PROPOSED DEVELOPMENT PEAK WATER DEMANDS					
Zone Number	Zone Name & Description	Area (ha)	Lots	Population	Demand (L/s)	Fire Hazard
1	South East Structure Plan Area (Low Pressure)	12	120	360	5.21	FW2
2	Falls Road Development (Low Pressure)		46	138	2.00	FW2
3	Stubbs East (Low Pressure)		46	138	2.00	FW2
4	East Structure Plan Area South of Sanderson Rd Business (Low Pressure)	0.8		0	0.41	FW4
5	East Structure Plan Area North of Sanderson Rd Business (Low Pressure)	7.5		0	3.80	FW4
6	North Structure Plan Area B Business (Low Pressure)	26		0	13.17	FW6
7	North Structure Plan Area A Residential Residential (Low Pressure)	8.4	84	252	3.65	FW2
8	Stubbs South (Low Pressure)		65	195	2.82	FW2
9	Stubbs Central (Low Pressure)		151	453	6.55	FW2
10	Stubbs Upper West (High Pressure)		97	291	4.21	FW2
11	North Structure Plan Area A Residential (High Pressure)	10	100	300	4.34	FW2
12	Stubbs East Mixed Use (Low Pressure)	4.6		0	2.33	FW2
		Totals:	**709**	**2127**	**50.47**	

STRUCTURE PLAN EXTENT

BOOSTED PRESSURE ZONE ABOVE RL: 50.0m CONTOUR

INDICATIVE BOOSTER PUMP INSTALLATIONS

SANDERSON ROAD BORE AND FUTURE TREATMENT SITE

EXISTING BULK WATER MAIN

WARKWORTH WATER TREATMENT PLANT

VIEW ROAD WATER RESERVOIR RL: 86.0m

Great North Road

PE100 PN12.5 225mm
PE100 PN12.5 355mm
PE100 PN12.5 180mm
PE100 PN12.5 125mm

REV	DATE	AMENDMENTS	CHECKED

Design:	NJ
Date:	18/01/2019
Check:	–
Job No:	11875

Subject:	CIVIL DESIGN - STRUCTURE PLAN
Client:	SF ESTATE LTD
Address:	WARKWORTH NORTH
Drawing Title:	WATER SUPPLY - EXAMPLE BULK MAIN PLAN

Drawing No:	502
Revision No:	2
Scale:	1:3000 @ A1
Issued for:	COMMENT

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APPENDIX E: WASTEWATER SERVICING PLAN

PROPOSED DEVELOPMENT CUMULATIVE WASTEWATER VOLUMES OVER TIME				
STAGE	CUMULATIVE LOTS	DAILY DRY WEATHER WASTEWATER VOLUME (m^3)	DAILY WET WEATHER WASTEWATER VOLUME (m^3)	224c TIMING
STAGE 1 (FALLS ROAD)	50	34	75	MARCH 2020
STAGE 2 TO 7	1060+	825	1833	2022 ONWARDS

CALCULATIONS USE THE FOLLOWING AS PER WSL COP;

No. PEOPLE PER DWELLING:	3
DAILY WATER DEMAND:	225l/p/d
DAILY WET WEATHER WASTEWATER VOLUME:	500l/p/d (1500/3)
LAND TO LOT RATIO:	10.2/ha (PROPOSED LOTS/SITE AREA)
BUSINESS ZONE WATER DEMAND (IN=OUT):	17,500l/ha/d

NOTES:

1. SHOWN WASTEWATER CATCHMENTS ARE INDICATE WHAT AREAS COULD POTENTIALLY DRAIN VIA GRAVITY TO THE PROPOSED PUMP STATION 1 (WWPS-1) LOCATION.

2. PCP = POSSIBLE CONNECTION POINTS INTO WATERCARE NETWORK. THE FOLLOWING OUTLINES EACH POINT;
   - 2.1. PCP1: CLOSEST POINT TO SITE BUT WOULD REQUIRE UPGRADES IN PRIVATE PROPERTY TO SERVICE ALL STAGES. WOULD ALSO REQUIRE MAJOR UPGRADES TO GRAVITY LINE IN PUBLIC LAND (E.G. ELIZABETH & QUEEN STREETS - SEE CAPACITY ASSESSMENT)
   - 2.2. PCP2: SECOND CLOSEST POINT TO SITE AND WOULD REQUIRE MAJOR UPGRADES TO GRAVITY LINE IN PUBLIC LAND (E.G. ELIZABETH & QUEEN STREETS - SEE CAPACITY ASSESSMENT).
   - 2.3. PCP3: A MAIN CAN BE INSTALLED TO APPROXIMATELY THIS POINT. IN THE SHORT TERM THE DEVELOPMENT COULD CONNECT TO PCP1 OR PCP2 THEN WHEN THE CONVEYANCE LINE IS READY IT COULD BE SWITCHED OVER. WE DO NOT HAVE ENOUGH INFORMATION TO KNOW IF CONNECTING TO THE CONVEYANCE LINE IS POSSIBLE AND WOULD NEED CONFIRMATION FROM WATERCARE.
   - 2.4. PCP4: THIS IS CONNECTION INTO THE EXISTING LPS NETWORK THAT TAKES WASTEWATER BACK TO THE WARKWORTH WWTP. OUR UNDERSTANDING IS THAT THIS NETWORK IS NOT DESIGNED TO TAKE OUR CATCHMENT SO WOULD REQUIRE UPGRADES. IT SEEMS COUNTER INTUITIVE TO UPGRADE THIS LINE TO GO FROM ONE SIDE OF WARKWORTH TO THE OTHER ONLY TO THEN BE PUMPED BACK AROUND.

3. WWPS-2 IS A SECOND POTENTIAL WASTEWATER PUMP STATION LOCATION THAT MAY BE USED BY WATERCARE TO PUMP TO THE CONVEYANCE PIPE LINE AS OPPOSED TO DIRECT FROM WWPS-1. THE AREA SOUTH OF THE "PRACTICAL GRAVITY BOUNDARY FOR WWPS-2" WILL STILL NEED TO BE PUMPED TO GET TO THIS POINT. THE BEST WAY TO ACHIEVE THIS IS TO PUMP TO PCP2 IN THE SHORT TERM AND THEN WHEN WWPS-2 COMES ONLINE A GRAVITY MAIN DOWN ALBERT & HUDSON ROADS CAN BE INSTALLED.

NORTH CATCHMENT D
ZONE: FUTURE URBAN
CATCHMENT AREA: 100ha
AVERAGE DAILY VOLUMES;
DWV = 675m³ / WWV = 1500m³

NORTH CATCHMENT C
ZONE: LIGHT INDUSTRY
CATCHMENT AREA: 64ha
AVERAGE DAILY VOLUMES;
WWV = 1120m³

TOP OF INDICATIVE GRAVITY MAIN DOWN TO WWPS-1
INDICATIVE IL: 22.00m

EAST CATCHMENT A
ZONE: BUSINESS
CATCHMENT AREA: 7ha
AVERAGE DAILY VOLUMES;
WWV = 123m³

NORTH CATCHMENT A
ZONE: RESIDENTIAL
CATCHMENT AREA: 19ha
AVERAGE DAILY VOLUMES;
DWV = 131m³ / WWV = 290m³

WWPS-2
POTENTIAL SITE FOR NEW WWPS
AVERAGE EXISTING GROUND RL: 25.00m

FALLS RD AND STUBBS FARM
DEVELOPMENT
CATCHMENT AREA: 54ha
DESIGN FLOW: AS PER TABLE

INDICATIVE GRAVITY MAIN FROM PCP2 DOWN TO WWPS-2

NORTH CATCHMENT B
ZONE: MIXED
CATCHMENT AREA: 24ha
AVERAGE DAILY VOLUMES;
WWV = 420m³

EXISTING GRAVITY WASTEWATER PIPELINE ROUTE TO THE LILBURN ST WWPS (SEE CAPACITY ASSESSMENT)

