ARAWA ROAD - ESZ

System Curve Calculation (Hazen-Williams Formula)

C:\Users\lmc1\Downloads\[Copy Arawa Road analysis and refernce information PvdBerg 05 2024.xls]Arawa Rd 2016 (Hazen-Williams)

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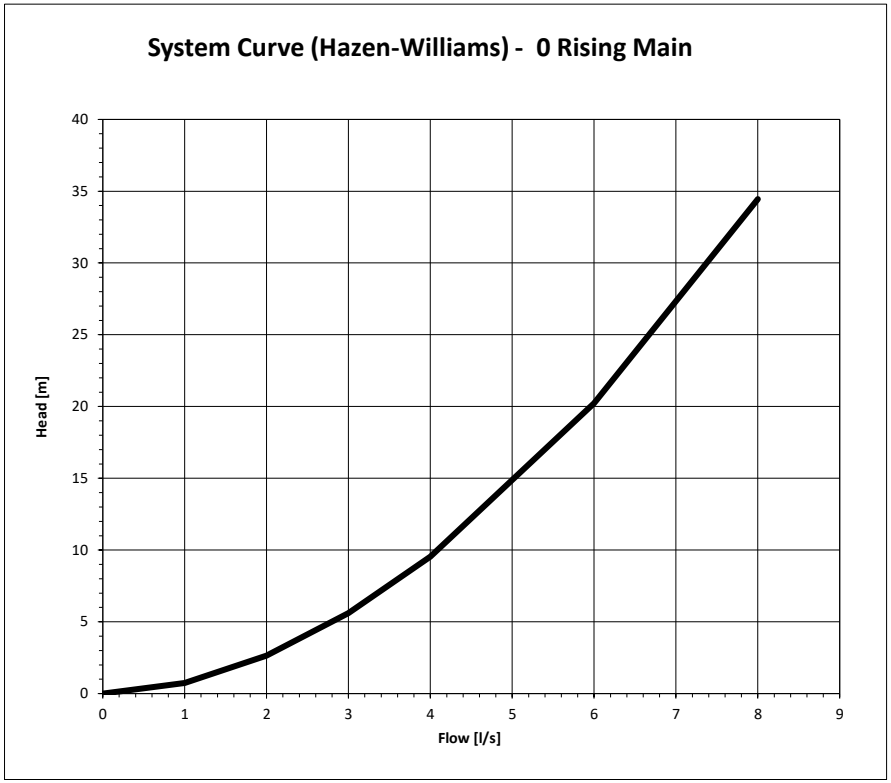
Flow	[l/s]	0	1	2	3	4	6	8
Flow	[m^3/s]	0	0.0010	0.0020	0.0030	0.0040	0.0060	0.0080
RISING MAIN								
Pipe OD	[mm]							
Pipe ID	[mm]	93						
Pipe Roughness		140	Hazen 'C'					
Mainline Length	[m]	2100						
Pipe Area	[m^2]	0.006793						
Velocity	[m/s]	0.00	0.15	0.29	0.44	0.59	0.88	1.18
Hydraulic Radius	[m]	0.02325						
Friction Loss	[m/m]	0.000	0.000	0.001	0.003	0.004	0.009	0.016
FRICTION LOSSES								
Rising Main Loss	[m]	0.00	0.70	2.52	5.34	9.09	19.26	32.81
MINOR LOSSES								
Minor Losses (5%)	[m]	0.000	0.035	0.126	0.267	0.454	0.963	1.640
SYSTEM CURVE	**[m]**	**0.00**	**0.73**	**2.64**	**6**	**9.54**	**20.22**	**34.45**



Arawa Road Pongakawa, 2.01 km 100mm NB MDPE Water main.

elevation at pipe start	mRL	5	5	5	5	5	5
pressure at pipe start		65	65	65	65	65	65
head losses through pipe		0.73	2.64	5.60	9.54	20.22	34.45
elevation at pipe end	mRL	5	5	5	5	5	5
elevation change	mRL	0	0	0	0	0	0
energy head at pipe start	m	70	70	70	70	70	70
energy head at pipe end	m	69	67	64	60	50	36
Pressure at pipe end	**m**	**64**	**62**	**59**	**55**	**45**	**31**

