MEMORANDUM

To: Lark Enterprises Ltd.
att'n: Mr. Malek Tawashy

From: CTQ Consultants Ltd.

CC:

Date: 2017-July-15

Project: Summerland Independent and Assisted Living – Okanagan Vistas

Re: Concept Servicing Memo – Revised Site Configuration

Section 1 – Existing Utilities Layout

The subject properties are bounded by Bristow Rd to the west, Latimer Avenue to the east, MacDonald Place to the north and by residential properties accessed via Webb Crescent to the south. The proposed development Scheme 6, as outlined by Derek Crawford Architect Inc., is referenced in CTQ's drawings. There are 289 units, downsized from the 332 units originally proposed.

The District of Summerland operates and maintains its own Geographic Information System (GIS) mapping database and provides Public access via the internet. Utility networks are mapped in relation to legal property boundaries for the entire District. After researching this website in relation to the subject properties, CTQ requested the mapping data from District GIS staff. The data was provided in digital format and included 3D points and features to enable CTQ to complete terrain modeling.

GIS Features provided for the utilities in the subject area included the Sanitary Sewer collection system, Water distribution system and Electrical distribution system. A Storm drainage piping system was noted by District staff to be non-existent in this area. Further queries determined that a storm sewer piping system exists approximately 160 meters away from the site along public road right-of-way.

A Letter to Applicant (LA) was prepared by District of Summerland Development Services on June 17th, 2016 outlining the need for more information to be provided regarding servicing. This revised report provides the information requested relative to onsite Civil servicing.

Drawing SK-00 depicts a composite map of the existing utilities surrounding the subject properties. It also presents contours produced by terrain modeling software.

Section 2 – Sanitary Sewer

The District's sanitary sewer collection system includes piping along Latimer Avenue at the lower elevations of the subject properties. The collection system then continues downhill to Lakeshore Drive and on to Lift Station #3 at Lakeshore Drive South and Butler Street.

Record data from the District indicates a tie-in elevation on Latimer Avenue that would enable gravity collection from all proposed buildings on the subject properties. The tie invert is approximately 394.2 meters. It should be noted that if the two lowest Parkade levels require sanitary sewer connections then a lift pump station will need to be utilized, the design of this station will be the responsibility of the Mechanical Engineer.

A sanitary service for the site is proposed to be a 200mm diameter pipe. Peak Design flow from the development is estimated to be 8.4 l/sec. District staff asked (in the LA) to have the consultant determine the effect of this additional flow on downstream piping and on Lift Station #3.

CTQ has completed a preliminary review of the downstream sanitary sewer and it's capacity and we believe there is sufficient spare capacity in the system to accommodate the addition of this development. We will work with the District during the detailed design process to confirm this in more detail. At this stage we reviewed the peak flows of the contributing area along with reviewing the pump station data obtained from the District. Utilizing just the peak flow information indicated spare capacity and as this is a conservative view if the system was modelled we should see an even better result.

Drawing SK-01 shows a proposed onsite collection network in schematic form.

Section 3 – Storm Drainage

The District currently has no storm drainage system within the immediate area of the subject property. The only feasible connections points would be a 250mm PVC main at the east end of Hill Crescent and a 300mm PVC main at the west end of Gowans Street. Since there is no storm infrastructure directly adjacent to the proposed development, the storm drainage will be captured and stored on site then released into adjacent natural drainage course.

The storm drainage system is designed to handle the post-development 100 year storm event while retaining a maximum release rate equal to the pre-development 10 year storm event. Design parameters, such as rainfall intensities and run-off coefficients, are as found in the District of Summerland - Master Drainage Plan (2009). The storm drainage system will be comprised of a proposed 375mm diameter pipe network that conveys all storm flows to a quality control manhole, 175 cu.m storage tank and flow control manhole which allows a max release rate of 113 LPS. The treatment unit to be used will be an approved stormwater treatment system and will be designed to treat the 2yr flow by removing oil, grease, and sediment from the stormwater. Treatment of 135 L/s is required to treat the 2yr-1hr storm event. The outlet location is a natural drainage path at the southeast corner of the site.

Drawing SK-02 shows a proposed onsite collection network in schematic form.