EAST CATCHMENT B
ZONE: RESIDENTIAL
CATCHMENT AREA: 20ha
AVERAGE DAILY VOLUMES;
DWV = 138m³ / WWV = 306m³

PCP3

PS2

INDICATIVE FUTURE CONVEYANCE PIPELINE ROUTE

WEST CATCHMENT B
ZONE: FUTURE URBAN
CATCHMENT AREA: 18ha
AVERAGE DAILY VOLUMES;
WWV = 275m³

PCP2

PRACTICAL GRAVITY BOUNDARY FOR WWPS-2

PCP1

INDICATIVE RISING MAIN TO CONNECT TO WSL NETWORK FROM PUMPSTATION OR LPS NETWORK

PS3

PS3a

LILBURN STREET WWPS
SITE LOCATION FOR FUTURE
CONVEYANCE LINE PUMP STATION - PS1

PS4(1a)

WEST CATCHMENT A
ZONE: FUTURE URBAN
CATCHMENT AREA: 71ha
AVERAGE DAILY VOLUMES;
DWV = 488m³ / WWV = 1085m³

PALMER STREET WWPS
PUMPS DIRECT TO
WARKWORTH WWTP

WARKWORTH WWTP

INDICATIVE FUTURE CONVEYANCE PIPELINE ROUTE (OPTION 1)

INDICATIVE FUTURE CONVEYANCE PIPELINE ROUTE (OPTION 1a)

PCP4

SOUTH EAST CATCHMENT
ZONE: RESIDENTIAL
CATCHMENT AREA: 12ha
AVERAGE DAILY VOLUMES;
DWV = 83m³ / WWV = 183m³

WWPS-1
1.3ha LOT TO VEST
IN AUCKLAND
COUNCIL
POTENTIAL SITE FOR
NEW WWPS
AVERAGE EXISTING
GROUND RL: 17.50m
ESTIMATED 1% AEP
FLOOD RL: 18.50m

EXISTING PRESSURE SEWER PIPELINE ROUTE TO THE WARKWORTH WWTP (CAPACITY UNKNOWN)

PS4

PS4a

SOUTH CATCHMENT
ZONE: FUTURE URBAN
CATCHMENT AREA: 477ha
ESTIMATED DAILY VOLUMES;
ADWV = 3273m³ / PWWV = 7272m³

SNELLS / ALGIES WWTP

REV	DATE	AMENDMENTS	CHECKED
3	18.01.2019	ZONING	NJ
2	14.02.2018	STAGE TIMING	NJ

Design:	NJ
Date:	18/01/2019
Check:	-
Job No:	11875

Subject:	CIVIL DESIGN - STRUCTURE PLAN
Client:	SF ESTATE LTD
Address:	WARKWORTH NORTH
Drawing Title:	WASTEWATER SERVICING PLAN 1 OF 2

Drawing No:	500
Revision No:	3
Scale:	1:10000 @ A1
Issued for:	COMMENT

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PROPOSED DEVELOPMENT CUMULATIVE WASTEWATER VOLUMES OVER TIME				
STAGE	CUMULATIVE LOTS	DAILY DRY WEATHER WASTEWATER VOLUME (m^3)	DAILY WET WEATHER WASTEWATER VOLUME (m^3)	224c TIMING
STAGE 1 (FALLS ROAD)	50	34	75	MARCH 2020
STAGE 2 TO 7	1060+	825	1833	2022 ONWARDS

CALCULATIONS USE THE FOLLOWING AS PER WSL COP;

No. PEOPLE PER DWELLING:	3
DAILY WATER DEMAND:	225l/p/d
DAILY WET WEATHER WASTEWATER VOLUME:	500l/p/d (1500/3)
LAND TO LOT RATIO:	10.2/ha (PROPOSED LOTS/SITE AREA)
BUSINESS ZONE WATER DEMAND (IN=OUT):	17,500l/ha/d

NOTES:

1. SHOWN WASTEWATER CATCHMENTS ARE INDICATE WHAT AREAS COULD POTENTIALLY DRAIN VIA GRAVITY TO THE PROPOSED PUMP STATION 1 (WWPS-1) LOCATION.

2. PCP = POSSIBLE CONNECTION POINTS INTO WATERCARE NETWORK. THE FOLLOWING OUTLINES EACH POINT;
   - 2.1. PCP1: CLOSEST POINT TO SITE BUT WOULD REQUIRE UPGRADES IN PRIVATE PROPERTY TO SERVICE ALL STAGES. WOULD ALSO REQUIRE MAJOR UPGRADES TO GRAVITY LINE IN PUBLIC LAND (E.G. ELIZABETH & QUEEN STREETS - SEE CAPACITY ASSESSMENT)
   - 2.2. PCP2: SECOND CLOSEST POINT TO SITE AND WOULD REQUIRE MAJOR UPGRADES TO GRAVITY LINE IN PUBLIC LAND (E.G. ELIZABETH & QUEEN STREETS - SEE CAPACITY ASSESSMENT).
   - 2.3. PCP3: A MAIN CAN BE INSTALLED TO APPROXIMATELY THIS POINT. IN THE SHORT TERM THE DEVELOPMENT COULD CONNECT TO PCP1 OR PCP2 THEN WHEN THE CONVEYANCE LINE IS READY IT COULD BE SWITCHED OVER. WE DO NOT HAVE ENOUGH INFORMATION TO KNOW IF CONNECTING TO THE CONVEYANCE LINE IS POSSIBLE AND WOULD NEED CONFIRMATION FROM WATERCARE.
   - 2.4. PCP4: THIS IS CONNECTION INTO THE EXISTING LPS NETWORK THAT TAKES WASTEWATER BACK TO THE WARKWORTH WWTP. OUR UNDERSTANDING IS THAT THIS NETWORK IS NOT DESIGNED TO TAKE OUR CATCHMENT SO WOULD REQUIRE UPGRADES. IT SEEMS COUNTER INTUITIVE TO UPGRADE THIS LINE TO GO FROM ONE SIDE OF WARKWORTH TO THE OTHER ONLY TO THEN BE PUMPED BACK AROUND.

3. WWPS-2 IS A SECOND POTENTIAL WASTEWATER PUMP STATION LOCATION THAT MAY BE USED BY WATERCARE TO PUMP TO THE CONVEYANCE PIPE LINE AS OPPOSED TO DIRECT FROM WWPS-1. THE AREA SOUTH OF THE "PRACTICAL GRAVITY BOUNDARY FOR WWPS-2" WILL STILL NEED TO BE PUMPED TO GET TO THIS POINT. THE BEST WAY TO ACHIEVE THIS IS TO PUMP TO PCP2 IN THE SHORT TERM AND THEN WHEN WWPS-2 COMES ONLINE A GRAVITY MAIN DOWN ALBERT & HUDSON ROADS CAN BE INSTALLED.