Calculations for typical average domestic demand on a reticulation system

		Current	Future	
Connections		64	93	
People / hh		3.1	3.1	
Daily demand /per		220	220	
Total daily demand		**43648**	**63426**	
Leakaage at 20%		8729		
TOTAL Demand		**52377**	**76111**	76111
Average Flow l/sec		0.61	0.88	1.76
Peak Factor 4.27	l/sec	**2.6**	**3.76**	**7.5152**
(above 30 dwellings)				
Usage over			24 HR	12HR

ARAWA ROAD - ESZ

System Curve Calculation (Hazen-Williams Formula)

C:\Users\lmc1\Downloads\[Copy Arawa Road analysis and refernce information PvdBerg 05 2024.xls]Hazen Williams Exist 100mm main

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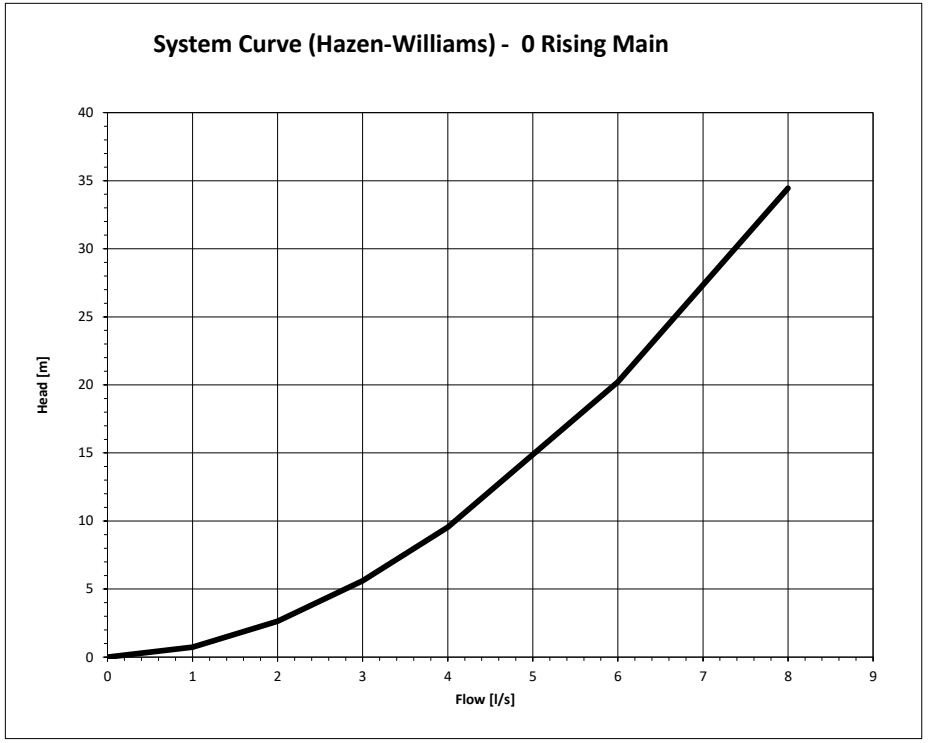
Flow	[l/s]	0	1	2	3	4	6	8
Flow	[m^3/s]	0	0.0010	0.0020	0.0030	0.0040	0.0060	0.0080
RISING MAIN								
Pipe OD	[mm]							
Pipe ID	[mm]	93						
Pipe Roughness		140	Hazen 'C'					
Mainline Length	[m]	2100						
Pipe Area	[m^2]	0.006793						
Velocity	[m/s]	0.00	0.15	0.29	0.44	0.59	0.88	1.18
Hydraulic Radius	[m]	0.02325						
Friction Loss	[m/m]	0.000	0.000	0.001	0.003	0.004	0.009	0.016
FRICTION LOSSES								
Rising Main Loss	[m]	0.00	0.70	2.52	5.34	9.09	19.26	32.81
MINOR LOSSES								
Minor Losses (5%)	[m]	0.000	0.035	0.126	0.267	0.454	0.963	1.640
SYSTEM CURVE	**[m]**	**0.00**	**0.73**	**2.64**	**6**	**9.54**	**20.22**	**34.45**



Arawa Road Pongakawa, 2.01 km 100mm NB MDPE Water main.