Section 4 – Water Distribution and Fire Protection

The subject properties are bordered by water distribution piping in three different pressure zones, namely PZ568m, PZ502m and PZ460m. These zones were determined from elevation and pressure readings provided by District's Water Department staff. The highest proposed building floor elevation was estimated to be approximately 420m, therefore the PZ460m zone would provide an adequate service pressure to the site. This pressure zone includes a 250mm diameter main along Latimer Avenue fronting the development indicating a water service from that zone is feasible.

A simple computer model depicting existing piping on Latimer Avenue and proposed piping onsite was created by CTQ in WATERGEMS software. The District's PRV #7 downstream pressure setting was set as a source Hydraulic Grade Line (HGL). Along with input of Maximum Daily Demands (MDD) for each building, various commercial fire flow demands at a possible hydrant location at the highest building were modeled. The MDD is estimated to be 23.5 l/sec total for all buildings. This value is based on a total population of 679 people equal to 2.35 people per unit as per the District bylaw 99-004. This per unit population figure should be verified by the District of Summerland for this type of residential development

A 150 l/sec fire flow was incorporated in the model. The scenario of MDD and Fire flow was run and resulted in a minimum residual pressure of approximately 30 psi at the highest building floor. The velocities in all pipe sections were less than the maximum 4 m/sec allowed.

The fire flow tested is in line with accepted practise for design of commercial zone fire protection. The proposed building size, construction materials, use of sprinklers and proximity to other structures will be aligned so that Fire Underwriters Survey calculations show a 150 l/sec max fire flow.

District Staff will model (at a cost as per LA) the proposed water demand to confirm serviceability. They are to be asked to verify the population per unit, the corresponding MDD of 23.5 l/sec and the fire flow of 150 l/sec.

Drawing SK-03 shows a Conceptual onsite water service and hydrant location in schematic form. CTQ will coordinate with the mechanical consultant for any on-site hydrants, standpipes or Siamese's that will be required.

Section 5 – Access Road and Site Circulation

We have reviewed the site access based on information provided and feel that a grade of 6% to 8% is achievable. We have completed site circulation for emergency vehicles and as the plan develops additional site circulation will be carried out to ensure that fire trucks, delivery vehicles and waste collection can be accommodated.

Maximum grades across parking areas should not exceed 4% if possible. If this is not possible wider parking stalls should be used to minimise door swing damage.

We understand from discussions with the District while they do not have a ladder truck at this stage one is planned for so we should allow for this in our circulation design. The site will need to accommodate a ladder truck due to the size and height of the buildings.

Prepared by CTQ:

Harry Byl, AScT

Senior Designer

Reviewed by CTQ:

Matt H. Cameron, P.Eng., FEC

Project Engineer

TO EX PRV 7 AT SOLLY RD AND LATIMER AVE

EXISTING PRV 8
HGL IN = 568m
HGL OUT = 502m

FROM EX PRV 7
HGL = 456M

MacDONALD PL

LATIMER AVE

GILLESPIE PL

GILLESPIE RD

HILL CRES

BANKS CRES

BRISTOW RD

LYNX AVE

GOWANS

LA

BLDG A
10x1 BDR
75x2 BDR

BLDG B
5x1 BDR
60x2 BDR

BLDG C
70x1 BDR
10x2 BDR

BLDG D
12x1 BDR
6x2 BDR

BLDG E
5x1 BDR
30x2 BDR

LINE OF PARKADE UNDER

POSSIBLE 250 WATER WORKS SERVICE

250 PVC WAT

200 SAN

200 SAN

POSSIBLE 200 SAN SERVICE – INVERT AT PL 394.2m

WATER RESERVOIR

4-119
4-125
4-131
4-132
4-057
4-059
4-060
4-062
4-063
4-064
4-065
4-066
4-067
4-068
4-069
4-070
4-071
4-073
4-074

