD DRIVE
SHEFFIELD STREET
DUNHILL COURT
KINGFISHER ROAD
REDLAND BAY ROAD
ROAD
BRIDGEMAN ROAD
STRACHAN ROAD
CLAY GULLY ROAD
WARREN STREET
ANITA STREET
MEREDITH PLACE
DOUBLE JUMP ROAD
GILES ROAD
GORDON ROAD
CLEVELAND REDLAND BAY ROAD
LIKE STREET
AIRLIE STREET
JARDINE DRIVE
GERMAN CHURCH ROAD
VICH DRIVE
DAYS ROAD

Legend

Results
- < 15
- 15 - 30
- > 30
- AZP Logger
- CMP Logger
- PRV and Meter Site

Diameter
63, 80, 100, 150, 200, 225, 250, 300, 375, 450, 500, 525, 600, 675, 691, 750, 900

DMA Boundary
- 106 Serpentine Ck
- 108 NSI to Heinemann Rd Trunk
- 201 Heinemann Rd
- 202 Boundary St
- 203 Benfer Rd
- 204 Bunker Rd South
- 205 Victoria Point
- 206 Mt Cotton Village
- 207A Mt Cotton Booster Pump
- 207B Mt Cotton Res HLZ
- 208 Mt Cotton Trunk
- 212 Mt Cotton Road
- 213 Heinemann Rd Trunk
- 250 Heinemann Rd to Alexandra Hills Trunk
- Unserviced Area

Fire Flow 30 L/s

Proposed Augmentations
- 2031
- 2026
- 2016

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 12.5
201 Heinemann Road DMA
2036 FF Results with Augmentations

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig12_5_201_2036MD_FF1330.mxd
Rev0 23 June 2016

13. 202 Boundary Street

13.1 DMA Topography and Land Use

The Boundary Street DMA consists of relatively flat, low coastal areas with elevations ranging from zero to approximately 20m AHD. The DMA inlet is located along Boundary Street near the intersection with Gordon Road. The topography of DMA is shown on Figure 13-1.

As shown on Figure 13-2 the majority of the DMA is Low Density and Low-medium Density Residential with some Medium Density and District Centre zoned areas around Broadwater Terrace

13.2 Previous Planning

The whole of this DMA was originally included in the Victoria Pt PRV zone. Planning undertaken for the PIP / ICS was based on the original configuration for this area and did not include any augmentations. The previous version of the Master Plan identified an augmentation along the Esplanade at Redland Bay (near North Street) which would enable a lower PRV setting to be utilised without compromising fire flow provision. This augmentation has been constructed.

13.3 Current System Configuration and Source of Supply

The Boundary St DMA is fed from the Heinemann Rd Reservoir via 675 and 600 mm dia MSCL pipes along Heinemann Rd, a 600 mm dia DICL pipe along Giles Rd and a 375 mm dia AC pipe from the abandoned Giles Rd Reservoirs to the PRV and Meter off-take in Boundary Street.

Due to the lack of reliability of the flow modulation control units, the modulation profile has been removed from this DMA and a fixed outlet pressure of 53m head has been applied.

13.4 Existing System Performance at Ultimate Demands

13.4.1 Peak Hour

Peak Hour is at 09:00 and at this time the flow into the DMA is 38.2 L/s.

When the PRV is set at 42 m, the minimum pressure in the zone is 28.7 m at 202CMP1.

13.4.2 MD Minimum Hour

The smallest flow into the system is at 23:00 with a flow of 3.5 L/s. With the PRV set at 42m, the maximum pressure at this time is 49.6 m at junction J11607. This is below the DSS for maximum service pressure of 55m.

13.4.3 Fire Flow

The fire flow scenario was run at 12:00 which is 2/3 PH.

PRV set at 42m

With the PRV set at 42m, most areas meet the DSS for fire flow except for the end of Hamilton Street as summarised in Table 13.1.

Table 13.1 - DMA 202 2036 Fire Flow Issues (PRV42m)

Junction	Fire Flow (L/s)	Location/Notes	Required Fire Flow (L/s)
Esplanade Road			
J11655	21.5	N46 is capable of providing 30L/s therefore the requirement of 30L/s over three hydrants can be met.	30
H62952	25.4		30
N46	30.4		15
Corner Hamilton Street & Weinam Street			
J11494	20.7	This is on the boundary of DMA106. Hydrant 63041 in DMA106 has an available FF of around 34L/s so no additional augmentations are	30

Junction	Fire Flow (L/s)	Location/Notes	Required Fire Flow (L/s)
		proposed.	

The fire flow results are shown Figure 13-4.

PRV set at 38m
With the PRV set at 38m, most areas meet the DSS for fire flow except for the end of Hamilton Street as summarised in Table 13.2.

Table 13.2 - DMA 202 2036 Fire Flow Issues (PRV38m)

Junction	Fire Flow (L/s)	Location/Notes	Required Fire Flow (L/s)
Esplanade Road			
J11655	20.1	The three hydrants are not capable of meeting the DSS for fire flow with the results as follows: - J11655 - 10L/s @ 0.2m - H62952 - 10L/s @ 2.6m - N46 - 10L/s @ 8.9 m	30
H62952	23.7		30
N46	28.5		15
Corner Hamilton Street & Weinam Street			
J11494	19.4	This is on the boundary of DMA106. Hydrant 63041 in DMA106 has an available FF of around 34L/s so no additional augmentations are proposed.	30
End of Sunningdale Drive			
1_224	14	There isn't a hydrant at this node and 1_225 where the hydrant is located has an available FF of 15.4 L/s	15

13.4.4 Water Quality
Water quality modelling indicates that water age in this zone is about 5 to 6 days. This appears to be largely due to the detention times in the Heinemann Road Reservoirs. These reservoirs are owned and managed by Seqwater, so a collaborative approach with Seqwater would be required to address water age issues.

13.5 Proposed Augmentations

13.5.1 Peak Hour
There are no peak hour augmentations needed.

13.5.2 Fire Flow
There are no augmentations proposed, however the PRV setting will need to be increased to accommodate the increased demands in the area.

13.6 Augmentation Timing

13.6.1 Existing System at 2016 Demands
As shown in Table 13.3, even with the 2016 demand scenario the fire flow along Esplanade Road cannot be met. It is therefore recommended that PRV is set at 42m until the interaction of the Weinam Creek Priority Development Area (PDA) with the rest of the network is known. At this setting the maximum pressures are only slightly above the 55m DSS maximum.

Once the Weinam Creek PDA impact is known, the PRV setting can be re-assessed.

Table 13.3 - DMA 202 2016 Fire Flow Issues (PRV38m)

Junction	Fire Flow (L/s)	Location/Notes	Required Fire Flow (L/s)
Esplanade Road			
J11655	20.4	The three hydrants are not capable of meeting the DSS for fire flow with the results as follows: - J11655 - 10L/s @ 0.2m - H62952 - 10L/s @ 2.6m - N46 - 10L/s @ 8.9 m	30
H62952	24.3		30
N46	29.1		15



FIGURE 13.1
202 Boundary Street Topography

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig13_1_202_Topography.mxd
Rev0 31 May 2016

N

DMA Inlet

Legend

63
80
100
150
200
225
250
300
375
450
500
525
600
675
691
750
900

Residential Zones
- Low Density Residential
- Low-medium Density Residential
- Medium Density Residential

Centre Zones
- District Centre

Recreation Zones
- Recreation and Open Space

Environmental Zones
- Environmental Management
- Conservation

Industry Zones
- Low Impact Industry

Other Zones
- Community Facilities
- Emerging Communities
- Rural

BOUNDARY STREET DMA

0 100 200 400 600 800 1,000 Meters

FIGURE 13.2
202 Boundary Street Planning Scheme

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure13_2_202_Planning_Scheme.mxd
Rev0 31 May 2016

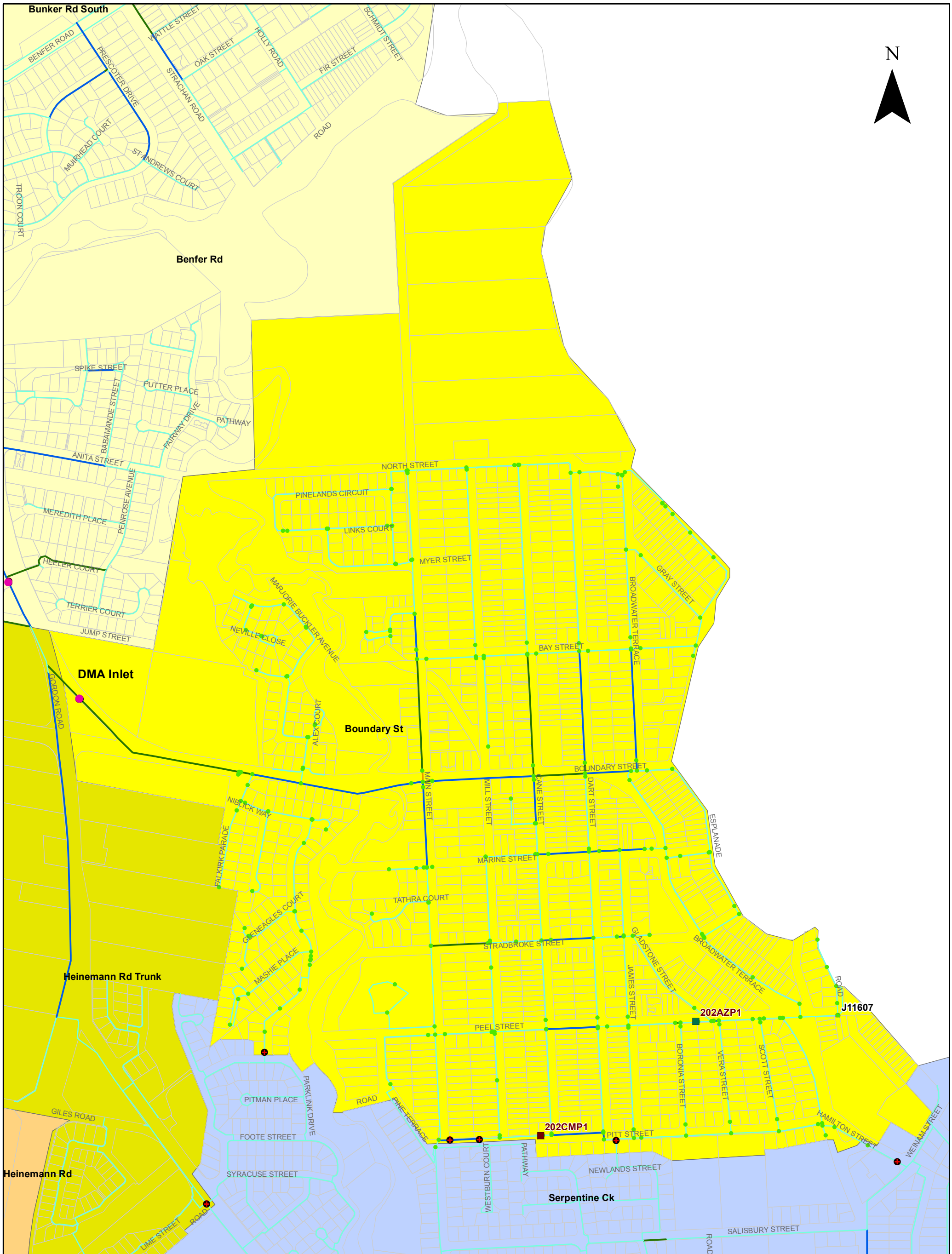


FIGURE 13.3
202 Boundary Street DMA
Existing System 2036 PH Demands (PRV = 42 m)

N

Benfer Rd

DMA Inlet

Boundary St

Heinemann Rd Trunk

Heinemann Rd

Serpentine Ck

J11655
H62952
202PUB
N46
202AZP1
119
1_225
202CMP1
J11535
H127
J11494
J11406

PRESCOTER DRIVE
OAK STREET
HOLLY ROAD
STRACHAN ROAD
FIR STREET
ROAD
MUIRHEAD COURT
ST ANDREWS COURT
TROON COURT
SPIKE STREET
PUTTER PLACE
BABAMANDE STREET
FAIRWAY DRIVE
PATHWAY
ANITA STREET
PENROSE AVENUE
PATHWAY
MEREDITH PLACE
HEELER COURT
TERRIER COURT
JUMP STREET
REDLAND BAY ROAD
NORTH STREET
PINELANDS CIRCUIT
LINKS COURT
MYER STREET
MARJORIE BUCKLER AVENUE
NEVILLE CLOSE
ALEX COURT
BAY STREET
BROADWATER TERRACE
GRAY STREET
BOUNDARY STREET
MAIN STREET
MILL STREET
DART STREET
ESPLANADE
MARINE STREET
NIBLICK WAY
FALKIRK PARADE
TATHRA COURT
CRANEAGLES COURT
MASHIE PLACE
STRADBROKE STREET
JAMES STREET
GLADSTONE STREET
BROADWATER TERRACE
ROAD
PEEL STREET
BORONIA STREET
VERA STREET
SCOTT STREET
HAMILTON STREET
MERVYN CRESCENT
PITMAN PLACE
PARKLINK DRIVE
ROAD
PINE TERRACE
FOOTE STREET
SYRACUSE STREET
GILES ROAD
ROAD
LIME STREET
TRUMP COURT
GORDON ROAD
DORY CLOSE
WESTBURN COURT
PATHWAY
NEWLANDS STREET
CAZNA COURT
LABIS STREET
SALISBURY STREET
ROAD
ROAD
ROAD
ROAD
WEINAM STREET
LANYARD PLACE

Legend

Available FF (L/s)
- 0 - 14
- 15 - 29
- 30 - 273

- AZP Logger
- CMP Logger
- PRV and Meter Site

DMA Boundary
- 106 Serpentine Ck
- 201 Heinemann Rd
- 202 Boundary St
- 203 Benfer Rd
- 204 Bunker Rd South
- 205 Victoria Point
- 209 Duncan Rd Booster Pump
- 213 Heinemann Rd Trunk

Fire Flow 30 L/s

0 100 200 400 600 800 1,000 Meters

FIGURE 13.4
202 Boundary Street DMA
Existing System 2036 FF Results (PRV = 42 m)

G:\RedlandWater&Waste\Data\TechSup\Planning\Projects\56025 Water & Sewerage PIP and ICS\10_PIP_Model_Review\202 BoundaryStDMA\Drawings\Figure12.3_202_ULT_FF0730.mxd
Rev0 9 February 2011

14. 203 Benfer Road

14.1 DMA Topography and Land Use

The Benfer Road DMA is a relatively long and narrow DMA. The bulk of the DMA follows Benfer Road to Link Road and includes customers either side of the Benfer Road in that stretch. From there, the DMA follows Colburn Avenue to Victoria Point itself, but only includes customers on the southern side of Colburn Avenue. The DMA also includes the submarine crossing and supply to Cochiemudlo Island and a small area west of Cleveland – Redland Bay Road around Clay Gully Road.

The DMA is primarily low coastal areas with elevations ranging from zero to approximately 20m AHD. The elevation of the highest point in the DMA is 21.9m AHD which is in the small section of the DMA to the west of Cleveland – Redland Bay Road.

The topography of the DMA is shown on Figure 14-1.

As shown on Figure 14-2, the majority of the DMA is Low Density and Low-medium Density Residential with some Medium Density Residential and Local and Neighbourhood Centre zoned land This DMA also presently contains some of the Emerging Communities zoned land north of Double Jump Road.

14.2 Previous Planning

All of this DMA was originally included in the Victoria Pt PRV zone. Planning undertaken for the PIP / ICS, was based on the original configuration for this area and included augmentations along Link Road and Colburn avenue, the installation of a booster pump at Victoria Pt (at the end of Colburn Avenue) and some further augmentations along the main on Coochiemudlo Island.

In March 2009, water supply needs of Coochiemudlo Island were investigated further to determine augmentation requirements for fire flow (RW, 2009(a)). The report titled "*Coochiemudlo Island Water Supply Investigation*" adopted a different strategy to the MWH report and included the augmentation of the main from the mainland to Coochiemudlo Island (instead of the booster pump station) and a number of minor augmentations on Coochiemudlo Island.

14.3 Current System Configuration and Source of Supply

The Benfer Road DMA is fed from the Heinemann Rd Reservoir via 675 and 600 mm dia MSCL pipes along Heinemann Rd, a 600 mm dia DICL pipe along Giles Rd and a 375 mm dia AC pipe from the abandoned Giles Rd Reservoirs to the Benfer Road DMA PRV and Meter off-take in Cleveland – Redland Bay Road.

PRV settings of 54 and 60m have been adopted as these are the recent downstream pressure readings for the DMA.

14.4 Existing System Performance at Ultimate Demands

14.4.1 Peak Hour

Peak Hour is at 09:00 and at this time the flow into the DMA is 68.9 L/s.

When the PRV is set at 60 m, the minimum pressure in the zone is 41.7 m at J14823. 203CMP has a pressure of 47.8 m. The PH results are shown on Figure 14-3.

14.4.2 MD Minimum Hour

The smallest flow into the system is at 23:00 with a flow of 7 L/s. With the PRV set at 60m, the maximum pressure at this time is 70.7 m at J14726. This is about 16 m above the DSS for maximum service pressure of 55m.

To achieve this DSS for maximum pressures without modulating the PRV, additional augmentations will be needed to meet the DSS for fire flow. It is proposed to monitor the DMA and if issues arise due to the higher pressures re-initiate the PRV modulation.

14.4.3 Fire Flow

2/3 PH is 45.9L/s at 12:00 the inflow is 47L/s this is the closest flow to 2/3 PH so 12:00 has been adopted.

When the PRV is set at 60 m all areas on the mainland meet the DSS for fire flow. However Coochiemudlo Island has a number of areas which does not meet the DSS.

Table 14.1 - DMA203 2036 Fire Flow Issues

Junction	PRV 60m	Location	Required Fire Flow (L/s)
J14772	26.7	Shirley Street - Coochiemudlo	30
H3	25.6	Shirley Street - Coochiemudlo	30
J14733	27.2	Corner of Elizabeth and Williams Street - Coochiemudlo	30

The fire flow results when the PRV is set at 60m are shown Figure 14-4. Note that the limiting issue for the Elizabeth Street area is that pressures around Cypress Street drop to less than 6m when a flow of 30L/s is applied to this J14733. These results are shown on Figure 14-5.

14.4.4 Water Quality

Water quality modelling indicates that water age in this zone is about 5 to 8 days with the longer detention times on Coochiemudlo Island. This is partially due to the detention times in the Heinemann Road Reservoirs. These reservoirs are owned and managed by Seqwater, so a collaborative approach with Seqwater would be required to address water age issues.

14.5 Proposed Augmentations

14.5.1 Peak Hour

There are no peak hour augmentations needed.

14.5.2 Fire Flow

The augmentations needed to meet the DSS for fire flow when the PRV is set at 60m are summarised in Table 14.2. The proposed augmentations are shown on Figure 14-6.

Table 14.2 - DMA203 2036 Proposed Fire Flow Augmentations (PRV 60m)

Junction	Location	Proposed Augmentations	Length (m)	Dia (mm)	Available FF (L/s)	Required FF (L/s)
Elizabeth Street - Coochiemudlo						
J14733	Elizabeth Street	PIP_IC10 PIP_IC8	560 207	200 200	30.4	30
J14733	Elizabeth Street	PIP_IC9_Opt2	410	250	29.5	30
Shirley Street - Coochiemudlo						
J14772	Shirley Street	PIP_IC10 PIP_IC8	- -	- -	29.8	30
J14772	Shirley Street	PIP_IC9_Opt2 The hydrant on the corner of Elizabeth and Merindah Street (J14768) has an available FF of 30 L/s so a flow of 30L/s is available from 3 adjacent hydrants	-	-	28.9	30

14.6 Augmentation Timing

14.6.1 Existing System at 2016 Demands

When the PRV is set at 60 m the critical junctions do not meet the DSS for Fire Flow are shown in Table 14.3 below.

Table 14.3 - DMA203 2016 Fire Flow Results Summary (PRV 60)

Junction	Location	Proposed Augmentations	Length (m)	Dia (mm)	Available FF (L/s)	Required FF (L/s)
Elizabeth Street - Coochiemudlo						
J14733	Elizabeth Street	With No Augmentations	-	-	30.9	30
Shirley Street - Coochiemudlo						
J14772	Shirley Street	With No Augmentations	-	-	29.3	30
J14772	Shirley Street	PIP_IC8	207	200	30.2	30
J14772	Shirley Street	PIP_IC9_Opt2	410	250	31.5	30

Either PIP_IC8 or PIP_IC9_Opt2 is required in 2016.

14.6.2 2021 Demands with 2016 Augmentations

If PIP_IC9Opt2 is adopted then no further augmentations are required.

If PIP_IC8 and PIP_IC9 are the adopted augmentations, when the PRV is set at 60 m the critical junctions for Fire Flow are shown in Table 14.4 below.

Table 14.4 - DMA203 2021 Fire Flow Results Summary (PRV 60m)

Junction	Location	Proposed Augmentations	Length (m)	Dia (mm)	Available FF (L/s)	Required FF (L/s)
Elizabeth Street - Coochiemudlo						
J14733	Elizabeth Street	PIP_IC8 (2016)	207	200	29.8	30
Shirley Street - Coochiemudlo						
J14772	Shirley Street	PIP_IC8 (2016)	-	-	29.5	30

When the PRV is set at 60m both areas meet the DSS for fire flow in 2021 so no additional augmentations are required. If the PRV is set at 54m PIP_IC9_Option 2 is required in 2021 to provide sufficient FF to Shirley Street.

14.6.3 2026 Demands with 2021 Augmentations

If PIP_IC8 is adopted, when the PRV is set at 60 m the critical junctions do not meet the DSS for Fire Flow are shown in Table 14.5 below.

Table 14.5 - DMA203 2021 Fire Flow Results Summary (PRV 60m)

Junction	Location	Proposed Augmentations	Length (m)	Dia (mm)	Available FF (L/s)	Required FF (L/s)
Elizabeth Street - Coochiemudlo						
J14733	Elizabeth Street	PIP_IC8 (2016)	207	200	28.7	30
J14733	Elizabeth Street	with PIP_IC10	560	200	31	30
Shirley Street - Coochiemudlo						
J14772	Shirley Street	PIP_IC8 (2016)	-	-	28.4	30
J14772	Shirley Street	With PIP_IC10	-	-	30.4	30

N

Legend

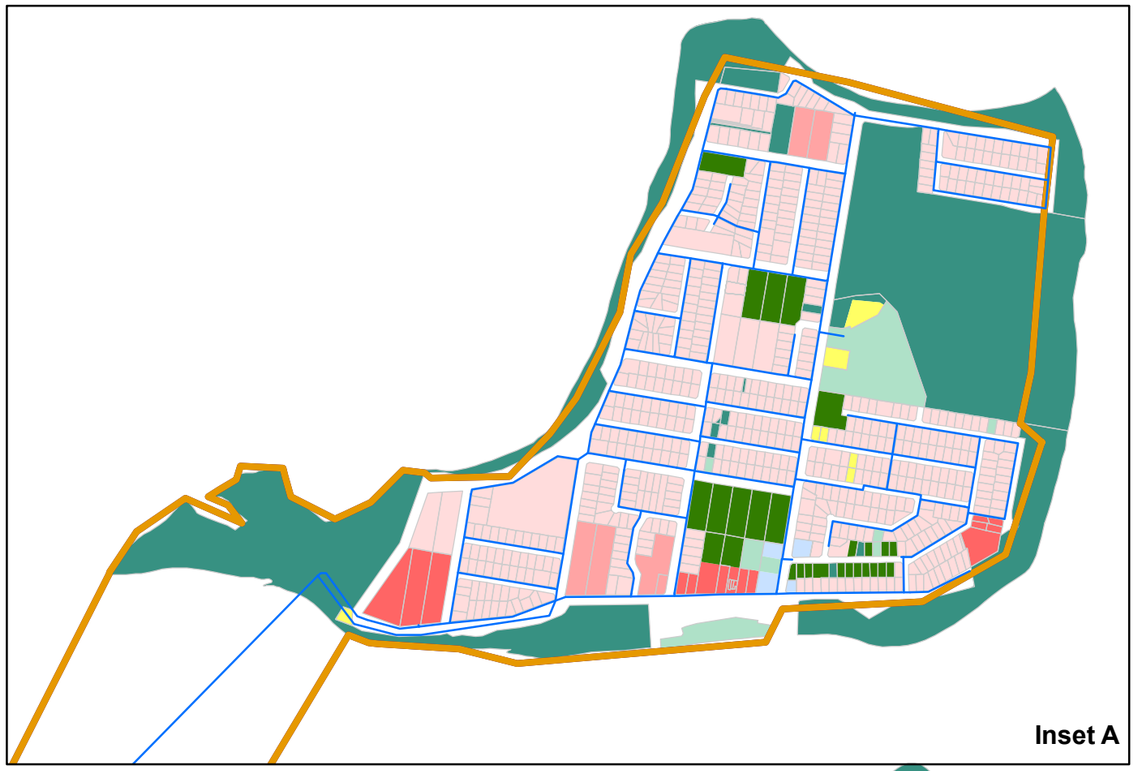
Benfer Rd | Existing DMA Boundaries | 5m Contours | **Diameter** 63 | 80 | 100 | 150 | 200 | 225 | 250 | 300 | 375 | 450 | 500 | 525 | 600 | 675 | 691 | 750 | 900

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 14.1
203 Benfer Road Topography

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig14_1_203_Topography.mxd
Rev0 3 June 2016

See Inset A



Legend

BENFER ROAD DMA
Water Supply DMAs

Residential Zones
Low Density Residential
Low-medium Density Residential
Medium Density Residential

Centre Zones
Major Centre
Local Centre
Neighbourhood Centre

Recreation Zones
Recreation and Open Space

Environmental Zones
Conservation
Environmental Management

Other Zones
Community Facilities
Emerging Communities
Rural

0 250 500 1,000 1,500 2,000 2,500
Meters

FIGURE 14.2
203 Benfer Rd Planning Scheme

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure14.2_203_Planning_Scheme.mxd
Rev0 3 June 2016

See Inset A

205CMP1
203AZP1
203CMP1
J14283
203AZP2
J14726
Victoria Point
Bunker Rd South
Benfer Rd
Heinemann Rd
Boundary St
Heinemann Rd Trunk
Heinemann Rd
Heinemann Rd Trunk
Benfer Rd
Inset A

Legend

Residual Pressure (m) <22 · 22-60 · >60 · AZP Logger · CMP Logger · PRV and Meter Site · DMA Boundary Valve

Headloss (m/1000) <1 · 1 - 2 · 2 -5 · 5 - 10 · >10

DMA Boundary

W004 Alexandra Hills LLZ · 201 Heinemann Rd · 202 Boundary St · 203 Benfer Rd · 204 Bunker Rd South · 205 Victoria Point · 208 Mt Cotton Trunk · 210 Thornlands · 250 Heinemann Rd to Alexandra Hills Trunk

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 14.3
203 Benfer Road DMA
Existing System with 2036 PH Demands (PRV = 60 m)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure14.3_203_2036PH.mxd
Rev0 3 June 2016

See Inset A

205CMP1
203AZP1
203AZP2
203CMP1
J12567
J12432
J14772
J14768
J14733
284

Victoria Point
Bunker Rd South
Benfer Rd
Heinemann Rd
Boundary St
Heinemann Rd Trunk

Inset A

Legend

Available FF (L/s): 0 - 14; 15 - 29; 30 - 273
AZP Logger; CMP Logger; PRV and Meter Site; DMA Boundary Valve
Diameter: 63; 80; 100; 150; 200; 225; 250; 300; 375; 450; 500; 525; 600; 675; 691; 750; 900
DMA Boundary; W004 Alexandra Hills LLZ
201 Heinemann Rd; 202 Boundary St; 203 Benfer Rd; 204 Bunker Rd South; 205 Victoria Point; 208 Mt Cotton Trunk; 210 Thornlands; 250 Heinemann Rd to Alexandra Hills Trunk
Fire Flow 30 L/s

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 14.4
203 Benfer Road DMA
Existing System 2036 FF Results (PRV = 60 m)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig14_4_203_2036MD_FF1200.mxd
Rev0 3 June 2016

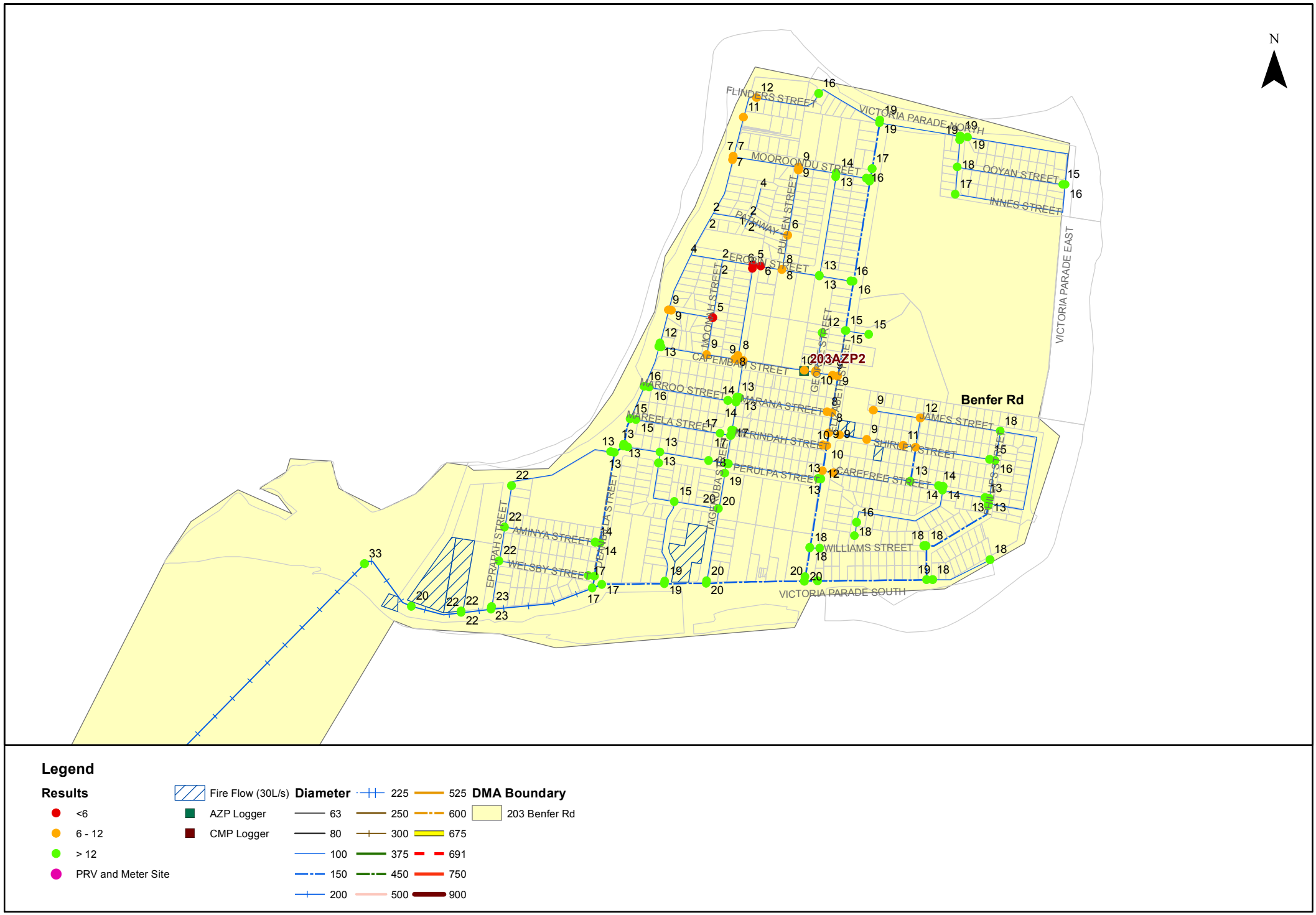


FIGURE 14.5
DMA203 2036 Pressures at 12:00 with 30L/s at J14733

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlanMaster Plan Report\Drawings\Fig14_5_203_2036MD_1200_30LpS_J14733.mxd
Rev1 14 October 2016

See Inset A

Note: Augmentation Options are:

- PIP_IC9OPt2
OR
- PIP_IC8, PIP_IC9 and PIP_IC10

PIP_IC9Opt2 has been adopted in the cost estimates and for the results shown on this drawing

Inset A

Legend

Available FF (L/s): 0 - 14; 15 - 29; 30 - 273

AZP Logger; CMP Logger; PRV and Meter Site; DMA Boundary Valve

Proposed Augmentations: 2026; 2016; 2031

Diameter: 63; 80; 100; 150; 200; 225; 250; 300; 375; 450; 500; 525; 600; 675; 691; 750; 900

DMA Boundary: W004 Alexandra Hills LLZ

201 Heinemann Rd; 202 Boundary St; 203 Benfer Rd; 204 Bunker Rd South; 205 Victoria Point; 208 Mt Cotton Trunk; 210 Thornlands; 250 Heinemann Rd to Alexandra Hills Trunk; Fire Flow 30 L/s

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 14.6
203 Benfer Road DMA
2036 FF Results with Augmentations (PRV = 60 m)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig14_6_203_2036MD_FF1200_wAUG.mxd
Rev0 3 June 2016

15. 204 Bunker Road South

15.1 DMA Topography and Land Use

The Bunker Road South DMA inlet is on the southern side of Bunker Road (behind the shopping centre). This DMA includes the Victoria Point commercial centre in the immediate vicinity.

From the DMA inlet, the zone extends south towards Benfer Road and north to South Street. Cleveland – Redland Bay Road runs north-south through the DMA and Eprapah Creek travels from west to east through the DMA. Bunker Road South DMA has lower lying coastal areas ranging from 5m to 20m AHD to the east of Cleveland – Redland Bay Road and higher elevations further inland ranging from 10 to 35m to the west of Cleveland – Redland Bay Road. The highest elevation within the zone is 35m along Bunker Road at the west of the DMA boundary. There are two other areas where the elevation reaches 30m, Trochus Court and Boundary Rd near Meadowland Road.

The topography of the DMA is shown on Figure 15-1.

As shown on Figure 15-2, Bunker Road south is a large DMA which comprises of Low Density and Low-medium Density Residential zones as well as Medium Density Residential zones around Beveridge Road. This DMA also includes the Major Centre of Victoria Point (including the shopping centres and cinema complexes).

15.2 Previous Planning

About two thirds of the area covered by this DMA was originally included in the Alexandra Hills LLZ with the remaining third in the Victoria Point PRV zone. Planning undertaken for the PIP / ICS, which was based on the original configuration for this area, only included connections in new development areas. There was however a “contingency” augmentation identified in the PIP / ICS which was essentially along the spine of this DMA. “Contingency” augmentations were developed in a planning study prior to the PIP / ICS and were directed at ensuring sufficient water could be transferred around the City in the event that one of the WTPs was off-line for an extended period of time. Given that Seqwater is now required to provide water security and the provision of the third source for Redlands (the EPI) this contingency augmentation has not been considered any further. Consideration may have to be given however to a separate study in conjunction with Seqwater as their Eastern Area Network Planning Report assumes continues usage of the network in this area in its current configuration.

The PLMP created the Bunker Road South DMA and attempted to size the zone based on the optimum use of the existing infrastructure (the Bunker Road South PRV existed before the PLMP was commenced and is a relatively large valve at DN500mm), hence the extension of the DMA north into the original Alexandra Hills LLZ.

Planning work undertaken as part of the PLMP originally had the Victoria Pt DMA supplied off the Bunker Rd North CV. However, modelling indicated that if SEQ Water Grid operations dictated that the Bunker Rd North CV be completely closed, then sufficient fire flow could not be provided to some areas of the Victoria Pt DMA without augmentation. The system was then changed so the Victoria Pt DMA receives its supply from the Bunker Road South DMA off the 375mm main along Cleveland – Redland Bay Road.

No significant trunk augmentations have been completed in this DMA since the preparation of the PIP. Fire flow augmentations and new developer donated reticulation infrastructure form the basis of the changes to the network in this DMA since the last planning report. The previous Master Plan, identified that splitting up of the DMA would be required to allow for the projected demand within the DMA. At this stage the triggers for that split-up of the DMA have not yet been reached.

15.3 Current System Configuration and Source of Supply

The Bunker Road South DMA is supplied from the HRR complex via two mains along Heinemann Rd, 675 and 600 mm dia MSCL until Giles Road and then two 600mm mains to the PRV and flowmeter off-take in Bunker Road (opposite Intrepid Drive and Manor Drive intersections). These two mains are interconnected just below the offtake for the Bunker Road South PRV where a single 750mm diameter main supplies the Bunker Road North Control Valve (CV).

Although the Bunker Rd North CV is located further down the trunk mains, the operation of the Bunker Road North PRV does impact on the upstream pressure at the Bunker Road South off-take (by drawing down the HGL in the trunk mains when fully open).

As mentioned previously the Victoria Pt DMA also receives its supply from the Bunker Road South DMA.

The Bunker Road South PRV is set at 64m and is not currently modulated. A setting of 64m has been adopted as this is the maximum pressure that the PRV can be set at without impacting on the operation of the PRV. It is recommended that detailed analysis of the significant commercial demand served by this PRV be undertaken to determine the optimum pressure setting for this DMA.

The analysis in this report is based on the assumption that the PRV will not be modulated. If it is modulated then there may be an additional head loss of about 6m through the PRV when it is fully open, so augmentation requirements would need to be reviewed.

