







### 6.3.5 Storage Requirements

As the growth areas rely on the water delivered from the Queens Business Park Reservoir, the reservoir should have sufficient volume to store water for the projected demands in the growth areas. The existing effective storage volume is 6,500 m<sup>3</sup> in the two existing cells of the Queens Business Park Reservoir. Based on the demands in **Table 6-3** and **Table 6-4** which were calculated for the two different servicing standards (current and relaxed standards), the required storage volumes are presented in the following two tables.

**Table 6-8: Required Storage Volumes for the Growth Scenarios – Current Standard**

Scenario No.	ADD (m <sup>3</sup> /d)	MDD (m <sup>3</sup> /d)	15% ADD (m <sup>3</sup> )	25% MDD (m <sup>3</sup> )	Fire Storage (m <sup>3</sup> )	Req. Storage (m <sup>3</sup> )	Remaining Capacity (m <sup>3</sup> )
1	8803	16522	1321	4130	2516	7967	-1467
2	5615	10462	842	2616	2516	5974	526
3	5935	10785	890	2696	2516	6103	397
4	4556	8344	683	2086	2516	5286	1214
5	4451	8135	668	2034	2516	5218	1282
6	4750	8733	713	2183	2516	5412	1088

**Table 6-9: Required Storage Volumes for the Growth Scenarios – Relaxed Standard**

Scenario No.	ADD (m <sup>3</sup> /d)	MDD (m <sup>3</sup> /d)	15% ADD (m <sup>3</sup> )	25% MDD (m <sup>3</sup> )	Fire Storage (m <sup>3</sup> )	Req. Storage (m <sup>3</sup> )	Remaining Capacity (m <sup>3</sup> )
1	6854	12797	1028	3199	2516	6744	-244
2	4623	8589	693	2147	2516	5357	1143
3	4942	8973	741	2243	2516	5501	999
4	3917	7177	588	1794	2516	4898	1602
5	3847	7037	577	1759	2516	4853	1647
6	4047	7436	607	1859	2516	4982	1518

*Note: A positive 'Remaining Capacity' value means that the existing available volume is more than the required storage volume, and conversely, a negative "Remaining Capacity" means that the existing available volume is less than the required storage volume.*

As indicated in **Table 6-8** and **Table 6-9** the existing storage volume is less than the required storage volumes for the growth areas in Scenario 1, however the storage is sufficient for other growth scenarios. The storage deficiency for the current standard is considered significant as it is close to 1,500 m<sup>3</sup>, which warrants a storage cell extension. However, due to the small storage deficit of 244 m<sup>3</sup> in Scenario 1 as for the relaxed standard, it is not recommended to add a new cell to the existing Queens Business Park



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Reservoir. As an alternative, the City can monitor the water consumption in the growth areas to verify if the actual demand matches the theoretical projections as noted in the table above, and then evaluate the need for a reservoir expansion at that time.

### 6.4 Growth Scenario Analysis Conclusions and Recommendations

From the simulated hydraulic performance results in the proposed distribution system for the six growth scenarios and the storage volume analysis based on the two servicing standards, we can draw the following conclusions and recommendations:

1. Without the proposed North Reservoir and the dedicated fill line to the North Reservoir, the 10 growth areas in the growth scenarios will need Queens Business Park Reservoir and Pump Station to supply water. The following two upgrades are needed as the preconditions to service the ten service areas:
  - a. A new 600 mm / 500 mm transmission main connecting the Queens Pump Station discharge mains with the Hazlett Lake area. A 400mm main and a PRV chamber are needed to connect the 500 mm main with the local distribution main in Area B.
  - b. A new 400 mm transmission main connecting the Queens Pump Station distribution main with the Hazlett Lake west area.
2. With the above two pipeline upgrades, the following upgrades are required to meet the servicing standards:
  - a. An expansion of 1,500 m<sup>3</sup> of effective storage volume is needed in the Queens Reservoir to meet the current servicing standard for the Growth Scenario 1. Note that a concrete cell with a total volume of 2,000 m<sup>3</sup> is needed to accommodate the 1,500 m<sup>3</sup> effective water storage volume. Although the storage volume analysis indicated a 244m<sup>3</sup> shortage for the relaxed standard, it is not recommended to construct this small volume. Storage volume is not required for other growth scenarios.
  - b. To ensure the Queens Pump Station has sufficient firm capacity for the fire flow supply, the City should have a 150 HP pump added to the existing Queens Pump Station.
3. With the above upgrades in Items 1 and 2, there are some deficiencies in the growth scenarios that can be addressed with the following:
  - a. There are some areas with less than 233 L/s fire flows in the industrial and commercial areas in Growth Scenarios 1, 2, 5 and 6 for the current standard and Growth Scenario 5 for the relaxed standard. The fire flow deficiencies in Growth Scenarios 1, 2 and 6 under the current design standard are mainly caused by the 2.5 m/s velocity constraint as the local watermains were sized based on 3.0 m/s back in the 2016 servicing studies. Without the velocity constraint, the available fire flows are increased to higher than 233 L/s under the relaxed standard scenario. The calculated fire flow deficiencies in Growth Scenario 5 Areas I and J for both design standards are



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a result of the un-looped pipe network. The developer can design the buildings in the fire flow deficient area based on the available fire flow for Growth Scenario 5.