SAN CONTINUES TO LAKESHORE DRIVE

SAN TIE–IN DATA
LATIMER AVE AT BANKS CRES

SAN MH 4–067 RIM 400.9 INV 399.0
SAN MH 4–066 RIM 396.9 INV 394.0

COLOUR KEY

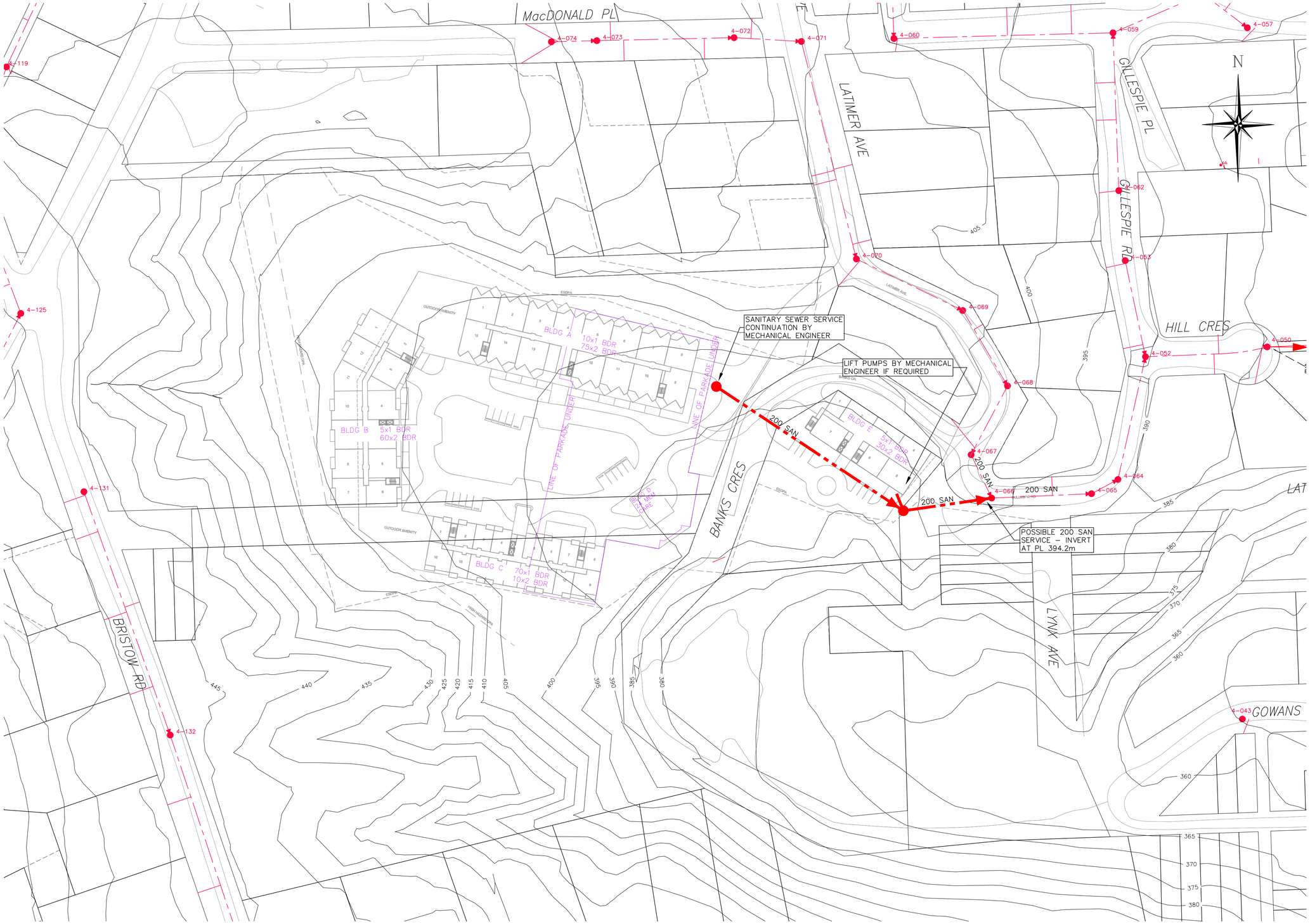
- SANITARY SEWER
- STORM DRAINAGE
- WATER DISTRIBUTION
- ELECTRICAL SYSTEM
  - –DASHED = U/GROUND
  - –SOLID = OVERHEAD