15.4 Existing System Performance at Ultimate Demands

15.4.1 Peak Hour

Flow at 9:00 am is 254.7 L/s (including 64.1L/s for the Victoria Pt DMA) and the pressure U/S of the PRV is 66.9 m with BRNPRV open and set at 57.9L/s. When the BRNFCV is fully open the maximum flow through the valve at 9:00 am is 95.7 L/s and the pressure U/S of the DMA204 PRV drops to 66.1 m.

When the PRV is set at 64 m, most areas receive the peak hour DSS except for the following:

Table 15.1 - DMA204 2036 PH Results Summary (PRV = 64m)

Junction	Residual Pressure (m)	Location
J8333	21.8 m	Corner of Island Outlook Avenue and Margery Street
J8227	21.5 m	The end of Barrique Court
J15595	18.7 m	Near the corner of Trundle Road and Ziegenfusz Road
J7416	18.1 m	Along Bunker Road near the boundary of the Heinemann Road Pressure Zone

The results are shown graphically on Figure 15-3.

Increasing the PRV setting will not be sufficient to provide the DSS at PH because the upstream pressure is only 66.9m. This is only an increase of 2.9m when 4 m is needed.

If the BRNFCV is closed at 9:00 am the U/S pressure increases to 68.1 m which is just sufficient to take the pressure above 22m at J7416. The option to remove Victoria Point from this zone has therefore been investigated.

When the BRNFCV is fully open and Victoria Point DMA is off BRN the maximum flow through the valve increases 159.2 L/s and the pressure upstream of DMA204 PRV drops to 66.1 m. If BRN FCV is set at 57.9 L/s the U/S pressure increases to 68.2m, which is sufficient to meet the DSS, however it is unlikely that it will be possible to put a restriction of the flow through the valve so even without Victoria Pt DMA the PH DSS cannot be met.

It is therefore proposed to leave Victoria Point and remove the Northern part of DMA204 (as DMA214) and put it on BRN main. A detailed study will need to be undertaken with Seqwater to understand the implications of this proposed transfer on the ability to transfer water from HRR to AHR via the BRN CV.

15.4.2 Fire Flow

2/3 PH is 164.7 L/s, at 12:30 the flow is 166.7 L/s which has been adopted as the FF time. The fire flow results are shown in Table 15.2 and shown graphically on Figure 15-4. The results show that without any augmentations the Trochus Court and Traminer Court areas do not meet the DSS for fire flow.

Table 15.2 - DMA204 2036 FF Results Summary (PRV = 64m)

Junction	Fire Flow (L/s)	Location	Required FF (L/s)
2_120	18.31	Fiddlewood Street	15
J7572	14.86	Kurrewa Court	15

Junction	Fire Flow (L/s)	Location	Required FF (L/s)
J7694	17.16	Kodak Close	15
J7957	14.18	Trochus Court	15
J8043	13.55	Traminer Court	15
J15850	31.22	Beveridge Road	30

15.4.3 Water Quality

Water quality modelling indicates that water age in this zone is about 3 to 6 days. However the trunk main from BRN to Ziegenfusz Road has a water age of over 20 days. While this is not connected to DMA204, if the northern section of the zone is removed and taken off this trunk main, the water age in this section would be significantly be reduced.

15.5 Proposed Augmentations

15.5.1 Peak Hour

To remove DMA214 from DMA204 the following changes have been made:

- Open 1815 connected to the BRN main; and
- close 1823_B which connects the zone to DMA204.

This provides a single feed into DMA214 from DMA250 (BRN trunk main) which is located on the corner of Redland Bay Road and Ziegenfusz Road.

With the following settings in place:

- DMA205 off DMA204
- BRN closed
- AHR = 5.2m
- HR = 3.85m

The key results at 9:00 am are:

- U/S PRV204 = 69.4 m
- PRV204 Flow = 170.9 L/s
- US PRV205 = 64.2 m
- Flow into DMA214 = 82.4L/s

When PRV204 is set at 64m all areas meet the DSS for PH with minimum pressures of 23.3m at J7416. 204CMP1 has a pressure of 24.6m in DMA204. The minimum pressure in DMA214 is 25.3m at J15596 at the boundary of DMA210 and 214 along Ziegenfusz Road.

The peak hour results are shown on Figure 15-5.

15.5.2 MD Minimum Hour

DMA 204

The smallest flow into the system is at 23:00 with a flow of 21 L/s.

With the PRV set at 64m for the maximum pressure at this time is 70.1 m at J15811 along Beveridge Road. This is about 15 m above the DSS for maximum service pressure of 55m.

DMA 214

The smallest flow into the system is at 23:00 with a flow of 7.2 L/s. The maximum pressure at this time is 66 m at 2_317 along George Thorn Drive. This is about 11 m above the DSS for maximum service pressure of 55m.

To achieve this DSS for maximum pressures without modulating the PRV, additional augmentations will be needed to meet the DSS for fire flow. It is proposed to monitor the DMA and if issues arise investigate them to determine the most appropriate solution.

15.5.3 Fire Flow

When the PH augmentation is in place all areas meet the DSS for fire flow as discussed below.

DMA204

The 2/3 PH flow into DMA204 114L/s , at 12:30 the flow into the zone is 115.3 L/s so 12:30 has been adopted for the FF analysis.

When the PRV is set at 64m all areas meet the DSS for fire flow, with the minimum fire flow at J7549 which receives 15.5 L/s.

DMA214

The inflow into DMA214 at PH is 82.4L/s. The 2/3 PH flow is 54.9 L/s. At 12:00 the 2/3 PH flow is 54.7 so 12:00 has been adopted. All areas meet the DSS for fire flow except for the areas shown in Table 15.3.

Table 15.3 - DMA214 2036 FF Results Summary

Junction	Fire Flow (L/s)	Location	Required FF (L/s)
J8043	14.1	End of Traminer Court Note: H67651 has an available FF of 18.5 L/s so 15L/s can be provided from two hydrants. Therefore no augmentations are proposed.	15
J8001	14.2	End of Chateau Street Note: H67649 has an available FF of 17.1 L/s so 15L/s can be provided from two hydrants. Therefore no augmentations are proposed.	15
J5597	18.6	Boundary of DMA210 and 214 along Ziegenfusz Road. Note: This junction is adjacent to the Thornlands DMA so a FF of 30L/s from two hydrants can easily be achieved in this area. Therefore no augmentations are proposed.	30

The fire flow results are shown on Figure 15-6.

15.6 Augmentation Timing

15.6.1 Existing System at 2016 Demands

Peak Hour

In 2016 all areas meet the PH DSS of 22m at 9:00 am. The lowest pressure is at J7416 at 21.8m. 204CMP1 has an available pressure of 23.2m. This just meets the DSS, so it is recommended that the system is monitored and if pressure issues arise the northern section of the DMA is removed to form DMA214.

Fire Flow

The fire flow results are shown in Table 15.4. The results show that without any augmentations the Trochus Court and Traminer Court areas just meet the DSS for fire flow.

Table 15.4 - DMA204 2016 FF Results Summary (PRV = 64m)

Junction	Fire Flow (L/s)	Location	Required FF (L/s)
2_120	20.15	Fiddlewood Street	15
J7572	15.9	Kurrewa Court	15
J7694	18.61	Kodak Close	15
J7957	15.29	Trochus Court	15
J8043	14.51	Traminer Court	15
J15850	32.11	Beveridge Road	30

15.6.2 Existing System at 2021 Demands

In 2021 the PH results show the lowest pressure is at J7416 and is 20.9m. 204CMP1 has an available pressure of 22.4m. The northern section will therefore need to be removed to form DMA214. Once the northern section has been removed all areas will meet the DSS for fire flow.

N

Legend

- AZP Logger
- CMP Logger
- Bunker Rd South
- Existing DMA Boundaries
- 5m Contours

Diameter

63, 80, 100, 150, 200, 225, 250, 300, 350, 375, 450, 500, 525, 550, 600, 675, 691, 750, 900

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 15.1
204 Bunker Road South Topography

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\DrawingssFig15_1_204_Topography.mxd
Rev0 3 June 2016

N

Legend

Bunker Rd South
Water Supply DMAs

Diameter
63
80
100
150
200
225
250
300
375
450
500
525
600
675
691
750
900

Residential Zones
Low Density Residential
Low-medium Density Residential
Medium Density Residential

Centre Zones
Major Centre
Neighbourhood Centre

Recreation Zones
Recreation and Open Space

Environmental Zones
Environmental Management
Conservation

Industry Zones
Medium Impact Industry
Waterfront and Marine Industry

Other Zones
Community Facilities
Emerging Communities
Rural

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 15.2
Bunker Rd South Planning Scheme

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig15_2_204_Planning_Scheme.mxd
Rev0 3 June 2016

Alexandra Hills LLZ
Alexandra Hills LLZ
210AZP1
204CMP2
J8333
Thornlands
J8227
204AZP3
210CMP1
J15595
Heinemann Rd to Alexandra Hills Trunk
2_317
J15811
Bunker Rd South
Mt Cotton Trunk
204AZP2
J7416
204CMP1
Heinemann Rd
203CMP1
Benfer Rd
205AZP2
205CMP1
Victoria Point
Boundary St
201CMP1
N
PANORAMA DRIVE
PATHWAY
ABBOTSFORD STREET
BAY WATER AVENUE
MORRIS CIRCUIT
ROAD
MANNING ESPLANADE
PORTLAS PLACE
TUDOR PLACE
THORNLANDS ROAD
WATERVILLE DRIVE
WELLINGTON STREET
GOVERNER DRIVE
KITE CRESCENT
MONTEREY AVENUE
RIESLING STREET
PRIMROSE DRIVE
REEF STREET
KING STREET
COLTHOUSE DRIVE
PEEL STREET
TROUT STREET
ZIEGENEUSZ ROAD
CAMERON COURT
TRUNDLE ROAD
PLACE
DINWOODIE ROAD
PINECONE PLACE
BEVERIDGE ROAD
KARL PLACE
VENN PARADE
THE GROVE
MEGAN COURT
THORNTON DRIVE
AJUGA CLOSE
BOUNDARY ROAD
LUKE STREET
ASHLEA STREET
PLATRES DRIVE
SPRINGACRE ROAD
ORANA STREET
SCHOOL ROAD
MACADAMIA STREET
YARRAN STREET
CUBANIA STREET
MINETTA STREET
ALBERT STREET
ASPECT DRIVE
BUNIN STREET
CIRRUS STREET
MELODY STREET
COLBURN AVENUE
LINK ROADWAY
KESTREL COURT
GANNET STREET
JEANNE DRIVE
ALISON COURT
YEO STREET
SIMON STREET
ADRIAN STREET
GLEN ROAD
BRETT ROAD
SHERLOCK STREET
BEAVER ROAD
HOLLY ROAD
FIR STREET
ANITA STREET
MEREDITH PLACE
NORTH STREET
PINELANDS CIRCUIT
ESPLANADE
EHRAPAH ROAD
KINGFISHER ROAD
WORTHING ROAD
GLENHAVEN AVENUE
BROOKWATER AVENUE
ELYSIAN STREET
PICCOLO COURT
SANDY DRIVE
BRENDAN WAY
THIRD AVENUE
CLAY GULLY ROAD
DOUBLE JUMP ROAD

Legend

- AZP Logger
- CMP Logger
- PRV and Meter Site

Residual Pressure (m)
- <22
- 22-60
- >60

Headloss (m/1000)
- <1
- 1 - 2
- 2 -5
- 5 - 10
- >10

DMA Boundary
- W004 Alexandra Hills LLZ
- 201 Heinemann Rd
- 202 Boundary St
- 203 Benfer Rd
- 204 Bunker Rd South
- 205 Victoria Point
- 208 Mt Cotton Trunk
- 210 Thornlands
- 250 Heinemann Rd to Alexandra Hills Trunk

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 15.3
204 Bunker Rd South DMA
Exsting System with 2036 PH Demands (PRV = 64 m, with Victoria Pt DMA)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawingss\Fig15_3_204_2036PH.mxd
Rev0 3 June 2016

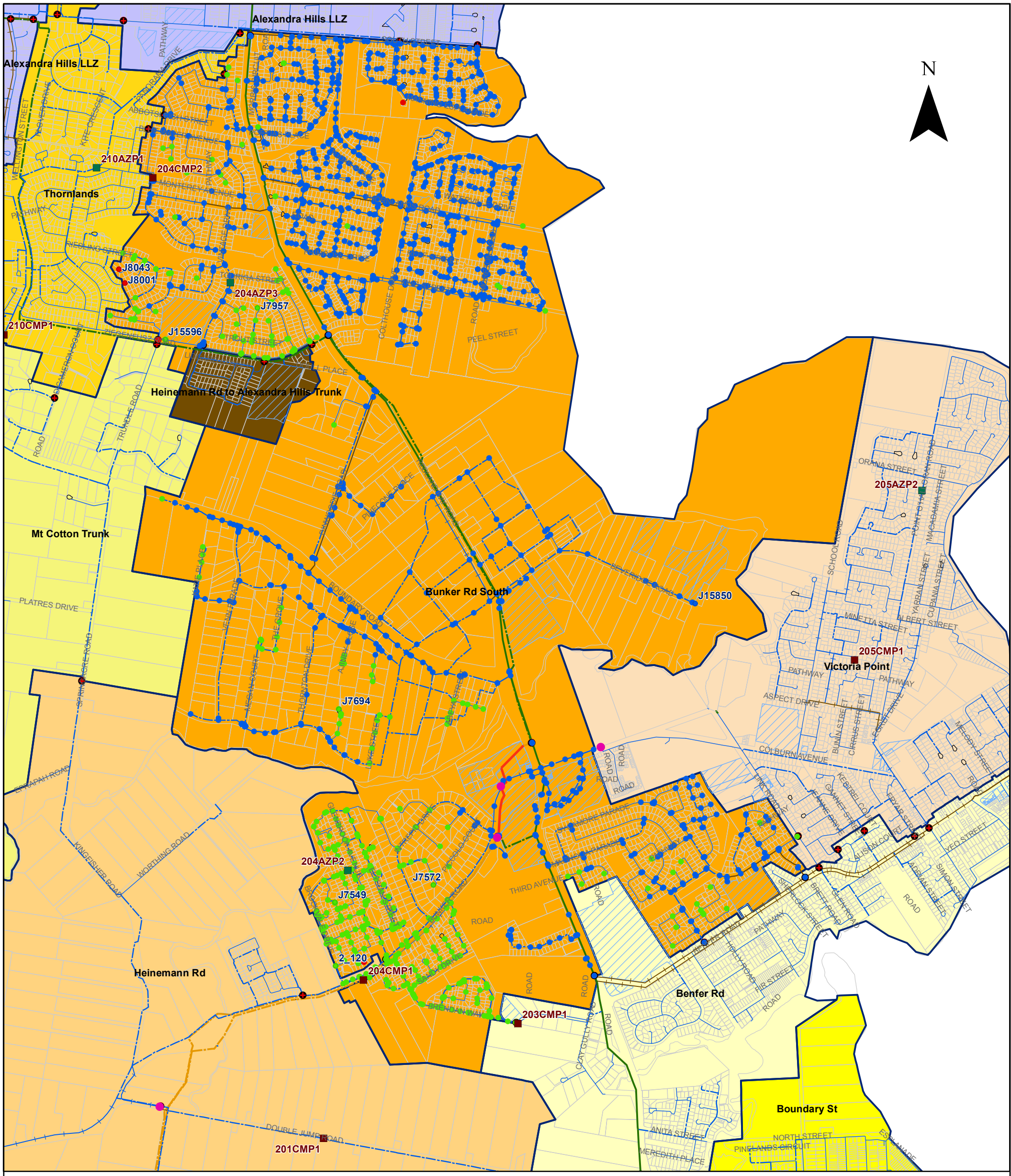


FIGURE 15.4
204 Bunker Rd South DMA
Exsting System 2036 FF Results (PRV = 64 m, with Victoria Pt DMA)

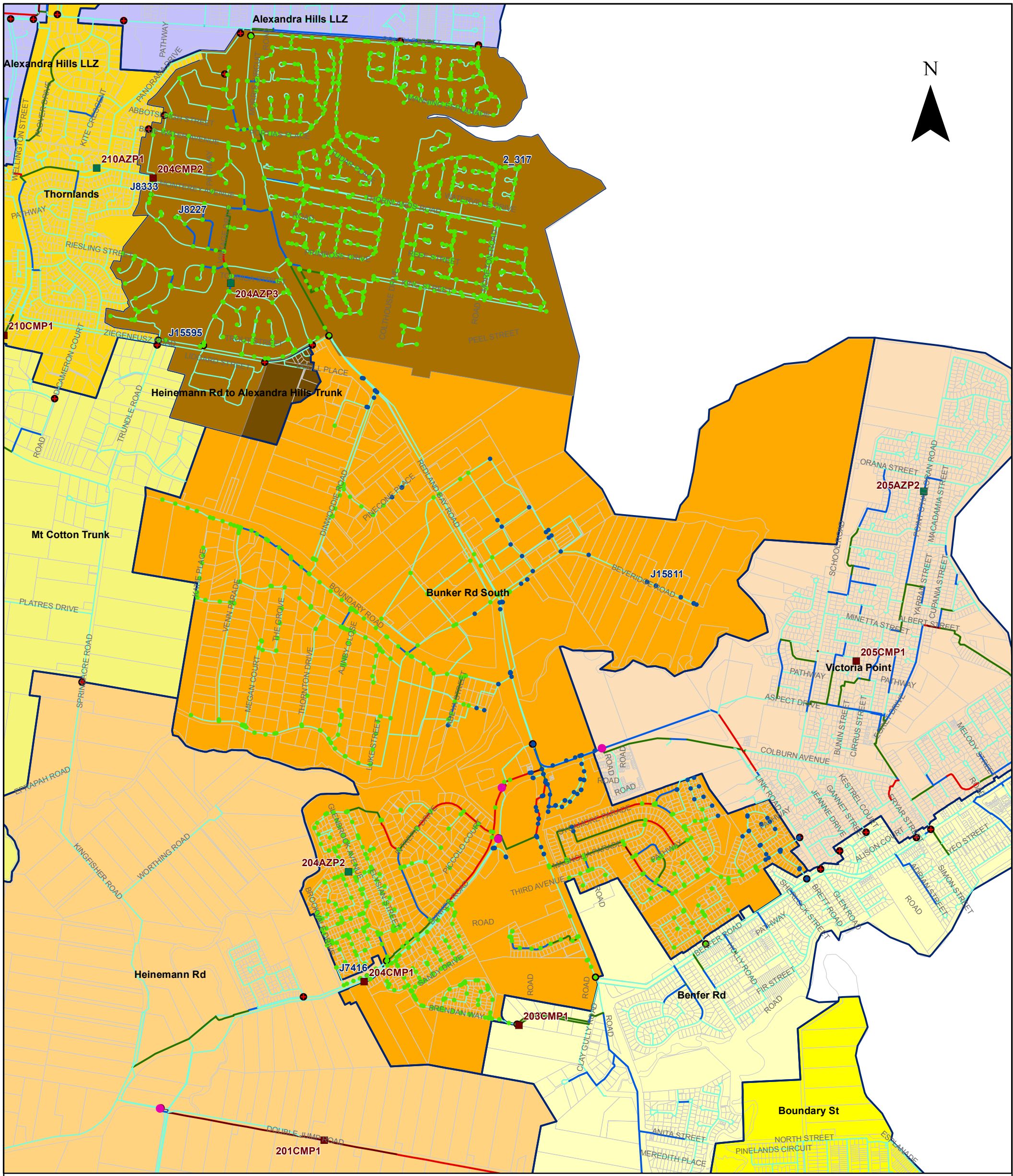


FIGURE 15.5
204 Bunker Rd South DMA
2036 System PH Results with Augmentation (PRV = 64 m, with Victoria Pt DMA)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawingss\Fig15_3_204_2036PH.mxd
Rev0 3 June 2016

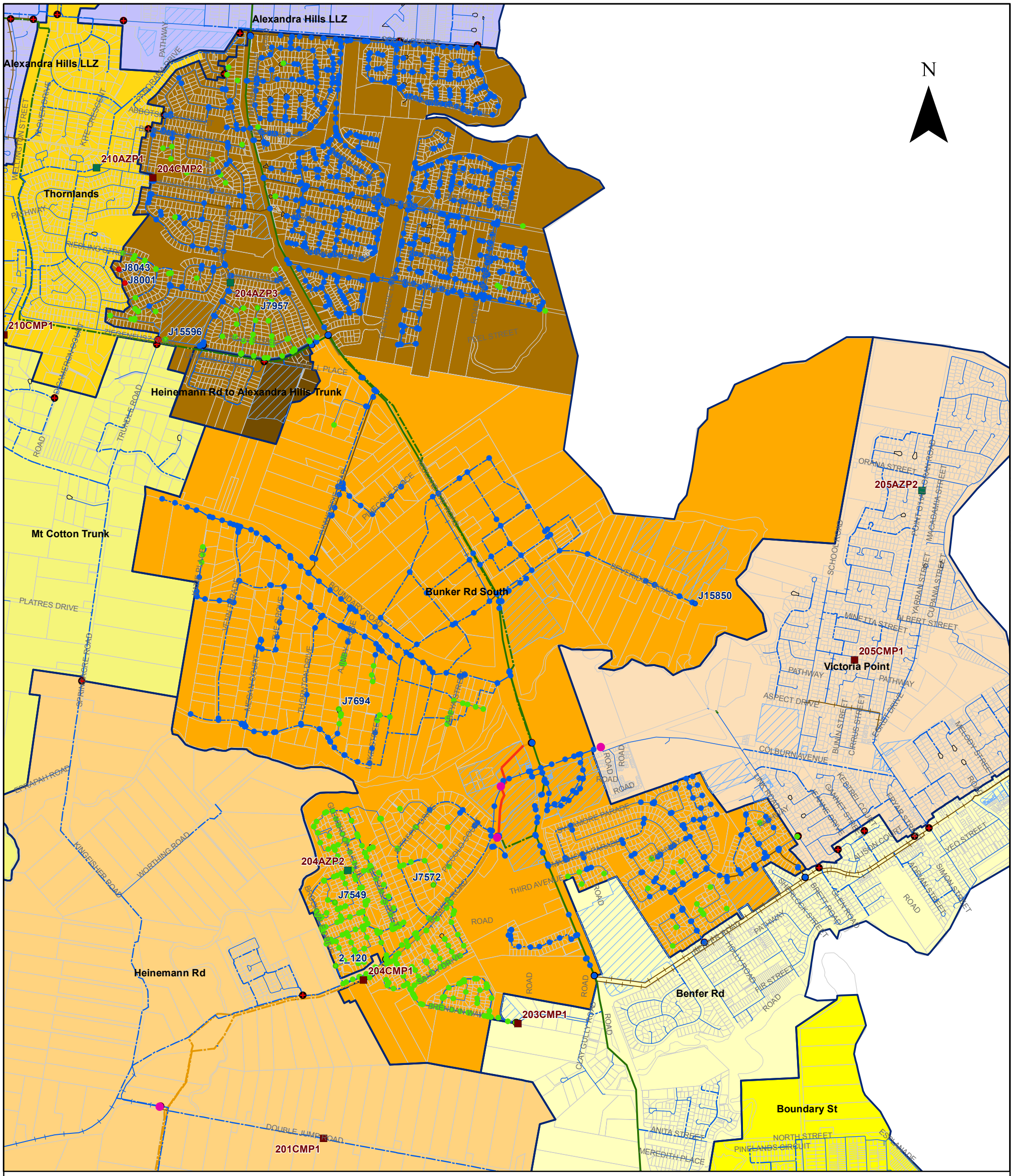


FIGURE 15.6
204 Bunker Rd South DMA
2036 FF Results with DMA214 (PRV = 64 m, with Victoria Pt DMA)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\DrawingssFig15_6_204_2036MD_FF1230_wDMA214.mxd
Rev0 3 June 2016

16. 205 Victoria Point

16.1 DMA Topography and Land Use

The Victoria Point DMA consists of relatively flat, low coastal areas with elevations ranging from zero to approximately 10m AHD. The DMA inlet is located along Colburn Avenue, approximately 350m from Cleveland – Redland Bay Road. The DMA essentially includes Point O'Halloran and the part of Victoria Point (the suburb) north of Colburn Avenue. It also includes Link Road between Colburn Avenue and Benfer Road.

The topography of DMA is shown on Figure 16-1.

As shown on Figure 16-2, the Victoria Pt DMA is predominantly Low Density Residential with some Community Facilities and a small amount of Medium Density Residential.

16.2 Previous Planning

This DMA was originally included in the Victoria Pt PRV zone. Planning undertaken for the PIP / ICS was based on the original configuration for this area and did not include any augmentations.

Planning work undertaken as part of the PLMP originally had the Victoria Pt DMA supplied off the Bunker Rd North PRV. However, modelling indicated that if SEQ Water Grid operations dictated that the Bunker Rd North PRV be completely closed, then sufficient fire flow could not be provided to some areas of the Victoria Pt DMA without augmentation. The system was then changed so the Victoria Pt DMA receives its supply from the Bunker Road South DMA off the 375mm main along Cleveland – Redland Bay Road.

Each of these scenarios has been investigated in this report.

16.3 Current System Configuration and Source of Supply

The Victoria Pt DMA receives its supply from the Bunker Road South DMA off the 375mm main along Cleveland – Redland Bay Road.

Due to the lack of reliability of the flow modulation control units, the modulation profile has been removed from this DMA and a fixed outlet pressure of 57m head has been applied.

16.4 Existing System Performance at Ultimate Demands

There are a number of different operating scenarios that impact on the pressures upstream of the Victoria Pt DMA as listed below.
- Off BRN with the BRN PRV on and fully open the flow is 159.2L/s - U/S pressure = 70.2 m
- Off BRN with the BRN PRV off - U/S pressure = 58.1 m
- Off BRS with the PRV set at 64m - U/S pressure = 63.1 m

The most conservative scenario with Victoria Pt off BRN and the flow control valve closed has been adopted.

16.4.1 Peak Hour

Peak Hour is at 09:00 and at this time the flow into the DMA is 64 L/s.

When the PRV is set at 58 m, the minimum pressure in the zone is 45.9 m at J12567. 205CMP has a pressure of 47.1 m. The PH results are shown on Figure 16-3.

16.4.2 MD Minimum Hour

The smallest flow into the system is at 23:00 with a flow of 6 L/s. With the PRV set at 58m, the maximum pressure at this time is 61.5 m at J12872. This is about 7 m above the DSS for maximum service pressure of 55m.

To achieve this DSS for maximum pressures without modulating the PRV, additional augmentations will be needed to meet the DSS for fire flow. As this is only slightly above the DSS it is considered acceptable.

16.4.3 Fire Flow

2/3 PH is 42.7L/s at 12:00 the inflow is 43L/s this is the closest flow to 2/3 PH so 12:00 has been adopted. AT 12:00 with 30L/s FF and BRN PRV closed the U/S PRV pressure is 63 m so a setting of 58 can still be adopted.

When the PRV is set at 58 m all areas meet the DSS for fire flow except J12432 in Link Road (opposite the child care centre) which has an available FF of 29.3L/s. However the adjacent hydrant is capable of 34L/s so between the two hydrants 30L/s is available. Therefore no augmentations are needed.

The fire flow results are shown on Figure 16-4.

16.4.4 Water Quality

Water quality modelling indicates that water age in this zone is about 5 to 8 days This is partially due to the detention times in the Heinemann Road and/or Alexandra Hills Reservoirs. These reservoirs are owned and managed by Seqwater, so a collaborative approach with Seqwater would be required to address water age issues.

16.5 Proposed Augmentations

No augmentations are needed for this DMA.

N

Legend

Victoria Point

Existing DMA Boundaries

5m Contours

Diameter

63 80 100 150 200 225 250 300 375 450 500 525 600 675 691 750 900

0 125 250 500 750 1,000 1,250 Meters

FIGURE 16.1
204 Victoria Point Topography

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawingss\Fig16_1_205_Topography.mxd
Rev0 3 June 2016

N

Legend

- VICTORIA POINT DMA
- Water Supply DMAs

Residential Zones
- Low Density Residential
- Low-medium Density Residential
- Medium Density Residential

Centre Zones
- Major Centre
- Local Centre
- Neighbourhood Centre

Recreation Zones
- Recreation and Open Space

Environmental Zones
- Environmental Management
- Conservation

Industry Zones
- Waterfront and Marine Industry

Other Zones
- Community Facilities
- Emerging Communities
- Rural

0 125 250 500 750 1,000 1,250
Meters

FIGURE 16.2
205 Victoria Point Planning Scheme

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig16_2_205_Planning_Scheme.mxd
Rev0 3 June 2016

N

Bunker Rd South

Victoria Point

Victoria Point PRV

Bunker Road South PRV

Benfer Rd

Boundary St

205AZP2

205CMP1

J12872

J12567

203AZP1

203CMP1

PANNIKIN PLACE
MACLEAY PLACE
KING STREET
PEEL STREET
ROAD
RACHOW STREET
BEVERIDGE ROAD
REDLAND BAY ROAD
COLBURN AVENUE
HIGH STREET
BUNKER ROAD
MANOR DRIVE
SYCAMORE PARADE
WARATAH AVENUE
MACROPHYLLA PARADE
DRIFTWOOD STREET
PIN OAK CRESCENT
LILIANA LANE
ALEXANDER AVENUE
BELAH COURT
PATHWAY
PEPPERMINT DRIVE
POINCIANA AVENUE
DARREN CLOSE
BENFER ROAD
PRESCOTT DRIVE
CLAY GULLY ROAD
STRATHOAK STREET
TOLLY ROAD
SCHMIDT STREET
FIR STREET
STRATHIAN ROAD
Heinemann Rd
LIMA ROAD
JEANNE DRIVE
FRYAR STREET
SUTTON STREET
HOLZ STREET
YEO STREET
EAGLE STREET
BEACH COURT
SIMON STREET
ADRIAN STREET
BANGALOW STREET
SEAVISTA COURT
GLEN ROAD
BEACHSIDE COURT
BRETT ROAD
SHERLOCK STREET
KANGA COURT
ROUS COURT
FINUGE COURT
MARITIME COURT
LAKEFIELD DRIVE
BAYSWATER DRIVE
BELLENDEN COURT
ORIANA STREET
POINT O'HALLORAN ROAD
MACADAMIA STREET
ORIANA ESPLANADE
ILLOGE ROAD
KINTYRE STREET
SEAHOLLY CRESCENT
SCHOOL ROAD
LAMBERT COURT
REGENCY STREET
TAFALGAR DRIVE
YARRAN STREET
CUPANIA STREET
LANCEWOOD STREET
MINETTA STREET
ALBERT STREET
RYAN COURT
JORDAN DRIVE
PATHWAY
LEES COURT
ASPECT DRIVE
SEAGULL STREET
STARLET COURT
ALBATROSS STREET
TERN STREET
WILSON STREET
FRANCES STREET
BUNIN STREET
CIRRUS STREET
WARD STREET
WILMOT STREET
ALARNA STREET
MARIANNE STREET
MELODY STREET
VICKI PLACE
BASSILAN AVENUE
ALLEN STREET
EDINBURGH STREET
CHURCH STREET
DAYSLAND STREET
BOAT STREET
MOORE STREET
BASE STREET
THOMPSON STREET

Legend

Pressure (m)
- <22
- 22-60
- >60
- DMA Boundary Valve
- AZP Logger
- CMP Logger
- PRV and Meter Site

Head Loss (m/1000m)
- <1
- 1 - 2
- 2 -5
- 5 - 10
- >10

DMA Boundary
- 204 Bunker Rd South
- 205 Victoria Point
- 202 Boundary St
- 203 Benfer Rd

0 125 250 500 750 1,000 1,250 Meters

FIGURE 16.3
205 Victoria Point DMA
Existing System with 2036 PH Demands (PRV = 58 m)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure16.3_205_2036PH.mxd
Rev0 3 June 2016

N

205AZP2

203AZP1

205CMP1

J12432

Bunker Rd South

Victoria Point

Benfer Rd

Legend

Available FF (L/s)

- 15 - 30
- > 30

- PRV and Meter Site
- DMA Boundary Valve
- AZP Logger
- CMP Logger

Diameter

- 63
- 100
- 150
- 200
- 225
- 250
- 300
- 350
- 375
- Fire Flow (30L/s)

- 202 Boundary St
- 203 Benfer Rd
- 204 Bunker Rd South
- 205 Victoria Point

0 125 250 500 750 1,000 1,250 Meters

FIGURE 16.4
205 Victoria Point DMA
Existing System 2036 FF Results (PRV = 58 m)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig16_3_205_2036MD_FF1200.mxd
Rev0 3 June 2016

17. DMAs 206, 207 & 212 Mt Cotton

The Mt Cotton area is made up of the following DMAs.

- 206 – Mt Cotton Village
- 207A – Mt Cotton Booster Pump
- 207B – Mt Cotton High Level Zone
- 212 – Mt Cotton Road

17.1 DMA Topography and Land Use

The Mt Cotton area has varying topography and elevations ranging from 10 to 105m. This is why the area has been divided into four different district meter areas.

The topography of DMA is shown on Figure 17-1. These are described further below.

The planning scheme for the area is shown on Figure 17-2.

17.1.1 206 Mt Cotton Village

Mt Cotton Village covers the largest area and includes areas with elevations as low as 10 m in the south east corner and as high as 50m at the end of Marigold Place.

The planning scheme in the area is predominantly Low Density Residential and a small Local Centre with some large areas of Recreation and Open Space and Conservation.

17.1.2 207A Mt Cotton Booster Pump

This area is located around the Mt Cotton Reservoir which is why the booster pump is needed to provide sufficient pressures to the area. The elevations in this area range from 70 to 105 m.

The area is predominantly Low Density Residential.

17.1.3 207B Mt Cotton High Level Zone

This area is also located around the Mt Cotton Reservoir but at lower elevations so there is no need for a booster pump. The elevations in this area range from around 40 to 70 m.

The area is predominantly Low Density Residential.

17.1.4 212 Mt Cotton Road

This zone includes the area to the west of Mt Cotton Road and a small area in the middle of the Mt Cotton Village Zone. The elevations along Mt Cotton Road range from about 30 m to 50 m along the water main with elevations up to 105 m at the back of some of the western properties. The elevations in the area in the middle of Mt Cotton Village range from about 30 to 65 m.

The area along Mt Cotton Road is Rural, while the area of the zone in the middle of Mt Cotton Village is predominantly Low Density Residential.

17.2 Previous Planning

The infrastructure requirements for 206 and 212 are covered by the Mt Cotton Village Water Supply Master Plan (JWP, 2005), which is being implemented by the developers in those areas as part of their infrastructure agreement.

The only significant change to the area since MWH prepared the ICP and JWP the Master Plan is the extension of the Mt Cotton Road zone (DMA 212) into the high level area of the Mt Cotton Village zone. This was put in place in preference to creating an additional booster pump zone as originally included in the JWP Master Plan.

17.3 Current System Configuration and Source of Supply

The Mt Cotton Area receives its supply from the Heinemann Road Reservoirs. Some areas receive the supply directly from the reservoirs while others via the Mt Cotton Reservoir. The Heinemann Rd Reservoirs supply the Mt Cotton Reservoir via the Heinemann Road PS and a 450 mm main along Sanctuary Drive.

17.3.1 206 Mt Cotton Village

Mt Cotton Village receives its supply via a western 375mm main and an eastern 200 mm main. The eastern and western areas of the DMA are connected with a 300mm main.

17.3.2 207A Mt Cotton Booster Pump

The Mt Cotton Booster Pump zone receives its supply from the Mt Cotton Reservoir via three booster pumps. Two of the pumps are in place for normal operation, while the third is to provide sufficient fire flow to the area.

17.3.3 207B Mt Cotton High Level Zone

This area receives its supply directly from the Mt Cotton Reservoir.

17.3.4 212 Mt Cotton Road

This area receives its supply from the Mt Cotton Reservoir via a PRV along Mt Cotton Road. At present the PRV is set at 48m.

17.4 Existing System Performance at Ultimate Demands

17.4.1 Peak Hour

Peak Hour is at 09:00 and at this time the flow into the DMA's and minimum pressures summarised in Table 17.1.

Table 17.1 - DMA206, 207 and 212 PH Results Summary

DMA	PH Inflow (L/s)	Critical Junction	Residual Pressure (m)
206	51.4	J0234	24.3
207A	0.4	207CMP2	39.6
207B	3.6	207CMP3	29.8
212*	22.8	554	30.6

**The PRV was set at 55m*

The PH results are shown on Figure 17-3.

17.4.2 MD Minimum Hour

The smallest flow into the system is at 23:00, the pressures at this time are summarised in Table 17.2.

Table 17.2 - DMA206, 207 and 212 MD Minimum Hour Results Summary

DMA	PH Inflow (L/s)	Critical Junction	Residual Pressure (m)
206	4.3	J15594	72.3
207A	0.04	J4419	66.0
207B	0.3	J4316	80.1
212*	6.7	475	69.2

**The PRV was set at 55m*

Table 17.2 shows that the pressures in DMA206 and 207B are well above the DSS of 55m. To achieve this DSS for maximum pressures additional pressure reducing valves would be required. While DMA207B does have very high pressures it is only very small so the addition of a PRV is not considered to be warranted. A PRV in DMA206 would need to be modulated in order to provide sufficient PH pressures.
It is proposed to monitor the DMAs and if issues arise determine and implement the most appropriate solution.

17.4.3 Fire Flow

The adopted Fire Flow scenarios are shown in Table 17.3.