reservoir top elevation = 68m

elevation at pipe start	mRL	5	5	5	5	5	5
pressure at pipe start		63	63	63	63	63	63
head losses through pipe		0.73	2.64	5.60	9.54	20.22	34.45
elevation at pipe end	mRL	7	7	7	7	7	7
elevation change	mRL	-2	-2	-2	-2	-2	-2
energy head at pipe start	m	68	68	68	68	68	68
energy head at pipe end	m	67	65	62	58	48	34
Pressure at pipe end	**m**	**60**	**58**	**55**	**51**	**41**	**27**

Calculations for typical average domestic demand on a reticulation system

		Arawa		+ Penelope		+ Pencarrow		
Connections		64		29		130		223
People / hh		3.1		3.1		3.1		3.1
Daily demand /per		220		220		220		220
Total daily demand		**43648**		**19778**	**0**	**88660**	**0**	**152086**
Leakage at 20%		8729		3955.6	0	17732	0	30417.2
TOTAL Demand		**52377**		**23733.6**	**0**	**106392**	**0**	**182503.2**
Average Flow l/sec		0.61		0.88		1.23		
Peak Factor 4.27	l/sec	**3.05**	**0.00**	**3.76**	**0.00**	**5.26**		
(above 30 dwellings)								
Usage over				24 HR				

3.05 + 0.88 + 1.23 = 5.2 l/sec

System Curve Calculation (Hazen-Williams Formula)

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Flow	[l/s]	0	10	20	25	40	50	60
Flow	[m^3/s]	0	0.010	0.020	0.025	0.040	0.050	0.060

RISING MAIN

Pipe OD	[mm]							
Pipe ID	[mm]	191						
Pipe Roughness		140	Hazen 'C'					
Mainline Length	[m]	2100						
Pipe Area	[m^2]	0.0286521						
Velocity	[m/s]	0.00	0.35	0.70	0.87	1.40	1.75	2.09
Hydraulic Radius	[m]	0.04775						
Friction Loss	[m/m]	0.000	0.001	0.003	0.004	0.009	0.014	0.020

FRICTION LOSSES

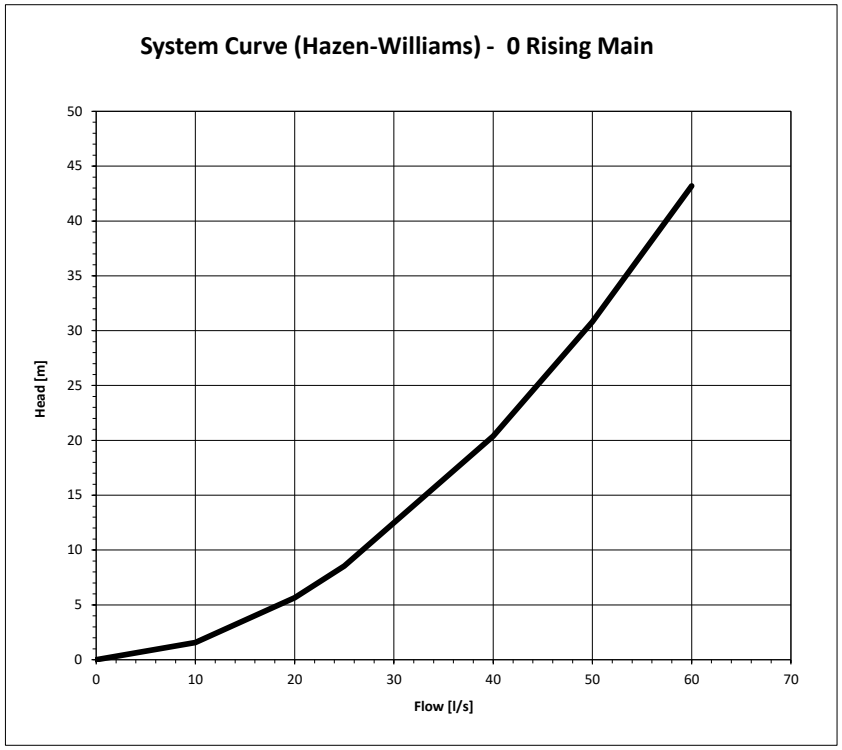
Rising Main Loss	[m]	0.00	1.49	5.38	8.13	19.42	29.35	41.14