WWPS-2
POTENTIAL SITE FOR NEW WWPS
AVERAGE EXISTING GROUND RL: 25.00m

EXISTING GRAVITY WASTEWATER PIPELINE ROUTE TO THE LILBURN ST WWPS (SEE CAPACITY ASSESSMENT)

INDICATIVE GRAVITY MAIN FROM PCP2 DOWN TO WWPS-2

TOP OF INDICATIVE GRAVITY MAIN DOWN TO WWPS-1
INDICATIVE IL: 22.00m

PCP3

PS2

INDICATIVE FUTURE CONVEYANCE PIPELINE ROUTE

PS3

PCP2

INDICATIVE RISING MAIN TO CONNECT TO WSL NETWORK FROM PUMPSTATION OR LPS NETWORK

PCP1

LILBURN STREET WWPS
SITE LOCATION FOR FUTURE
CONVEYANCE LINE PUMP STATION - PS1

PRACTICAL GRAVITY BOUNDARY FOR WWPS-2

PALMER STREET WWPS
PUMPS DIRECT TO
WARKWORTH WWTP

WARKWORTH WWTP

PRACTICAL GRAVITY BOUNDARY FOR WWPS-2

WWPS-1
1.3ha LOT TO VEST IN AUCKLAND COUNCIL
POTENTIAL SITE FOR NEW WWPS
AVERAGE EXISTING GROUND RL: 17.50m
ESTIMATED 1% AEP FLOOD RL: 18.50m

PCP4

REV	DATE	AMENDMENTS	CHECKED
3	18.01.2019	ZONING	NJ
2	07.03.2018	STAGE TIMING	NJ
1	14.02.2018	STAGE TIMING	NJ

Design:	NJ
Date:	18/01/2019
Check:	-
Job No:	11875
Subject:	CIVIL DESIGN - STRUCTURE PLAN
Client:	SF ESTATE LTD
Address:	WARKWORTH NORTH
Drawing Title:	WASTEWATER SERVICING PLAN 2 OF 2
Drawing No:	501
Revision No:	3
Scale:	1:5000 @ A1
Issued for:	COMMENT

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WASTEWATER NETWORK CAPACITY WORKSHEET - REVISION 1

Job Name: Warkworth North **Date:** 28.03.2017

Job Number: **Author:** K. Rai

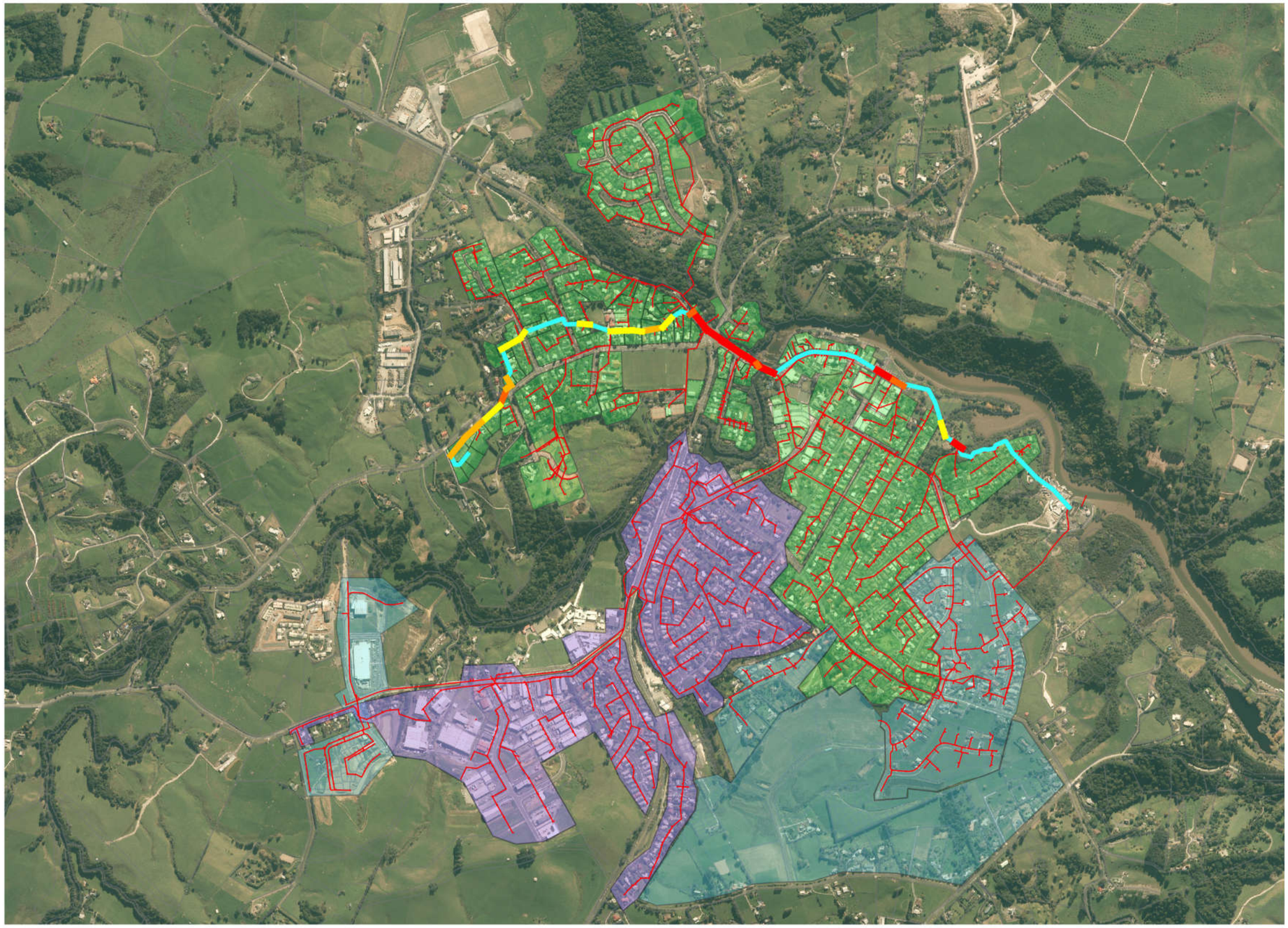
Number of People per Dwelling:	3	
ADWF	225	l/p/d
Dry Weather Diurnal PF:	3	
PWWF:	1500	l/p/d
Pipe Flow Condition:	100	% Full

Material	Mannings Roughness Coefficient (n)
VC	0.012
PVC	0.011
PE	0.01
GRP	0.011
C	0.012