Table 17.3 - DMA206, 207 & 212 Fire Flow analysis timing (2/3PH)

DMA	2/3 PH (L/s)	Adopted Time	Inflow at FF Time
206	34.3	07:30	35.4
207A*	0.28	12:00	0.28
207B	2.4	07:30	2.5
212**	15.2	18:00	16.2

**Three booster pumps operating*
***The PRV was set at 55m*

Figure 17-4 shows that all areas meet the DSS for fire flow except the following:

Table 17.4 - Mt Cotton FF Results Summary

Junction	Fire Flow (L/s)	Location	Required FF (L/s)
J4111	13.5	DMA206 - Marigold Place Note: The adjacent hydrant H68616 has an available FF of 17.4L/s (Asset ID68616). 15 L/s is therefore available from two hydrants so this is considered satisfactory.	15
552	14.4	DMA212 - Cycad Close Note: The adjacent hydrant 554 has an available FF of 15.3 L/s (Asset ID329893). 15 L/s is therefore available from two hydrants so this is considered satisfactory.	15

As the fire flow is available from two hydrants no augmentations are proposed.

17.4.4 Water Quality

Water quality modelling indicates that water age in these DMAs 207A, 207B range from 6 to 9 days. This is likely due to the rural residential nature of the area with means there is a large amount of storage in the pipes compared to the demands.

DMA212 has similar results, except the cul-de-sacs and dead ends (at the zone boundary) where water age increases to more than 20 days.

DMA206 has a water age ranging from 3 - 6 days.

The water age in all areas, is directly affected by the operation of the Heinemann Road Reservoirs. These reservoirs are owned and managed by Seqwater, so a collaborative approach with Seqwater would be required to address water age issues.

17.5 Proposed Augmentations

There are no augmentations proposed for these DMAs.

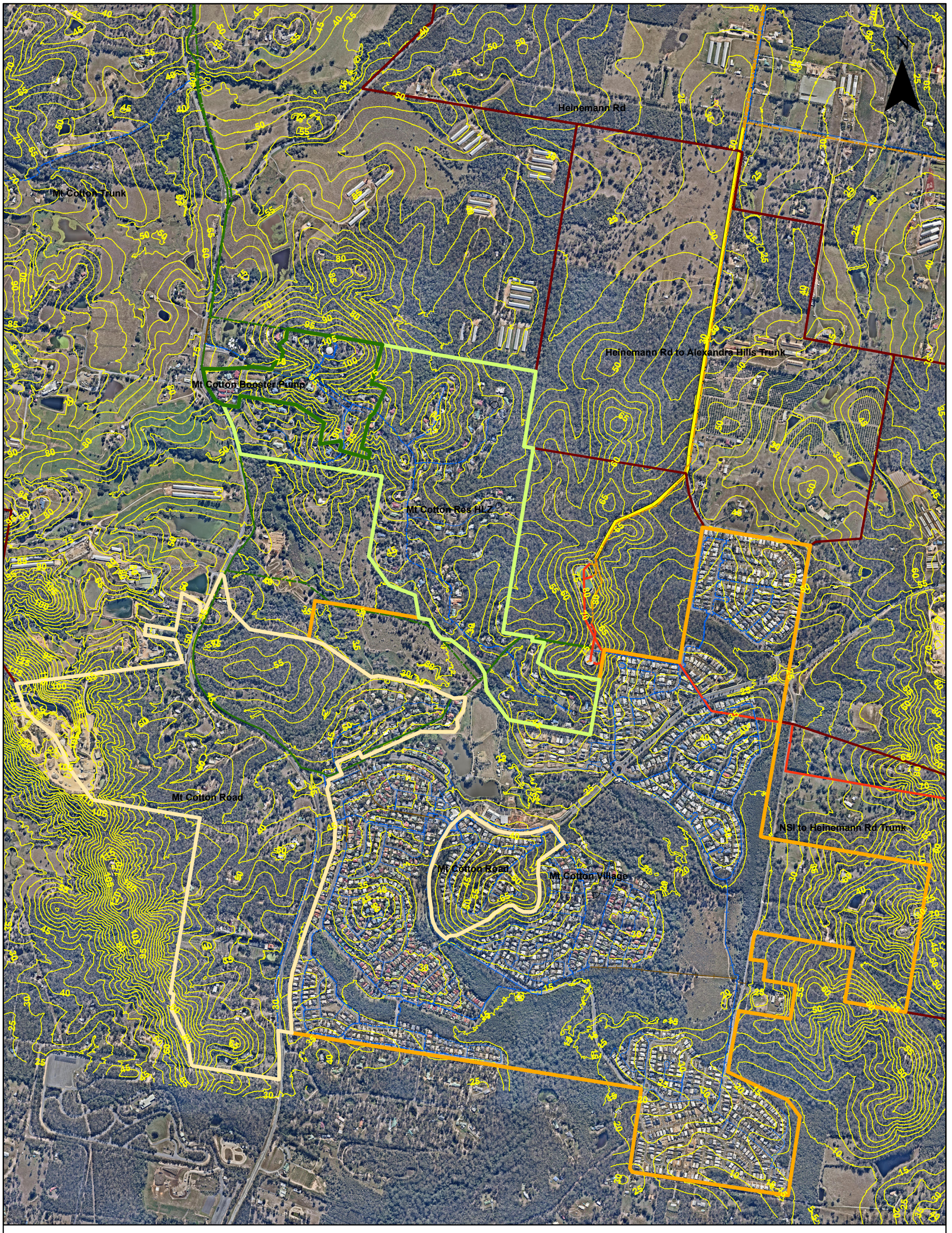


FIGURE 17.1
Mt Cotton Topography

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\DrawingsFig17_1_206_Topography.mxd
Rev0 3 June 2016

N

Heinemann Rd

Mt Cotton Trunk

Heinemann Rd to Alexandra Hills Trunk

Mt Cotton Booster Pump

Mt Cotton Res HLZ

Mt Cotton Road

Mt Cotton Road

Mt Cotton Village

NSI to Heinemann Rd Trunk

Legend

DMA Boundary
- Mt Cotton Village
- Mt Cotton Road
- Mt Cotton Res HLZ
- Mt Cotton Booster Pump
- DMA Boundary

Residential Zones
- Low Density Residential

Centre Zones
- Local Centre

Recreation Zones
- Recreation and Open Space

Environmental Zones
- Conservation

Other Zones
- Community Facilities
- Rural

0 125250 500 750 1,000 1,250 Meters

FIGURE 17.2
Mt Cotton Planning Scheme

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig17_2_206_Planning_Scheme.mxd
Rev0 3 June 2016

N

MOUNT VIEW ROAD
KRAUSE ROAD
MOUNT COTTON ROAD
DOUBLE JUMP ROAD
GILES ROAD
ROAD
DARWALLA ROAD
SEAVIEW ROAD
HILLVIEW ROAD
GRAMZOW ROAD
GERMAN CHURCH ROAD
HABERMANN ROAD

208CMP1
207CMP2
J4419
207AZP2
207CMP3
207AZP1
J4316
J0234
475
554
206AZP1
206CMP1
J15594

Legend

Residual Pressure (m): <22; 22-60; >60
Headloss (m/1000m): <1; 1 - 2; 2 -5; 5 - 10; >10
AZP Logger
CMP Logger
PRV and Meter Site
Closed Boundary Valve
Water Supply Reservoirs

DMA Boundary:
106 Serpentine Ck
108 NSI to Heinemann Rd Trunk
201 Heinemann Rd
202 Boundary St
203 Benfer Rd
204 Bunker Rd South
205 Victoria Point
206 Mt Cotton Village
207A Mt Cotton Booster Pump
207B Mt Cotton Res HLZ
208 Mt Cotton Trunk
210 Thornlands
212 Mt Cotton Road
213 Heinemann Rd Trunk
250 Heinemann Rd to Alexandra Hills Trunk
Unserviced Area
Dialysis Patient

0 200 400 800 1,200 1,600 2,000 Meters

FIGURE 16.3
Mt Cotton DMAs (206, 207A, 207B & 212)
Existing System with 2036 PH Demands (DMA212 PRV = 55 m)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig17_3_206_2036PH.mxd
Rev0 3 June 2016

N

208CMP1
207CMP2
207AZP2
207CMP3
207AZP1
206AZP1
206CMP1
J4111
552

MOUNT COTTON ROAD
DARWALLA ROAD
SEAVIEW ROAD
HILLVIEW ROAD
GRAMZOW ROAD
GERMAN CHURCH ROAD
HABERMANN ROAD
ROAD

Legend

Available FF (L/s)
- < 15
- 15 - 30
- > 30
- AZP Logger
- CMP Logger
- PRV and Meter Site

- Closed Boundary Valve
- Water Supply Reservoirs

Diameter
63, 80, 100, 150, 200, 225, 250, 300, 350, 375, 450, 500, 525, 600, 675, 691, 750, 900

DMA Boundary
- 106 Serpentine Ck
- 108 NSI to Heinemann Rd Trunk
- 201 Heinemann Rd
- 202 Boundary St
- 203 Benfer Rd
- 204 Bunker Rd South
- 205 Victoria Point
- 206 Mt Cotton Village
- 207A Mt Cotton Booster Pump
- 207B Mt Cotton Res HLZ
- 208 Mt Cotton Trunk
- 210 Thornlands
- 212 Mt Cotton Road
- 213 Heinemann Rd Trunk
- 250 Heinemann Rd to Alexandra Hills Trunk
- Unserviced Area

Fire_Flow
- Fire Flow (30L/s)
- Dialysis Patient

0 200 400 800 1,200 1,600 2,000 Meters

FIGURE 17.4
Mt Cotton DMAs (206, 207A, 207B & 212)
Existing System 2036 FF Results (DMA212 PRV = 55 m)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig17_4_206_2036MD_FF.mxd
Rev0 3 June 2016

18. 208 Mt Cotton Trunk and 209 Duncan Road

The northern section of the Mt Cotton Trunk DMA was reviewed in the Thornlands DMA assessment in Section 19. This section will look at the remainder of the Mt Cotton Trunk DMA. The review includes the Duncan Road DMA because it only operates as a second DMA when water is flowing from north to south. In south to north flow, the Duncan Road DMA is part of the Mount Cotton Trunk DMA.

18.1 DMA Topography and Land Use

The Mt Cotton Trunk DMA covers a large geographical area (over 2600 ha) and consists of a wide range of elevations from 180m AHD along the south western boundary to 13 m AHD near the centre of the eastern boundary. The land is predominantly rural in nature so not all the areas are connected to the water supply.

The elevations of the water supply network range from 23 m in Wisbech Place (J7813) to 74 m (J4423) at the corner of Mt Cotton Road and Sanctuary Drive.

The Duncan Road DMA covers an area of approximately 1000 ha which is predominantly made up of rural properties in an environmental protection area. The elevations in the Duncan Road area range from around 75m south east of the end of Winston Road and 20 m to the north of the zone along Greenfield Road.

The topography of the Mt Cotton Trunk DMA and the Duncan Road DMA is shown on Figure 18-1.

As shown on Figure 18-2 the Mt Cotton Trunk DMA is predominantly Rural with some Low Density Residential to the north. The north eastern part of the DMA is the Kinross Road development area that is primarily Low-medium Density Residential and Medium Density Residential. The Duncan Road DMA is predominantly Rural.

18.2 Previous Planning

These DMA's have had minimal changes as a result of the PLMP except for the removal of the north eastern section of the zone to form the Thornlands DMA.

Planning undertaken for the PIP / ICS was based on the original configuration for this area and did not include any augmentations. Planning work undertaken as part of the PLMP did not look at this southern area in any detail.

18.3 Current System Configuration and Source of Supply

Mt Cotton Reservoir services DMA207, 208, 209, 210 & 212. The projected 2036 population in these areas is 24,250 EP. 4hrs of MDMM demand is 1.2 ML. This gives a MOL of just 1.45m. The Operating Protocols with SEQ Water have a minimum operating level of 65% (5.91m), so this has been adopted for this study. The HR booster pumps have also been turned off during PH to provide the most conservative results.

18.4 Existing System Performance at Ultimate Demands

The pressure zone has the ability to operate from South to North and North to South. The zone is typically operated from South to North. The operation from North to South has not been investigated because the original PIP identified the need for booster pumps at AH Reservoirs to operate in this configuration. This is now the responsibility of Seqwater, and controls exist in the operating protocols to limit the North to South operation to times of emergency.

18.4.1 Peak Hour

Peak Hour is at 09:00 and at this time the flow into the DMA208, 209 and 210 from Mt Cotton Reservoir is 241.3L/s and the inflow to the DMA209 and DMA210 is 13.9 and 60 L/s respectively.

Table 18.1 - DMA208 and 209 PH Results Summary

DMA	PH Inflow (L/s)	Critical Junction	Residual Pressure (m)
208	241.3*	J4533	21.5
209**	13.9	J60	23.6
		209CMP1	50.8

** Including DMA209 & 210*
***One booster pump operational*

J4533 just meets the DSS for PH. With the construction of reticulation in the Kinross Road area as shown on Figures 18/ a & b, the available pressure at J4533 increases to 22.4m. It is therefore recommended that this area is monitored and if necessary construct an additional augmentation along Boundary Road.

The peak hour results are shown on Figure 18-3.

18.4.2 MD Minimum Hour

The smallest flow from Mt Cotton reservoir is 146.6 L/s at 24:00. At this time the flow into DMA209 and DMA210 is 3.9 and 52.3 L/s respectively. The high night flow can be attributed to the Inghams chicken processing plant which is in DMA210 and runs cleaning processes overnight.

Table 18.2 - DMA208 and 209 MD Minimum Hour Results Summary

DMA	PH Inflow (L/s)	Critical Junction	Residual Pressure (m)
208	164*	J4289	82.1
209**	3.9	J2264	80.1

** Including DMA209 & 210*
***No booster pump operational*

The maximum pressure in both these DMAs is well above the DSS for maximum service pressure of 55m.

Given the wide range of elevations serviced by these DMAs and the trunk (bulk water transport) nature of these DMAs, it is proposed to monitor the DMAs and if issues arise determine and implement the most appropriate solution

18.4.3 Fire Flow

2/3 PH is 169.8 L/s at 04:00 the flow from Mt Cotton Reservoir is 169.4 L/s this is the closest flow to 2/3 PH so 04:00 has been adopted. Table 18.3 shows the fire flow results without any HR booster pumps and with two pumps running at HR.

Table 18.3 - DMA208 and 209 FF Results Summary

Junction	Fire Flow (L/s)		Location	Required FF (L/s)
	No HR BP	2 HR BP		
J14940	15.9	16.1	DMA209* - Pioneer Road	15
J0071	14.0	14.8	DMA208 - Mount View Road When 7.5L/s is added to J0071 and J0072 the available pressure is only 10.7m and 17.5m respectively.	15
2_69	14.5	14.8	DMA208 - Redland Bay Road Note: This is not an issue because the hydrant across the road has sufficient fire flow.	15
J4511	14.2	15.0	DMA208 - Plates Drive	15

* 1 Booster Pump operating

The results with no Heinemann Road Booster Pumps operating are shown graphically on Figure 18-4.

18.4.4 Water Quality

The water age analysis conducted as part of the DWQMP shows that most areas in these zones have a water age around 6 to 8 days. This is largely due to the Heinemann Road Reservoirs and will gradually improve as development is completed in the Kinross Road area. The daily use of the trunk mains in this DMA to transfer water from Heinemann Road reservoirs to Alexandra Hills reservoirs is also having a positive effect on the water age in this DMA,

18.5 Proposed Augmentations

18.5.1 Peak Hour

There are no peak hour augmentations required in DMA208 and DMA209.

18.5.2 Fire Flow

To provide sufficient fire flow to Mount View Road with both Heinemann Road booster pumps off the augmentation included in Table 18.4 is required. The proposed augmentations are shown on Figure 18-5.

Table 18.4 - DMA208 2036 Proposed Fire Flow Augmentations

Junction	Location	Proposed Augmentations	Length (m)	Dia (mm)	Available FF (L/s)	Required FF (L/s)
J0071	Mt View Road	PIP_NEWAUG6	137	150	16.9	15
J4511	Plates Drive	PIP_NEWAUG5 **OR** PIP_NEWAUG8	448 160	100 150	27.1 16.5	15

18.6 Augmentation Timing

18.6.1 Existing System at 2016 Demands

Peak Hour

There are no peak hour augmentations required.

Fire Flow

As shown in Table 18.5, when the fire flow scenario is run at 04:00 for the 2016 demands neither J0071 or J4511 have sufficient fire flow to meet the DSS.

Table 18.5 - DMA208 2016 Fire Flow Results

Junction	Location	Available FF (L/s)	Required FF (L/s)
J0071	Mt View Road	13.7	15
J4511	Plates Drive	14.4	15

The proposed FF Augmentations are therefore required by 2016.

Legend

Mt Cotton Trunk

Duncan Rd Booster Pump

Existing DMA Boundaries

10m Contours

Diameter

63 80 100 150 200 225 250 300 350 375 450 500 525 600 675 691 750 900

0 250 500 1,000 1,500 2,000 2,500 Meters

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig18_1(a)_208_Topography.mxd
Rev 0 7 June 2016

FIGURE 18.1(a)
208 Mt Cotton Trunk & 209 Duncan Road Topography

N

Legend

- Mt Cotton Trunk
- Duncan Rd Booster Pump
- Existing DMA Boundaries
- 10m Contours

Diameter

63, 80, 100, 150, 200, 225, 250, 300, 350, 375, 450, 500, 525, 600, 675, 691, 750, 900

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 18.1(b)
208 Mt Cotton Trunk & 209 Duncan Road Topography

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig19_1(b)_208_Topography.mxd
Rev 0 7 June 2016

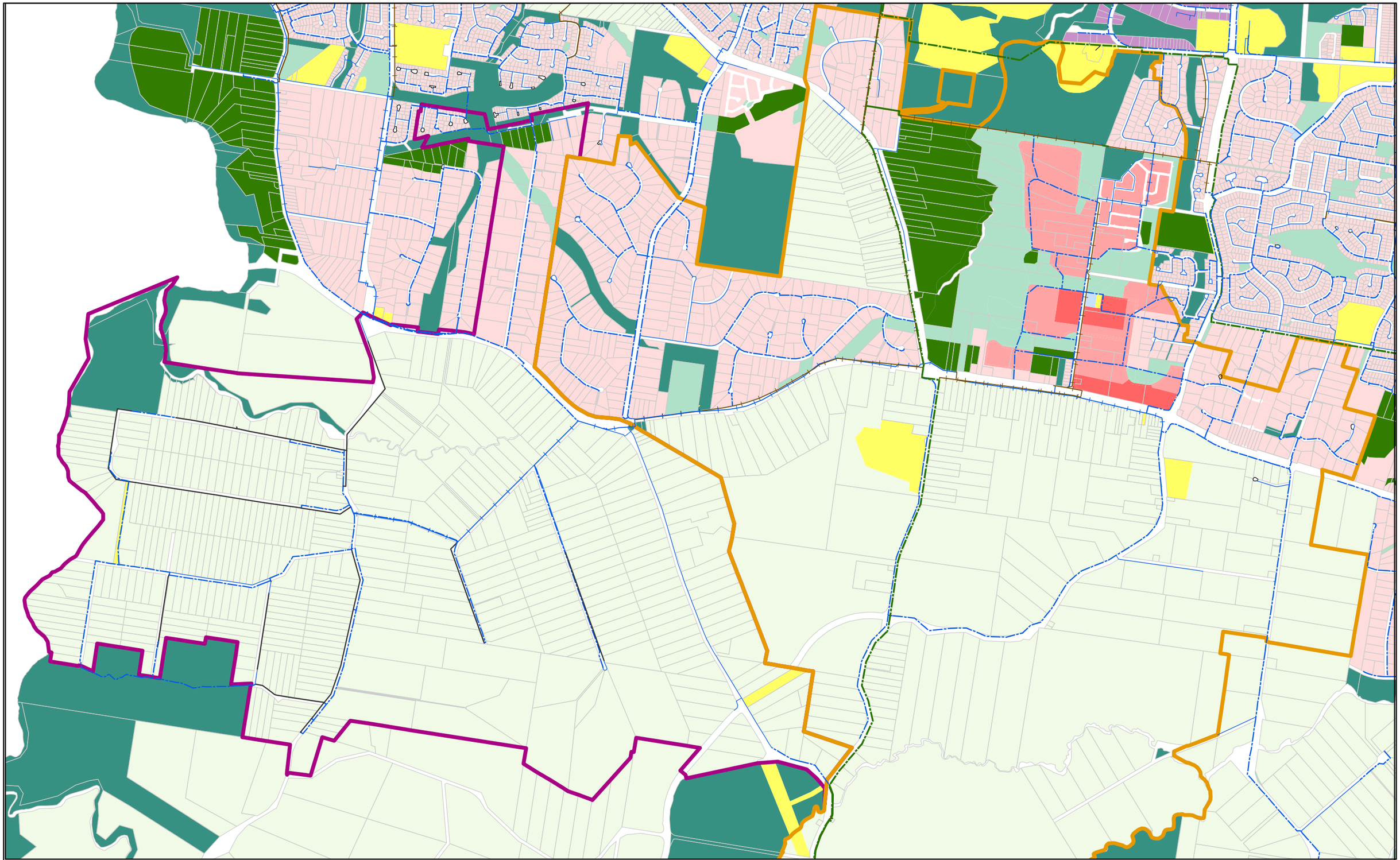


FIGURE 18.2(a)
208 & 209 Mt Cotton Trunk and Duncan Road Planning Scheme

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig18_2(a)_208_PScheme.mxd
Rev 0 7 June 2016

N

Legend

- Mt Cotton Trunk
- Duncan Rd Booster Pump
- DMA Boundaries

Residential Zones
- Low Density Residential

Recreation Zones
- Recreation and Open Space

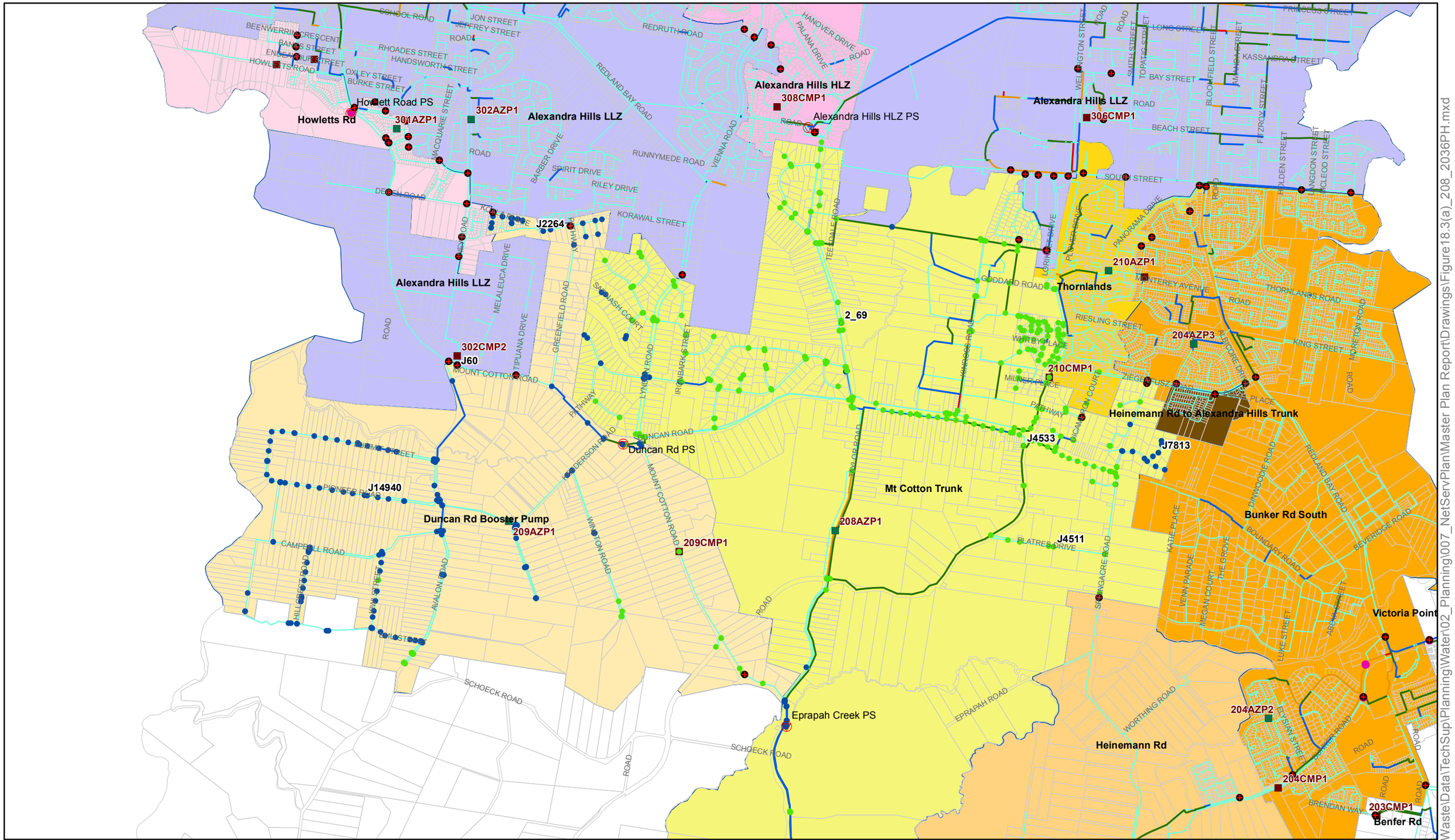
Environmental Zones
- Conservation

Other Zones
- Community Facilities
- Rural

0 125 250 500 750 1,000 1,250
Meters

FIGURE 18.2(b)
208 & 209 Mt Cotton Trunk and Duncan Road Planning Scheme

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig18.2(b)_208_PScheme.mxd
Rev 0 7 June 2016



Legend

Residual Pressure (m)
- < 22 m
- 22 - 60 m
- > 60 m

- AZP Logger
- CMP Logger
- PRV and Meter Site
- DMA Boundary Valve
- Water Supply Pumpstations

Headloss (m/1000m)
- <1
- 1 - 2
- 2 -5
- 5 - 10
- >10

DMA Boundary
- W004 Alexandra Hills LLZ
- 201 Heinemann Rd
- 204 Bunker Rd South
- 208 Mt Cotton Trunk
- 209 Duncan Rd Booster Pump
- 210 Thornlands
- 250 Heinemann Rd to Alexandra Hills Trunk
- 301 Howletts Rd
- 308 Alexandra Hills HLZ

0 250500 1,000 1,500 2,000 2,500
Meters

FIGURE 18.3(a)
208 Mt Cotton Trunk & 209 Duncan Road DMAs
Existing System with 2036 PH Demands (1 Duncan Rd BP)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure18.3(a)_208_2036PH.mxd
Rev 0 7 June 2016

N

208AZP1
209CMP1
Duncan Rd Booster Pump
J4511
Bunker Rd South
Eprapah Creek PS
Mt Cotton Trunk
Heinemann Rd
J0071
208CMP1
207CMP2
J4423
Mt Cotton Booster Pump
207AZP2
207CMP3
Heinemann Rd to Alexandra Hills Trunk
Mt Cotton Res HLZ
207AZP1
Mt Cotton Village
J4289
Mt Cotton Road
NSI to Heinemann Rd Trunk

WINSTON ROAD
WEST MOUNT COTTON ROAD
SCHOECK ROAD
MOUNT VIEW ROAD
KARINGAL ROAD
KRAUSE ROAD
MOUNT COTTON ROAD
SEAVIEW ROAD
HILLVIEW ROAD
EPRAPAH ROAD
WORTHING ROAD
BOUNDARY ROAD
VENN PARADE
SPRINGACRE ROAD
LUKE STREET
WOODLANDS DRIVE
PLATRES DRIVE
KINGFISHER ROAD
WARREN STREET
BUNKER ROAD
DOUBLE JUMP ROAD
GILES ROAD
HEINEMANN ROAD
ANDROPOGON STREET
PORTLIN PLACE
VALLEY WAY
PATHWAY

Legend

Residual Pressure (m)
- < 22 m
- 22 - 60 m
- > 60 m

- AZP Logger
- CMP Logger
- DMA Boundary Valve
- PRV and Meter Site

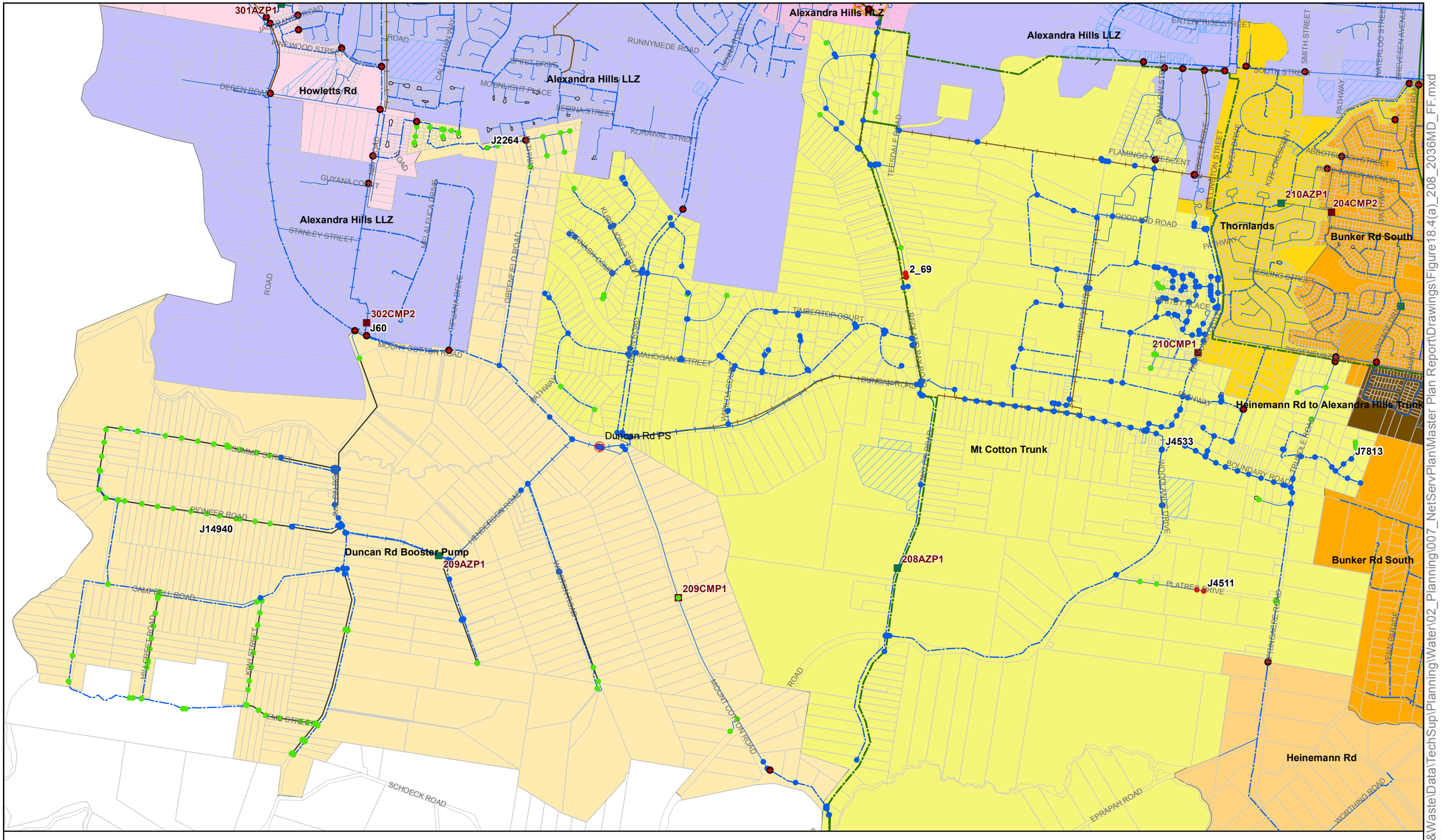
Headloss (m/1000m)
- <1
- 1 - 2
- 2 -5
- 5 - 10
- >10

DMA Boundary
- 201 Heinemann Rd
- 204 Bunker Rd South
- 206 Mt Cotton Village
- 207A Mt Cotton Booster Pump
- 207B Mt Cotton Res HLZ
- 208 Mt Cotton Trunk
- 209 Duncan Rd Booster Pump
- 210 Thornlands
- 212 Mt Cotton Road
- 213 Heinemann Rd Trunk
- 250 Heinemann Rd to Alexandra Hills Trunk

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 18.3(b)
208 Mt Cotton Trunk & 209 Duncan Road DMAs
Existing System with 2036 PH Demands (1 Duncan Road BP)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure18.3(b)_208_2036PH.mxd
Rev 0 9 June 2016



Legend

Available FF (L/s)
- < 15
- 15 - 30
- > 30

AZP Logger
CMP Logger
PRV and Meter Site
DMA Boundary Valve
Water Supply Pumpstations

Diameter
150, 300, 500, 691
63, 200, 350, 525, 750
80, 225, 375, 600, 900
100, 250, 450, 675

DMA Boundary
- W004 Alexandra Hills LLZ
- 201 Heinemann Rd
- 204 Bunker Rd South
- 208 Mt Cotton Trunk
- 209 Duncan Rd Booster Pump
- 210 Thornlands
- 250 Heinemann Rd to Alexandra Hills Trunk
- 301 Howletts Rd
- 308 Alexandra Hills HLZ
- Fire Flow (30L/s)

0 250 500 1,000 1,500 2,000 2,500 Meters

G:\RedlandWater&Waste\DataTechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure18.4(a)_208_2036MD_FF.mxd
Rev 0 7 June 2016

FIGURE 18.4(a)
208 Mt Cotton Trunk & 209 Duncan Road DMAs
Existing System with 2036MD FF Results (1 Duncan Rd BP, no Heinemann Rd BPs)

N

208AZP1

209CMP1

Duncan Rd Booster Pump

J4511

Bunker Rd South

Eprapah Creek PS

Mt Cotton Trunk

Heinemann Rd

J0071

208CMP1

207CMP2

J4423

Mt Cotton Booster Pump

207AZP2 207CMP3

Heinemann Rd to Alexandra Hills Trunk

Mt Cotton Res HLZ

207AZP1

Mt Cotton Village

J4289

Mt Cotton Road

NSI to Heinemann Rd Trunk

WOODLANDS DRIVE

PLATRES DRIVE

BOUNDARY ROAD

VERAN PARADE

LUKE STREET

WORTHING ROAD

EPRAPAH ROAD

SCHOECK ROAD

WEST MOUNT COTTON ROAD

KARINGAL ROAD

KRAUSE ROAD

MOUNT VIEW ROAD

SEAVIEW ROAD

HILLVIEW ROAD

KINGFISHER ROAD

BUNKER ROAD

GILES ROAD

WARREN STREET

VALLEY WAY

Legend

Available FF (L/s)
- < 15
- 15 - 30
- > 30

- AZP Logger
- CMP Logger
- DMA Boundary Valve
- PRV and Meter Site

Diameter
- 63
- 80
- 100
- 150
- 200
- 225
- 250
- 300
- 350
- 375
- 450
- 500
- 525
- 600
- 675
- 691
- 750
- 900
- Fire Flow (30L/s)

DMA Boundary
- 201 Heinemann Rd
- 204 Bunker Rd South
- 206 Mt Cotton Village
- 207A Mt Cotton Booster Pump
- 207B Mt Cotton Res HLZ
- 208 Mt Cotton Trunk
- 209 Duncan Rd Booster Pump
- 210 Thornlands
- 212 Mt Cotton Road
- 213 Heinemann Rd Trunk
- 250 Heinemann Rd to Alexandra Hills Trunk

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 18.4(b)
208 Mt Cotton Trunk & 209 Duncan Road DMAs
Existing System with 2036MD FF Results (1 Duncan Rd BP, no Heinemann Rd BPs)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure18.4(b)_208_2036MD_FF.mxd
Rev 0 9 June 2016

301AZP1
Howletts Rd
Alexandra Hills HLZ
Alexandra Hills LLZ
J2264
Alexandra Hills LLZ
302CMP2
J60
2_69
210AZP1
204CMP2
Thornlands
Bunker Rd South
210CMP1
Heinemann Rd to Alexandra Hills Trunk
Duncan Rd PS
Mt Cotton Trunk
J4533
J7813
J14940
Duncan Rd Booster Pump
209AZP1
208AZP1
209CMP1
J4511
Not adopted in cost estimates
Bunker Rd South
Heinemann Rd

Legend

Available FF (L/s)
- < 15
- 15 - 30
- > 30

AZP Logger
CMP Logger
PRV and Meter Site
DMA Boundary Valve
Water Supply Pumpstations

Proposed Augmentations
- 2031
- 2026
- 2016

Diameter
63, 80, 100, 150, 200, 225, 250, 300, 350, 375, 450, 500, 525, 600, 675, 691, 750, 900

DMA Boundary
- W004 Alexandra Hills LLZ
- 201 Heinemann Rd
- 204 Bunker Rd South
- 208 Mt Cotton Trunk
- 209 Duncan Rd Booster Pump
- 210 Thornlands
- 250 Heinemann Rd to Alexandra Hills Trunk
- 301 Howletts Rd
- 308 Alexandra Hills HLZ
- Fire Flow (30L/s)

0 250 500 1,000 1,500 2,000 2,500 Meters

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure18.5(a)_208_2036MD_FF_wAUG.mxd
Rev 0 9 June 2016

FIGURE 18.5(a)
208 Mt Cotton Trunk & 209 Duncan Road DMAs
2036 FF Results with Augmentations (1 Duncan Road BP, no Heinemann Road BPs)

208AZP1
209CMP1
Duncan Rd Booster Pump
Eprapah Creek PS
Mt Cotton Trunk
J0071
PIP_NEWAUG6
208CMP1
J4423
207CMP2
Mt Cotton Booster Pump
207AZP2
207CMP3
Mt Cotton Res HLZ
207AZP1
Mt Cotton Road
Mt Cotton Village
J4289
Heinemann Rd
PIP_NEWAUG8
J4511
PIP_NEWAUG5
Not adopted in cost estimates
PIP_AUG51
2016PIP_AUG1
2016PIP_AUG2
Heinemann Rd to Alexandra Hills Trunk
NSI to Heinemann Rd Trunk
Bunker Rd South
Mt Cotton Village
WANGTON ROAD
WEST MOUNT COTTON ROAD
SCHOECK ROAD
KARINGAL ROAD
KRAUSE ROAD
MOUNT VIEW ROAD
SEAVIEW ROAD
HILLVIEW ROAD
EPRAPAH ROAD
BOUNDARY ROAD
PLATRES DRIVE
SPRINGACRE ROAD
LUKE STREET
WORTHING ROAD
KINGFISHER ROAD
BUNKER ROAD
WARREN STREET
DOUBLE JUMP ROAD
GILES ROAD
VALLEY WAY
N

Legend

Available FF (L/s)
- < 15
- 15 - 30
- > 30

AZP Logger
CMP Logger
DMA Boundary Valve
PRV and Meter Site

Proposed Augmentations
- 2031
- 2026
- 2016

Diameter
- 63, 80, 100, 150, 200, 225, 250, 300, 350, 375, 450, 500, 525, 600, 675, 691, 750, 900
- Fire Flow (30L/s)

DMA Boundary
- 201 Heinemann Rd
- 204 Bunker Rd South
- 206 Mt Cotton Village
- 207A Mt Cotton Booster Pump
- 207B Mt Cotton Res HLZ
- 208 Mt Cotton Trunk
- 209 Duncan Rd Booster Pump
- 210 Thornlands
- 212 Mt Cotton Road
- 213 Heinemann Rd Trunk
- 250 Heinemann Rd to Alexandra Hills Trunk

0 250 500 1,000 1,500 2,000 2,500 Meters

FIGURE 18.5(b)
208 Mt Cotton Trunk & 209 Duncan Road DMAs
2036 FF Results with Augmentations (1 Duncan Road BP, no Heinemann Road BPs)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure18.3(b)_208_2036PH.mxd
Rev 0 9 June 2016

19. 210 Thornlands

19.1 DMA Topography and Land Use

The Thornlands DMA has reasonably consistent topography with elevations ranging from 25m to 55m AHD. The DMA mainly comprises of the higher areas of the suburbs of Cleveland and Thornlands along the ridge line generally followed by Panorama Drive and Wellington Street (up to approximately Weippin Street). The topography of DMA is shown on Figure 19-5.