SUMMERLAND
INDEPENDENT AND ASSISTED LIVING
GENERAL LAYOUT - UTILITIES

PROJECT No.16028
DRAWING No.SK-00
SCALE 1:750
May 18, 2016
REVISED JULY 12, 2016

CTQ

L:\General Data\Projects-2016\16028 – Summerland-Independent and Assisted Living\4-CAD\SKETCHES\16028-SK-00-UTILS.dwg July 14, 2016 Harry Byl



SAN CONTINUES TO LAKESHORE DRIVE

SAN TIE–IN DATA
LATIMER AVE AT BANKS CRES

SAN MH 4–067 RIM 400.9 INV 399.0
SAN MH 4–066 RIM 396.9 INV 394.0

BUILDING LOWEST FLOOR

UNDER BUILDINGS A, B, C AND D P1 LEVEL = 396.4
UNDER BUILDING E – LOWEST LEVEL = 390.6

SUMMERLAND
INDEPENDENT AND ASSISTED LIVING
SANITARY SEWER SERVICING

PROJECT No.16028
DRAWING No.SK-01
SCALE 1:750
June 15, 2016
REVISION DATE JULY 13, 2016

CTQ

L:\General Data\Projects-2016\16028 – Summerland-Independent and Assisted Living\4-CAD\SKETCHES\16028-SK-01-SANI.dwg July 14, 2016 Harry By

SANITARY FLOW CALCULATION SHEET

(Based on "District of Summerland Subdivision Development and Servicing Bylaw No. 99-004")

Project Name:	Summerland IL and AL	**By:**	hb
Project #:	16028	**Date:**	2016-03-22
Client Name:	Lark Group	**Rev:**	2016-07-12

Peak Design Flow From Formula $(Q_{PEAK} = Q_{AVG} * P_{FACTOR} + I)$

1. **Type of General Zoning:** — Resid - Independent and Assisted Living

2. **Density (Unit Method) =** (# of units)(people per unit)

# of units =	289	units
Area =	6.38	ha
People per unit based on general zoning densities =	2.35	people/unit
Population =	679	people

Density (Area Method) = (area)(people per hectare)

Area =	0.00	ha
People per Gross Hectare based on type of zoning =	0	people/Gross ha
Population =	0	people

3. **Peaking Factor =** $f * (1 + 14/(4 + (population/1000)^{0.5}))$

Total Population =	680	people
Reduction Factor based on development type, f =	0.75	
Peaking Factor, P_{FACTOR} =	2.93	

4. **Infiltration Rate =** (I)(Area)

Infiltration Rate =	5000	L/ha/day
Area =	6.38	ha
Infiltration Rate, I =	31900	L/day

5. **Average Flow =** (Domestic Flow Rate)(Total Population)

Domestic Flow Rate =	350	L/capita/day
Average Flow, Q_{AVG} =	238000	L/day

6. **Peak Design Flow =** $(Q_{AVG})(P_{FACTOR}) + (I)$

Peak Design Flow per Day, Q_{PEAK} =	728368	L/day
Peak Design Flow per Hour, Q_{PEAK} =	30349	L/hr
Peak Design Flow per Second, Q_{PEAK} =	8.43	LPS

NOTES:

Reduced from 331 to 289 units

N

LATIMER AVE

GILLESPIE RD

HILL CRES

BANKS CRES

LYNX AVE

BRISTOW RD

BLDG A
10x1 BDR
75x2 BDR

BLDG B
5x1 EDR
60x2 BDR

BLDG C
70x1 BDR
10x2 BDR

BLDG D
5x1 BDR
30x2 BDR

BLDG E
5x1 BDR
30x2 BDR

LINE OF PARKADE UNDER

STORM SERVICE CONTINUATION BY MECHANICAL ENGINEER

MRR = 113 LPS

175 cu.m STORAGE TANK

QUALITY CONTROL MANHOLE

SITE BOUNDARY

OVERLAND FLOW TO BE DIRECTED AWAY FROM BUILDING AND COLLECTED BY THE ONSITE DRAINAGE SYSTEM

CATCHMENT BOUNDARY
TOTAL AREA = 6.77 Ha.
WEIGHTED COEFFICIENT = 0.31

PRE-DEVELOPMENT AND POST-DEVELOPMEMT FLOWS OF THIS CATCHMENT ARE UNCHANGED

250ø PVC_STM

300ø PVC_STM

1600ø PVC STM

STM MH

STM MH
E INV. 381.70

NOTES:
1. STORM SEWER FLOWS AND STORAGE VOLUME DETERMINED USING RATIONAL METHOD. USING A WEIGHTED COEFFICIENT OF 0.30 AND A CONCENTRATION TIME OF 10 MINUTES.
2. RAINFALL INTENSITIES DERIVED FROM THE DISTRICT OF SUMMERLAND – MASTER DRAINAGE PLAN (2009).
3. PEAK FLOWS ARE BASED ON 1hr DURATION, 10yr AND 100yr RETURN PERIOD STORM EVENTS.
4. MAX RELEASE RATE (MRR) EQUAL TO 10yr PRE-DEVELOPMENT FLOW.

SUMMERLAND
INDEPENDENT AND ASSISTED LIVING
STORM SERVICING
PROJECT No.16028
DRAWING No.SK-02
SCALE 1:1500
July 14, 2016

CTQ

L:\General Data\Projects-2016\16028 - Summerland-Independent and Assisted Living\4-CAD\SKETCHES\16028-SK-02-STORM.dwg July 15, 2016 Dylan deSousa

TO EX PRV 7 AT SOLLY RD AND LATIMER AVE

MacDONALD PL

FROM EX PRV 7 HGL = 456m

EXISTING PRV 8
HGL IN = 568m
HGL OUT = 502m

LATIMER AVE

GILLESPIE PL

GILLESPIE RD

HILL CRES

N

WATER SERVICE CONTINUATION BY MECHANICAL ENGINEER

HYD

250 WAT

250 WAT

250 PVC WAT

WATER SERVICE CONNECTION TO EXISTING MAIN

BLDG A
10x1 BDR
75x2 BDR

BLDG B
5x1 BDR
60x2 BDR

BLDG C
70x1 BDR
10x2 BDR

BLDG D
24 MEM
CARE

BLDG E
5x1 BDR
30x2 BDR

LINE OF PARKADE UNDER

LINE OF PARKADE UNDER

BANKS CRES

BANKS CRES

WATER RESERVOIR

LYNX AVE

GOWANS

BRISTOW RD

445 440 435 430 425 420 415 410 405 400 395 390 385 380 375 370 365 360

SUMMERLAND
INDEPENDENT AND ASSISTED LIVING
WATER SERVICING

PROJECT No.16028
DRAWING No.SK-03
SCALE 1:750
June 15, 2016
REVISION DATE JULY 13, 2016

CTQ

L:\General Data\Projects-2016\16028 - Summerland-Independent and Assisted Living\4-CAD\SKETCHES\16028-SK-03-WATER.dwg July 14, 2016 Harry Byl

WATER DEMAND & STORAGE REQUIREMENTS

(Based on "District of Summerland Subdivision Development and Servicing Bylaw No. 99-004")

Project Name:	Summerland IL and AL	**Date:**	3/22/2016
Project #:	16028	**By:**	hb
		Revision Date:	7/6/2016

Total Reservoir Storage Requirement = Fire Storage + Equalization Storage + Emergency Storage

1. Type of General Zoning: **Multi-family**

2. Density (Unit Method) = (# of units)(people per unit)

# of units =	**289**	units
People per unit based on general zoning densities =	**2.35**	people/unit
Population =	**679**	people

Density (Area Method) = (area)(people per hectare)

Area =	**0.00**	ha
People per Gross Hectare based on type of zoning =	**0**	people/Gross ha
Population =	**0**	people

3. Average Daily Demand = Demand * Population

Total Population =	**679**	people
Demand =	**1000**	L/capita/day
Average Daily Demand, ADD =	**679150**	L/day
Average Daily Demand, ADD =	**7.9**	LPS

4. Maximum Daily Demand = Demand * Population

Total Population =	**679**	people
Demand =	**3000**	L/capita/day
Maximum Daily Demand, MDD =	**2037450**	L/day
Maximum Daily Demand, MDD =	**23.6**	LPS

5. Peak Hourly Demand = Demand * Population

Total Population =	**679**	people
Demand =	**5000**	L/capita/day
Peak Hourly Demand, PHD =	**3395750**	L/day
Peak Hourly Demand, PHD =	**39.3**	LPS