PIPE											PRE-DEVELOPMENT									POST-DEVELOPMENT FALLS RD STAGE (+50 HOUSES)					POST-DEVELOPMENT STUBBS STAGE 1 (+150 HOUSES)					POST-DEVELOPMENT STUBBS STAGE 2 (+100 HOUSES)					POST-DEVELOPMENT STUBBS STAGE 3 (+100 HOUSES)					POST-DEVELOPMENT STUBBS STAGE 4 (+130 HOUSES)							
											LOAD		DRY WEATHER			WET WEATHER			LOAD		WET WEATHER			LOAD		WET WEATHER			LOAD		WET WEATHER			LOAD		WET WEATHER			LOAD		DRY WEATHER			WET WEATHER		
Ref no.	Upstream SSMH ID	Dowstream SSMH ID	Pipe Dia (mm)	US Level	DS Level	Length	Pipe Grade (%)	Pipe Material	Pipe Velocity (m/s)	Pipe Capacity (L/s)	No. of Houses	Population	ADWF (L/s)	Cumul. ADWF (L/s)	Pipe Res. Capacity (L/s)	PWWF (L/s)	Cumul. PWWF (L/s)	Pipe Reserve Capacity (L/s)	No. of Houses	Population	PWWF (L/s)	Cumul. PWWF (L/s)	Res. Capacity (L/s)	No. of Houses	Population	PWWF (L/s)	Cumul. PWWF (L/s)	Res. Capacity (L/s)	No. of Houses	Population	PWWF (L/s)	Cumul. PWWF (L/s)	Res. Capacity (L/s)	No. of Houses	Population	PWWF (L/s)	Cumul. PWWF (L/s)	Res. Capacity (L/s)	No. of Houses	Population	ADWF (L/s)	Cumul. ADWF (L/s)	Pipe Res. Capacity (L/s)	PWWF (L/s)	Cumul. PWWF (L/s)	Res. Capacity (L/s)
100	3001259	3001255	100	67.09	64.56	44.3	5.71	PVC	1.86	**14.59**	2	6	0.047	0.047	14.54	0.104	0.104	14.48	2	6	0.10	0.00	14.59	2	6	0.10	0.00	14.59	2	6	0.10	0.00	14.59	2	6	0.10	0.00	14.59	2	6	0.047	0.047	14.54	0.10	0.00	14.59
101	3001255	3001252	150	64.6	62.43	14.46	15.01	PVC	3.95	**69.72**	1	3	0.023	0.070	69.65	0.052	0.156	69.57	1	3	0.05	0.05	69.67	1	3	0.05	0.05	69.67	1	3	0.05	0.05	69.67	1	3	0.05	0.05	69.67	1	3	0.023	0.070	69.65	0.05	0.05	69.67
102	3001252	3001249	150	62.43	56.51	33.1	17.89	PVC	4.31	**76.12**	1	3	0.023	0.094	76.02	0.052	0.208	75.91	1	3	0.05	0.10	76.01	1	3	0.05	0.10	76.01	1	3	0.05	0.10	76.01	1	3	0.05	0.10	76.01	1	3	0.023	0.094	76.02	0.05	0.10	76.01
103	3001249	2700595	150	56.51	55.56	73	1.30	PVC	1.16	**20.53**	3	9	0.070	0.164	20.37	0.156	0.365	20.17	53	159	2.76	2.86	17.67	203	609	10.57	10.68	9.86	303	909	15.78	15.89	4.65	403	###	20.99	21.09	-0.56	533	1599	12.492	12.586	7.95	27.76	27.86	-7.33
104	2700595	2700644	150	55.56	55	51.54	1.09	PVC	1.06	**18.76**	2	6	0.047	0.211	18.55	0.104	0.469	18.29	2	6	0.10	2.97	15.79	2	6	0.10	10.78	7.98	2	6	0.10	15.99	2.77	2	6	0.10	21.20	-2.44	2	6	0.047	12.633	6.13	0.10	27.97	-9.21
105	2700644	2670059	150	55	54.52	40.912	1.17	PVC	1.10	**19.50**	4	12	0.094	0.305	19.19	0.208	0.677	18.82	4	12	0.21	3.18	16.32	4	12	0.21	10.99	8.51	4	12	0.21	16.20	3.30	4	12	0.21	21.41	-1.91	4	12	0.094	12.727	6.77	0.21	28.18	-8.68
106	2670059	2670743	150	54.52	53.29	61.372	2.00	PVC	1.44	**25.48**	3	9	0.070	0.375	25.11	0.156	0.833	24.65	3	9	0.16	3.33	22.15	3	9	0.16	11.15	14.33	3	9	0.16	16.35	9.13	3	9	0.16	21.56	3.92	3	9	0.070	12.797	12.68	0.16	28.33	-2.85
107	2670743	2658858	150	53.29	52.89	59.15	0.68	PVC	0.84	**14.80**	7	21	0.164	0.539	14.26	0.365	1.198	13.60	7	21	0.36	3.70	11.10	7	21	0.36	11.51	3.29	7	21	0.36	16.72	-1.92	7	21	0.36	21.93	-7.13	7	21	0.164	12.961	1.84	0.36	28.70	-13.90
-	2658858	2666178	150	52.89	52.69	17.6	1.14	PVC	1.09	**19.19**	0	0	0.000	0.539	18.65	0.000	1.198	17.99	0	0	0.00	3.70	15.49	0	0	0.00	11.51	7.68	0	0	0.00	16.72	2.47	0	0	0.00	21.93	-2.74	0	0	0.000	12.961	6.23	0.00	28.70	-9.51
108	2666178	2663617	150	52.69	52.42	28.11	0.96	PVC	1.00	**17.64**	1	3	0.023	0.563	17.08	0.052	1.250	16.39	1	3	0.05	3.75	13.89	1	3	0.05	11.56	6.08	1	3	0.05	16.77	0.87	1	3	0.05	21.98	-4.34	1	3	0.023	12.984	4.66	0.05	28.75	-11.11
109	2663617	2662644	150	52.42	51.6	24.3	3.37	PVC	1.87	**33.06**	1	3	0.023	0.586	32.48	0.052	1.302	31.76	1	3	0.05	3.80	29.26	1	3	0.05	11.61	21.45	1	3	0.05	16.82	16.24	1	3	0.05	22.03	11.03	1	3	0.023	13.008	20.05	0.05	28.80	4.26
110	2662644	2700021	150	52.5	49.5	42.075	7.13	PVC	2.72	**48.06**	4	12	0.094	0.680	47.38	0.208	1.510	46.55	4	12	0.21	4.01	44.05	4	12	0.21	11.82	36.24	4	12	0.21	17.03	31.03	4	12	0.21	22.24	25.82	4	12	0.094	13.102	34.96	0.21	29.01	19.05
111	2700021	2664734	150	49.5	46	37.5	9.33	PVC	3.11	**54.99**	3	9	0.070	0.750	54.24	0.156	1.667	53.32	3	9	0.16	4.17	50.82	3	9	0.16	11.98	43.01	3	9	0.16	17.19	37.80	3	9	0.16	22.40	32.59	3	9	0.070	13.172	41.81	0.16	29.17	25.82
112	2664734	2667167	150	44.9	43.14	69.42	2.54	PVC	1.62	**28.66**	2	6	0.047	0.797	27.86	0.104	1.771	26.89	2	6	0.10	4.27	24.39	2	6	0.10	12.08	16.57	2	6	0.10	17.29	11.37	2	6	0.10	22.50	6.16	2	6	0.047	13.219	15.44	0.10	29.27	-0.61