MINOR LOSSES

Minor Losses (5%)	[m]	0.000	0.075	0.269	0.407	0.971	1.468	2.057
SYSTEM CURVE	**[m]**	**0.00**	**1.56**	**5.65**	**9**	**20.39**	**30.82**	**43.20**

SH2 Main from Kaikokopu to Arawa Rd

elevation at pipe start	mRL	5	5	5	5	5	5
pressure at pipe start	m	63	63	63	63	63	63
head losses through pipe	m	2	6	9	20	31	43
elevation at pipe end	mRL	7	7	7	7	7	7
elevation change	m		-2	-2	-2	-2	-2
energy head at pipe start	m	68	68	68	68	68	68
energy head at pipe end	m	66	62	59	48	37	25
Pressure at pipe end	**m**	**59**	**55**	**52**	**41**	**30**	**18**



50 l/sec and 31 meters head loss

Budget Tracking - Western Bay Pump Station 25 customers

Company	Project Description	Due Date for Completion	Quote Rec'd (Objective Ref)	Purchase Order / Contract No.	Quote Cost (Plus GST)
Mishmish	Archaeology				NA
CKL	Design work				NA
CKL					NA
CKL					NA
Consultant Designer	Design works				NA
Civil Construction	Physical Works				NA
Waiotahi	VO - tank & pump area ground prep				$ 107,115.47
Bay Pumps	Booster Pump Station				$ 15,318.75
Bay Pumps	Boost pump 5 l/sec				$ 12,181.31
Tiaki	As-builts				$ 9,840.00
The Shed Shop	Pump Shed				$ 11,000.00
Eagle Eye	Electrical				$ 120.00
Eagle Eye	Electrical				$ 2,695.00
Eagle Eye	Pillar Supply Installation				$ 53,580.00
Eagle Eye	Internal Electrical for Pump Station				$ 41,845.08
Sub Total					$ 253,695.61
	50 l/sec pump set add $55,000 for dual pump system with VSDs				55,000
Total					**$ 308,695.61**

	Western Bay new 30 customers					
1	**PUMP STATION WORKS - Bay Pumps**	**Qty**	**Unit**	**Rate**	**Total**	
1.1	**Supply and install:**					41432
	3m x 4m Shed with barn door and entry door (estimate 4 week build time , they will build onsite once floor is done) Shed will be fully lined with 12mm ply except for doors. 1 x 100mm Khrone zero rated mag meter with 10m cable, wall mount convertor and potting of meter terminations. (currently in stock) Installation of an ARV Full plumbing in shed with S/S 100mm Pipe Duel Lowara Sv pumpset without drives but includes pressure transducers and over temp switches. Full labour for the above works					
	Subtotal:					**41432**
2	**Electrical - Steve and Downers**					
2.1	Electrical Design - Steve		LS			10000
2.2	Physical works: switchboard, VSD and analysers - PO 58339		LS			73974.91
	Subtotal:					**83974.91**
3	**Controls - NZ Controls**					
3.1	Supply, install and commission controls for new PS - PO 57950		LS			7762
	Supply unmanaged 8 port switch - PO 58857		LS			406
	Subtotal:					**8168**
4	**Watermain Installation and Civil Works - Loveridge**					
4.1	Concrete slab, ground improvement, pipe connections and commision - PO 58354	1	LS			42642
	Subtotal:					**42642**
5	**Design and Documentation - CKL**					
5.1	Design Review and Documentation - Drawings and Specs	1	LS			10000
	V01 - Additional Works	1	LS			1225
						0
	Subtotal:					**11225**
	All				**TOTAL**	**187441.91**
	Note for 20 house pump.					
	Add 55,000 for 50 l/sec dual pump system with VSDs					55,000
	TOTAL					**242,442**

Table 11.1 Pricing Schedule for 1 X FBE Steel Panel Tank 300m3		
Item	Description	Amount excl.
P & G	Preliminaries and General in including Health & Safety to latest specifications	$7,300.00
Foundation design	Supply adjusted engineering design drawings for civil concrete foundations to latest specifications	$8,629.20
Tank	Supply and construction of 1 x Fusion Bonded Epoxy storage tank and ancillaries as set out in tables 8.1 and 9.1	$147,630.41
	Supply and construction of 1 X reinforced concrete foundations as set out in table 7.1	$59,637.82
Scour	Supply and installation of 1 x 100nb scour pipe	$7,866.17
Leak testing	Undertake 3 day leak test on tanks	$5,961.96
	TOTAL INVESTI	$243,455.83 +GST NZD