As shown on Figure 19-6 the Thornlands DMA comprises mainly of Low Density Residential and General Industry to the northern section.

19.2 Previous Planning

The Thornlands DMA was originally included in the Mt Cotton zone. Planning undertaken for the PIP / ICS, was based on the original configuration for this area and included about 350m of 150mm diameter main along Kinross Road from Goddard Road to the 300mm dia main to the north.

Planning work undertaken as part of the PLMP, identified that a separate DMA could be established in the north eastern area of the Mt Cotton zone. This was called the Thornlands DMA. Originally the DMA boundary was located along South Street with Redland City Council's South Street Depot the only area north of South Street included in the DMA. Sizing of the Thornlands DMA inlet flowmeter and PRV took into account the future demand generated by the Kinross Road MDA, i.e. the original intention was to add at least part of the Kinross Road MDA to the Thornlands DMA.

The Weippin Street and Olympus Drive areas have had prolonged pressure problems as a result of their elevation (45m) in comparison to the elevation of the Alexandra Hills LLZ Reservoirs (TWL=70m). The Water Supply System Fire Flow Review (RWW, March 2009) also indicated that these areas had insufficient available fire flow. To address these issues the Thornlands DMA was extended north to include these areas.

Network planning for the Kinross Road MDA, identified the need for a 300mm diameter main from the now Seqwater trunk main at the corner of Taylor Road and Boundary Road, along Boundary Road to Kinross Road, and up Kinross Road with a connection to be provided through the development area at the north east corner to the 300mm diameter main that feeds the Thornlands DMA.

19.3 Current System Configuration and Source of Supply

The system configuration is as described for DMA208 and 209 in Section 18.3. It includes Whitby Place area in DMA208. The PRV is not modulated and is set at 58m fixed outlet pressure.

DMA210 includes Inghams chicken processing plant, which has a high night demand but low day time demand. To ensure the most representative flows into the system, the Inghams demand pattern has been adjusted so that 80% of the flow is from 10:00 pm to 4:00 am and the remaining 20% during the day. This is shown on Figure 19-1.

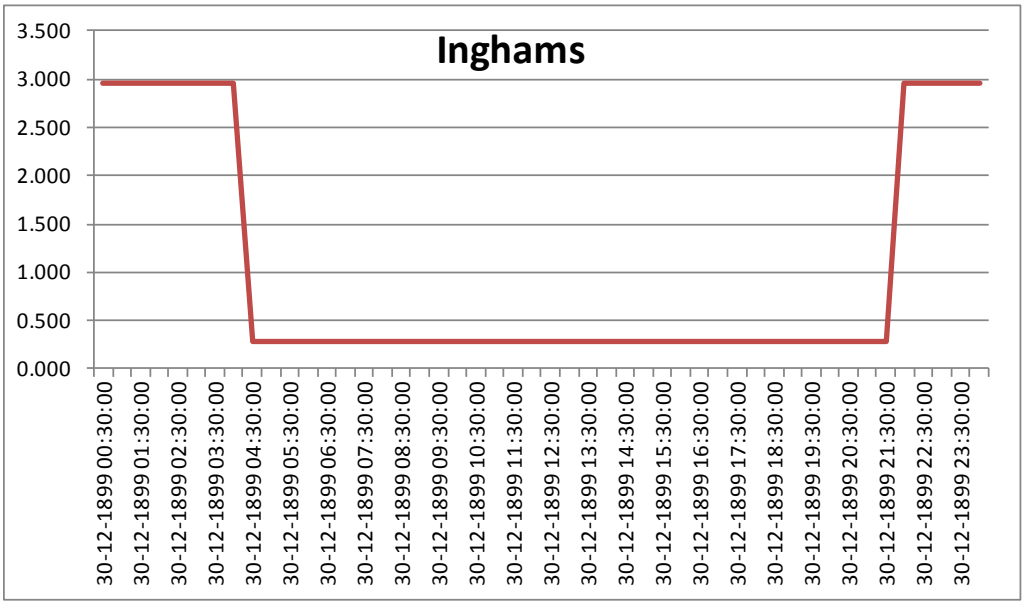


Figure 19-1 - Ingham's demand pattern

19.4 Existing System Performance at Ultimate Demands

The existing system with the trunk network augmentations along Kinross Road as previously planned for the Kinross Road MDA have been modelled for this scenario. Without these augmentations in place, the existing 300mm diameter main running from Teesdale Road to Lorikeet Street runs at a headloss rate in excess of the DSS (up to 3.9m/km), likewise the existing 150mm diameter main at the southern end of Kinross Road (up to 18.3m/km). The mains are included in all modelled scenarios from 2021 onwards as demand growth on the eastern side of Kinross Road area is predicted to be near complete by this time.

The details of these mains are shown below in Table 19.1.

Table 19.1 - DMA210 2016 Proposed Headloss Augmentations

Location	Proposed Augmentations	Length (m)	Dia (mm)	Headloss Improvement (m/km)
Kinross Road	PIP_IC14A	313	300	18.3 → 0.6 3.9 →0.7
Kinross Road	PIP_IC13_P1	212	300	
Kinross Road	PIP_IC13_P2	573	300	

19.4.1 Peak Hour

The inflow into DMA210 on MD is as shown in Figure 19-2. The sudden change in flow at 4:00 and 10:00 is due to the Ingham demand.

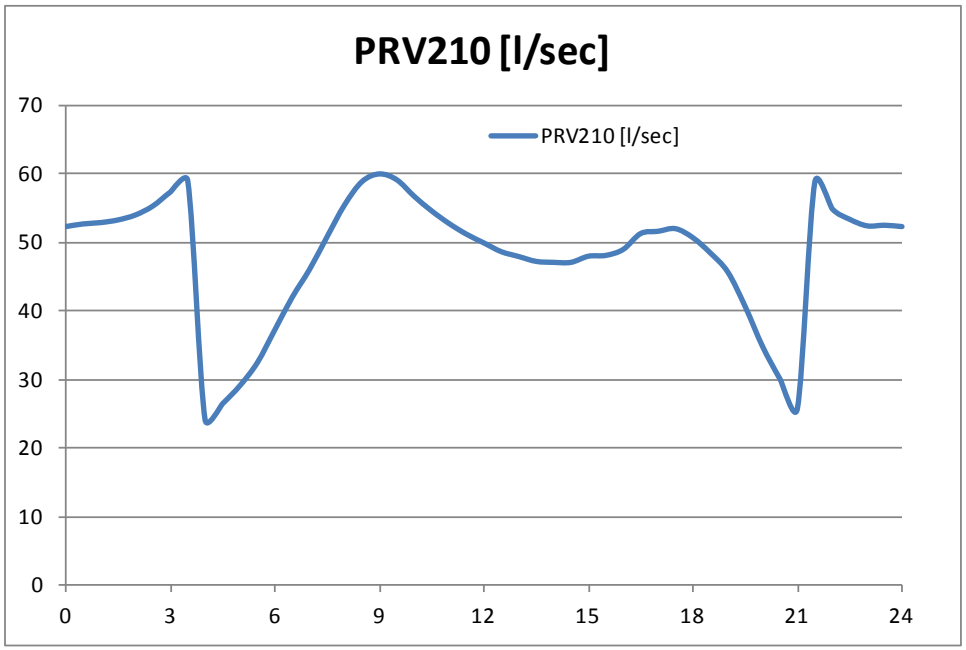


Figure 19-2 - PRV210 2036 Inflow

Inflow at 9:00 is 60.5L/s. Without any augmentations there is 51.2 m (HGL 87.8) of pressure available U/S of PRV210. Allowing for 6m head loss through the PRV to allow for modulation of this PRV, a setting of 45.2 m has been adopted.

With this setting all areas meet the DSS for PH.

The peak hour results are shown on Figure 19-7.

19.4.2 MD Minimum Hour

The minimum flow into the system is at 4:00am with a flow of 24.6 L/s through PRV210. The pressure upstream of PRV210 is 67.8m. When the PRV is set at 48.3 m (required for fire flow as described below). The maximum pressure in DMA210 is 64.4 m at J8690 which is located at the end of Laurette Avenue.

19.4.3 Fire Flow

2/3 PH is 40L/s, 19:30 has been adopted as the inflow at this time is 41.1 L/s. At 19:30 with 30L/s FF added to the DMA the upstream pressure is 48.8m. A PRV setting of 42.2m has therefore been adopted for commercial fire flow. With this setting all commercial area have 30 L/s available.

When 15L/s is added to the DMA the upstream pressure is 54.3 m. A pressure of 48.3 m has therefore been adopted for residential fire flow to allow for modulation of this PRV.
The results when the PRV is set at 48.3 m are shown on Figure 19-8. Table 19.2 summarises the results of the residential fire flow with the PRV set at 48.3 m.

Table 19.2 - DMA210 FF Results Summary

Junction	Fire Flow (L/s) (PRV 48.3m)	Location	Required FF (L/s)
J4823	12.1	Lorikeet Drive near Nook Court	15
J4648	13.3	End of Moyston Court	15
117	14.6	Ziegenfusz Road at the boundary of DMA204.	15
306CMP1	12.0	End of Olympus Drive	15
J4870	15.1	Flamingo Crescent	15

Junction	Fire Flow (L/s) (PRV 48.3m)	Location	Required FF (L/s)
J4910	14.7	End of Peachface Court	15

19.4.4 Water Quality

The water age analysis conducted as part of the DWQMP shows that most areas in this zone have a water age around 6 to 8 days. Similarly to DMA 208 this will gradually improve as the development of Kinross Road area is completed along with the continued use of the DMA 208 trunk network for water transfer between Heinemann Road reservoirs and Alexandra Hills reservoirs.

19.5 Proposed Augmentations

19.5.1 Peak Hour

At 9:00 am there is 3 m of headloss through the pipework U/S and D/S of the PRV. These are currently 100 and 150mm diameter. It is proposed to upgrade these to 250mm and 300mm diameter respectively.

When PRV210 is upgraded the pressure upstream of the PRV is 52.6 at 9:00 am. A setting of 46.6 has therefore been adopted. When this augmentation is in place the minimum pressure of 22 is maintained throughout the DMA.

19.5.2 Fire Flow

To achieve the DSS for fire flow in DMA210 the augmentations included in Table 19.3 are proposed.

Table 19.3 - DMA210 2036 Proposed Fire Flow Augmentations (19:30)

Proposed Augmentations	Description	Length (m)	Dia (mm)	Adopted PRV Setting(m)
PRV210 U/G	Peak Hour	-	-	53.8
PIP_NEWAUG1	Lorikeet Drive near Nook Court	91	150	
PIP_NEWAUG2_Opt_P1	Bay Street (from Wellington Street to Olympus Drive)	96	150	

** With 15L/s FF in DMA210 at 19:30, the U/S pressure is 59.8m*

To avoid a long length of dead end main, an alternative to PIP_NEWAUG1 is to close a valve on the 150mm main along the western side Panorama Drive (past Truscot Place), opening the Lorikeet Drive valve and installing a cross connection under Panorama Drive.

Upgrading PRV210 not only increases the pressure upstream of the PRV but it also reduces losses downstream. The adopted PRV setting has been chosen to ensure that flow modulation of the PRV is a viable option in the future given the relatively high pressure required on the downstream side of the PRV for fire fighting flows.

The fire flow results with the augmentations listed above are included in Table 19.4.

Table 19.4 - DMA210 2036FF with Proposed Fire Flow Augmentations

Junction	Location	Available FF PRV 53.8m (L/s)	Required FF (L/s)
J4823	Lorikeet Drive near Nook Court	79.5	15
J4648	End of Moyston Court	15.9	15
117	Ziegenfusz Road at the boundary of DMA204. Note: This is on the Boundary of DMA204 so 15L/s is also available	16.0	15

Junction	Location	Available FF PRV 53.8m (L/s)	Required FF (L/s)
	from adjacent hydrants.		
306CMP1	End of Olympus Drive	13.8	15
J4870	Flamingo Crescent	17.7	15
J4910	End of Peachface Court	16.2	15

The fire flow results with augmentation are shown on Figure 19-9.

19.6 Augmentation Timing

19.6.1 Existing System at 2016 Demands

The existing system has been modelled assuming that no additional reticulation in the Kinross Road area has been constructed to what is currently in the model.

Peak Hour

The flow into DMA210 in 2016 is shown on Figure 19-3. The figure shows that the actual peak is 65.6 L/s at 08:00. While this is the period of highest flow into the DMA it may not be the critical time period because the demands in the remaining system are very low. Figure 19-4 shows that lowest pressure into DMA210 is at 09:00. Both scenarios have therefore been considered in this analysis.

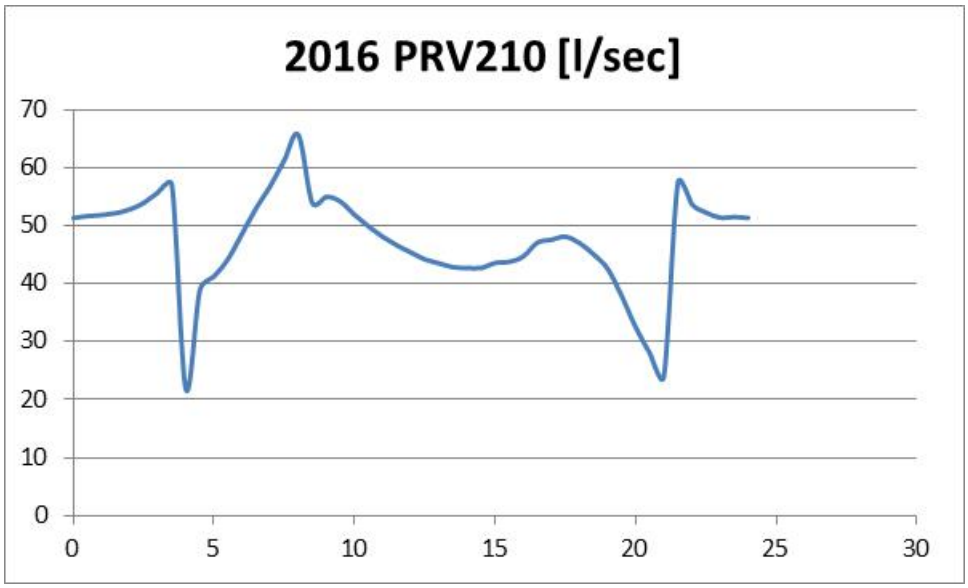


Figure 19-3 - PRV210 2016 Inflow

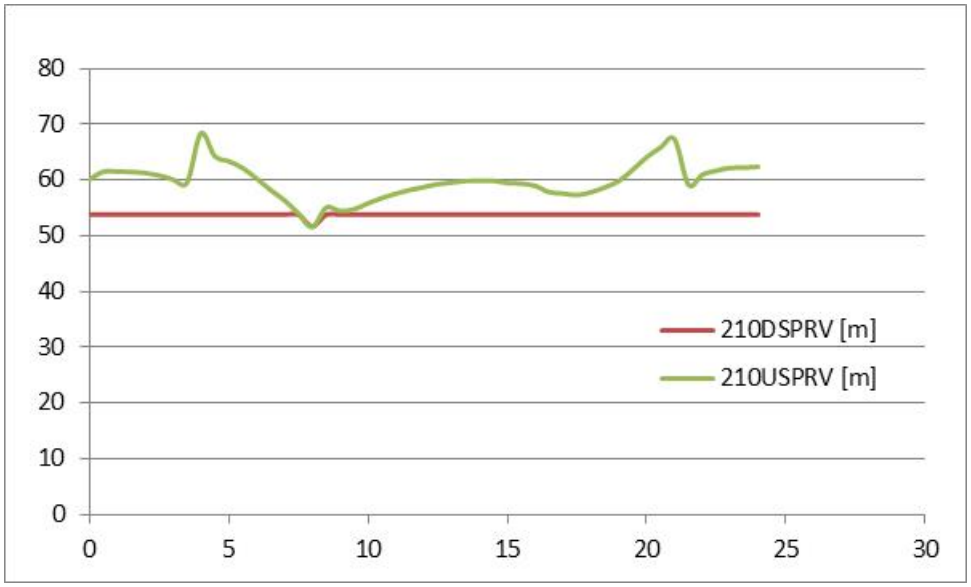


Figure 19-4 - PRV210 2016 Pressures (PRV set at 54.5 m)

At 08:00 the lowest pressure in the DMA is 21.6 m at J0271. As this a minor drop below DSS, it is proposed to monitor the pressure in this area and augment by 2021 if augmentation for fire flow provision is not triggered.

Fire Flow

2/3 of the 08:00 demand is 43.8 L/s. The flow into the DMA that is closest to this is 43.8 L/s which occurs at 15:30.

When 15 and 30 L/s are put on a junction in DMA210 at 06:30 the upstream pressures are 53.9 and 47.8 m respectively. A PRV setting of 41.8 m has therefore been adopted for the commercial FF analysis. With this setting, all commercial areas meet the DSS for fire flow. When a setting of 47.9 is adopted for residential fire flow there are still some areas of the DMA that do not meet the DSS for residential fire flow. It has therefore been proposed that the PRV remain unmodulated for the 2016 demands and the DMA has been assessed using a downstream pressure of 52.9m.

The results of the analysis are summarised in Table 19.5.

Table 19.5 - DMA210 2016 FF Results Summary

Junction	Fire Flow (L/s) (PRV 47.9m)	Fire Flow (L/s) (PRV 52.9m)	Location	Required FF (L/s)
J4823	12.05	13.2	Lorikeet Drive near Nook Court	15
J4648	13.2	15.3	End of Moyston Court	15
306CMP1	12.2	13.6	End of Olympus Drive	15
J4870	15.0	17.0	Flamingo Crescent	15
J4910	14.6	15.7	End of Peachface Court	15

To achieve the DSS for fire flow in DMA210 the augmentation included in Table 19.6 is proposed.

Table 19.6 - DMA210 2016 Proposed Fire Flow Augmentations (06:30)

Junction	Location	Proposed Augmentations	Length (m)	Dia (mm)	Available FF (L/s)	Required FF (L/s)
J4823	Lorikeet Drive near Nook Court	PIP_NEWAUG1	91	150	63.8	15
306CMP 1	Bay Street (from Wellington Street to Olympus Drive)	PIP_NEWAUG2_ Opt2_P1	96	150	16.3	15

19.6.2 2021 Demands with 2016 Augmentations

The 2021 system has been modelled assuming that 2016 augmentations are complete. It also modelled assuming the construction of the 300mm diameter main along the eastern side of Kinross Road has been completed as by this timeframe the demand projections suggest that development is substantially complete in this area.

Peak Hour

The peak demand is at 17:30 pm and is 65.7 L/s. At 17:30 the lowest pressure in the DMA is 21.8 m at J9047. In order to improve this pressure, the augmentation of the 210PRV is recommended for completion in 2021.

Fire Flow

All fire flow issues have been addressed in the 2016 planning horizon.

N

Legend

Thornlands

Existing DMA Boundaries

5m Contours

Diameter

80 100 150 200 225 250 300 350 375 450 500 525 600 675 691 750 900

63

0 125 250 500 750 1,000 1,250 Meters

FIGURE 19.5
210 Thornlands Topography

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure19_5_210_Topography.mxd
Rev0 9 June 2016

N

Legend

LOCDESC
- Thornlands DMA
- DMA Boundaries

Residential Zones
- Low Density Residential
- Low-medium Density Residential
- Medium Density Residential

Centre Zones
- Neighbourhood Centre
- Specialised Centre

Recreation Zones
- Recreation and Open Space

Environmental Zones
- Environmental Management
- Conservation

Industry Zones
- Medium Impact Industry

Other Zones
- Community Facilities
- Rural

0 125 250 500 750 1,000 1,250
Meters

FIGURE 19.6
210 Thornlands Planning Scheme

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Figure19.6_210_Planning_Scheme.mxd
Rev0 9 June 2016

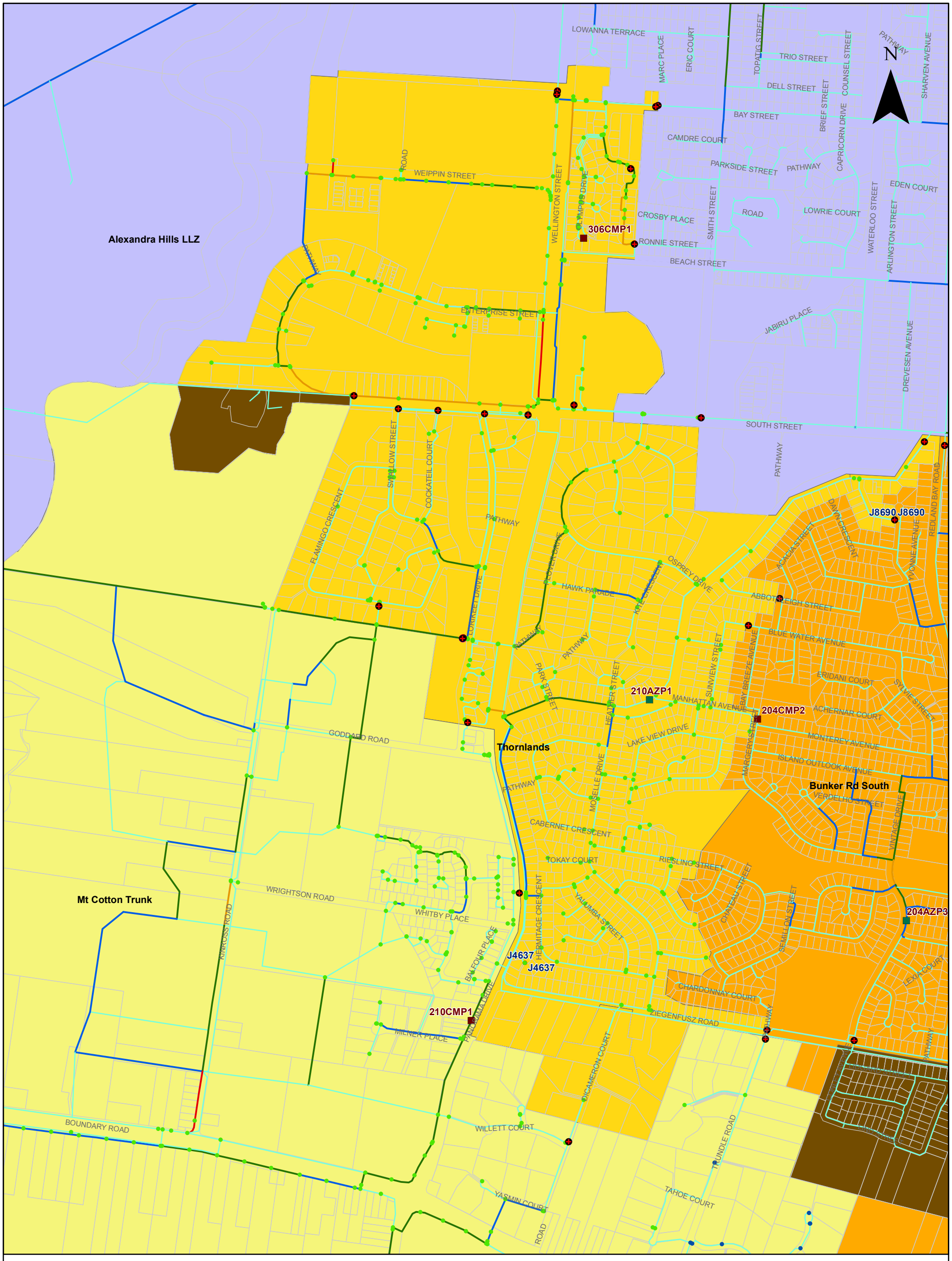


FIGURE 19.7
210 Thornlands DMA
Existing System with 2036 PH Demands (PRV = 44.1)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig19_7_210_2036PH.mxd
Rev0 9 June 2016

Alexandra Hills LLZ
Thornlands
Mt Cotton Trunk
Bunker Rd South
306CMP1
210AZP1
204CMP2
J4870
J4823
J4648
210CMP1
204AZP3
117
LOWANNA TERRACE
MARC PLACE
ERIC COURT
TOPATIG STREET
TRIO STREET
DELL STREET
BRIEF STREET
COUNSEL STREET
SHARVEN AVENUE
PATHWAY
BAY STREET
CAMDRE COURT
CAPRICORN DRIVE
PARKSIDE STREET
EDEN COURT
LOWRIE COURT
WATERLOO STREET
ARLINGTON STREET
SMITH STREET
CROSBY PLACE
RONNIE STREET
BEACH STREET
WEIPPIN STREET
WELLINGTON STREET
COMPOS DRIVE
ROAD
PATHWAY
BUTTERCRISE STREET
JARURU PLACE
DREYESSEN AVENUE
SOUTH STREET
SWALLOWS STREET
COCKATEIL COURT
FLAMINGO CRESCENT
PATHWAY
CORMORANT DRIVE
HAWK PARADE
OSPREY DRIVE
ABBOTSLEIGH STREET
BLUE WATER AVENUE
ERIDANI COURT
SIRIUS STREET
ACHERNAR COURT
MONTEREY AVENUE
ISLAND OUTLOOK AVENUE
VERDELHO STREET
VINTAGE DRIVE
REDLAND BAY ROAD
ACACIA STREET
CYPRESS CRESCENT
LYNNE AVENUE
PARK STREET
HEATHERD STREET
SUNVIEW STREET
BAY BREEZE AVENUE
MARGERY STREET
MANHATTAN AVENUE
LAKE VIEW DRIVE
MOSELLE DRIVE
CABERNET CRESCENT
TOKAY COURT
RIESLING STREET
CRITERION STREET
SEMILLON STREET
YARRAMBAT STREET
HERMITAGE CRESCENT
CHARDONNAY COURT
LEXIA COURT
ZEGENFUSZ ROAD
GODDARD ROAD
WRIGHTSON ROAD
WHITBY PLACE
KINROSS ROAD
BALFOUR PLACE
PANORAMA DRIVE
MILNER PLACE
BOUNDARY ROAD
WILLETT COURT
YASMIN COURT
TAHOE COURT
TRUNDLE ROAD
BUCKINGHAM COURT
N

Legend

Available FF (L/s)
- < 15
- 15 - 30
- > 30

AZP Logger
CMP Logger
PRV and Meter Site
Closed Boundary Valve
Fire Flow (30L/s)

Diameter
63, 80, 100, 150, 200, 225, 250, 300, 350, 375, 450, 500, 525, 600, 675, 691, 750, 900

DMA Boundary
- W004 Alexandra Hills LLZ
- 204 Bunker Rd South
- 208 Mt Cotton Trunk
- 210 Thornlands
- 250 Heinemann Rd to Alexandra Hills Trunk

0 125 250 500 750 1,000 1,250 Meters

FIGURE 19.8
210 Thornlands DMA
Existing System 2036 FF Results (PRV = 48.3)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig19_8_210_2036MD_FF.mxd
Rev0 9 June 2016

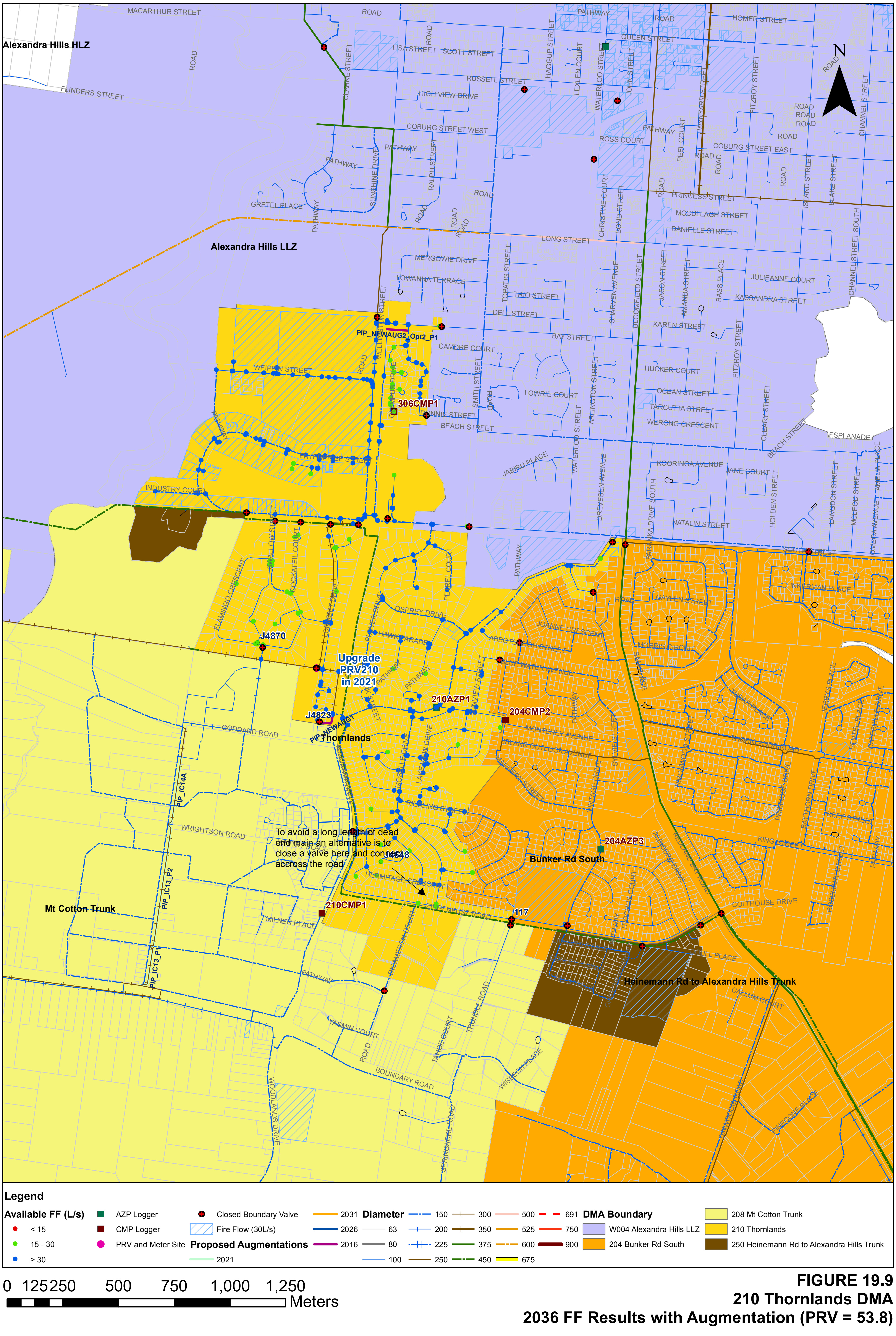


FIGURE 19.9
210 Thornlands DMA
2036 FF Results with Augmentation (PRV = 53.8)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig19_9_210_2036MD_FF_wAUG.mxd
Rev0 9 June 2016

20. 301 Howletts Road

20.1 DMA Topography and Land Use

The Howletts Road DMA covers a relatively small geographical area of around 177 ha and consists of a range of elevations from 20m to 50 m AHD

The topography of the Howletts Road DMA is shown on Figure 20-1.

As shown on Figure 20-2 the area is Low Density Residential with large areas of Environmental Management and Conservation.

20.2 Previous Planning

Planning undertaken for the PIP / ICS was based on the original configuration for this area and did not include any augmentations. Planning work undertaken as part of the PLMP did not look at this area in any detail.

The Howletts Road DMA has had minimal changes as a result of the PLMP except for the operational removal of three non-return valves which were replaced with closed valves. This was completed so the water entering the zone could be measured. Due to fire flow issues the non-return valves have been recommissioned.

20.3 Current System Configuration and Source of Supply

The Howletts Road DMA is fed from the Alexandra Hills LLZ via 300mm, 250mm & 150 mm AC mains which join a 200mm AC main which is the inlet to the Howletts Road pump station.

The non-return valves are located on pipes 5000, 5024 and 5044A.

20.4 Existing System Performance at Ultimate Demands

20.4.1 Peak Hour

At 9:00 am (PH) the flow through the Howletts Road PS is 13.5 L/s. With one pump operating with the VSD set using a pressure of 31.5m at HOW-ANL all areas have an available pressure above 22m. The minimum pressure is 23m at J404.

The peak hour results are shown on Figure 20-3.

20.4.2 MD Minimum Hour

The minimum flow into Howletts Road is 1.6L/s at midnight. With one pump operating with the VSD set using a pressure of 31.5m at HOW-ANL the maximum pressure is 58.4 m at J171. This is below the DSS of 60m.

20.4.3 Fire Flow

2/3 PH is 8.9 L/s. At 15:30 the flow into Howletts Rd is 8.9 L/s so 15:30 has been adopted for the FF analysis. The analysis has been completed with one booster pump operating at full speed. Previous modelling has found that two booster pumps operating together have very little impact on the available FF in the zone.

As shown on Figure 20-4 all areas meet the DSS for fire flow except for the end of Willowie Cresent.

The results of the analysis where the DSS for fire flow is not met are included in Table 20.1.

Table 20.1 - DMA301 2036 FF Results

Junction	Fire Flow (L/s)	Location	Required FF (L/s)
J488	14.0	Willowie Cresent Note: 15 L/s is available from two hydrants because the nearest hydrant has a FF above 20L/s. This is considered satisfactory.	15

20.4.4 Water Quality

The water age analysis conducted as part of the DWQMP shows that most areas in this zone have a water age of around 0 to 2 days. This is considered to be satisfactory.

20.5 Proposed Augmentations

There are no augmentations required to meet the DSS for PH or FF.