113	2667167	2667814	150	43.14	42.54	24.14	2.49	PVC	1.61	**28.38**	8	24	0.188	0.984	27.39	0.417	2.188	26.19	8	24	0.42	4.69	23.69	8	24	0.42	12.50	15.88	8	24	0.42	17.71	10.67	8	24	0.42	22.92	5.46	8	24	0.188	13.406	14.97	0.42	29.69	-1.31
114	2667814	2663501	150	42.54	41.75	19.74	4.00	PVC	2.04	**36.01**	27	81	0.633	1.617	34.39	1.406	3.594	32.41	27	81	1.41	6.09	29.91	27	81	1.41	13.91	22.10	27	81	1.41	19.11	16.89	27	81	1.41	24.32	11.68	27	81	0.633	14.039	21.97	1.41	31.09	4.91
115	2663501	2667372	150	41.75	32.74	53.58	16.82	PVC	4.18	**73.81**	2	6	0.047	1.664	72.14	0.104	3.698	70.11	2	6	0.10	6.20	67.61	2	6	0.10	14.01	59.80	2	6	0.10	19.22	54.59	2	6	0.10	24.43	49.38	2	6	0.047	14.086	59.72	0.10	31.20	42.61
116	2667372	2660121	150	32.74	28.68	60.5	6.71	PVC	2.64	**46.63**	2	6	0.047	1.711	44.91	0.104	3.802	42.82	2	6	0.10	6.30	40.32	2	6	0.10	14.11	32.51	2	6	0.10	19.32	27.30	2	6	0.10	24.53	22.09	2	6	0.047	14.133	32.49	0.10	31.30	15.32
117	2660121	2665599	150	28.68	27.49	21.56	5.52	PVC	2.39	**42.28**	8	24	0.188	1.898	40.39	0.417	4.219	38.07	8	24	0.42	6.72	35.57	8	24	0.42	14.53	27.75	8	24	0.42	19.74	22.55	8	24	0.42	24.95	17.34	8	24	0.188	14.320	27.96	0.42	31.72	10.57
118	2665599	2661939	150	27.49	23.87	46.85	7.73	PVC	2.83	**50.03**	5	15	0.117	2.016	48.01	0.260	4.479	45.55	5	15	0.26	6.98	43.05	5	15	0.26	14.79	35.24	5	15	0.26	20.00	30.03	5	15	0.26	25.21	24.82	5	15	0.117	14.438	35.59	0.26	31.98	18.05
119	2661939	2667242	150	23.87	23.16	33.79	2.10	PVC	1.48	**26.09**	3	9	0.070	2.086	24.00	0.156	4.635	21.45	3	9	0.16	7.14	18.95	3	9	0.16	14.95	11.14	3	9	0.16	20.16	5.93	3	9	0.16	25.36	0.73	3	9	0.070	14.508	11.58	0.16	32.14	-6.05
120	2667242	2670701	150	23.16	20.69	68.89	3.59	PVC	1.93	**34.08**	6	18	0.141	2.227	31.85	0.313	4.948	29.13	6	18	0.31	7.45	26.63	6	18	0.31	15.26	18.82	6	18	0.31	20.47	13.61	6	18	0.31	25.68	8.40	6	18	0.141	14.648	19.43	0.31	32.45	1.63
121-126	2670701	2666310	150	20.69	18.89	62.36	2.89	PVC	1.73	**30.58**	65	195	1.523	3.750	26.83	3.385	8.333	22.25	65	195	3.39	10.83	19.75	65	195	3.39	18.65	11.93	65	195	3.39	23.85	6.72	65	195	3.39	29.06	1.52	65	195	1.523	16.172	14.41	3.39	35.83	-5.25
127	2666310	2658376	150	18.89	17.94	31.9	2.98	PVC	1.76	**31.06**	18	54	0.422	4.172	26.89	0.938	9.271	21.79	18	54	0.94	11.77	19.29	18	54	0.94	19.58	11.48	18	54	0.94	24.79	6.27	18	54	0.94	30.00	1.06	18	54	0.422	16.594	14.47	0.94	36.77	-5.71
128	2658376	2669653	150	17.94	16.58	68.45	1.99	PVC	1.44	**25.37**	5	15	0.117	4.289	21.08	0.260	9.531	15.84	5	15	0.26	12.03	13.34	5	15	0.26	19.84	5.53	5	15	0.26	25.05	0.32	5	15	0.26	30.26	-4.89	5	15	0.117	16.711	8.66	0.26	37.03	-11.66
129	2669653	2660918	150	16.58	15.17	41.94	3.36	PVC	1.87	**33.00**	5	15	0.117	4.406	28.59	0.260	9.792	23.21	5	15	0.26	12.29	20.71	5	15	0.26	20.10	12.90	5	15	0.26	25.31	7.69	5	15	0.26	30.52	2.48	5	15	0.117	16.828	16.17	0.26	37.29	-4.29
130	2660918	2665833	150	16	13.5	37.27	6.71	PVC	2.64	**46.61**	3	9	0.070	4.477	42.14	0.156	9.948	36.67	3	9	0.16	12.45	34.17	3	9	0.16	20.26	26.35	3	9	0.16	25.47	21.15	3	9	0.16	30.68	15.94	3	9	0.070	16.898	29.72	0.16	37.45	9.17
131	2665833	2665609	150	13.5	11.5	31.625	6.32	PVC	2.56	**45.26**	2	6	0.047	4.523	40.74	0.104	10.052	35.21	2	6	0.10	12.55	32.71	2	6	0.10	20.36	24.90	2	6	0.10	25.57	19.69	2	6	0.10	30.78	14.48	2	6	0.047	16.945	28.32	0.10	37.55	7.71
132	2665609	2660388	150	9.66	9.46	13.14	1.52	PVC	1.26	**22.21**	3	9	0.070	4.594	17.61	0.156	10.208	12.00	3	9	0.16	12.71	9.50	3	9	0.16	20.52	1.68	3	9	0.16	25.73	-3.52	3	9	0.16	30.94	-8.73	3	9	0.070	17.016	5.19	0.16	37.71	-15.50
133-141	2660388	2663991	150	9.46	8.87	70.56	0.84	PVC	0.93	**16.46**	140	420	3.281	7.875	8.58	7.292	17.500	-1.04	140	420	7.29	20.00	-3.54	140	420	7.29	27.81	-11.35	140	420	7.29	33.02	-16.56	140	420	7.29	38.23	-21.77	140	420	3.281	20.297	-3.84	7.29	45.00	-28.54
142-143	2663991	2660756	150	8.87	8.14	73.94	0.99	PVC	1.01	**17.88**	15	45	0.352	8.227	9.66	0.781	18.281	-0.40	15	45	0.78	20.78	-2.90	15	45	0.78	28.59	-10.71	15	45	0.78	33.80	-15.92	15	45	0.78	39.01	-21.13	15	45	0.352	20.648	-2.76	0.78	45.78	-27.90
144-146	2660756	2658275	150	8.14	7.46	68.56	0.99	PVC	1.01	**17.92**	16	48	0.375	8.602	9.32	0.833	19.115	-1.19	16	48	0.83	21.61	-3.69	16	48	0.83	29.43	-11.50	16	48	0.83	34.64	-16.71	16	48	0.83	39.84	-21.92	16	48	0.375	21.023	-3.10	0.83	46.61	-28.69
147-149	2658275	2671309	150	7.46	7.22	23	1.04	PVC	1.04	**18.39**	24	72	0.563	9.164	9.22	1.250	20.365	-1.98	24	72	1.25	22.86	-4.48	24	72	1.25	30.68	-12.29	24	72	1.25	35.89	-17.50	24	72	1.25	41.09	-22.71	24	72	0.563	21.586	-3.20	1.25	47.86	-29.48