Tank Specifications	
Diameter:	8.529 metres
Floor area:	57.267 m²
Wall height:	6.338 metres less 125mm in the rebate
Gross capacity:	355.799 m3
Finished floor level:	0.000 RL (Assumed)
Topwater level:	5.239 RL
Bottom water level:	0.000 RL
Eaves level:	6.213 RL) Freeboard: 974 mm
Nett capacity:	300.00 m3 (Between TWL and BWL)
Water height: 5,239 mm (Between TWL and FFL)	
Application: Potable water	
Ancillaries: 1 x 800mm epoxy coated mild steel low level manway	

Budget - Option 2 - Pencarrow - Reservoir and Pump system			
item	description	unit	Cost ex GST
1	Pump Station and switchboard power	incl'	310,000
2	Reservoir	incl'	275,000
3	Pipework, control valves on site	PC	30,000
4	Telemetry, comms, controls, monitors	PC	60,000
5	Site / civil / security / access	PC	65,000
6	Land value	300m2	200,000
	Total estimate ex GST		**$ 940,000.00**

Budget - Option 1 - Pencarrow - New Water Main upgrade		
Item	Summary of Prices	
1	Preliminary and General	79140
2	Sediment Control and Environmental Works	8500
3	Traffic Management	62500
4	Works	753925
5	Sundry and Provisional items	50000
	Total estimate ex GST	**$ 954,065.00**

Water Main - SH2 Kaikokopu to Arawa Road - 250 OD PE100 class PN13.6.

Item	Description	Unit	Quantity	Rate	Amount
1	**Preliminary and General**				
1.1	Establishment and Disestablishment	L.S.	1	2,500	2,500
1.2	Supervision and Communication	L.S.	1	8,000	8,000
1.3	Documentation, Bonds and Insurances	L.S.	1	2,500	2,500
1.4	Site Specific Health and Safety Plan	L.S.	1	320	320
1.5	Traffic Management Plans	L.S.	1	2,500	2,500
1.6	Environmental Management Plan	L.S.	1	480	480
1.7	Contractor's Quality Plan	L.S.	1	640	640
1.8	Location of Services	L.S.	1	55,000	55,000
1.9	Construction Progress Reports	L.S.	1	1,200	1,200
1.10	As-Built Information	L.S.	1	6,000	6,000
	Subtotal section 1 carried to summary				**79,140**
2	**Sediment Control and Environmental Works**				
2.1	Sediment Control Works for duration of contract	L.S.	1	2,500	2,500
2.2	Dust Control	L.S.	1	2,500	2,500
2.3	Catchpit inlet Protection	L.S.	1	3,500	3,500
	Subtotal section 2 carried to summary				**8,500**
3	**Traffic Management**				
3.1	Hire TM services, all equipment, set up and monitoring	per week	5	12,500	**62,500**
	Subtotal section 3 carried to summary				**########**
4	**Works**				
4.1	supply and install watermain 250 OD SDR13.6 PE100	m	2100	300	630,000
4.2	connect new 250 OD SDR13.6 PE100 water main to existing 300mm PE pipe.	L.S.	1	22,500	22,500
4.3	connect to Arawa Rd retic	L.S.	1	12,500	12,500
4.4	transfer connections	L.S.	15	895	13,425
4.5	connections to development	L.S.	1	15,500	15,500
4.6	Sundry construction from design	P.C.	1	60,000	60,000
					-
	Subtotal section 4 carried to summary				**753,925**
5	**Sundry and Provisional items**				
5.1	Change alignment for services clashes	L.S	1	50,000	50,000
	Subtotal section 5 carried to summary				**50,000**

	Summary of Prices	
1	Preliminary and General	**79140**
2	Sediment Control and Environmental Works	**8500**
3	Traffic Management	**62500**
4	Works	**753925**
5	Sundry and Provisional items	**50000**
	TOTAL	**$ 954,065**