FIGURE 20.1
301 Howletts Road Topgraphy

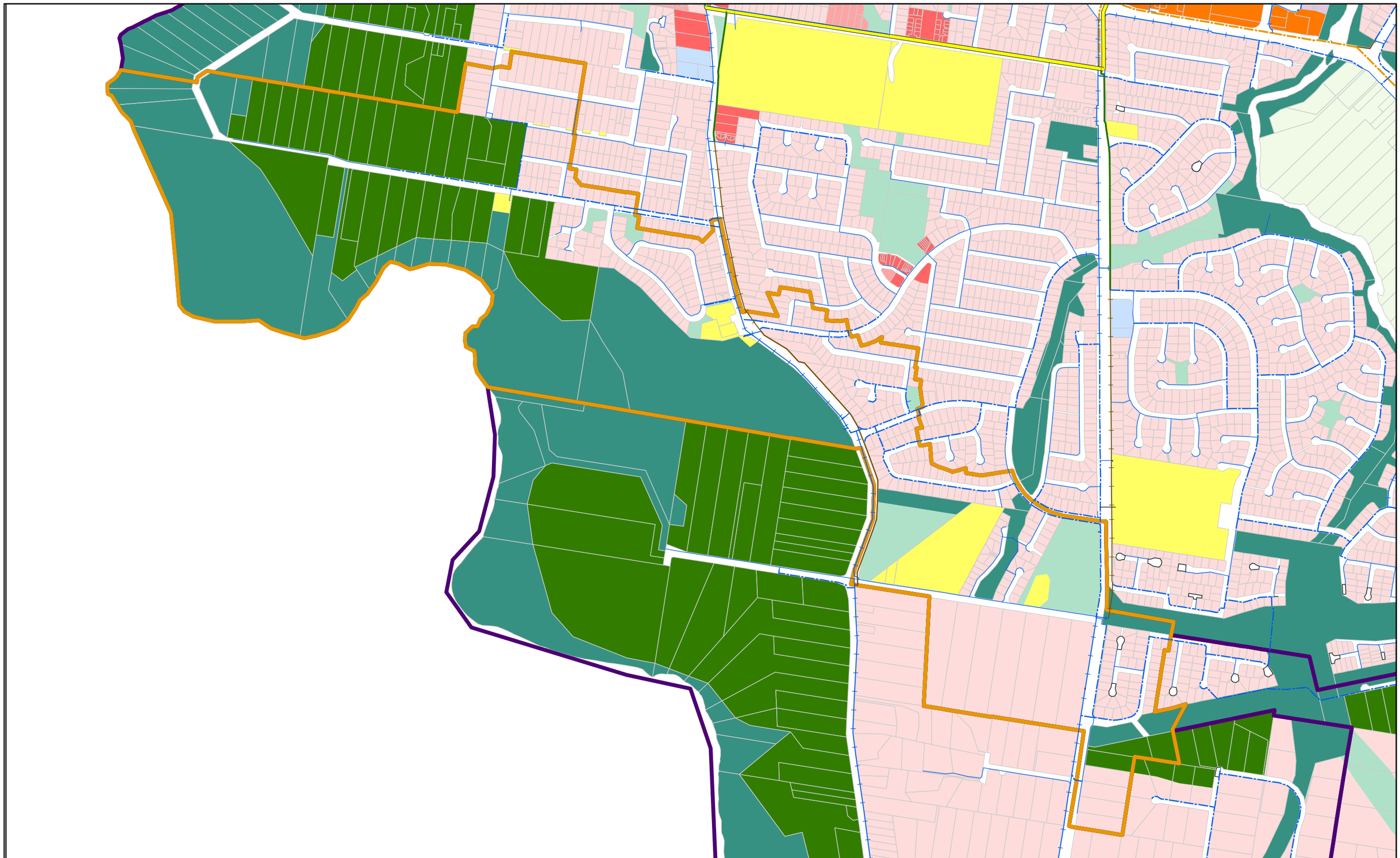


FIGURE 20.2
301 Howletts Road Planning Scheme

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig20.2_301_Planning_Scheme.mxd
Rev0 9 June 2016



Legend

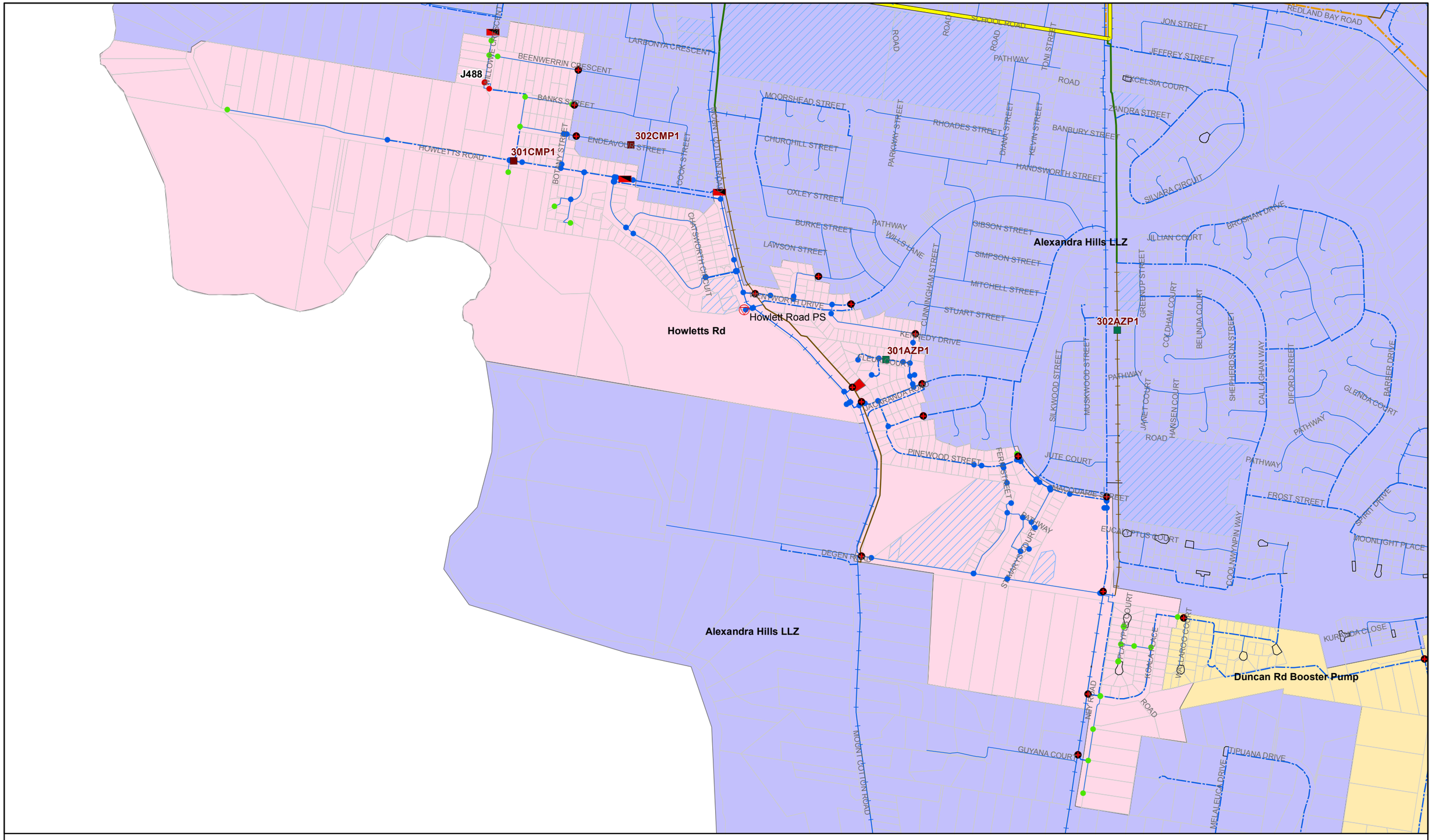
Residual Pressure (m)	Headloss (m/1000m)					
<22	<1	2 -5	AZP Logger	Non Return Valve	Dialysis Patient	DMA Boundary
22-60	1 - 2	5 - 10	CMP Logger	DMA Boundary Valve		W004 Alexandra Hills LLZ
>60		>10		Water Supply Pumpstations		201 Heinemann Rd

204 Bunker Rd South	210 Thornlands	308 Alexandra Hills HLZ	
208 Mt Cotton Trunk	250 Heinemann Rd to Alexandra Hills Trunk		
209 Duncan Rd Booster Pump	301 Howletts Rd		

0 100 200 400 600 800 1,000 Meters

FIGURE 20.3
301Howletts Road DMA
Existing System with 2036 PH Demands (VSD setting = 31.5 m)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlanMas
Rev0 14 June 2016



G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlanMaster Plan Report\Drawings\Fig12_4_301_2036MD_FF.mxd
Rev0 14 June 2016

FIGURE 20.4
301Howletts Road DMA
Existing System 2036 FF Demands (1VSD @ 100%)

21. W004 Alexandra Hills LLZ

21.1 DMA Topography and Land Use

The Alexandra Hills DMA covers a large geographical area (over 5790 ha) and consists of a range of elevations from 40m AHD near the high level zone near the reservoirs to 5 m AHD along the coast line. The Alexandra Hills HLZ is in the middle of this zone around the reservoirs in the high elevation areas (above 40m).

The topography of the Alexandra Hills Low Level DMA is shown on Figure 21-1.

As shown on Figure 21-2 the area is predominantly Low and Low-medium Density Residential with some Medium Density Residential & Mixed Use areas along with the Principal Centres of Capalaba and Cleveland.

21.2 Previous Planning

The Alexandra Hills DMA has had minimal changes as a result of the PLMP except for the removal of the south eastern section of the zone to form the Bunker Road South DMA.

Planning undertaken for the PIP / ICS was based on the original configuration for this area and did not include any augmentations. Planning work undertaken as part of the PLMP did consider breaking this area down into smaller DMAs, but it was determined that the cost-benefit ratio for installation further DMAs was not justified by the predicted water savings possible.

Some minor boundary changes have been made around the High Level Zone to supply suitable pressures to some higher areas that were originally in the Low Level Zone.

21.3 Current System Configuration and Source of Supply

The Alexandra Hills area receives the majority of its supply from Leslie Harrison Dam and the Capalaba WTP. There are a number of high lift pumps at the Capalaba WTP which supply five Ground Level Reservoirs at the Alexandra Hills Reservoir complex via a 600mm main. This main has numerous connections to the reticulation network as it makes its way to the reservoir complex.

There is an elevated tower at the Alexandra Hills Reservoir complex which is supplied from the low level zone via three booster pumps. The low and high level reservoirs have a bottom water level of about 63 m and 86.7 m respectively.

Water is can also be supplied to the low level reservoirs via a 450mm eastern main from the Heinemann Road Reservoir complex and from the Mt Cotton Reservoir via the Mt Cotton DMA.

21.4 Possible Future Configuration and Source of Supply

Seqwater are in the process of developing their bulk transport network master plan for Redlands which has the potential to directly affect the supply of water to this zone. One option that is being considered is a booster pump on the 450mm trunk main from Heinemann Road to Alexandra Hills Reservoirs. At the time of writing this report, a preferred solution has not been finalised by Seqwater. There will need to be a detailed assessment undertaken on the effects of the proposed Seqwater solution once it is known.

21.5 Existing System Performance at Ultimate Demands

21.5.1 Peak Hour

At 9:00 am the flow into the DMA is 898.5 L/s which is made up of 410.2 L/s from the booster pump and 488.3 L/s from the reservoirs.

At 9:00 am with one booster on at Capalaba and AHR levels set at 5.2 m (the adopted minimum operating level) all areas meet the DSS of 22m. The minimum pressure is 22.6m at J2743 which is located at the end of Scotby Court. The peak hour results with one booster pump on are shown on Figure 21-3.

Without any booster pumps operating there are large areas around the High Level and Howletts Road zones with pressures below 22m. The lowest being J140 with a pressure of 12.1m, which is located at the corner of Degen and Mount Cotton Roads. The peak hour results without any booster pumps operating at

Capalaba are shown on Figure 21-4. Redland Water will need to continue to work with Seqwater to ensure that the system is operated appropriately in the future.

21.5.2 MD Minimum Hour

The highest pressure in the DMA (where there is a local service connection) is 71.6 m at J1467 which is located in Mond Street Thorneside. This is about 12 m above the DSS of 60 m.

Given the large size of the DMA and wide range of elevations serviced it is proposed to monitor the high pressure areas and if issues arise determine and implement the most appropriate solution.

21.5.3 Fire Flow

The 2/3 PH flow is 599 L/s. The time adopted for the FF analysis, is 15:30 when there is a flow of 595.5 L/s into the DMA. This is the closest inflow at a modelled time interval.

The fire flow analysis has been completed assuming one booster pump is operational at Capalaba.

The fire flow results are shown on Figure 21-5 all areas meet the DSS for fire flow except for a small number of dead end areas. The results of the critical fire flow areas are included in Table 21.1.

Table 21.1 - W004 2036 FF Results

Junction	Fire Flow (L/s)	Location	Required FF (L/s)
J617	11.9	Cleveland WWTP Note the adjacent hydrant is on the trunk main and has well over 30L/s available. Internal water supply system to the WWTP includes small pump boosted network.	30
309	13.7	South Street - Thornlands Note: This is on the boundary of DMA210 Thornlands so 15 L/s is available from two hydrants (one from each DMA). This is considered acceptable.	15
J7163	14.6	The Esplanade - Wellington Point	15
J15297	15.0	The Esplanade - Wellington Point	15
J13183	27.0	Queen Street - Cleveland	30
J13179	22.7	Longland Street - Cleveland	30
J13190	28.5	Ferry Terminal - Emmett Drive Cleveland	30
J9680	28.1	Haggup Street - Cleveland	30
J9700	28.2	Middle Street - Cleveland	30
J9548	24.4	Michelle Court - Cleveland Note: This area is currently residential. When this is developed the 100mm main in Michelle Court will need to be connected to the main in Queen Street (J9572) or upgraded to 150 mm dia. It has not been considered further in this report.	30
J1271	34.4	Banfield Lane - Capalaba	30
J2201	37.4	Tipuana Drive - Capalaba	15
J1306	23.6	Jones Road - Capalaba	30
J10144	13.3	Outlook Parade off Clearwater Street - Ormiston	15
J10142	14.3	Romano Court off Clearwater Street - Ormiston	15
H221565	24.6	Thorn Street - Ormiston This is a small church in a residential area, 15L/s is considered suitable so no further action is proposed.	30
J1147	28.0	Dan Street - Capalaba Note: This 28L/s is considered acceptable in the short term because there are other hydrants across the road which are capable of providing 30L/s. However if there was a fire the QFRS would need to close Moreton Bay Road to access the hydrants. An augmentation has therefore proposed to provide sufficient FF to the area.	30

21.5.4 Water Quality

The water age analysis conducted as part of the DWQMP shows that most areas in the northern and western areas water age of around 0 to 2 days. The eastern areas have a much high water age of around 5 days. This is because the northern and western areas receive fresh water from the Water Treatment Plant Booster Pumps and the eastern area only receives water from the Alexandra Hills Reservoirs.

Opportunities to improve water quality outcomes in the eastern areas are fairly limited in terms of infrastructure based solutions (e.g. elimination of dead ends). The Alexandra Hills Reservoirs are owned and operated by Seqwater, so the issue needs to be addressed in conjunction with Seqwater.

Continued system quality monitoring and proactive maintenance procedures like regular flushing dead ends will continue to be critical to maintaining good water quality in the eastern areas. The water quality should also improve as the area continues to develop and detention times in the reservoirs reduce. Implementing water quality improvements in this zone will need to be done in conjunction with regional projects such as the secondary disinfection optimisation project and will have to consider more inputs than simply water age.

21.6 Proposed Augmentations

21.6.1 Peak Hour

There are no peak hour augmentations required.

21.6.2 Fire Flow

To achieve the DSS for fire flow in W004 the augmentations included in Table 21.2 are proposed.

Table 21.2 - W004 2036 Proposed Fire Flow Augmentations

Junction	Location	Proposed Augmentations	Length (m)	Dia (mm)	Available FF (L/s)	Required FF (L/s)
J13190	Ferry Terminal - Emmett Drive Cleveland	PIP_AUG30	62	150	35.2	30
J1306	Jones Road - Capalaba	PIP_AUG12 - Cross connection to 500mm main in Old Cleveland Road East	4	100	26.4	30
J1147	Dan Street - Capalaba	PIP_NEWAUG10	89	100	51.5	30
Longland & Queen Streets - Cleveland						
J13183	Queen Street	PIP_AUG11_Opt1 **OR** PIP_AUG11_Opt2	219	100	40.9/27.05	30
J13179	Longland Street		143	150	38.7/34.4	30
Haggup and Middle Streets - Cleveland						
J9680	Haggup Street	PIP_AUG29	117	100	49.2	30
J9700	Middle Street				49.3	30
Clearwater Street - Ormiston						
J10144	Outlook Parade	FF_AUG_305_P15 **AND** FF_AUG_305_P10	164	150	49.7	15
J10142	Romano Court		231	150	22.6	15

The augmentations and results are shown graphically on Figure 21-6.

21.7 Augmentation Timing

21.7.1 Existing System at 2016 Demands

Peak Hour

There are no peak hour augmentations required.

Fire Flow
The results of the 2016 analysis are summarised in Table 21.3.

Table 21.3 - W004 2016 FF Results

Junction	Fire Flow (L/s)	Location	Required FF (L/s)
J13183	28.2	Queen Street - Cleveland	30
J13179	23.5	Longland Street - Cleveland	30
J13190	30.5	Ferry Terminal - Emmett Drive Cleveland	30
J9680	28.7	Haggup Street - Cleveland	30
J9700	29.0	Middle Street - Cleveland	30
J1306	23.7	Jones Road - Capalaba	30
J10144	13.8	Outlook Parade off Clearwater Street - Ormiston	15
J10142	15.1	Romano Court off Clearwater Street - Ormiston	15
J1147	28.3	Dan Street - Capalaba	30

The results show that the only areas to meet the DSS for fire flow are the Ferry Terminal and Romano Court. However, the Romano Court augmentation is needed for Outlook Parade.

The augmentations included in Table 21.4 are needed by 2016.

Table 21.4 - W004 2016 Fire Flow Augmentations

Junction	Location	Proposed Augmentations	Length (m)	Dia (mm)
J1306	Jones Road - Capalaba	PIP_AUG12 - Cross connection to 500mm main in Old Cleveland Road East	4	100
J1147	Dan Street - Capalaba	PIP_NEWAUG10	89	100
Longland & Queen Streets - Cleveland				
J13183	Queen Street	PIP_AUG11_Opt1 **OR** PIP_AUG11_Opt2	219	100
J13179	Longland Street		143	150
Haggup and Middle Streets - Cleveland				
J9680	Haggup Street	PIP_AUG29	117	100
J9700	Middle Street			
Clearwater Street - Ormiston				
J10144	Outlook Parade	FF_AUG_305_P15	164	150
J10142	Romano Court	FF_AUG_305_P10	231	150

21.7.2 2021 Demands with 2016 Augmentations

Fire Flow
Without any augmentations in the area the available FF in 2021 at J13190 is 29.7L/s. This is considered satisfactory.

21.7.3 2026 Demands with 2016 Augmentations

Fire Flow
Without any augmentations in the area the available FF in 2026 at J13190 is 29.2L/s, the augmentation included in Table 21.5 is therefore required in 2026.

Table 21.5 - W004 2026 Fire Flow Augmentations

Junction	Location	Proposed Augmentations	Length (m)	Dia (mm)
J13190	Ferry Terminal - Emmett Drive Cleveland	PIP_AUG30	62	150

N

304AZP1
304CMP1
307AZP1
307CMP1
303AZP1
308AZP1
305AZP1
305CMP1

Legend

AZP Logger
CMP Logger
Alexandra Hills HLZ
Alexandra Hills LLZ
Existing DMA Boundaries
5m Contours

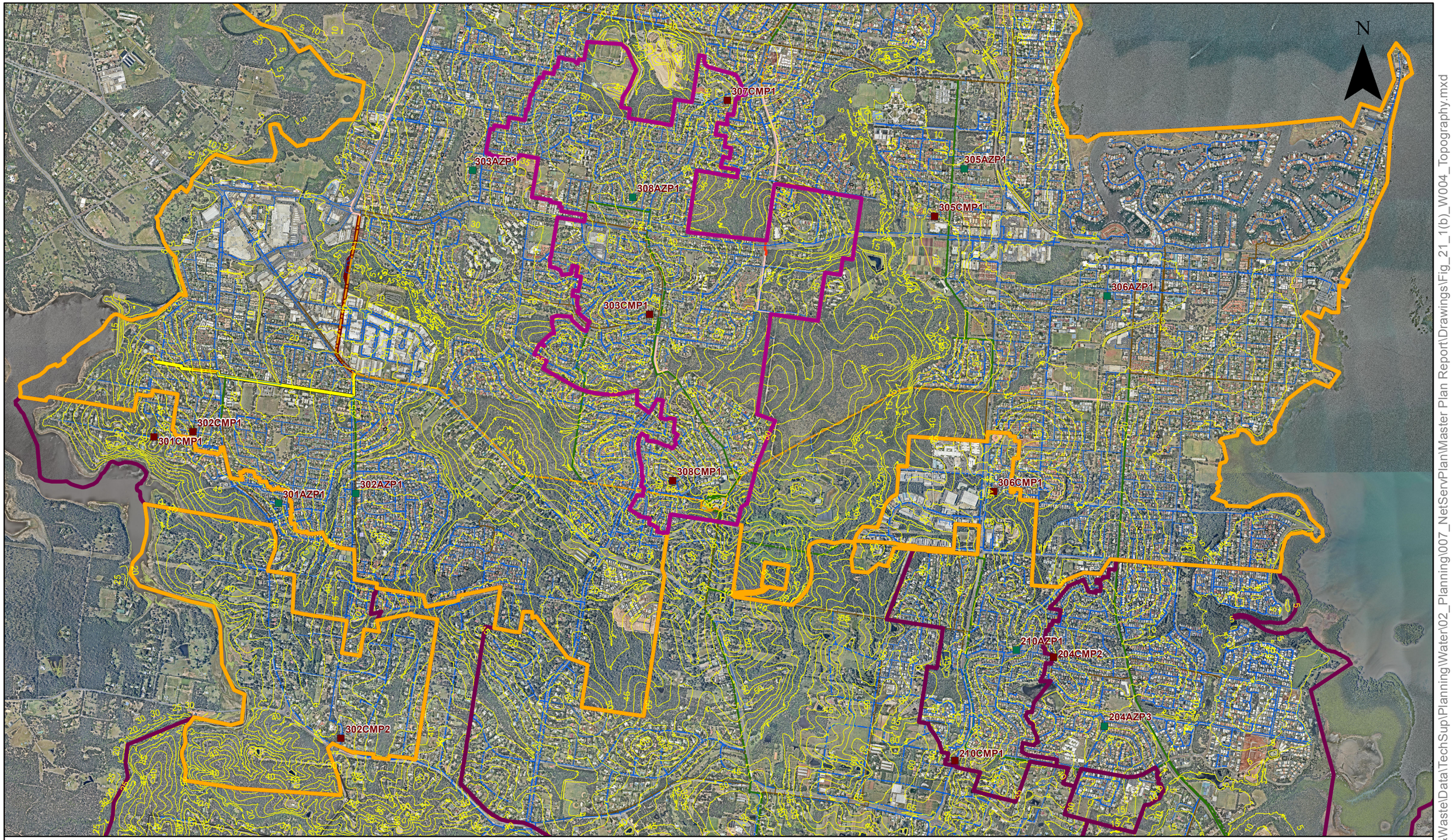
Diameter

63 80 100 150 200 225 250 300 350 375 450 500 525 600 675 691 750 900

0 250500 1,000 1,500 2,000 2,500
Meters

FIGURE 21.1(a)
W004 Alexandra Hills LLZ Topography

G:\RedlandWater&Waste\DataTechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig_21_1(a)_W004_Topography.mxd
Rev0 14 June 2016



G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlanMaster Plan Report\Drawings\Fig_21_1(b)_W004_Topography.mxd
Rev0 14 June 2016

FIGURE 21.1(b)
W004 Alexandra Hills LLZ Topography

N

Legend

Alexandra Hills HLZ
Alexandra Hills LLZ
Existing DMA Boundaries

Residential Zones
Low Density Residential
Low-medium Density Residential
Medium Density Residential

Centre Zones
Principal Centre
District Centre
Local Centre
Neighbourhood Centre

Recreation Zones
Recreation and Open Space

Environmental Zones
Environmental Management
Conservation

Industry Zones
Low Impact Industry

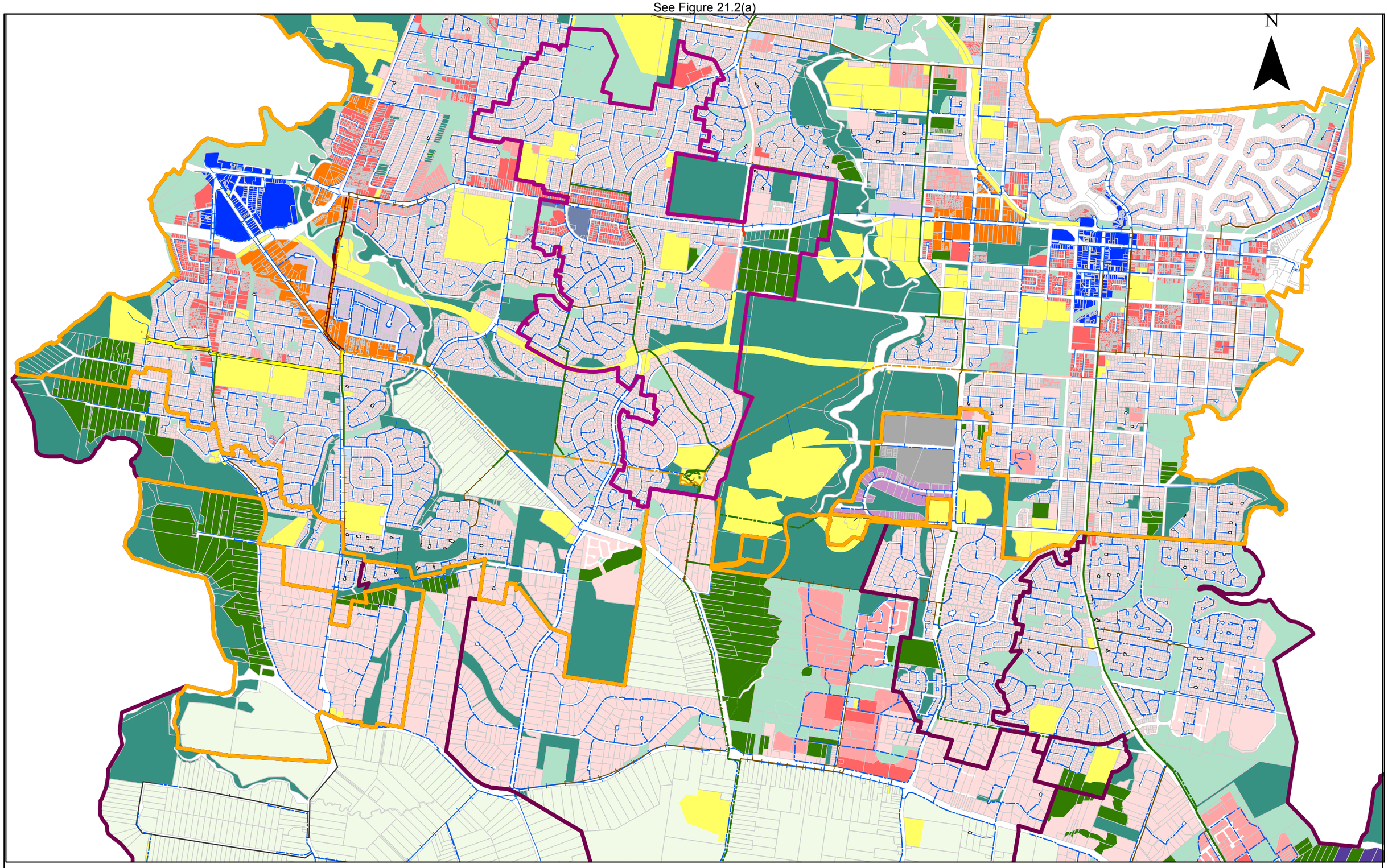
Other Zones
Community Facilities
Mixed Use
Rural

0 250500 1,000 1,500 2,000 2,500
Meters

FIGURE 21.2(a)
W004 Alexandra Hills LLZ Planning Scheme

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig21_2(a)_W004_Planning_Scheme.mxd
Rev0 14 June 2016

See Figure 21.2(a)



G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig21_2(b)_W004_Planning_Scheme.mxd
Rev0 14 June 2016

FIGURE 21.2(b)
W004 Alexandra Hills LLZ Planning Scheme

N

304AZP1
J1467
304CMP1
303AZP1
Alexandra Hills HLZ
308AZP1
Alexandra Hills LLZ
307AZP1
307CMP1
305CMP1

Legend

- AZP Logger
- CMP Logger
- DMA Boundary Valve

Residual Pressure (m)

- <22
- 22-60
- >60

Headloss (m/1000)

- <1
- 1 - 2
- 2 -5
- 5 - 10
- >10

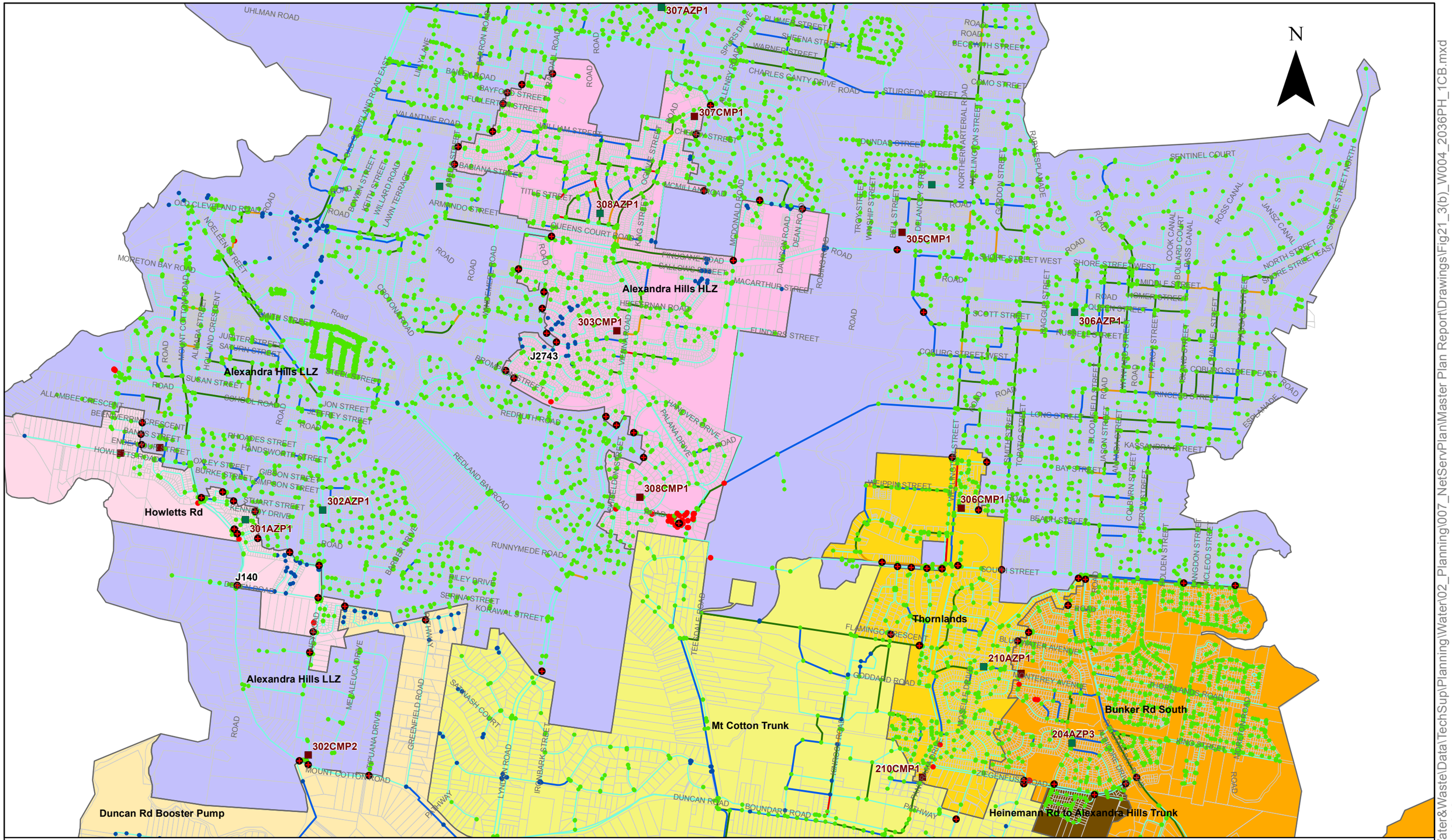
DMA Boundary

- W004 Alexandra Hills LLZ
- 201 Heinemann Rd
- 204 Bunker Rd South
- 208 Mt Cotton Trunk
- 209 Duncan Rd Booster Pump
- 210 Thornlands
- 250 Heinemann Rd to Alexandra Hills Trunk
- 301 Howletts Rd
- 308 Alexandra Hills HLZ
- Dialysis Patient

0 250500 1,000 1,500 2,000 2,500 Meters

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig21_3(a)_W004_2036PH_1CB.mxd
Rev0 14 June 2016

FIGURE 21.3(a)
W004 Alexandra Hills LLZ
Existing System with 2036 PH Demands (1 Capalaba BP)



0 250500 1,000 1,500 2,000 2,500 Meters

FIGURE 21.3(b)
W004 Alexandra Hills LLZ
Existing System with 2036 PH Demands (1 Capalaba BP)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlanMaster Plan Report\Drawings\Fig21_3(b)_W004_2036PH_1CB.mxd
Rev0 14 June 2016

N

304AZP1
J1467
304CMP1
Alexandra Hills LLZ
307AZP1
307CMP1
Alexandra Hills HLZ
308AZP1
303AZP1
305CMP1

Legend

- AZP Logger
- CMP Logger
- DMA Boundary Valve

Residual Pressure (m)
- <22
- 22-60
- >60

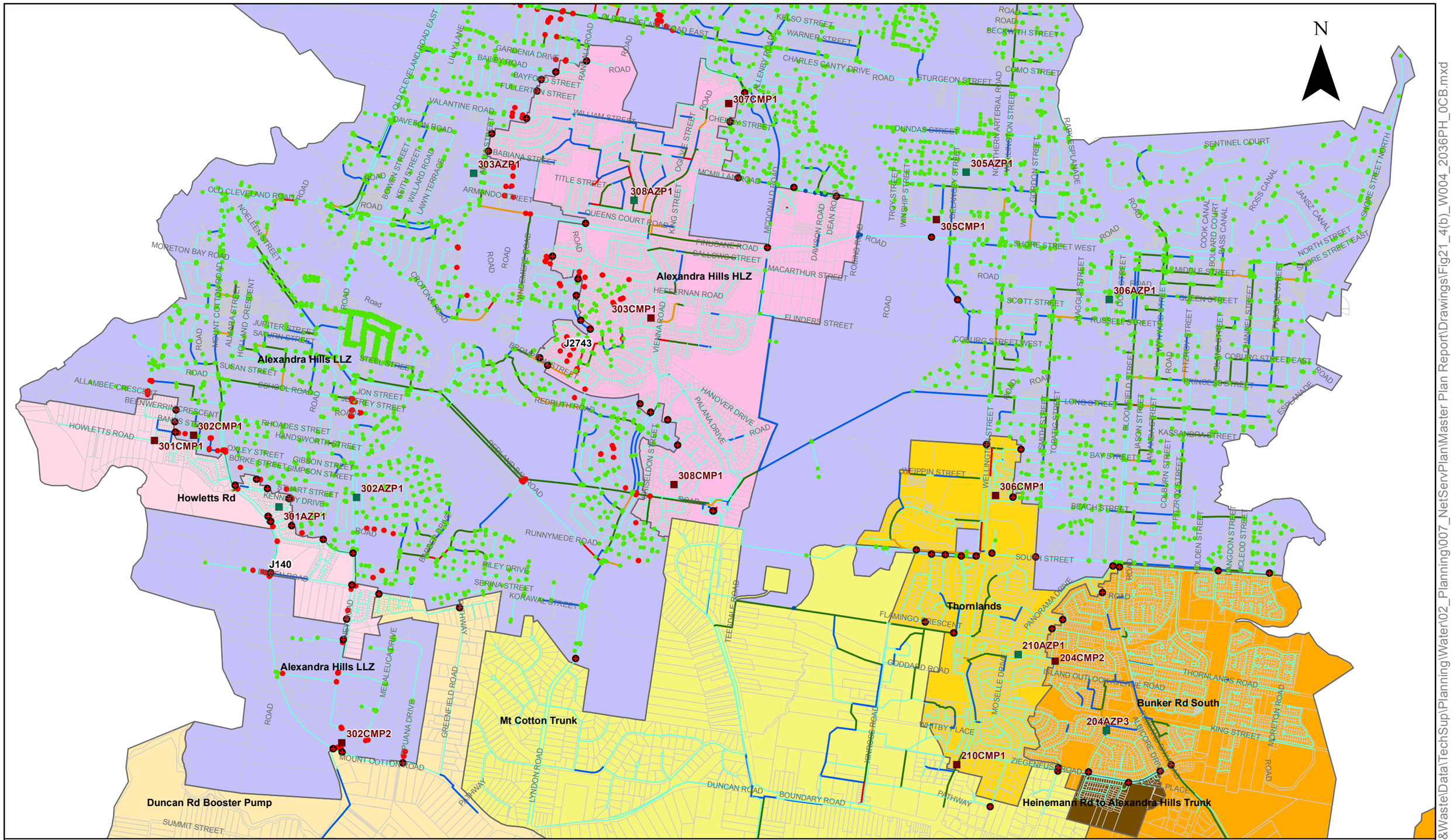
Headloss (m/1000)
- <1
- 1 - 2
- 2 -5
- 5 - 10
- >10

DMA Boundary
- W004 Alexandra Hills LLZ
- 201 Heinemann Rd
- 204 Bunker Rd South
- 208 Mt Cotton Trunk
- 209 Duncan Rd Booster Pump
- 210 Thornlands
- 250 Heinemann Rd to Alexandra Hills Trunk
- 301 Howletts Rd
- 308 Alexandra Hills HLZ
- Dialysis Patient

0 250500 1,000 1,500 2,000 2,500 Meters

FIGURE 21.4(a)
W004 Alexandra Hills LLZ
Existing System with 2036 PH Demands (No Capalaba BPs)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlanMaster Plan Report\Drawings\Fig21_4(a)_W004_2036PH_0CB.mxd
Rev0 14 June 2016