150	2671309	2671730	150	7.22	7.01	56.33	0.37	PVC	0.62	**10.99**	1	3	0.023	9.188	1.80	0.052	20.417	-9.43	1	3	0.05	22.92	-11.93	1	3	0.05	30.73	-19.74	1	3	0.05	35.94	-24.95	1	3	0.05	41.15	-30.16	1	3	0.023	21.609	-10.62	0.05	47.92	-36.93
-	2671730	2669302	150	7.01	6.87	8.16	1.72	PVC	1.33	**23.58**	0	0	0.000	9.188	14.39	0.000	20.417	3.16	0	0	0.00	22.92	0.66	0	0	0.00	30.73	-7.15	0	0	0.00	35.94	-12.36	0	0	0.00	41.15	-17.57	0	0	0.000	21.609	1.97	0.00	47.92	-24.34
151-152	2669302	2661210	150	6.87	6.81	54.55	0.11	PVC	0.34	**5.97**	4	12	0.094	9.281	-3.31	0.208	20.625	-14.66	4	12	0.21	23.13	-17.16	4	12	0.21	30.94	-24.97	4	12	0.21	36.15	-30.18	4	12	0.21	41.35	-35.39	4	12	0.094	21.703	-15.73	0.21	48.13	-42.16
-	2661210	3000712	175	8.41	8.16	4.9	5.10	PVC	2.55	**61.32**	0	0	0.000	9.281	52.04	0.000	20.625	40.70	0	0	0.00	23.13	38.20	0	0	0.00	30.94	30.39	0	0	0.00	36.15	25.18	0	0	0.00	41.35	19.97	0	0	0.000	21.703	39.62	0.00	48.13	13.20
-	3000712	3000707	355	8.16	7.02	87.4	1.30	PE	2.27	**224.92**	0	0	0.000	9.281	215.64	0.000	20.625	204.29	0	0	0.00	23.13	201.79	0	0	0.00	30.94	193.98	0	0	0.00	36.15	188.77	0	0	0.00	41.35	183.56	0	0	0.000	21.703	203.21	0.00	48.13	176.79
153-154	3000707	3000714	355	7.02	4	180.1	1.68	PE	2.58	**255.02**	4	12	0.094	9.375	245.64	0.208	20.833	234.19	4	12	0.21	23.33	231.69	4	12	0.21	31.15	223.87	4	12	0.21	36.35	218.66	4	12	0.21	41.56	213.46	4	12	0.094	21.797	233.22	0.21	48.33	206.69
155	3000714	2665823	355	4.02	4	16.4	0.12	PVC	0.63	**62.52**	34	102	0.797	10.172	52.35	1.771	22.604	39.92	34	102	1.77	25.10	37.42	34	102	1.77	32.92	29.60	34	102	1.77	38.13	24.40	34	102	1.77	43.33	19.19	34	102	0.797	22.594	39.93	1.77	50.10	12.42
156-158	2665823	2661420	450	4.02	3.85	83.4	0.20	C	0.88	**139.45**	72	216	1.688	11.859	127.59	3.750	26.354	113.09	72	216	3.75	28.85	110.59	72	216	3.75	36.67	102.78	72	216	3.75	41.88	97.57	72	216	3.75	47.08	92.36	72	216	1.688	24.281	115.17	3.75	53.85	85.59
159	2661420	2663919	150	3.85	3.71	62.5	0.22	C	0.44	**7.81**	6	18	0.141	12.000	-4.19	0.313	26.667	-18.86	6	18	0.31	29.17	-21.36	6	18	0.31	36.98	-29.17	6	18	0.31	42.19	-34.38	6	18	0.31	47.40	-39.59	6	18	0.141	24.422	-16.61	0.31	54.17	-46.36
160	2663919	2672243	225	3.71	3.54	37	0.46	C	0.83	**32.97**	7	21	0.164	12.164	20.81	0.365	27.031	5.94	7	21	0.36	29.53	3.44	7	21	0.36	37.34	-4.37	7	21	0.36	42.55	-9.58	7	21	0.36	47.76	-14.79	7	21	0.164	24.586	8.39	0.36	54.53	-21.56
161	2672243	2658412	450	3.54	3.42	13.6	0.88	C	1.82	**290.13**	18	54	0.422	12.586	277.54	0.938	27.969	262.16	18	54	0.94	30.47	259.66	18	54	0.94	38.28	251.85	18	54	0.94	43.49	246.64	18	54	0.94	48.70	241.43	18	54	0.422	25.008	265.12	0.94	55.47	234.66
-	2658412	2672852	450	3.42	3.11	70.7	0.44	C	1.29	**204.52**	0	0	0.000	12.586	191.94	0.000	27.969	176.55	0	0	0.00	30.47	174.05	0	0	0.00	38.28	166.24	0	0	0.00	43.49	161.03	0	0	0.00	48.70	155.82	0	0	0.000	25.008	179.51	0.00	55.47	149.05
-	2672852	2672588	375	3.11	2.96	46.18	0.32	C	0.98	**108.25**	0	0	0.000	12.586	95.67	0.000	27.969	80.28	0	0	0.00	30.47	77.78	0	0	0.00	38.28	69.97	0	0	0.00	43.49	64.76	0	0	0.00	48.70	59.55	0	0	0.000	25.008	83.24	0.00	55.47	52.78
162	2672588	2668353	375	2.96	2.82	69.6	0.20	C	0.77	**85.19**	310	930	7.266	19.852	65.34	16.146	44.115	41.07	310	930	16.15	46.61	38.57	310	930	16.15	54.43	30.76	310	930	16.15	59.64	25.55	310	930	16.15	64.84	20.34	310	930	7.266	32.273	52.91	16.15	71.61	13.57
-	2668353	2667998	300	2.82	2.62	45.8	0.44	C	0.98	**69.23**	0	0	0.000	19.852	49.38	0.000	44.115	25.11	0	0	0.00	46.61	22.61	0	0	0.00	54.43	14.80	0	0	0.00	59.64	9.59	0	0	0.00	64.84	4.38	0	0	0.000	32.273	36.95	0.00	71.61	-2.39
-	2667998	2660150	375	2.62	2.5	37.58	0.32	C	0.97	**107.33**	0	0	0.000	19.852	87.48	0.000	44.115	63.22	0	0	0.00	46.61	60.72	0	0	0.00	54.43	52.91	0	0	0.00	59.64	47.70	0	0	0.00	64.84	42.49	0	0	0.000	32.273	75.06	0.00	71.61	35.72
-	2660150	2659205	375	2.5	2.499	23	0.00	C	0.11	**12.52**	0	0	0.000	19.852	-7.33	0.000	44.115	-31.59	0	0	0.00	46.61	-34.09	0	0	0.00	54.43	-41.90	0	0	0.00	59.64	-47.11	0	0	0.00	64.84	-52.32	0	0	0.000	32.273	-19.75	0.00	71.61	-59.09
163	2659205	2669096	225	2.5	2.49	6.5	0.15	PVC	0.52	**20.81**	50	150	1.172	21.023	-0.21	2.604	46.719	-25.90	50	150	2.60	49.22	-28.40	50	150	2.60	57.03	-36.22	50	150	2.60	62.24	-41.43	50	150	2.60	67.45	-46.63	50	150	1.172	33.445	-12.63	2.60	74.22	-53.40