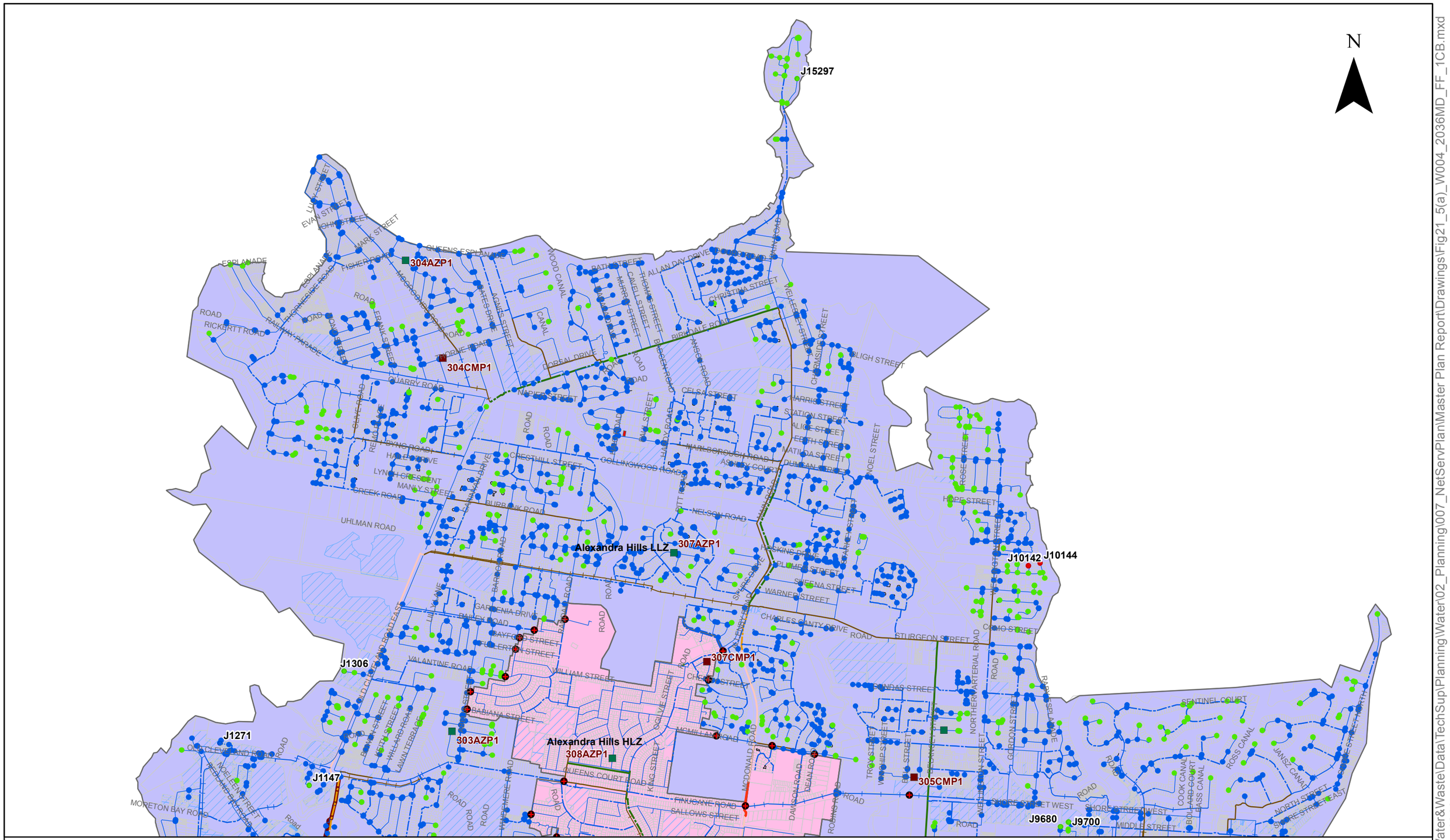
Legend

AZP Logger	**Residual Pressure (m)**	**Headloss (m/1000)**	2 -5	**DMA Boundary**	204 Bunker Rd South	210 Thornlands	308 Alexandra Hills HLZ
CMP Logger	<22	<1	5 - 10	W004 Alexandra Hills LLZ	208 Mt Cotton Trunk	250 Heinemann Rd to Alexandra Hills Trunk	Dialysis Patient
DMA Boundary Valve	22-60	1 - 2	>10	201 Heinemann Rd	209 Duncan Rd Booster Pump	301 Howletts Rd	
	>60						

0 250500 1,000 1,500 2,000 2,500 Meters

FIGURE 21.4(b)
W004 Alexandra Hills LLZ
Existing System with 2036 PH Demands (No Capalaba BPs)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig21_4(b)_W004_2036PH_0CB.mxd
Rev0 14 June 2016



Legend

- AZP Logger
- CMP Logger
- DMA Boundary Valve

Available FF (L/s)

- < 15
- 15 - 30
- > 30

Diameter

63, 80, 100, 150, 200, 225, 250, 300, 350, 375, 450, 500, 525, 600, 675, 691, 750, 900

DMA Boundary

- W004 Alexandra Hills LLZ
- 201 Heinemann Rd
- 204 Bunker Rd South
- 208 Mt Cotton Trunk
- 209 Duncan Rd Booster Pump
- 210 Thornlands
- 250 Heinemann Rd to Alexandra Hills Trunk
- 301 Howletts Rd
- 308 Alexandra Hills HLZ
- Fire Flow (30L/s)
- Dialysis Patient

0 250500 1,000 1,500 2,000 2,500 Meters

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlanMaster Plan Report\Drawings\Fig21_5(a)_W004_2036MD_FF_1CB.mxd
Rev0 14 June 2016

FIGURE 21.5(a)
W004 Alexandra Hills LLZ
Existing System 2036 FF Demands (1 Capalaba BP)

N

J1306
J1271
J1147
J617
307CMP1
308AZP1
303CMP1
Alexandra Hills HLZ
Alexandra Hills LLZ
305CMP1
J9680
J9548
306AZP1
J13190
J13183
J13179
308CMP1
306CMP1
309
Howletts Rd
302AZP1
301AZP1
Alexandra Hills LLZ
302CMP2
J2201
Duncan Rd Booster Pump
Mt Cotton Trunk
Thornlands
210AZP1
210CMP1
204AZP3
Bunker Rd South
Heinemann Rd to Alexandra Hills Trunk

Legend

- AZP Logger
- CMP Logger
- DMA Boundary Valve

Available FF (L/s)
- < 15
- 15 - 30
- > 30

Diameter
63, 80, 100, 150, 200, 225, 250, 300, 350, 375, 450, 500, 525, 600, 675, 691, 750, 900

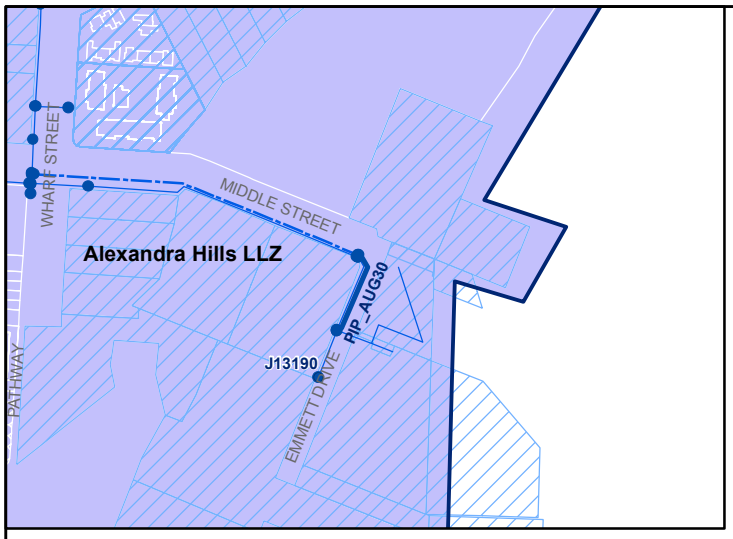
- Fire Flow (30L/s)
- Dialysis Patient

DMA Boundary
- W004 Alexandra Hills LLZ
- 201 Heinemann Rd
- 204 Bunker Rd South
- 208 Mt Cotton Trunk
- 209 Duncan Rd Booster Pump
- 210 Thornlands
- 250 Heinemann Rd to Alexandra Hills Trunk
- 301 Howletts Rd
- 308 Alexandra Hills HLZ

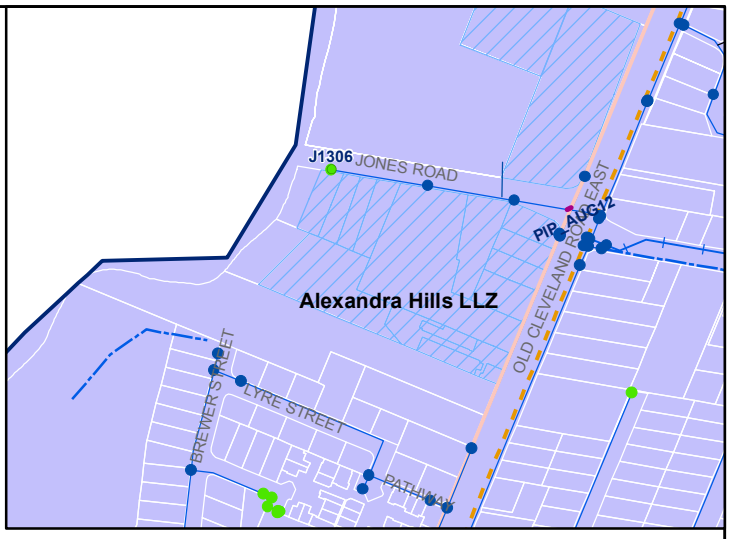
0 250500 1,000 1,500 2,000 2,500
Meters

FIGURE 21.5(b)
W004 Alexandra Hills LLZ
Existing System 2036 FF Demands (1 Capalaba BP)

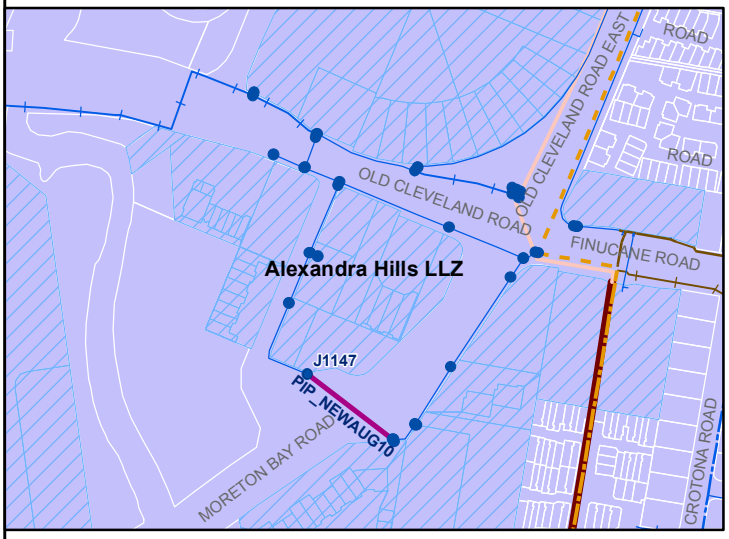
G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlanMaster Plan Report\Drawings\Fig21_5(b)_W004_2036MD_FF_1CB.mxd
Rev0 14 June 2016



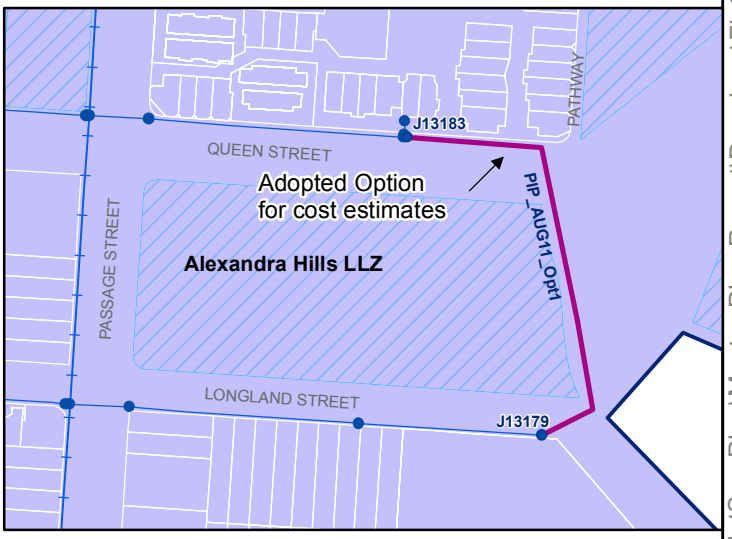
Ferry Terminal - Emmett Drive Cleveland



Jones Road - Capalaba



Dan Street - Capalaba



Longland and Queen Streets - Cleveland



Haggup and Middle Streets - Cleveland



Clearwater Street - Ormiston

Legend

Available FF (L/s)
- < 15
- 15 - 30
- > 30

Proposed Augmentations
- 2031
- 2026
- 2016

Diameter
63, 80, 100, 150, 200, 225, 250, 300, 350, 375, 450, 500, 525, 600, 675, 691, 750, 900

Fire Flow 30 L/s

DMA Boundary
- Mt Cotton Trunk
- Thornlands
- W004 Alexandra Hills LLZ
- 301 Howletts Rd
- 308 Alexandra Hills HLZ

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig21_6_W004_2036MD_FF_1CB_wAUG.mxd
Rev0 17 June 2016

FIGURE 21.6
W004 Alexandra Hills DMA
2036 FF Results with Augmentations (1 CBP)

22. 308 Alexandra Hills High Level Zone

22.1 DMA Topography and Land Use

The Alexandra Hills HLZ is in the middle of the Alexandra Hills Low Level Zone and located around the top of the zone near the reservoirs. It covers about 550 ha with elevations ranging from about 14 to 63 m.

The topography of the Alexandra Hills High Level Zone is shown on Figure 22-1.

As shown on Figure 22-2 the area is predominantly Low Density and Low-medium Density Residential with some Medium Density Residential and commercial and special use areas including the District Centre of Alexandra Hills.

22.2 Previous Planning

The Alexandra Hills HLZ has had minimal changes as a result of the PLMP. Planning work undertaken as part of the PLMP did not look at this area in any detail.

Planning undertaken for the PIP / ICS was based on the original configuration and has resulted in the zone being extended slightly to address some pressure issues in some of the higher areas which were previously in the LLZ.

22.3 Current System Configuration and Source of Supply

There is an elevated tower at the Alexandra Hills Reservoir complex which is supplied from the low level zone via three booster pumps. The high level reservoir has a bottom water level of about 86.7 m and supplies the high level zone. This infrastructure is owned and operated by Seqwater.

See Section 21.3 for the source of water that supplies the HLZ. In addition, water can be provided directly into the Alexandra Hills HLZ via the Mount Cotton HLZ mains.

22.4 Existing System Performance at Ultimate Demands

This scenario has been run with a reservoir level of 5.6 m. This has been adopted because previous studies have identified this as the minimum operating level. The worst case scenario with the booster pump off has also been adopted.

22.4.1 Peak Hour

At PH the inflow into the DMA is 106.1 L/s.

All areas meet the DSS of 22 m with a minimum pressure of 29.9 m at J5077 on Hilltop Crescent. 308CMP has a pressure of 29 m and is located adjacent to J5077. This means there are no restrictions on the operational level of the reservoir to meet the DSS of 22 m.

The peak hour results are shown on Figure 22-3.

22.4.2 MD Minimum Hour

The highest pressure in the DMA is 78.3 m at J5450 which is located at the corner of Finucane and Robins Roads. While this is well above the DSS of 60 m, it is located near a conservation area.

The highest pressure where there is a service is at J5533, on the corner of Dawson and McMillan Roads, with a pressure of 71.7 m. The DMA has been sized to provide suitable pressures to the high level areas in Alexandra Hills and to remove this area would most likely result in pressures below the DSS in adjacent areas. It is therefore proposed to monitor the high pressure areas and if issues arise determine and implement the most appropriate solution.

22.4.3 Fire Flow

2/3 PH flow is 70.7L/s. At 12:00 midday the flow is 70.7L/s so midday has been adopted for the fire flow analysis.

With a fire flow of 30L/s a single booster pump is still able to keep the reservoir levels within the booster pump start and stop limits of 5.6 to 6.7 m because the booster pump has a capacity of around 145L/s.

A level of 5.6m has therefore been adopted for the Fire Flow Analysis. The operation of the booster pump does not significantly impact on results, however a conservative approach has been taken so the analysis has been done without any booster pumps on.

The fire flow results are shown on Figure 22-4 all areas meet the DSS for fire flow except for a small number of dead areas as included in Table 22.1.

Table 22.1 - DMA308 2036 FF Results

Junction	Fire Flow (L/s)	Location	Required FF (L/s)
J2621	12.8	End of Ravensworth Place Note: The nearest hydrant (J2632) is in the Alexandra Hills LLZ and has an available fire flow of 53L/s. The requirement of 15L/s from two hydrants is therefore met so this is considered acceptable.	15
J5228	14.3	End of Andrew Court Note: The adjacent hydrant (J5253) has an available fire flow of 18.1 L/s. The requirement of 15L/s from two hydrants is therefore met so this is considered acceptable.	15
J1797	16.3	End of Babiana St St Anthony's Catholic Primary School is located near this street. The off-take for the school is near junction J1805, which has an available FF of 33.4L/s. While J1797 only receives 16L/s, there are only sports ovals near this junction so a flow of 30L/s has not been adopted as a FF DSS requirement at this point. All other areas meet the DSS of 30L/s.	30
238	28.1	Allenby Road A Retirement Village is located along Allenby Road (actual address 16 Balmoral Street). The two hydrants to the west (J5930 and 237) have an available FF of 31.6 L/s and 29.9 L/s respectively, so the requirement of 30L/s from 3 hydrants is met. H11 (the hydrant to the East) also has an available FF of 29.7 L/s (30L/s with the 1 Booster Pump operational). This is considered satisfactory so no augmentations are proposed.	30
J5512	16.6	Sandringham Street - From FF Report There is a retirement Village located off Sandringham Street (J5512) and Buckingham Street (J5556). J5556 off Buckingham St has an available FF of 31.3L/s. The requirement of 30L/s from up to three hydrants is therefore met, so an augmentation is not considered necessary.	30
J5312	25.8	Joe Wood Court - From FF Report The Nandeebie Centre of Care (retirement village) has its water supply off-take from J5312. The two adjacent hydrants both have a fire flow above 30L/s so the FF DSS of 30L/s from 3 hydrants is met.	30

22.4.4 Water Quality

The water age analysis conducted as part of the DWQMP shows that the water age in the high level zone is relatively high, being around 5 to 12 days. This is because it mainly receives water from the Alexandra Hills Reservoirs.

Opportunities to improve water quality outcomes are fairly limited in terms of infrastructure based solutions. The Alexandra Hills Reservoirs and the High Level Reservoir are owned and operated by Seqwater, so the issue needs to be addressed in conjunction with Seqwater, and the outcomes of the regional secondary disinfection optimisation project.

Continued system quality monitoring and proactive maintenance procedures like regular flushing dead ends will continue to be critical to maintaining good water quality in the western areas. The water quality should also improve as the area continues to develop and detention times in the Alexandra Hills low level reservoirs reduce.

22.5 Proposed Augmentations

There are no augmentations proposed.



FIGURE 22.1
308 Alexandra Hills LLZ Topography

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig_22_1_308_Topography.mxd
Rev0 14 June 2016

N

Legend

- Alexandra Hills HLZ
- Alexandra Hills LLZ
- Existing DMA Boundaries

Residential Zones
- Low Density Residential
- Low-medium Density Residential
- Medium Density Residential

Centre Zones
- District Centre
- Neighbourhood Centre

Recreation Zones
- Recreation and Open Space

Environmental Zones
- Environmental Management

- Conservation

Industry Zones
- Medium Impact Industry

Other Zones
- Community Facilities
- Rural

0 100200 400 600 800 1,000
Meters

FIGURE 22.2
308 Alexandra Hills HLZ Planning Scheme

G:\RedlandWater&Waste\Data\TechSup\PlanningWater\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig22_2_308_Planning_Scheme.mxd
Rev0 14 June 2016

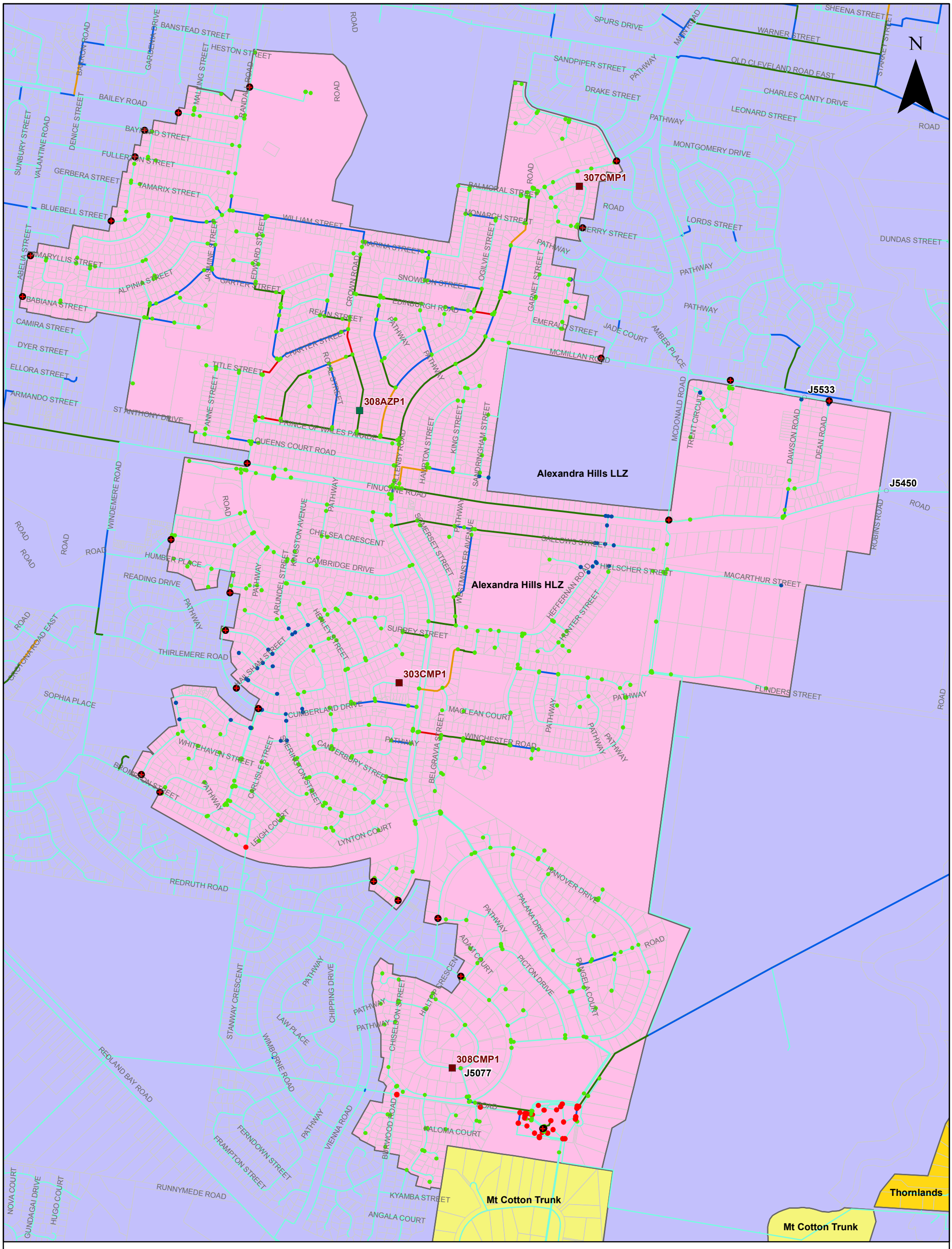


FIGURE 22.3
308 Alexandra Hills HLZ
Existing System with 2036 PH Demands (No BP)

Alexandra Hills LLZ
Alexandra Hills HLZ
238
307CMP1
J1797
308AZP1
J5512
J5312
303CMP1
J5228
J2621
308CMP1
Mt Cotton Trunk
Thornlands
Mt Cotton Trunk
N
WELDON STREET
BANSTEAD STREET
GARDENIA DRIVE
BAILEY ROAD
BAYFORD STREET
FULLERTON STREET
GERBERA STREET
AMARIX STREET
BLUEBELL STREET
WILLIAM STREET
MARINA STREET
SNOWDON STREET
EDINBURGH ROAD
REIGN STREET
CHARTER STREET
TITLE STREET
QUEENS COURT ROAD
PRINCE OF WALES PARADE
FINUCANE ROAD
WARNER STREET
OLD CLEVELAND ROAD EAST
CHARLES CANTY DRIVE
LEONARD STREET
MONTGOMERY DRIVE
PALMORAL STREET
MONARCH STREET
LORDS STREET
PERRY STREET
SANDPIPER STREET
DRAKE STREET
PATHWAY
ROAD
JADE COURT
AMBER PLACE
MCMILLAN ROAD
EMERALD STREET
GARNET STREET
OGILVIE STREET
CROWN ROAD
EDWARD STREET
JASMINE STREET
GARTER STREET
ALPINIA STREET
AMARYLLIS STREET
BABIANA STREET
CAMIRA STREET
DYER STREET
ELLORA STREET
ARMANDO STREET
ST ANTHONY DRIVE
ANNE STREET
ROYAL STREET
KING STREET
SANDRINGHAM STREET
HAMPTON STREET
MCDONALD ROAD
TRENT CIRCUIT
DAWSON ROAD
DEAN ROAD
ROBINS ROAD
STARKEY STREET
WINDEMERE ROAD
CROTONIA ROAD EAST
SOPHIA PLACE
GLOVER DRIVE
REDLAND BAY ROAD
RUNNYMEDE ROAD
HUMBER PLACE
READING DRIVE
THIRLEMERE ROAD
CUMBERLAND DRIVE
WHITEHAVEN STREET
BROMFORD STREET
CARLISLE STREET
LEIGH COURT
LYNTON COURT
CHELSEA CRESCENT
CAMBRIDGE DRIVE
ARUNDEL STREET
KINGSTON AVENUE
SURREY STREET
SOMERSET STREET
WESTMINSTER AVENUE
SALLOWS STREET
HEFFERNAN ROAD
HEALSCHER STREET
MACARTHUR STREET
FLINDERS STREET
HEWETT STREET
ASHLEY STREET
CANTERBURY STREET
WINCHESTER ROAD
MACLEAN COURT
BELGRAVIA STREET
HANOVER DRIVE
PICTON DRIVE
PALAWA DRIVE
ADAM COURT
CHISELDON STREET
BURWOOD ROAD
KYAMBA STREET
ANGALA COURT
PALOMA COURT
STANWAY CRESCENT
CHIPPING DRIVE
VIENNA ROAD
WIMBORNE ROAD
FERNDOWN STREET
FRAMPTON STREET
LAIN PLACE
NOVA COURT
HUGO COURT
Legend
AZP Logger
CMP Logger
DMA Boundary Valve
Available FF (L/s)
< 15
15 - 30
> 30
Diameter
63
80
100
150
200
225
250
300
350
375
450
500
525
600
675
691
750
900
DMA Boundary
W004 Alexandra Hills LLZ
201 Heinemann Rd
204 Bunker Rd South
208 Mt Cotton Trunk
209 Duncan Rd Booster Pump
210 Thornlands
250 Heinemann Rd to Alexandra Hills Trunk
301 Howletts Rd
308 Alexandra Hills HLZ
Fire Flow (30L/s)
0 100200 400 600 800 1,000
Meters
FIGURE 22.4
308 Alexandra Hills HLZ
Existing System 2036 FF Results (No BP)
G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig22_4_308_2036MD_FF.mxd
Rev0 14 June 2016

23. 401 Amity Point

23.1 DMA Topography and Land Use

The majority of township covers a relatively level area fronting the Amity Point western shoreline with a smaller separate portion along the eastern shoreline at Flinders Beach.

The levels in the township range from 0 to 19 m. The topography is shown on Figure 23-1.

As shown on Figure 23-2 Amity Point is predominantly Low Density Residential.

23.2 Previous Planning

Amity Point has had minimal changes as a result of the PLMP. Planning work undertaken as part of the PLMP did not look at this area in any detail.

Planning undertaken for the PIP / ICS was based on the original configuration and no augmentations were identified. The most recent planning studies have found that the modelling results did not calibrate very well with the actual system monitoring results. To address this, the model has been run with a friction factor of 150. This will need to be monitored regularly to confirm that the results are reflective of the system.

23.3 Current System Configuration and Source of Supply

The township is supplied from bores and a water treatment plant which has a clear water storage that pumps the water to a high elevation (~71m AHD TWL) ground level reservoir. Seqwater owns and operates the WTP infrastructure and booster pump, while Redland Water owns and operates the high level reservoir.

23.4 Existing System Performance at Ultimate Demands

23.4.1 Peak Hour

At 9:00 am the flow into the system is 18.5L/s.

Adopting an operating level of 3.1 m and without the booster pump operating, the minimum pressure is at the end of Sovereign Road (J16570), which has a pressure of 43.9 m.

The Peak Hour results are shown on Figure 23-3.

23.4.2 MD Minimum Hour

The highest pressure in the township is 69.4 m at J16634 which is located at the southern end of Claytons Road. While this is above the DSS of 60 m, it is located on the trunk main in an area with only a few services. The highest pressure where there is a service is at J16547, on the corner of Kawana and Birch Streets, with a pressure of 66.2 m. As this is relatively close to the DSS it is recommended that this is monitored and if necessary investigate and implement an appropriate solution.

23.4.3 Fire Flow

The 2/3 PH flow is 12.3 L/s. The closest flow to this is at 06:30 with a flow of 12.8 L/s. 06:30 has therefore been adopted for the analysis.

As shown on Figure 23-4, there are several areas that don't meet the DSS for fire flow.

23.4.4 Water Quality

The water age analysis conducted as part of the DWQMP shows that the water age in the zone is relatively high, being around 15 days. This appears to be because of the detention time in the reservoir. Seqwater have commenced studies into the chlorine detention time which have potential to change how the WTP delivery to the reservoir and in reservoir detention time is managed.

Opportunities to improve water quality outcomes are fairly limited in terms of infrastructure based solutions.

Continued system quality monitoring and proactive maintenance procedures like regular flushing dead ends will continue to be critical to maintaining good water quality in the town.

23.5 Proposed Augmentations

23.5.1 Peak Hour

No augmentations are needed to provide the DSS for peak hour.

23.5.2 Fire Flow

To achieve the DSS for fire flow the 150mm main along Claytons Road needs to be augmented with a 200mm main. It is recommended that a detailed planning study be undertaken into the performance of the Amity Point zone with respect to friction factor calibration of the model and fire flow demands to confirm the need for this augmentation,

The results are shown on Figure 23-5. The figure shows that with the above augmentations all areas meet the DSS for fire flow except for near the hall located at 16 Ballow Street.

The fire hydrants adjacent to the hall are all on 100mm mains or further up the system so they are also unable to provide 30L/s Fire Flow. However 30L/s is available on the 150mm main at the corner of Gonzales and Ballow Streets. It is therefore recommended that an additional hydrant is installed in this location.

Table 23.1 - DMA401 2036 Fire Flow Augmentations

Proposed Augmentations	Location	Length (m)	Dia (mm)
PIP_NEWAUG14_P1	Augmentation of the existing trunk along Claytons Road	1100	200
PIP_NEWAUG14_P2	Augmentation of the existing trunk along Claytons Road	718	200
Hydrant Installed near J16552	Corner of Gonzales and Ballow Streets	-	-

23.6 Augmentation Timing

23.6.1 Existing System at 2016 Demands

Without any augmentations the DSS for fire flow is unable to be met in the critical areas.

With PIP_NEWAUG14_P1, the commercial fire flow requirements cannot be met so both augmentations are needed in 2016.



Legend

AZP Logger
CMP Logger
Russell Island East
Existing DMA Boundaries
5m Contours

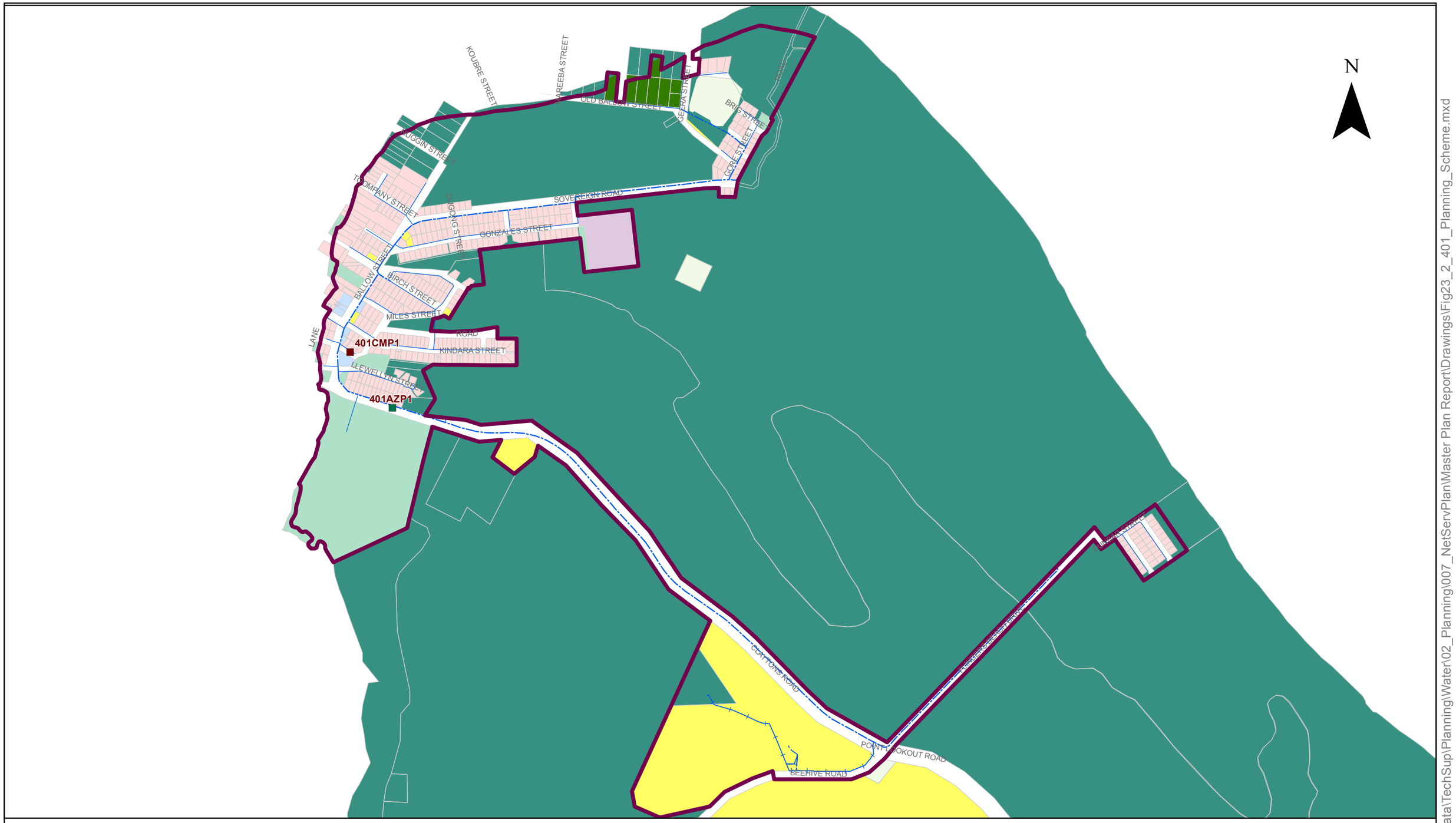
Diameter

63 80 100 150 200 225 250 300 375 450 500 525 600 675 691 750 900

0 125 250 500 750 1,000 1,250
Meters

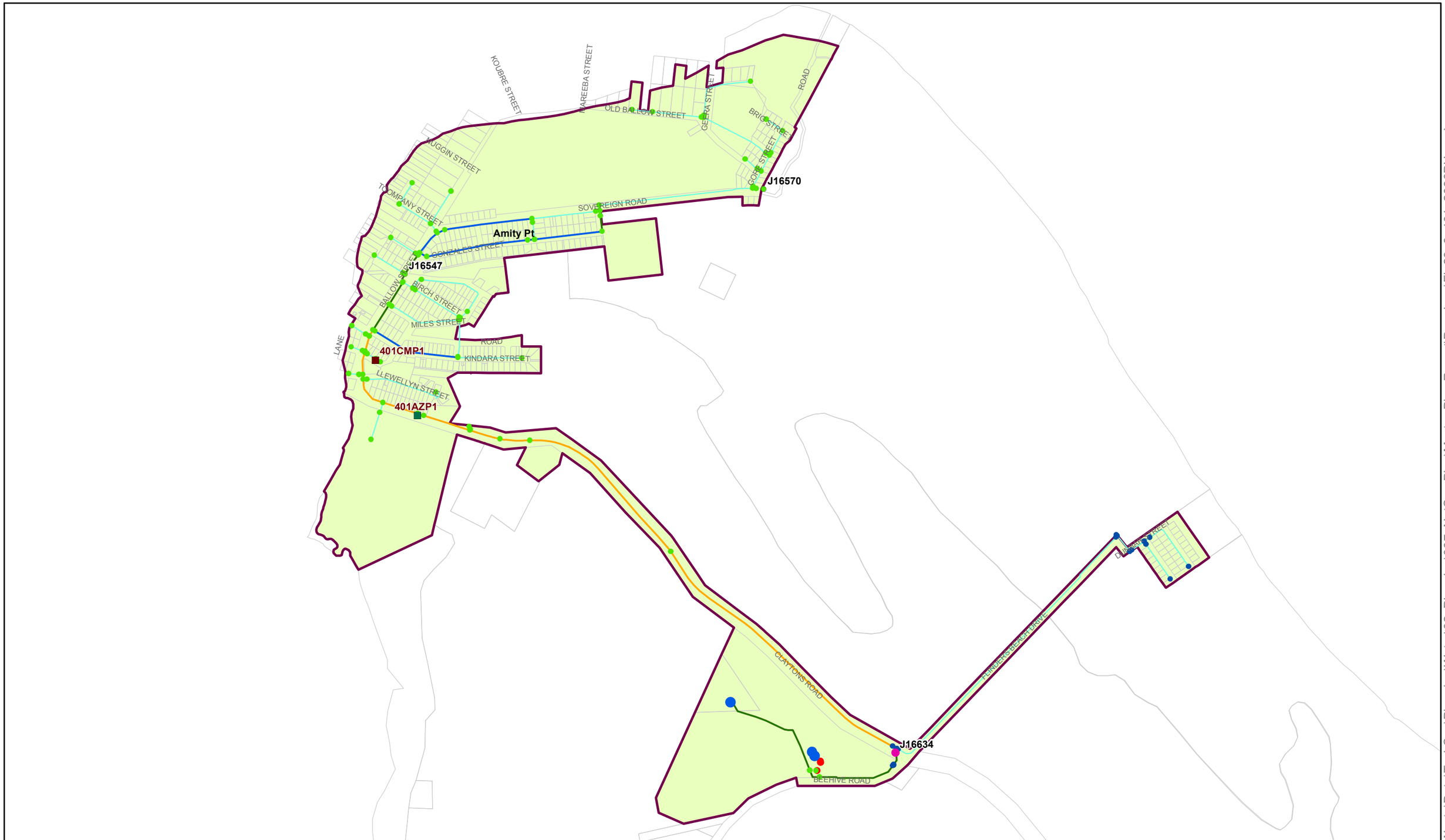
FIGURE 23.1
401 Amity Point Topography

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlanMaster Plan Report\Drawings\Fig23_1_401_Topography.mxd
Rev 0 17 June 2016



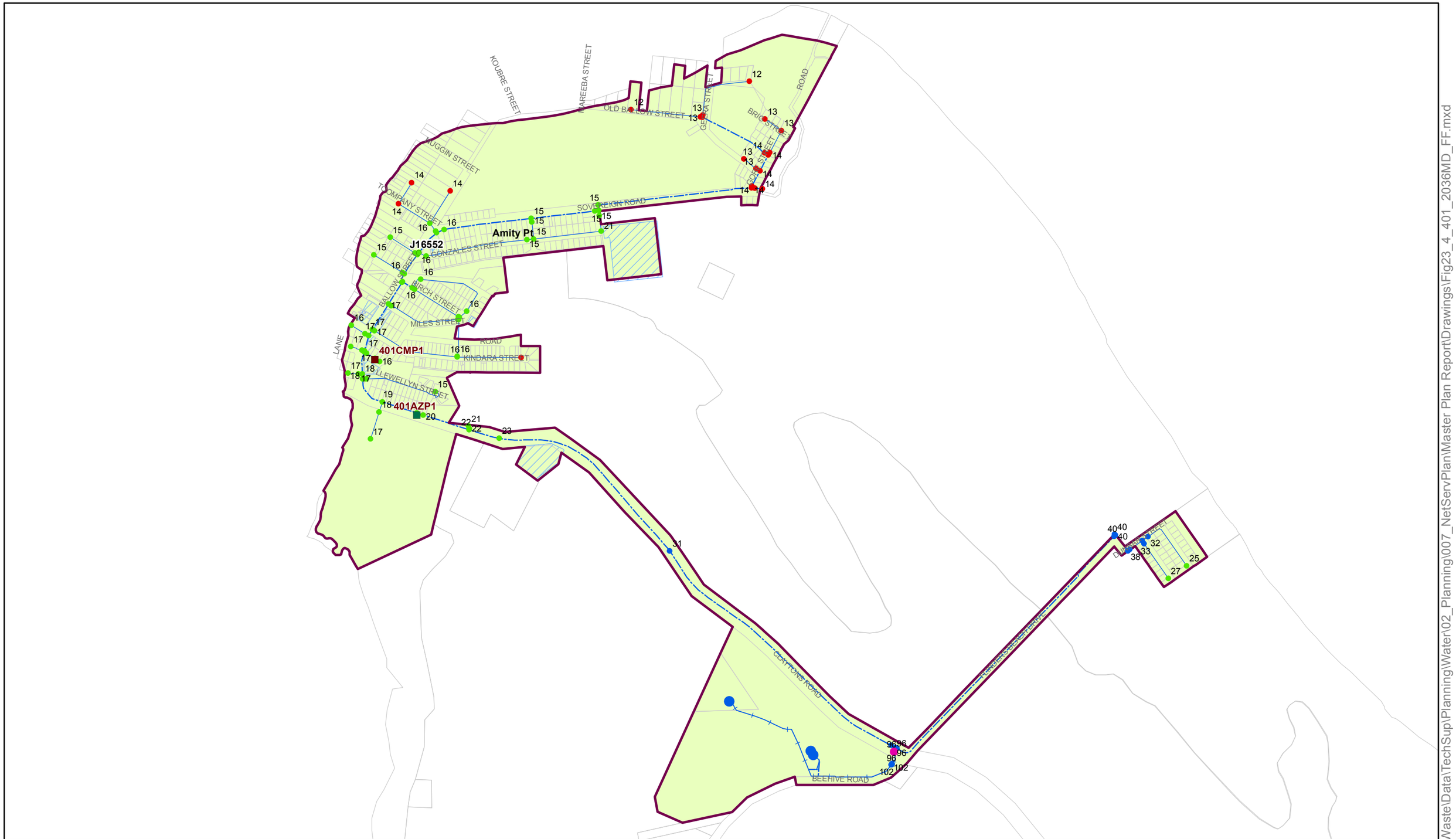
G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig23_2_401_Planning_Scheme.mxd
Rev 0 17 June 2016

FIGURE 23.2
401 Amity Point Planning Scheme



G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig23_3_401_2036PH.mxd
Rev0 17 June 2016

FIGURE 23.3
401 Amity Point
Existing System with 2036 PH Demands



G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig23_4_401_2036MD_FF.mxd
Rev0 17 June 2016

FIGURE 23.4
401 Amity Point
Existing System 2036 FF Results

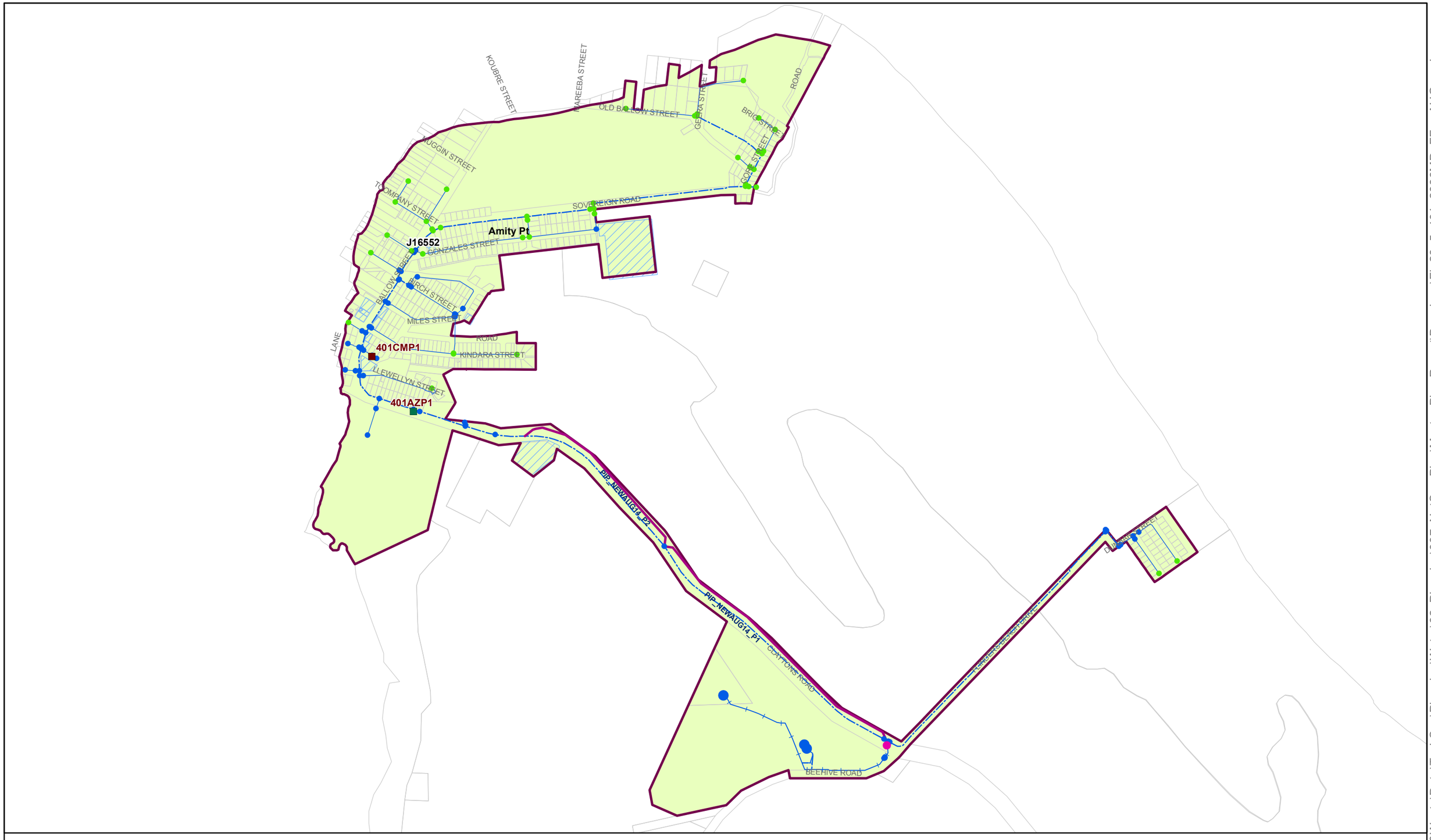


FIGURE 23.5
401 Amity Point
Existing System 2036 FF Results with Augmentations

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig23_5_401_2036MD_FF_wAUG.mxd
Rev0 17 June 2016

24. 402 Dunwich

24.1 DMA Topography and Land Use

The majority of the Dunwich Township covers a relatively level area fronting the shoreline and has elevations ranging from about 4.5 m to 46m. This area is supplied from the Rainbow Crescent reservoir.

A smaller portion of the township is elevated and supplied from the Illawong Crescent Reservoir. The elevations supplied by this reservoir range from about to 43 to 120 m. The topography of the Township is shown on Figure 24-1.

As shown on Figure 24-2 Dunwich is made up of Low Density Residential, Low-medium Density, Local Centre, Marine Activity, Low Impact Industry and Community Facilities zones.

24.2 Previous Planning

The earlier PIP/IC studies identified a number of properties in the high areas supplied from the Tazi Reservoir did not receive the minimum standard of service of 22m pressure. The report recommended that the Tazi Reservoir and Illawong Crescent Reservoir zones be combined to form a single water supply zone off the Illawong Crescent reservoir. It also recommended that a new rising main be constructed from the Rainbow Crescent pump station to the new Illawong reservoir.

This recommendation has now been adopted and the required infrastructure put in place.

24.3 Current System Configuration and Source of Supply

The township is supplied from bores and a water treatment plant which has a clear water storage that pumps the water to the Rainbow Crescent Reservoir. There is a separate high level zone (DMA402A) which is serviced by the Illawong Crescent Reservoir. This zone extends to some low lying areas along Rainbow Crescent so there is a PRV located near the old Tazi Reservoir to reduce pressures in the area (DMA402B).

Seqwater owns and operates the WTP infrastructure and Redland Water owns and operates the remaining infrastructure.

24.4 Existing System Performance at Ultimate Demands

Previous planning has identified the following minimum operating levels.

- Rainbow Crescent Reservoir - 1.25 m (0.5ML minimum storage)
- Illawong Crescent Elevated Storage - 8.8 m (start level of the duty pump)

These have been adopted for this report.

24.4.1 Peak Hour

At peak hour (9:00 am) the system has the following inflow:

- DMA402 - 27.9 L/s
- DMA402A - 1.4 L/s
- DMA402B - 1.7 L/s

As shown on Figure 24-3, without any booster pumps operating all areas meet the DSS of 22m except for:-

- Near the WTP where there are no properties which need a minimum pressure of 22 m.
- At Rainbow Crescent Reservoir
- Illawong Crescent, where the CMP2 has a pressure of 20.0m.

The Illawong Crescent properties have always had lower pressures due to their location near the reservoir, and as a result properties may have local booster pumps installed. When the new reservoir at Illawong Crescent was planned, it was determined that a slightly (2m) lower PH pressure was acceptable with the improved fire flow coverage from the new reservoir.

24.4.2 MD Minimum Hour

At midnight, the maximum pressure where there is a service connection is 88.8 m at the end of Rainbow Crescent. The minimum pressure at this time is 43.7 m near the PRV. To reduce the pressures in this area while still providing suitable Fire Flow the PRV would need to be modulated. It is therefore proposed that the pressures are monitored and if necessary investigate and implement an appropriate solution.

The maximum pressure in the DMA402 is 61.1 m. This is just above the DSS of 60m.

The maximum pressures in DMA402A are similar to the minimum pressures and are around 20 to 21 m.

24.4.3 Fire Flow

The 2/3 PH demands are as follows:

- DMA402 - 18.6 L/s. 19:00 has been adopted because the inflow is 18.8 L/s at this time.
- DMA402A and 402B - 1.1 and 0.9 L/s. 07:30 has been adopted because the inflows are 1.1 and 0.9 L/s respectively at this time.

The fire flow results when the model is run with no booster pumps are shown on Figure 24-4. Most areas easily meet the DSS for fire flow, those that don't are included in Table 24.1.

Table 24.1 - DMA402 2036 FF Results

Junction	Fire Flow (L/s)	Location	Required FF (L/s)
J15906	26.1	DMA402 - Yabby Street There is no hydrant at J15906, the closest hydrant is at H59387 which has an available FF of 32.1 L/s.	30
H59440 H59441	28.6 28.0	DMA402 - Junner Street H58439 has an available FF of 29.9 L/s, so between the three hydrants along the road the fire flow requirement is met, as a result no augmentations are proposed.	30
Rainbow Crescent (DMA402A)			
335	13.0	There is no hydrant at this location. The closest hydrant is H59336.	15
H59336	13.0	H59336 is adjacent to the Tazi PRV Zone. The hydrant in this zone has an available FF of over 20L/s so this is considered acceptable.	15
H59335	13.4	The adjacent hydrants don't meet the available FF requirements, however if one Illawong Crescent booster pump is operational the available flow at H59335 is 15.3L/s.	15
J16179	13.8	J16179 has a hydrant H403445 (J15949) in DMA402B which is 110 m away that has available FF of over 20L/s. H59333 also has an available flow of 15.4 L/s when one Illawong Crescent booster pump is operational.	15
Illawong Crescent (DMA402A)			
Trunk Main from 402CMP2 to Tazi Res	-	This line is a trunk main without any service connections so 15L/s FF does not need to be provided along this main.	-

H59335 and J16179 are unable to provide sufficient fire flow if there are no booster pumps operating, however with one Illawong Crescent booster pump operational the DSS for fire flow can be met. It is therefore recommended that the local fire brigade is informed of this restriction so arrangements can be made with RW to start the booster pump in the event of a fire.

24.4.4 Water Quality

The water age analysis conducted as part of the DWQMP shows that the water age in the low level zone is up to 12 days old and in the high level zones 17 days old. This does not appear to be because of the detention time in the reservoir as not all the town has high water age.

Opportunities to improve water quality outcomes are fairly limited in terms of infrastructure based solutions (e.g. elimination of dead ends). Continued system quality monitoring and proactive maintenance procedures like regular flushing dead ends will continue to be critical to maintaining good water quality in the town.

24.5 Proposed Augmentations

There are no augmentations proposed for Dunwich.

N

402CMP2

402CMP3

402AZP1

402CMP1

Legend

AZP Logger
CMP Logger
Alexandra Hills HLZ
Alexandra Hills LLZ
Existing DMA Boundaries
5m Contours

Diameter

63 80 100 150 200 225 250 300 350 375 450 500 525 600 675 691 750 900

0 100 200 400 600 800 1,000
Meters

FIGURE 24.1
402 Dunwich Topography

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig_22_1_308_Topography.mxd
Rev0 14 June 2016

N

Legend

Existing DMA Boundaries

Residential Zones
- Low Density Residential
- Low-medium Density Residential
- Medium Density Residential

Centre Zones
- Local Centre
- Neighbourhood Centre

Recreation Zones
- Recreation and Open Space

Environmental Zones
- Conservation

Industry Zones
- Low Impact Industry
- Medium Impact Industry
- Waterfront and Marine Industry

Other Zones
- Community Facilities
- Emerging Communities
- Rural

0 100 200 400 600 800 1,000 Meters

FIGURE 24.2
402 Dunwich Planning Scheme

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig22_2_308_Planning_Scheme.mxd
Rev0 14 June 2016

N

EAST COAST ROAD

RAINBOW CR RES

ILLAWONG CRES RES

402CMP2

Tazi PRV Zone

J15906

Dunwich

J15949

ROAD

J16179

402CMP3

H59335

Illawong Crescent HLZ

H59336

TAZI RES

335

402AZP1

FLINDERS AVENUE

ESPLANADE

PETRIE STREET

BANKSIA STREET

FRASER STREET

OXLEY PARADE

BINGLE ROAD

SHEPHERD LANE

WELSBY STREET

MITCHELL CRESCENT

STURT STREET

FINNEGAN STREET

PARSONS STREET

ROUS STREET

JACK LANE

PATHWAY

MERMAID STREET

MALLON STREET

JUNNER STREET

BARTON STREET

BAYLIS STREET

LOGAN CRESCENT

ROAD

H59440

H59441

Tazi PRV Zone

TRANS ISLAND ROAD

BALLOW ROAD

DUNWICH CWT

DUNWICH WTP

ROAD

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig24_3_402_2036PH.mxd
Rev0 16 June 2016

Legend

Residual Pressure (m)
- <22
- 22-60
- >60

AZP Logger
CMP Logger
mw_Tank
DMA Boundary Valve

Headloss (m/1000)
- <1
- 1 - 2
- 2 -5
- 5 - 10
- >10

DMA Boundary
- 402 Dunwich
- 402A Illawong Crescent HLZ
- 402B Tazi PRV Zone

0 100 200 400 600 800 1,000 Meters

FIGURE 24.3
402 Dunwich
Existing System with 2036 PH Demands (no Booster Pumps)

N

EAST COAST ROAD

RAINBOW CR RES

ILLAWONG CRES RES

402CMP2

Tazi PRV Zone

J15906

Dunwich

J15949

ROAD

J16179

402CMP3

H59335

Illawong Crescent HLZ

H59336

TAZI RES

335

402AZP1

ESPLANADE

FLINDERS AVENUE

PETRIE STREET

FRASER STREET

BANKSIA STREET

OXLEY PARADE

BINGLE ROAD

SHEPHERD LANE

WELSBY STREET

MITCHELL CRESCENT

STOUT STREET

FINNEGAN STREET

PARSONS STREET

CUNNINGHAM STREET

JACK LANE

PATHWAY

MERCHANT STREET

MALLON STREET

JUNNER STREET

BARTON STREET

LOGAN CRESCENT

ROAD

H59440

H59441

Tazi PRV Zone

BALLOW ROAD

DUNWICH CWT

DUNWICH WTP

TRANS ISLAND ROAD

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig24_4_402_2036PH.mxd
Rev0 16 June 2016

Legend

Available FF (L/s)		AZP Logger	mw_Tank
	< 15	CMP Logger	DMA Boundary Valve
	15 - 30		PRV and Meter Site
	> 30		

Available FF (L/s)	
	< 15
	15 - 30
	> 30

Diameter					
63	150	300	500	675	Water Supply Zones
80	200	350	525	691	DMA Boundary
100	225	375	550	750	402 Dunwich
250	450	600	900		402A Illawong Crescent HLZ
					402B Tazi PRV Zone
					Fire Flow (30L/s)

0 100 200 400 600 800 1,000
Meters

FIGURE 24.4
401 Dunwich
Existing System 2036 FF Results (no Booster Pumps)

25. 403 Point Lookout

When completing a city-wide study some of the individual characteristics of an area can be lost. There is potential for this in Point Lookout with its major tourist influence on peak day demands. Any augmentations identified in this report need to be assessed in detail relative to the actual demand being experienced in the water supply scheme.

25.1 DMA Topography and Land Use

The Point Lookout water supply scheme covers about 176 ha and consists of a range of elevations from 85m AHD in the Tramican Street high level zone to 5 m AHD along the coast line.

The topography of the Point Lookout DMA's is shown on Figure 25-1.

As shown on Figure 25-2, the area is predominantly residential (Low Density Residential) with a high tourist demand (Tourist Accommodation zones). There are some large areas allocated as Emerging Communities on land owned by the state government. It is unknown when these areas will be developed or if in fact they will be developed in the locations currently nominated, but if they are developed, then a separate water supply study will be required to ensure adequate water supply to the areas. This report has considered the augmentations required to service growth on the existing network by connecting demand from these areas to the nearest node on the existing network.

Previous advice from RCC planning officers has that the maximum building height in Point Lookout is 3 storeys, so commercial fire flow (30L/s) will only be required in Commercial/Industrial areas.

25.2 Previous Planning

The Point Lookout DMA's were not changed as a result of the PLMP. Planning undertaken for the PIP / ICS was based on the current configuration for this area and included an augmentation along Bigoon Road in the Booran Street zone.

25.3 Current System Configuration and Source of Supply

Point Lookout water supply is independent of the mainland. All the supply is from ground water bores and a local water treatment plant which is located on the western side of the township. There are three booster pumps which are used to supply the town from the water treatment plant.

There are three water supply zones within the township as follows:

- The low level zone (DMA403) is supplied from the Lighthouse Hill Reservoir which is fed from the Water Treatment Plant Booster Pumps.
- The Booran St booster zone (DMA403A) is supplied by the Booran Street Boosters which have been set so one pump keeps the pressure at 93m at outlet. Should the pressure drop to 83m the 2nd one operates, it will run until 90m is reached and then run on for a set time.
- The Tramican Street High Level Zone (DMA403B) has its own reservoir (Donahue St Reservoir) that is supplied from the low level zone via a direct on line booster pump.

25.4 Existing System Performance at Ultimate Demands

The following minimum operating levels have been adopted for this analysis;

- Lighthouse Hill - 1.7 m (0.5ML minimum storage)
- Donahue Street Reservoir - 1.1 m (The capacity of the reservoir is only 150kL, so a minimum operating level of 50% has been adopted).

25.4.1 Peak Hour

At peak hour (9:00 am) the system has the following demands:

- DMA403 - 6.5 L/s
- DMA403A - 7.9 L/s
- DMA403B - 5.2 L/s

As shown on Figure 25-3, when the model is run without any booster pumps on from the WTP and into the Tramican Street zone, all areas meet the DSS of 22m except for 403CMP2. 403CMP2 on Cumming Parade (in DMA403) has an available pressure of 20.8 m. This can be addressed by moving the valve further down the hill.

The other areas shown as below 22 m on Figure 25-3 are the Booran St booster pumps and on the trunk main to Lighthouse Hill Reservoir.

The minimum pressure in DMA403A is 30.2 m near the Lighthouse Hill Reservoir and it is 25.7 m at the end of Pratt Court and in DMA403B.

25.4.2 MD Minimum Hour

At midnight the maximum pressures are:

- DMA403 - J16332 - 63.8 m (Corner of Booran and Mulung Streets)
- DMA403A - J16217 77.2 m (End of Kennedy Drive)
- DMA403B - J16313 77.9 m (End of Roseby Court)

The maximum pressure in DMA403 is just above the DSS of 60 m, which is considered acceptable. The maximum pressures in DMA403A and DMA403B are well above the DSS. These are at a few the low points in the zones, so it is recommended that the pressures are monitored and if necessary investigate and implement an appropriate solution.

25.4.3 Fire Flow

The 2/3 PH demands are as follows:

- DMA403 and 403B - 4.3 and 3.5 L/s. 20:00 has been adopted because the inflows are 4.3 and 3.5 L/s respectively at this time.
- DMA403A - 5.3 L/s. 15:30 has been adopted because the inflow is 5.4 L/s at this time.

When the Lighthouse Hill reservoir is 1.7m, 1 Booran St booster is at full speed and the Tramican and Pt Lookout pumps are off, as shown on Figure 25-4 most areas meet the DSS for fire flow.

Most areas easily meet the DSS for fire flow, those that don't are included in Table 24.1.

Table 25.1 - DMA402 2036 FF Results

Junction	Fire Flow (L/s)	Location	Required FF (L/s)
403CMP1	13.7	DMA403B - End of Pratt Court The adjacent hydrant H59106 has an available flow of 16.3 L/s, so the DSS can be met from two hydrants.	15
60	13.1	DMA403 - End of Mooloomba Road J16363 is in an adjacent zone and has an available FF of 28.3 L/s. This is therefore considered acceptable.	15

25.4.4 Water Quality

The water age analysis conducted as part of the DWQMP shows that Pt Lookout has a water age of only one to two days. This is considered to be satisfactory.

Opportunities to improve water quality outcomes are fairly limited in terms of infrastructure based solutions (eg elimination of dead ends). Continued system quality monitoring and proactive maintenance procedures like regular flushing dead ends will continue to be critical to maintaining good water quality in the town.

25.5 Proposed Augmentations

There are no augmentations proposed for Point Lookout.



Legend

AZP Logger | CMP Logger | Booran St HLZ | Point Lookout LLZ | Tramican St HLZ | 10m Contours

Diameter: 63, 80, 100, 150, 200, 225, 250, 300, 350, 375, 450, 500, 525, 550, 600, 675, 691, 750, 900

0 125 250 500 750 1,000 1,250 Meters

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig25.1_403_Topograph.mxd
Rev0 16 June 2016

FIGURE 25.1
403 Point Lookout Topgraphy

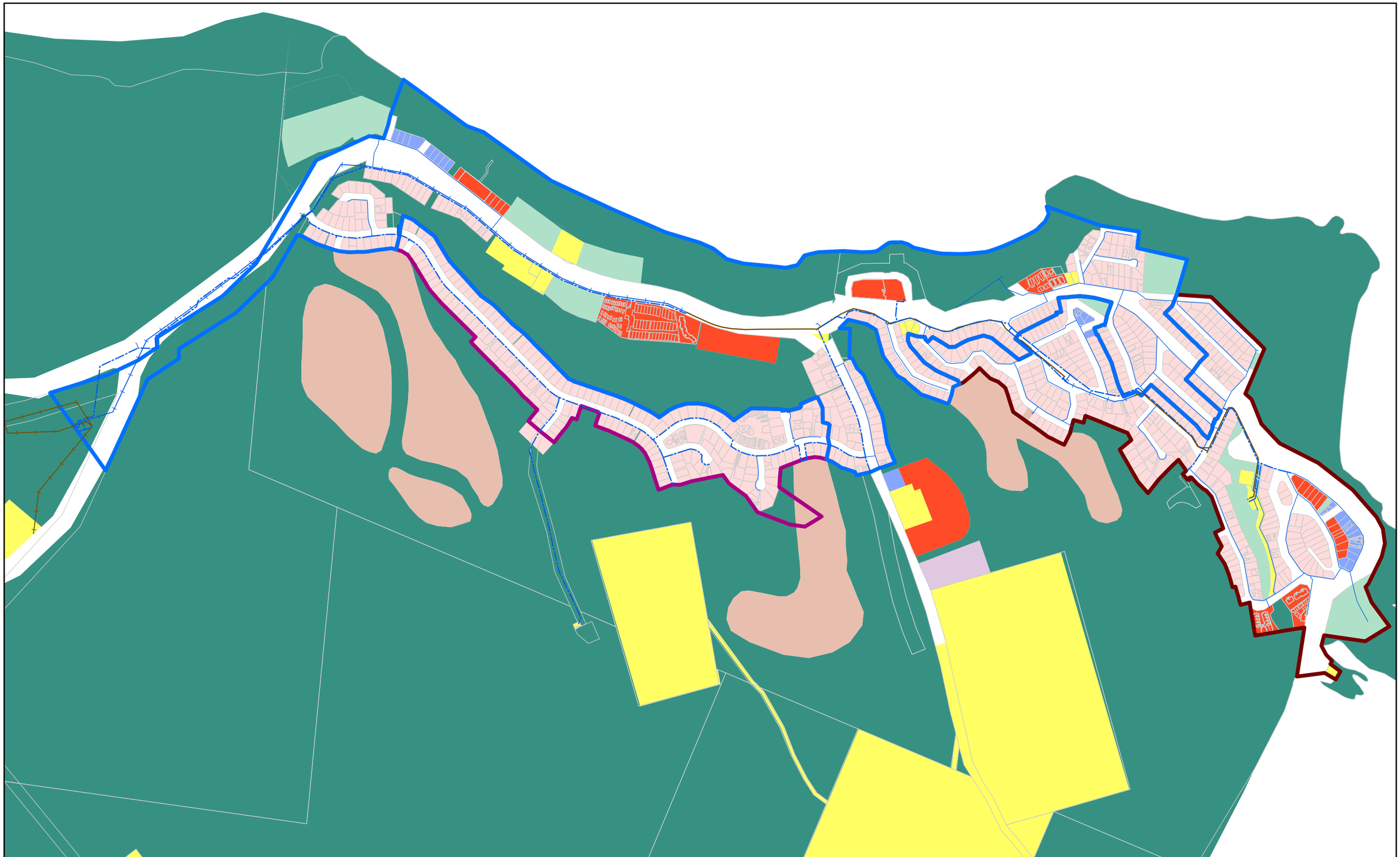


FIGURE 25.2
403 Point Lookout Planning Scheme

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig25_2_403_Planning_Scheme.mxd
Rev0 16 June 2016

N

Tramican Street BP
Point Lookout LLZ
403AZP1
Booran Street BP
403CMP3
J16332
60
J16313
Tramican St HLZ
403CMP1
403CMP2
Booran St HLZ
WTP PS
PT LOOKOUT CWT
LIGHTHOUSE HILL RES
J16217
DONAHUE ST RES

POINT LOOKOUT ROAD
EAST COAST ROAD
TRAMICAN STREET
DONAHUE STREET
GEORGE NOTHLING DRIVE
CUTTER STREET
ADMIRALTY STREET
NEEGERA PLACE
BILLABONG CLOSE
WARRONG ROAD
PATHWAY
GUNDAH STREET
GALLEON STREET
WALLER COURT
BAMBARA STREET
TIMBIN ROAD
MOOLOOMBA ROAD
MAROON ROAD
BASALT STREET
MINTEE STREET
NORTH LANE
SAMARINDA WAY
LUCINDA CRESCENT
ROAD

Legend

Residual Pressure (m)
- < 22 m
- 22 - 60 m
- > 60 m

AZP Logger
CMP Logger
mw_Tank
PRV and Meter Site

Headloss (m/1000m)
- 0 - 1
- 1 - 2
- 2 - 5
- 5 - 10
- >10

DMA Boundary
- 403 Point Lookout LLZ
- 403A Booran St HLZ
- 403BTramican St HLZ

0 125 250 500 750 1,000 1,250 Meters

FIGURE 25.3
304 Point Lookout DMA's
Existing System with 2036 PH Demands (1 Booran St BP, No other Pumps)

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig25_3_403_2036PH.mxd
Rev0 16 June 2016

N

Tramican Street BP

Point Lookout LLZ

403AZP1

Booran Street BP

403CMP3

60

Tramican St HLZ

403CMP1

403CMP2

Booran St HLZ

WTP PS

PT LOOKOUT CWT

LIGHTHOUSE HILL RES

DONAHUE ST RES

POINT LOOKOUT ROAD

EAST COAST ROAD

TRAMICAN STREET

DONAHUE STREET

GEORGE NOTHLING DRIVE

WALLEN COURT

MINT STREET

NORTH LANE

EUCINDA CRESCENT

Legend

Available FF (L/s): < 15; 15 - 30; > 30

AZP Logger; CMP Logger

mw_Tank; PRV and Meter Site

Diameter: 63; 80; 100; 150; 200; 225; 250; 300; 350; 375; 450; 500; 525; 550; 600; 675; 691; 750; 900

DMA Boundary: 403 Point Lookout LLZ

403A Booran St HLZ

403BTramican St HLZ

Fire Flow (30L/s)

0 125 250 500 750 1,000 1,250 Meters

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig25_4_403_2036MD_FF.mxd
Rev0 16 June 2016

FIGURE 25.4
304 Point Lookout DMA's
Existing System 2036 FF Demands (1 Booran St BP, No other Pumps)

26. Proposed Works

A summary of the proposed works by year is included in Table 26.1 below.

Table 26.1 - Summary of Proposed Augmentations

DMA	MUID	ICS Zone	Dia (mm)	Length (m)	Reason	Cost
2016						
DMA101	PIP_AUG44	SMBI Zone	100	58	Fire Flow	$17,000
DMA106	FF_AUG_106_P1	Heinemann Rd Zone	158	307	Fire Flow	$93,000
	FF_AUG_106_P2	Heinemann Rd Zone	150	850	Fire Flow	$209,000
	PIP_NEWAUG4	Heinemann Rd Zone	150	140	Fire Flow	$40,000
	PIP_NEWAUG9	Heinemann Rd Zone	150	250	Fire Flow	$72,000
	PIP_AUG6	Heinemann Rd Zone	209	400	Fire Flow	$144,000
	PIP9705	Heinemann Rd Zone	157	151	Fire Flow	$37,000
DMA201	PIP_AUG51	Heinemann Rd Zone	200	325	Fire Flow	$108,000
DMA203	PIP_IC9_Opt2	Heinemann Rd Zone	259	403	Fire Flow	$197,000
DMA208	PIP_NEWAUG8	Mt Cotton Zone	150	160	Fire Flow	$39,000
	PIP_NEWAUG6	Mt Cotton Zone	150	136	Fire Flow	$33,000
DMA210	PIP_NEWAUG1	Mt Cotton Zone	150	91	Fire Flow	$26,000
	PIP_NEWAUG2_Opt2_P1	Mt Cotton Zone	150	96	Fire Flow	$28,000
DMA401	PIP_NEWAUG14_P1	Amity Zone	200	1101	Fire Flow	$617,000
	PIP_NEWAUG14_P2	Amity Zone	200	718	Fire Flow	$381,000
	Install Hydrant	Amity Zone	-	-	Fire Flow	$5,000
W004	FF_AUG_305_P10	Alex Hills Zone	158	231	Fire Flow	$67,000
	FF_AUG_305_P15	Alex Hills Zone	158	164	Fire Flow	$47,000
	PIP_AUG11_Opt1	Alex Hills Zone	100	219	Fire Flow	$43,000
	PIP_AUG12	Alex Hills Zone	100	4	Fire Flow	$1,000
	PIP_AUG29	Alex Hills Zone	100	117	Fire Flow	$47,000
	PIP_NEWAUG10	Alex Hills Zone	100	89	Fire Flow	$37,000
2021						
DMA208	PIP_IC14A	Mt Cotton Zone	300	313	Headloss	$172,000
	PIP_IC13_P1	Mt Cotton Zone	300	212	Headloss	$116,000
	PIP_IC13_P2	Mt Cotton Zone	300	573	Headloss	$315,000
DMA210	Upgrade PRV210	Mt Cotton Zone	250	N/A	Peak Hour & Fire Flow	$105,000
DMA214	Install PRV214	Heinemann Rd Zone	200	N/A	Peak Hour & Fire Flow	$91,000

DMA	MUID	ICS Zone	Dia (mm)	Length (m)	Reason	Cost
2026						
W004	PIP_AUG30	Alex Hills Zone	150	62	Fire Flow	$23,000
2031						
DMA105	PIP_AUG46	SMBI Zone	104	284	Fire Flow	$83,000

26.1 Interaction with Renewal Program

When the renewal program for water mains is fully developed for the city, it should be overlaid with the augmentations developed in this Master Plan to look for project efficiencies. Figure 26-1 shows an initial view of the high risk and high historic burst frequency area shows (sourced from the Redland Water ASMP) compared to the augmentations proposed in this plan. It shows that there are some areas that would benefit from some more in depth site specific analysis to determine if there are efficiencies to be gained by replacing mains in the areas of the proposed augmentations.

Inset A

Refer Inset A

N

Legend

Risk Assessment of AC Main

- High
- Medium
- Low

Specified Water Main Assets by Mainbreak Event Frequency

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- RCC Outline

Mainbreak Event Frequency

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- New Augmentations
- Reservoir
- Existing Network

0 1,250 2,500 5,000 7,500 10,000 12,500 Meters

FIGURE 26.1
Interaction of Renewals Program and future pipe augmentations

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig26_1_Interaction_with_Renewal_Program.mxd
Rev0 11 Oct 2016

27. Cost Estimates

27.1 Methodology

The cost of trunk infrastructure was calculated based on unit rates used by Redland City Council, for asset valuation purposes. The report, *Redland Water Assets Revaluation 2012, Underground Assets* (GHD, June 2013) includes a base cost and then additional adjustment factors depending on estimates of local site conditions. The methodology and assumptions associated with these adjustment factors are described below.

27.1.1 Base Year for Costs

The rates provided in the Redland City Council, *Redland Water Assets Revaluation 2012, Underground Assets*, are provided in 1 July 2012 dollars. These rates were indexed to 1 July 2016 dollars and have been used in the cost estimates.

27.1.2 Base Rates (for pipelines)

All the base rates for pipelines are exclusive of overheads and other adjustment factors. It has been assumed that, all pipes will be replaced with a standard pipe diameter (modern engineering equivalent) and the work packaged with other works, so the non-standard diameter and short-pipe length adjustment factors have not been used.