*Insufficient Invert Level info on GIS, grade determined from contours/interpolation.

Wastewater Capacity Assessment - Warkworth North



Legend

- WW Capacity Exceeded - Stubbs Stage 4
- WW Capacity Exceeded - Stubbs Stage 3
- WW Capacity Exceeded - Stubbs Stage 2
- WW Capacity Exceeded - Stubbs Stage 1
- WW Capacity Exceeded - Falls Rd Stage
- WW Mainline

WW - AC GIS

- Wastewater Retail Fitting
- Wastewater Retail Manhole
- Wastewater Retail Pipe
- Wastewater Retail Pump Station
- Wastewater Retail Structure
- Wastewater Wholesale Fitting
- Wastewater Wholesale Pipe
- WW Catchments (Gravity to Pump)
- WW Catchments (Pressure)
- WW Branches (Pressure)
- WW Branches (Gravity)
- WW Catchments (Gravity)

Contours

- AC 0.5m CONTOURS
- AC 0.5m CONTOURS 2
- AC 0.5m CONTOURS 3
- nz-river-centrelines-topo-150k
- NZ Parcels

Aerials

RGB_AZ31_10K_0205_2012

RGB_AZ31_10K_0204_2012

RGB_AZ31_10K_0203_2012

500 0 500 1000 1500 2000 m

Wastewater Capacity Assessment - Warkworth North

0 100 200 300 400 500 m

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RGB_AZ31_10K_0204_2012

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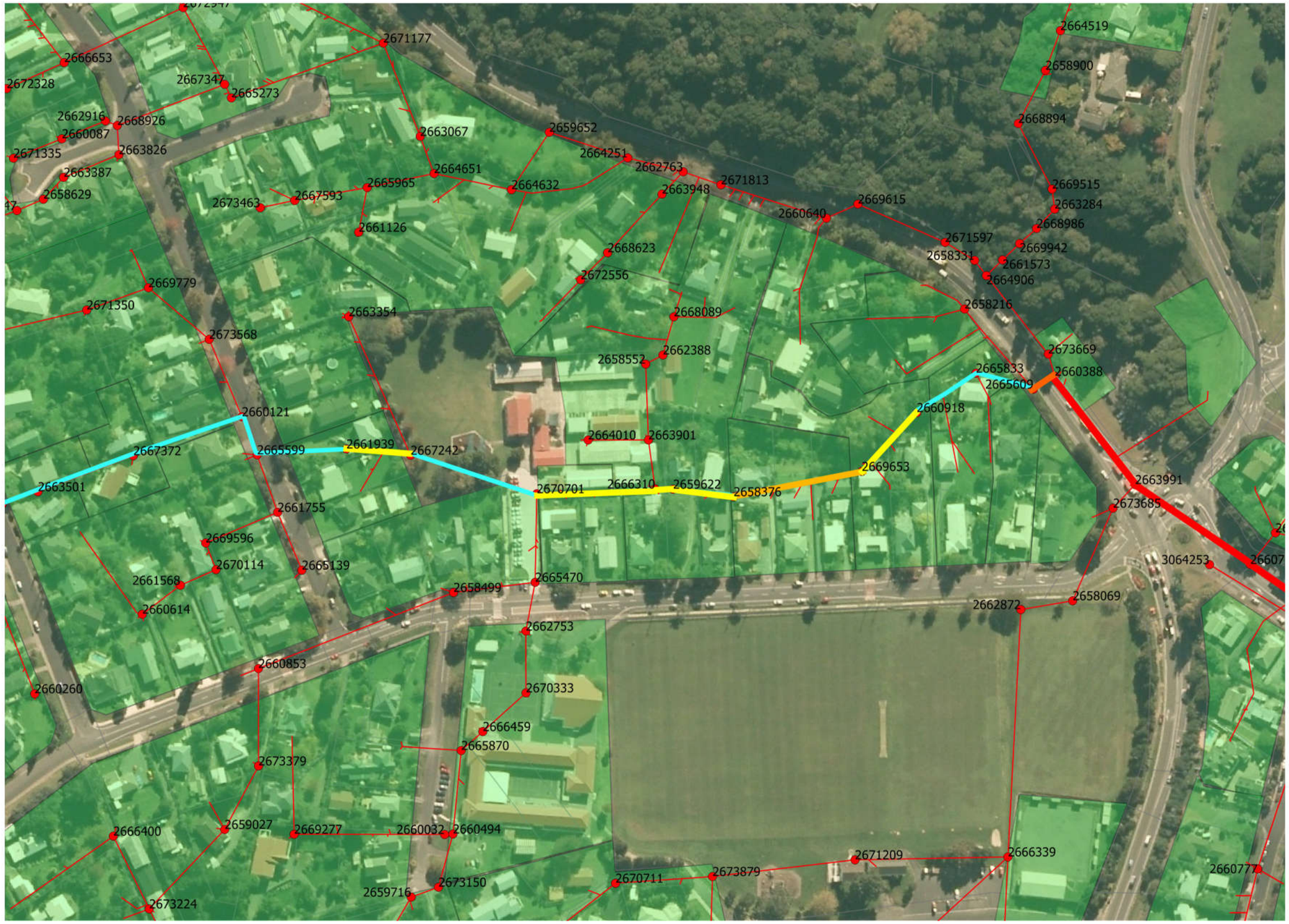
RGB_AZ31_10K_0205_2012

RGB_AZ31_10K_0204_2012

RGB_AZ31_10K_0203_2012

Wastewater Capacity Assessment - Warkworth North



0 100 200 300 400 500 m

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Aerials

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RGB_AZ31_10K_0204_2012

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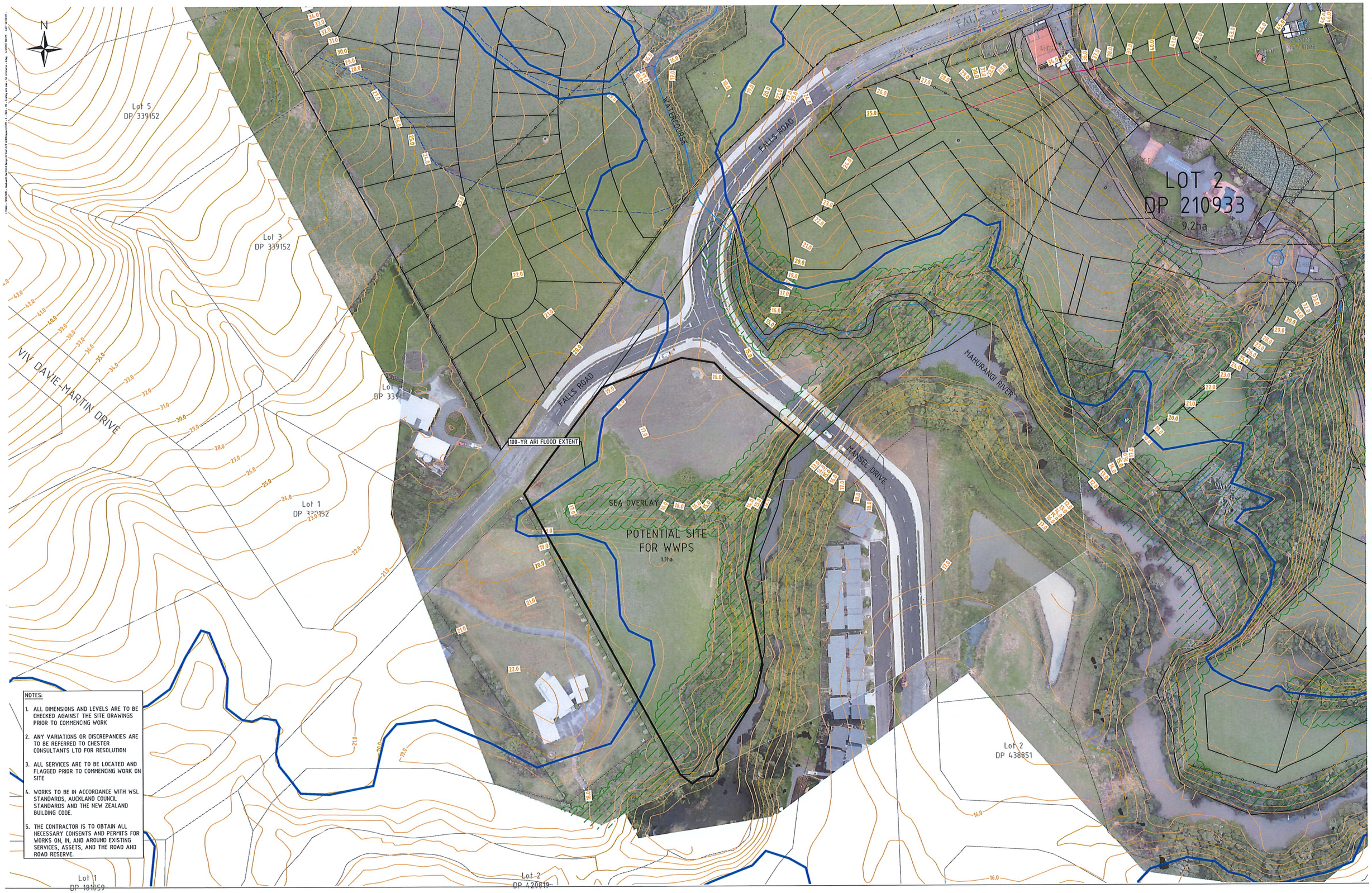
RGB_AZ31_10K_0204_2012

RGB_AZ31_10K_0203_2012



NOTES:

1. ALL DIMENSIONS AND LEVELS ARE TO BE CHECKED AGAINST THE SITE DRAWINGS PRIOR TO COMMENCING WORK
2. ANY VARIATIONS OR DISCREPANCIES ARE TO BE REFERRED TO CHESTER CONSULTANTS LTD FOR RESOLUTION
3. ALL SERVICES ARE TO BE LOCATED AND FLAGGED PRIOR TO COMMENCING WORK ON SITE
4. WORKS TO BE IN ACCORDANCE WITH WSL STANDARDS, AUCKLAND COUNCIL STANDARDS AND THE NEW ZEALAND BUILDING CODE.
5. THE CONTRACTOR IS TO OBTAIN ALL NECESSARY CONSENTS AND PERMITS FOR WORKS ON, IN, AND AROUND EXISTING SERVICES, ASSETS, AND THE ROAD AND ROAD RESERVE.

REV	DATE	AMENDMENTS	CHECKED

Design:	N. JULL
Date:	24.03.2017
Check:	S. RANKIN
Job No:	11085

Subject:	WARKWORTH NORTH - STRUCTURE PLAN
Client:	SF ESTATE LTD
Address:	NORTH WARKWORTH, AUCKLAND, NEW ZEALAND
Drawing Title:	EXISTING SITE PLAN

Drawing No:	110
Revision No:	0
Scale:	1:750 @ A1
Issued for:	PLAN CHANGE

CHESTER
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APPENDIX F: UTILITIES

Andrew Schunke

From: Grant Walker <Grant.Walker@chorus.co.nz>
Sent: Thursday, 15 December 2016 11:25 AM
To: Andrew Schunke
Cc: TSG; Network Scoping Team; Danny Masterson
Subject: RE: Warkworth North Structure Plan (Attention: Alex)

Hi Andrew,

Response to your queries in red below.

Happy to discuss further if required

Cheers

Danny - FYI

Grant Walker | Network Scoper
Chorus | **T :** +6479592915 | **M :**

From: Andrew Schunke [mailto:Andrew@chester.co.nz]
Sent: Tuesday, 13 December 2016 3:16 p.m.
To: TSG <TSG@chorus.co.nz>
Subject: Warkworth North Structure Plan (Attention: Alex)

Good afternoon Alex

Thank you for your time on the phone earlier today.

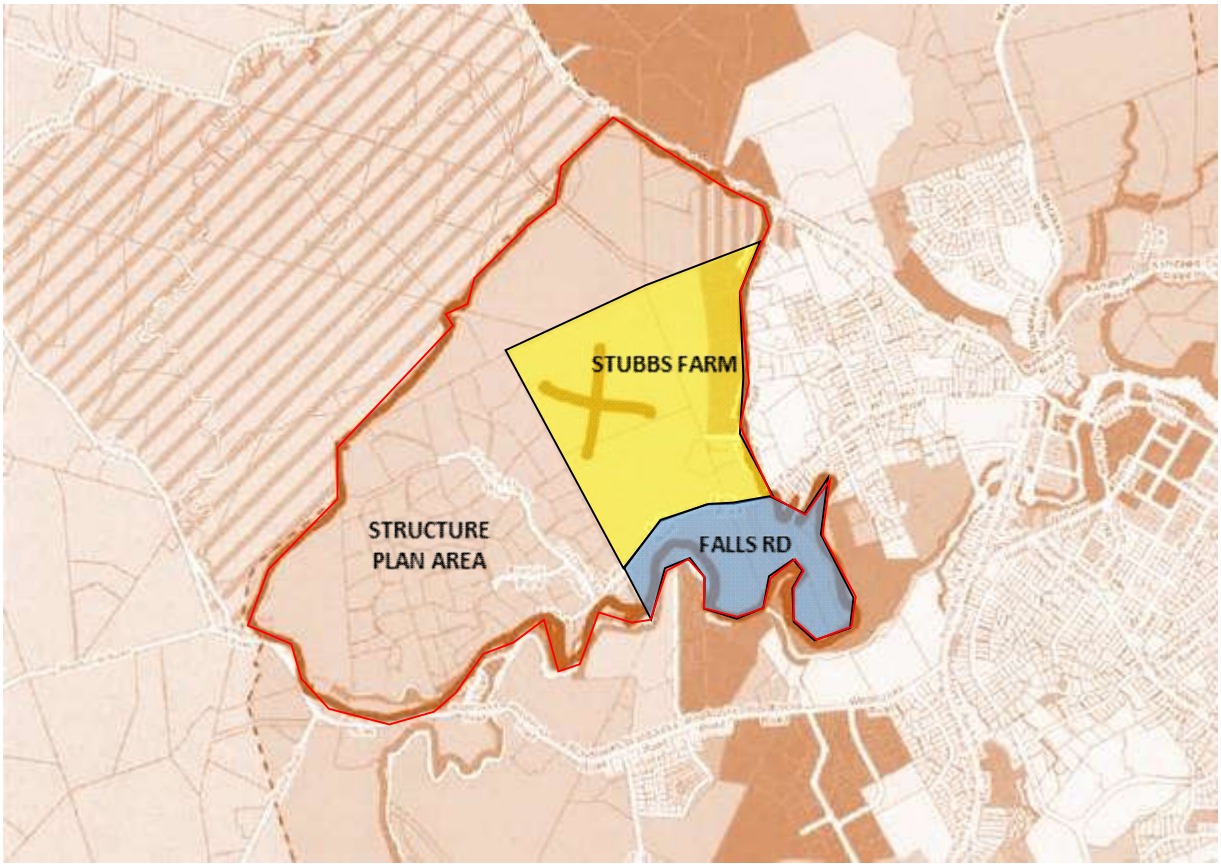
We have been engaged to provide engineering input for the proposed "Structure Plan" (map below), which includes how the development will be serviced by the various utilities.

The area is proposed for residential development and includes two initial proposed developments "Stubbs Farm" (approx. 600 lots) and "Falls Road" (approx 50 lots). The total area is likely to have in the range of 1200-1500 lots.

Can you please assist by providing the following information (or referring me on to someone who can) at your earliest convenience:

- Confirmation that the proposed development is able to be serviced by Chorus for telecommunication services Definitely
- Information about the existing telecommunications infrastructure in the area (eg. location/scale/capacity) Large capacity fibre-optic cable running along Falls Rd & Hudson Rd, with ducting in place to install more if/when required
- Advice whether the development can be serviced with fibre. Definitely. Chorus would not reticulate developments of this size with copper
- Identify any issues or constraints in provision of telecommunication services to the development None
- What (if any) overhead infrastructure would be required. None
- An estimate of cost to provide telecommunication services to the development, would also be helpful. You will receive this estimate shortly from TSG

I appreciate some of these questions may be difficult to answer. Please don't hesitate to contact me if you would like clarification.



Kind Regards

Andrew Schunke
Senior Civil Engineer BE(Civil)
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Chorus Network Services
PO Box 9405
Waikato Mail Centre
Hamilton 3200
Telephone: 0800 782 386
Email: tsg@chorus.co.nz

Chorus Ref: WW38201
Your Ref:

15 December 2016

Chester Consultants Ltd

Attention: Andrew Schunke

Dear Sir / Madam

SUBDIVISION RETICULATION - WW : Stubb Farm/ Falls Road development - 650 lots (Simple Estimate)

Thank you for your enquiry regarding the above subdivision.

Chorus is pleased to advise that, as at the date of this letter, we would be able to provide ABF telephone reticulation for this subdivision. In order to complete this reticulation, we require a contribution from you to Chorus' total costs of reticulating the subdivision. Chorus' costs include the cost of network design, supply of telecommunications specific materials and supervising installation. At the date of this letter, our estimate of the contribution we would require from you is $1,196,000.00 (including GST).

We note that (i) the contribution required from you towards reticulation of the subdivision, and (ii) our ability to connect the subdivision to the Chorus network, may (in each case) change over time depending on the availability of Chorus network in the relevant area and other matters.

If you decide that you wish to undertake reticulation of this subdivision, you will need to contact Chorus (see the contact details for Chorus Network Services above). We would recommend that you contact us at least 3 months prior to the commencement of construction at the subdivision. At that stage, we will provide you with the following:

- confirmation of the amount of the contribution required from you, which may change from the estimate as set out above;

- a copy of the Contract for the Supply and Installation of Telecommunications Infrastructure, which will govern our relationship with you in relation to reticulation of this subdivision; and

- a number of other documents which have important information regarding reticulation of the subdivision, including - for example - Chorus' standard subdivision lay specification.

Yours faithfully

Ruthie Coltrane
Network Services Coordinator