27.1.3 Soil Type Adjustment Factor (for pipelines)

The adopted soil type has been calculated using GIS using the GEO_GLS_SOI_VALUATIONTYPE_FC feature class. Figure 27-1 shows the adopted soil types. The soil type has been allocated based the spatial location in GIS with each pipe being given the attribute of the polygon that is closest to it. The soil types are shown in Table 27.1.

Table 27.1 – Adopted Soil Types

Soil Type	Dominant Soil	Adjustment Factor Classification
Acid peat		Acid sulphate
Dark soils on basalt	Thin differentiated soils on basalt on low hills and slopes between sandstone	Hard rock
Dark soils on basalt	Prairie-like soils and shallow black earths on low hill crests and gentle slopes	Hard rock
Dark soils on basalt	Differentiated and gleyed soils on basalt in depressions between ridges	Poor soil
Giant podzol		Good soil
Humus podzol		Acid sulphate
Lithosol		Soft rock
Podzol (deep)		Good soil
Podzol (minimal)		Good soil
Podzolic soils on sedimentary and metamorphic	Red-yellow podzolics on low hills of metasediments	Good soil
Podzolic soils on sedimentary and metamorphic	Lateritic podzolics and red-yellow podzolics on moderatley high hills with sandy lithosol	Good soil
Podzolic soils on sedimentary and metamorphic	Red-yellow podzolics on low hills with lateritic podzolics near crests	Good soil
Podzolic soils on sedimentary and metamorphic	Lateritic podzolics and sandy red-yellow podzolics on gently undulating surfaces	Good soil

Soil Type	Dominant Soil	Adjustment Factor Classification
Podzolic soils on sedimentary and metamorphic	Red-yellow podzolics on low hills of sedimentary rocks	Good soil
Podzols (minimal & deep)		Acid sulphate
Red earth		Good soil
Red soils	Krasnozems on crests and prairie-like soils on slopes	Good soil
Red soils	Krasnozems, often lateritic, on low hills and ridges	Good soil
Red soils	Red earths on a gently undulating surface lateritic podzolics on this and on adjacent ste	Good soil
Saline mud		Acid sulphate
Shallow stony soils	Lithosols (loam textures) on steep ridges and spurs	Soft rock
Shallow stony soils	Lithosols on high quartzite ridges and red clays on fringing slopes	Soft rock
Shallow stony soils	Lithosols (sand textures) on narrow ridge crests and steep slopes	Soft rock
Siliceous sand		Sand
Siliceous sand		Sand
Soils on transported materials	Yellow podzolics on low terraces, alluvial soils and gleys on floodplains	Acid sulphate
Soils on transported materials	Tidal solonchak	Acid sulphate
Soils on transported materials	Meadow podsolics on low terraces, alluvial soils and gleys on floodplains	Poor soil
Soils on transported materials	Alluvial soils on banks and humic gleys on plains	Acid sulphate
Soils on transported materials	Regosols on low beach aridges and gleys on adjacent plains	Poor soil
Soils on transported materials	Saline gleys on very low plains	Acid sulphate
Soils on transported materials	Peaty gleys in broad shallow depressed areas	Poor soil
Soils on transported materials	Gilgaied acid clays on high terraces	Acid sulphate
Soils on transported materials	Humic gleys on low plains	Poor soil
** Balance areas of NSI (areas that did not come up with a dominant soil type)*		*Sand*
*** Submarine Pipes*		*Water*
**** Unknown*		*Good soil*

Development Density of site (for pipelines)

The development density was determined using GIS. The draft City Plan GIS zone boundary file was converted to *Draft_City_Plan_Dissolve* layer which includes the adopted densities shown in **Table 27.2**. Each pipe was then given the attribute of the polygon that is closest to it. The adopted densities for the Planning Scheme zone are included in **Table 27.2**.

Table 27.2 – Adopted Density

Planning Scheme Zone	Adopted Density	Island Factor
Commercial Industry	CBD	
Community Purposes	Urban	
Conservation	Rural	
District Centre	CBD	
Emerging Urban Community	Urban	
Environmental Protection	Rural	
General Industry	Urban	
Investigation Zone	Rural	
Island Industry	Urban	Island
Local Centre	CBD	
Low Density Residential	Urban	
Major Centre	CBD	
Marine Activity	Rural	
Medium Density Residential	HDU	
Neighbourhood Centre	Urban	
Open Space	Rural	
Park Residential	Urban	
Point Lookout Centre	Urban	Island
Point Lookout Residential	HDU	Island
Point Lookout Tourist	Rural	
Rural Non-Urban	Urban	Island
SMBI Centre	Urban	Island
SMBI Residential	Rural	
Unzoned	Urban	
Urban Residential	CBD	

27.1.4 Submarine Adjustment Factor (for pipelines)

There are no submarine pipelines included in this report.

27.1.5 Island Adjustment Factor

Pipes

Redland Water also operates water supply networks on the Southern Moreton Bay Islands and North Stradbroke Island. Specific adjustment factors have been determined for constructing mains on these islands to take into account the extra costs for mobilising labour, plant and materials to site. The original planning report and its addendum for the inclusion of the Southern Moreton Bay Islands in the scheme have been reviewed to identify the costs for the construction of mains on islands. The factors used in this costing exercise are the same as those used in the 2013 asset revaluation and are shown below in Table 27.3. The island construction factor is applied in addition to the other adjustment factors detailed above.

Table 27.3 – Island Adjustment Factors

Pipe Diameter*	Island Adjustment Factor*
20	1.2164
25	1.2184
30	1.2204
35	1.2224
40	1.2244
70	1.2364
60	1.2324
80	1.2404
100	1.2484
150	1.2684
200	1.2884
225	1.2984
250	1.3084
300	1.3284
350	1.3484
375	1.3584
450	1.3884
500	1.4084
550	1.4284
575	1.4384
600	1.4484
675	1.4784
750	1.5084
900	1.5684

Other Infrastructure (reservoirs, valves and pump stations)
For other infrastructure constructed on the islands, a single adjustment factor has been used. This adjustment factor has been determined by averaging the factors determined from the actual island construction costs only (i.e. not over the whole range of pipe diameters). The adopted island factor is 1.4.

27.1.6 Adjustment for Subsidies

There have been no subsidies allowed for in this report.

27.1.7 Risk Management Contingency Allowance

In accordance with our previous Master Plan cost estimates, an allowance of 20% for existing infrastructure and 30% for future infrastructure has been applied for risk management contingency. These values were as previously used in our infrastructure charges calculations. Note that in our renewal estimates (prepared by GHD following the 2013 asset revaluation) a further 20% factor is applied to manage costs associated with replacing existing infrastructure in urban environments.

27.1.8 Administrative Costs

An administrative allowance of 15% for items such as survey, planning, design, supervision and contract administration has also been adopted as per the 2013 asset revaluation.

27.2 Summary of Costs

27.2.1 Augmentation Costs

The costs, rounded to the nearest $1,000, for the augmentations identified in this report are summarised in **Table 27.4**.

Table 27.4 – Future Augmentation Costs

DMA	MUID	ICS Zone	Dia (mm)	Length (m)	Reason	Cost
2016						
DMA101	PIP_AUG44	SMBI Zone	100	58	Fire Flow	$17,000
DMA106	FF_AUG_106_P1	Heinemann Rd Zone	158	307	Fire Flow	$93,000
	FF_AUG_106_P2	Heinemann Rd Zone	150	850	Fire Flow	$209,000
	PIP_NEWAUG4	Heinemann Rd Zone	150	140	Fire Flow	$40,000
	PIP_NEWAUG9	Heinemann Rd Zone	150	250	Fire Flow	$72,000
	PIP_AUG6	Heinemann Rd Zone	209	400	Fire Flow	$144,000
	PIP9705	Heinemann Rd Zone	157	151	Fire Flow	$37,000
DMA201	PIP_AUG51	Heinemann Rd Zone	200	325	Fire Flow	$108,000
DMA203	PIP_IC9_Opt2	Heinemann Rd Zone	259	403	Fire Flow	$197,000
DMA208	PIP_NEWAUG8	Mt Cotton Zone	150	160	Fire Flow	$39,000
	PIP_NEWAUG6	Mt Cotton Zone	150	136	Fire Flow	$33,000
DMA210	PIP_NEWAUG1	Mt Cotton Zone	150	91	Fire Flow	$26,000
	PIP_NEWAUG2_Opt2_P1	Mt Cotton Zone	150	96	Fire Flow	$28,000
DMA401	PIP_NEWAUG14_P1	Amity Zone	200	1101	Fire Flow	$617,000
	PIP_NEWAUG14_P2	Amity Zone	200	718	Fire Flow	$381,000
	Install Hydrant	Amity Zone	-	-	Fire Flow	$5,000
W004	FF_AUG_305_P10	Alex Hills Zone	158	231	Fire Flow	$67,000
	FF_AUG_305_P15	Alex Hills Zone	158	164	Fire Flow	$47,000
	PIP_AUG11_Opt1	Alex Hills Zone	100	219	Fire Flow	$43,000
	PIP_AUG12	Alex Hills Zone	100	4	Fire Flow	$1,000
	PIP_AUG29	Alex Hills Zone	100	117	Fire Flow	$47,000
	PIP_NEWAUG10	Alex Hills Zone	100	89	Fire Flow	$37,000
2021						
DMA208	PIP_IC14A	Mt Cotton Zone	300	313	Headloss	$172,000
	PIP_IC13_P1	Mt Cotton Zone	300	212	Headloss	$116,000

DMA	MUID	ICS Zone	Dia (mm)	Length (m)	Reason	Cost
	PIP_IC13_P2	Mt Cotton Zone	300	573	Headloss	$315,000
DMA210	Upgrade PRV210	Mt Cotton Zone	250	N/A	Peak Hour & Fire Flow	$105,000
DMA214	Install PRV214	Heinemann Rd Zone	200	N/A	Peak Hour & Fire Flow	$91,000
2026						
W004	PIP_AUG30	Alex Hills Zone	150	62	Fire Flow	$23,000
2031						
DMA105	PIP_AUG46	SMBI Zone	104	284	Fire Flow	$83,000

Inset A

N

Refer Inset A

Legend

Redland City Boundary

Ownership

Redland Water

Seqwater

Adopted Soil Class

GOOD SOIL

POOR SOIL

SOFT ROCK

ACID SULPHATE

HARD ROCK

SAND

Reservoir

0 1,250 2,500 5,000 7,500 10,000 12,500 Meters

FIGURE 27.1
Redland City Adopted Soils

G:\RedlandWater&Waste\Data\TechSup\Planning\Water\02_Planning\007_NetServPlan\Master Plan Report\Drawings\Fig27_1_Adopted_Soil.mxd
Rev0 24 June 2016

28. Conclusions and Recommendations

The analysis of the water supply network completed for the 2036 planning horizon for this report has identified that a number of changes need to be made to the water supply network in order to continue to meet the desired standards of service at the project demands for the city. Some of the changes proposed include splitting some of the existing DMAs, pipe augmentations and installation of additional valves for altering the extent of some DMAs. The significant proportion of the identified augmentations are triggered by the DSS for fire flow provision.

These works need to be staged from 2016 to 2036. The actual construction date will be determined following detailed analysis of the actual demands in the network, with participate attention to be paid to the consumption patterns as the regional demand management communications are commenced.

28.1 Summary of Findings and Conclusions

28.2 Recommendations

For specific recommendations for operation and augmentation for each DMA the summary at the end of each section of the report should be used. Included below are a series of recommendations that generally apply to all parts of the water supply network.

28.2.1 Demand Projections

The full demand from PDAs and Emerging Communities zoned land within the draft Redland City Plan has not been considered within the 2036 planning horizon of this report. The full extent of the demand growth in these areas is not included in the IDM and reference needs to be made to the connection policy in the Netserv Plan with respect to allowable demands in these areas. No trunk network augmentations are considered for these areas and are therefore not included in any financial modelling or infrastructure charges calculations subsequent to this report.

Demand projections for the townships on North Stradbroke Island can be improved by the use of detailed projections for each township rather than the whole of city approach used for this report. When the potential impacts of the end of mining on the island are known and State Government planning work for the island is completed, it is recommended that water supply planning for each of townships is reviewed.

28.2.2 Major Trunk Network Augmentations Required

The major trunk main augmentations identified in this report are:

- the extension of the trunk main along Kinross Road, from the section constructed by Redland Water along Boundary Road to the section constructed by the developer of estate including East Ridge Road; and
- duplication of part of the trunk main servicing the Amity Point township on North Stradbroke Island.

It is identified that the Thornlands DMA (PRV 210) will require an upgrade to minimise the loss of pressure through the bypass arrangement and PRV itself as demand increases on the network.

Detailed planning studies on the timing and detail of these trunk augmentations are recommended before the timing triggers identified in this report are met.

28.2.3 Fire Flow Augmentations

This Master Plan has identified a number of augmentations for the water supply network in order to maintain adequate fire flow provision. Some of these augmentations will need to be incorporated into future development approvals for the areas of concern. Coordination of this with RCC Engineering Assessment Team in the conditioning of developments will be required. It is recommended that the actual performance of the water supply network at some of these key locations be monitored over time to confirm timing of the augmentations and to assess the validity of the theoretical model versus the actual network performance.

28.2.4 Water Quality

This Master Plan has attempted to address water quality issues in the consideration of the augmentations proposed, but in order to better understand nature of the network configuration on water quality, a detailed study of the water quality kinetics in the Redland Water distribution system needs to be undertaken. This potential project could build on the work of the regional bulk network water quality model recently completed

by the SEQ Water Partnership. Continued system quality monitoring and proactive maintenance procedures like regular flushing dead ends will continue to be critical to maintaining good water quality in the water supply network.

28.2.5 DMA Operations

Modelling undertaken for this report has identified a number of PRV settings that may need slight modification into the future to continue to meet the desired standards of service. Regular field tests of the available flows and pressures should be undertaken within DMAs to confirm requirement and timing of these changes. In some cases PRV modulation is potentially required. Investigations into the optimum method of operating the PRV and any flow modulation unit are recommended.

28.3 Seqwater Liaison

Seqwater will need to be advised of the outcomes of this study, particularly in relation to the following items:

- Confirmation that the Mt Cotton Trunk Main system will continue to not be operated in a north to south direction. In addition the HGL at the offtake point for the Thornlands DMA will need to be confirmed in respect to the value currently included in the Operating Protocols.
- Consider undertaking a joint planning study using a Redland 'all-pipes' model to assess some of the options proposed in the draft Eastern Area Planning Report. Likewise an assessment of some of the proposed augmentations like the creation of the Ziegnfusz Road (DMA 214) will have on the bulk water transfer functions in Redland.
- Continue to work with Seqwater through the Operating Protocols and the Seqwater planning processes to ensure that it is known that the use of the Capalaba WTP High Lift Pumps are required at peak hour at 2036 to provide suitable pressures to some areas in the Alexandra Hills LLZ during peak demands.
- Continue to operate the Bunker Road North valve and its subsequent main to ensure that water quality problems due to non-use do not eventuate, noting that this also significantly assists with managing water quality outcomes in the Alexandra Hills Water Supply Zone by allowing mixing of water from North Stradbroke Island Water Treatment Plan and the Capalaba Water Treatment Plant.
- It is recommended that more detailed modelling be undertaken in the Redland all-pipes model at Seqwater's 2045 planning horizon be undertaken to fully optimise the proposed augmentations in the Seqwater part of the system.

28.4 Summary Recommendations

In order to complete planning for the water supply network in Redland City Council, it is recommended that:

- The augmentation strategies detailed in this report are adopted for the purpose of input into the Local Government Infrastructure Plan and the Netserv Plan.
- The proposed augmentations should also form the basis of the next revision of the capital work program.
- A formal joint study is proposed to resolve the unresolved components of the Seqwater Eastern Area Long Term Planning Report.

29. References

Allconnex Water, *Allconnex Water Redland District - Model Verification Report*, April 2011a

Allconnex Water, *Allconnex Water Redland District – Water Supply Network Master Plan Northern District, Rev 3, May 2011.*

Department of Energy and Water Supply, *Planning Guidelines for Water Supply and Sewerage,* April 2010 (Chapter 6 amended March 2014.

Hyder, *Gold Coast Water, Unit Rates Review – 2008*, December 2008 (Final V1.0)

GHD, *Redland Water Assets Revaluation 2012, Underground Assets,* June 2013)

MWH Australia Pty Ltd, *Redland Water and Waste, Water Supply Planning Report,* 29 January 2007.

qldwater, *Queensland's Urban Potable Water and Sewerage Benchmarking Report 2014/15.*

Redland City Council, *Corporate Plan 2015 – 2020, Printed* 19 June 2015.

Redland Water and Waste, *DMA Overview document*, Rev 0, July 2009.

Redland Water, Drinking Water Quality Management Plan, Rev 5, February 2014.

Redland Water, *Water Supply System Fire Flow Review*, Rev1, July 2009.

Redland Water, *Coochiemudlo Island Water Supply Investigation*, March 2009 (a)

Redland Water, *106 Serpentine Creek DMA Report, Rev 0*, April 2009.

Redland Water, 202 *Boundary Street DMA Report, Rev 0*, April 2009.

Redland Water, 203 *Benfer Road DMA Report, Rev 0*, April 2009.

Redland Water, 204 *Bunker Road South DMA Report, Rev 0*, August 2009

Redland Water, 205 *Victoria Point DMA Report, Rev 0*, April 2009

Redland Water, 210 *Thornlands DMA Report, Rev 0*, April 2009

Redland Water, *403 Point Lookout Township DMA Report*, Rev 1, March 2010

Seqwater, Eastern Network Draft Long Term Planning Report, Rev B, June 2015

John Wilson and Partners (JWP), *Redland Water Supply Scheme, Report on Water Supply Headworks contributions,* April 1990.

John Wilson and Partners (JWP), *Redland Water Supply, Augmentation Works to Year 2011, Planning Report Volume 1,* April 1997.

John Wilson and Partners (JWP), *Mt Cotton Village, Water Supply Master Plan, Final Report,* May 2005.

Appendix A DMA Names and Numbers

DMA Number	DMA Name
W004	Alexandra Hills LLZ
101	Russell Island East
102	Russell Island West
103	Karragarra Island
104	Lamb Island
105	Macleay Island
106	Serpentine Ck
108	NSI to Heinemann Rd Trunk
201	Heinemann Rd
202	Boundary St
203	Benfer Rd
204	Bunker Rd South
205	Victoria Point
206	Mt Cotton Village
207B	Mt Cotton Res HLZ
207A	Mt Cotton Booster Pump
208	Mt Cotton Trunk
209	Duncan Rd Booster Pump
210	Thornlands
211	Heinemann Rd Trunk
212	Mt Cotton Road
250	Heinemann Rd to Alexandra Hills Trunk
301	Howletts Rd
308	Alexandra Hills HLZ
401	Amity Pt
402	Dunwich
402A	Illawong Crescent HLZ
402B	Tazi PRV Zone
403	Point Lookout LLZ
403B	Tramican St HLZ
403A	Booran St HLZ

Appendix B Pressure Loss through Modulated PRVs

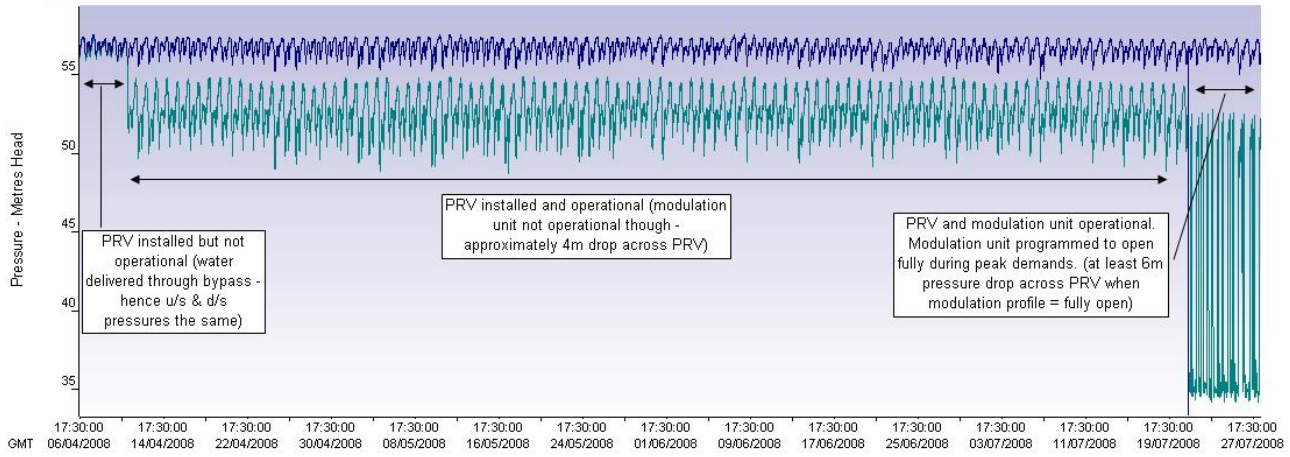
It is assumed that the DMAs and their associated PRVs recently installed as part of work completed under the legislated regional project will remain an integral part of the water supply network, particularly for leakage reduction, into the future.

One of the assumptions used in the preparation of this report is the amount of headloss experienced through the PRVs installed in the system.

Upon commissioning these PRVs it was noticed that a substantial pressure loss occurs through these valves. In analysing the DMAs controlled by PRVs in this report, we have allowed for a headloss through the PRV of 6m when it is fully open, i.e. usually when providing maximum flow and pressure for fire fighting conditions.

This headloss equates to that which the manufacturers recommend as a minimum drop across the PRV to ensure that the PRV and the associated modulation systems work adequately and is most easily demonstrated by the graph below from the Benfer Road DMA. This DMA is controlled by a modulated PRV which is programmed to "open fully" under peak flow conditions. **Figure - B**.1 shows the various stages of the installation of this PRV. The pressure losses similar to this have been seen at other PRVs throughout the network.

Figure - B.1 - Benfer Road PRV Pressure Loss through valve



Appendix C Building Class Descriptions

Class	Description
1	Single dwelling 1 level
1	Single dwelling 2-3 level
1	Duplex Townhouse 1- 2 levels
1	Shared Accommodation Units 1 -2 levels
1	Dormitory Accommodation 1-2 levels

Class	Description
2	Apartments, 1-3 storeys
2	Apartments, 3 storeys, <25m
2	Apartments, 3 storeys + Carpark >40 cars, <25m
2	Apartments > 25m tall
2	Apartments > 50m tall

Class	Description
3	Hotels and boarding houses, 1-2 storeys
3	Hotels and boarding houses, >2 storeys <25m
3	Hotels and boarding houses, >25m
3	Hotels >50m
3	Aged accommodation, 1-3 storeys

Class	Description
4	Unit, Apartment part of a another class

Class	Description
5	Offices, 1-2 storeys
5	Offices, >2 storeys; <25m
5	Offices > 25m
5	Offices > 50m

Class	Description
6	Shops, 1-2 storeys <3500m2
6	Shops, >2 storeys no Mall >3500m2, sprinklered
6	Shops, <2 storeys or Internal Mall >3500m2, sprinklered
6	Shops, >25m

Class	Description
7a	Carparks, >2 storeys, <40 cars
7a	Carparks, >2 storeys, >40 cars
7a	Carparks, >8 storeys, >40 cars, >25m
7a	Carparks, <8 storeys, >40 cars Open Deck Class

Class	Description
7b	Warehouses 1 storeys, Industrial <1000m3 racked
7b	Warehouses 2-3 storeys, <5000m2 Type A/B Construction
7b	Warehouses, 2-3 storeys, >5000m2 Type A/B Construction
7b	Warehouses & Dangerous Goods <3 storeys

Class	Description
8	Factories,<2 storeys, Industrial <2000m2 or 12000m3
8	Factories, 2-3 storeys, <2000m2 Type C or 5000m2 Type A/B
8	Factories, 2-3 storeys, >2000m2 Type C or 5000m2 Type A/B
8	Factories, >3 storeys, >2000m2 or 5000m2 Type A <25m
8	Factories & Dangerous Goods <3 storeys

Class	Description
9a	Health care buildings, 1 storey, <1000m2 Institutional
9a	Health care buildings, 2 storeys, <1,000m2
9a	Health care buildings, >2 storeys or >1000m2
9a	Health care buildings, >25m

Class	Description
9b	Assembly buildings, 1 storey, <1000m2 Public assembly
9b	Assembly buildings, 1 storey, <1000m2, Educational
9b	Assembly buildings, 1 storey, >1000m2
9b	Night Club buildings, 1 storey, >1000m2
9b	Assembly buildings, 1-2 & schools 1-3 storeys, <1000m2
9b	Assembly buildings, >3 storeys & Schools <25m
9b	Assembly buildings, >8 storeys & Schools >25m

Appendix D DEWS Guideline Extract

6.6.2 Minimum fire flow[1]

The minimum fire flow provision will vary dependent on the type of development, and the capability of the community to resource fire protection. The following categories of development should be considered for the design fire flow:

- **General urban category** – comprises areas served by an urban fire service. Minimum fire flows for this category are–
    - residential buildings (3 storeys and below) – 15 L/s for 2 hour duration
    - high density residential buildings (greater than 3 storeys) – 30 L/s for 4 hour duration
    - commercial/industrial buildings – 30 L/s for 4 hour duration
    - high fire flow areas – refer to Section 6.5.2
- **Small community category** – comprises communities with a permanent population of less than 500 people, or served by a rural fire service or equivalent. In these communities discussions with the local rural fire service are required to determine minimum fire flows. It is recommended that the following is considered–
    - residential buildings (up to 2 storeys) – the agreed fire flow should not be below 7.5 L/s for a 2 hour duration
    - non-residential buildings (up to 2 storeys) – the agreed flow rate should not be below 15 L/s for a 2 hour duration
    - other buildings – in the case where higher fire risks are associated with a building or group of buildings, the 'General Urban Category' provision should be adopted. A building may be deemed to be subject to a high fire risk due to one or more of the following factors-
        - public access buildings that are constructed of high risk material e.g. full timber
        - construction
        - buildings that are constructed in close proximity e.g. multiple sole occupancy, building spacing less than 1.5m etc.
        - buildings with more than 2 storeys
        - buildings close to dense vegetation with a high risk of bushfires
        - areas with aged water supply infrastructure including mains, hydrants and fittings
        - areas where access to buildings is difficult due to terrain
        - buildings with fire flow demand greater than the default residential and non-residential values (i.e. high fire flow areas)
        - buildings used to store or manufacture highly flammable materials.

  Where identified risks cannot be mitigated, more appropriate fire flow provisions should be adopted.

- **Tourist affected small community category** – this category comprises small communities with a permanent population of less than 500 people and served by a rural fire service or equivalent. A risk assessment should be undertaken, in conjunction with the local fire service to determine whether an elevated level of risk exists during peak holiday periods. Based on the assessed level of risk the fire flow adopted for this category should be as follows–
    - limited risk – refer to small communities category above
    - elevated risk – refer to general urban category above
- **Rural residential category** – this category includes large lot rural or park residential development (e.g. >5000 m2). Due to the difficulties that exist in providing effective and practical fire flow provision to areas of sparse residential development, a clear understanding of the capacity of the water supply service should be developed with the fire service. Water service providers should consider the following when determining a minimum fire flow–

[1] Accessed 14/11/14 2:00pm https://www.dews.qld.gov.au/__data/assets/pdf_file/0016/80053/water-sewerage-planning-guidelines.pdf

- urban fire service – general urban category flows should be provided
- rural fire service – the greater of the small communities flow provision or the existing standard provided in adjoining areas should be provided
- development provisions such as on-site storages (swimming pools or tanks) or tanker filling points on the main for schemes where small mains or a constant flow water supply scheme is provided which will not provide adequate fire flows.

Appendix E Landuse Codes and Adopted Fire Flow

Landuse No.	Description	Fire Flow Allocated Mainland	Fire Flow Allocated SMBI	Notes
25	1 DUPLEX & 1 DWELLING	15	7.5	
1	ABBATOIR	30	30	
120	Aboriginal Display Centre	Manual check	Manual check	
116	Access	15	7.5	
101	ACCESS RESTRICTION STRIP	15	7.5	
97	ADVERTISING SIGN	15	7.5	
177	AGED CARE HOSTEL	30	15	
138	Air Space	15	7.5	
112	Airstrip	30	15	
2	AMBULANCE	30	15	
8	AMENITIES BLOCK (RSC)	15	7.5	
141	Art Gallery	Manual check	Manual check	
95	ARTS COMPLEX	30	15	
152	AUTO WRECKERS	30	15	
3	BAKER	30	15	
4	BANK	30	15	
5	BARRACKS	30	15	
110	Beachfront	15	7.5	Non-rateable - below high water mark
150	BED AND BREAKFAST	15	7.5	Has a RES Property Use - usually a house
123	Bikeway	15	7.5	
6	BOARDING HOUSE	30	15	Boarding houses are Class 3
155	BOAT YARD	30	15	
160	BODY CORPORATE	30	15	Common Area of Body Corporate Complexes
113	Bus Interchange	30	15	
9	BUTCHER	30	15	Shop
11	CABIN (MULTI)	Manual check	Manual check	Has a RES Property Use
14	CAMPING GROUND	Manual check	Manual check	
106	CANAL	15	7.5	
161	CAR PARK (COMMERCIAL)	15	7.5	No multi story car parks in RSC
108	CAR PARK (INFRASTRUCTURE)	15	7.5	No multi story car parks in RSC
17	CAR SALES YARD	30	15	Commercial Use
16	CARAVAN PARK (COMMERCIAL)	Manual check	Manual check	
167	CARAVAN PARK (RSC)	Manual check	Manual check	
115	Cemetery	15	7.5	No infrastructure
18	CHEMIST	30	15	
23	CHILD CARE CENTRE (COM)	30	15	
105	CHURCH	30	15	Assembly building
19	CLUB (LICENCED)	30	15	
146	CLUB (RESTRICTED LICENCE)	30	15	
20	CLUB (UNLICENCED)	30	15	
21	CLUB (VARIOUS)	30	15	
22	COMMERCIAL/INDUSTRIAL	30	15	
132	Communications Tower	15	7.5	
24	COMPLEX (SHOPS/OFFICES)	30	15	
27	COUNCIL METER (PARKS)	15	7.5	
130	Council Water Meter	15	7.5	
26	COURT HOUSE	30	15	
28	DENTIST SURGERY	30	15	
162	DEPOT - BUS	30	15	Has a COM property use
31	DEPOT - FUEL	30	15	Has a COM property use
32	DEPOT - MILK	30	15	Has a COM property use
33	DEPOT - TRUCK	30	15	Has a COM property use
118	DEPOT (RSC)	30	15	Has a COM property use
34	DOCTOR SURGERY	30	15	
36	DOMESTIC GARAGE	15	7.5	
145	Drain	15	7.5	
35	DRY CLEANER	30	15	

Landuse No.	Description	Fire Flow Allocated Mainland	Fire Flow Allocated SMBI	Notes
40	DUPLEX	15	7.5	
37	DWELLING (1 UNIT)	15	7.5	
38	DWELLING (2 UNITS)	15	7.5	
100	DWELLING/MULTIPLE	30	15	
63	DWELLING/NURSERY	Manual check	Manual check	
41	DWELLING/OFFICE	30	15	
30	DWELLING/POULTRY FARM	Manual check	Manual check	
39	DWELLING/RELATIVES APARTMENT	Manual check	Manual check	
43	DWELLING/SHOP	30	15	
42	DWELLING/SHOPS	30	15	
68	DWELLING/VETERINARY SURGERY	30	15	
122	Equestrian Centre	15	7.5	
134	Extractive Industry	15	7.5	
94	FERRY TERMINAL	15	7.5	
170	FERRY TERMINAL (RSC)	15	7.5	
121	Fire Station	15	7.5	
44	FISH MARKET	30	15	
45	FLATS	15	7.5	Flats are usually no more than 2 storeys
159	FLOWER FARM	15	7.5	
158	FOOD MANUFACTURER	30	15	
125	Fuel Filling Station	30	15	
147	Golf Course	30	15	
48	GOVERNMENT (VARIOUS)	Manual check	Manual check	
50	GREENHOUSES/HORTICULTURE	15	7.5	
49	GUEST HOUSE (W/CABINS)	15	7.5	
157	GYMNASIUM	30	15	
173	HALL (CHURCH)	30	15	Assembly building
174	HALL (COMMERCIAL)	30	15	Assembly building
29	HALL (COMMUNITY)	30	15	Assembly building
143	Hard Landfill/Fill Storage Site	15	7.5	
114	Hardware	30	15	
169	HEALTH CLINIC (PRIVATE)	30	15	
139	Health Clinic (Public)	30	15	
126	Helipad	15	7.5	
52	HOME INDUSTRY	15	7.5	Industry from home - has a RES classification
166	HOSPITAL (PRIVATE)	30	15	
53	HOSPITAL (PUBLIC)	30	15	
54	HOTEL	30	15	
149	KENNEL/CATTERY/DWELLING	15	7.5	Has a RES property use
117	Koala Sanctuary	15	7.5	
140	Lake	15	7.5	
135	Library	30	15	
142	MAJOR SHOPPING CENTRE	30	15	
168	MARINA (COMMERCIAL)	30	15	
12	MARINA (INFRASTRUCTURE)	30	15	
59	MEDICAL CENTRE	30	15	
58	MINI STORAGE UNITS	30	15	
62	MOTEL	30	15	
61	MOTOR MECHANICS/AUTO WORKSHOP	30	15	
129	Museum	30	15	
175	Nursery	15	7.5	
127	Nursing Home	30	15	
64	OFFICE/PROFESSIONAL	30	15	
99	ORGANIZATION/VARIOUS	30	15	
65	PANEL BEATING	30	15	
102	PARK	15	7.5	
103	PARK/AMENITIES BLOCK	15	7.5	
109	PIPELINE	15	7.5	
69	POLICE STATION	30	15	
82	PONTOON/JETTY (COMMERCIAL)	15	7.5	No real infrastructure?
92	PONTOON/JETTY (NON-COMMERCIAL)	15	7.5	No real infrastructure?
70	POST OFFICE (OFFICIAL)	30	15	
71	POST OFFICE (RESIDENCE)	15	7.5	Has a RES property use

Landuse No.	Description	Fire Flow Allocated Mainland	Fire Flow Allocated SMBI	Notes
13	POULTRY FARM	15	7.5	
153	PRINTER	30	15	
46	PUBLIC SHELTER	15	7.5	
15	PUMPING STATION (SEWERAGE)	15	7.5	
131	Reserve	15	7.5	
137	Resort Complex	30	15	
7	RESPITE CENTRE	30	15	
74	RESTAURANT	30	15	
128	Retirement - Single Unit	30	15	Have booster hydrants etc
60	RETIREMENT VILLAGE	30	15	
104	ROAD/ROAD RESERVE	15	7.5	
93	SALES/INFORMATION CENTRE	30	15	
75	SAWMILL	30	15	
111	School - Private	30	15	
78	SCHOOL-HANDICAPPED	30	15	
76	SCHOOL-HIGH	30	15	
79	SCHOOL-OPPORTUNITY	30	15	
80	SCHOOL-PRE/KINDERGARTEN	30	15	
81	SCHOOL-PRIMARY	30	15	
47	SERVICE STATION	30	15	
10	SEWERAGE FARM	15	7.5	
84	SHED	15	7.5	
136	Shed- Landscaping Supplies	15	7.5	
86	SHOP	30	15	
51	SHOWROOMS	30	15	
87	SKATING RINK	30	15	
89	SNACK BAR (TAKEAWAY)	30	15	
85	SPORTING COMPLEX	30	15	
148	SPORTSFIELD	15	7.5	Usually just the field with a stand or small building
90	STORE/WAREHOUSE	30	15	
91	SUBSTATION	15	7.5	
171	SWIMMING POOL (COMMERCIAL)	30	15	
72	SWIMMING POOL (PRIVATE)	30	15	
144	SWIMMING POOL (RSC)	30	15	
98	TENNIS COURT - PRIVATE	15	7.5	
119	Tennis Courts (COMMERCIAL)	15	7.5	
172	TENNIS COURTS (SCHOOL)	15	7.5	
66	THEATRE (DRIVE-IN)	30	15	
154	TIMBER YARD	30	15	
96	TOWN HOUSES	15	7.5	
124	Transfer Station/Landfill Site	15	7.5	
176	VACANT (SALES INFORMATION CENTRE)	15	7.5	
57	VACANT LAND	15	7.5	
67	VETERINARY SURGERY	30	15	
133	Walkway/Boardwalk	15	7.5	
73	WATER METER(COMMERCIAL)	15	7.5	
83	WATER METER(RESIDENTIAL)	15	7.5	
88	WATER RESERVOIR	15	7.5	
151	WINERY	15	7.5	
156	WORKSHOP LIGHT INDUSTRIAL	30	15	

Appendix F Planning Scheme Zones and Adopted Fire Flows

Zone Description	Adopted Fire Flow Mainland	Adopted Fire Flow SMBI
Character Residential	15	7.5
Community Facilities	15	7.5
Conservation	15	7.5
District Centre	30	15
Emerging Communities	15	7.5
Environmental Management	15	7.5
Local Centre	30	15
Low Density Residential	15	7.5
Low Impact Industry	30	15
Low-medium Density Residential	15	7.5
Major Centre	30	15
Medium Density Residential	30	15
Medium Impact Industry	30	15
Mixed Use	30	15
Neighbourhood Centre	30	15
Principal Centre	30	15
Recreation and Open Space	15	7.5
Rural	15	7.5
Specialised Centre	30	15
Tourist Accommodation	15	7.5
Waterfront and Marine Industry	30	15