- b. With the MDD and PHD demands, the minimum residual pressure in the Central Park, Edgar, Johnstone and Glendale areas are low at 250-300 kPa in all the growth scenarios in current and relaxed standards. These areas currently have low residual pressures (minimum 280-300kPa) in the existing MDD and PHD periods, the slightly lower pressures (minimum 250 kPa) might or might not trigger low pressure complaints. If desired, the homeowner can install an in-house booster pump in the internal plumbing inlet to boost the pressure in the low-pressure area. This solution can be applied to the buildings with the low pressures in the night fill periods.

Figure 6-50 presents the proposed upgrades to service the growth areas.

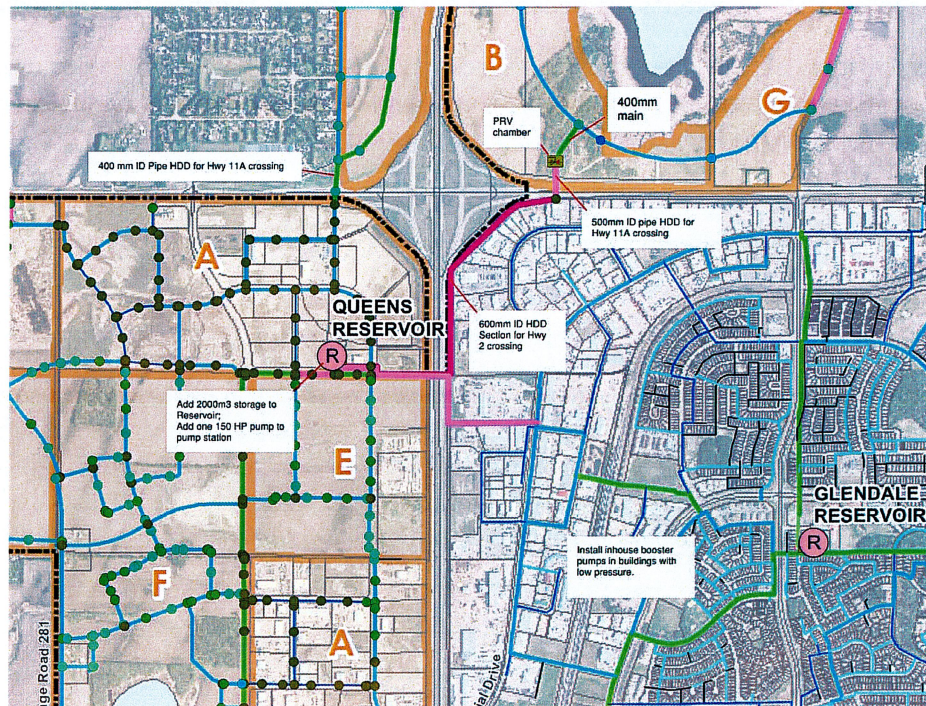


Figure 6-50: Proposed Upgrades for Growth Areas Development

Besides the proposed upgrades, it is recommended that the City can consider the following provisions for system improvement:

1. To increase system reliability, installing a new water transmission main across Hwy 2 to connect the Hazlett west area to the Hazlett Lake area to form a loop.
2. The watermain in Area H could be extended to Central Park by adding a PRV station. This would improve the hydraulic performance in Central Park.



### 6.5 Opinion of Probable Costs for Growth Areas Upgrades

The following table outlines the recommended infrastructure upgrades with a Class 4 Opinion of Probable Cost (OPC). The local distribution watermains in the growth areas are not included in the OPC. The upgrades are based on the model analysis results of the 6 growth scenarios, and the major components of the proposed upgrades are presented in **Figure 6-50**. The costs are based on 2023 industry pricing, however due to the pandemic and high inflation over the last 2 years, the actual costs may vary significantly.

**Table 6-10: Recommended Upgrades and Opinion of Probable Costs**

<b>Upgrade No.</b>	<b>Recommended Upgrade Description</b>	<b>Details</b>	<b>Opinion of Probable Cost (2023 CDN)</b>
1	Install a new 600 mm / 500 mm transmission main connecting the Queens Pump Station discharge with the Hazlett Lake area.	1. 1600 m of 600 mm dia. main including a Hwy 2 crossing by 150 m HDD 2. 150 m of 500 mm dia. main for Hwy 11A crossing 3. A PRV chamber to reduce HGL from 955m to 930m for Hazlett Lake area 4. 220 m of 400mm main to connect the PRV to the watermain loop in Area B	\$6.5M
2	Install a new 400mm transmission main connecting the Queens Pump Station distribution main with the Hazlett Lake west area.	200 m of 400mm dia. main including a Hwy 11A crossing	\$0.8M
3	Install a 150 HP pump to Queens pump station	One 150 HP pump with 120 L/s at 70m TDH, equipped with VFD	\$1.2M
4	Expansion of Queens Reservoir Store by 1500 m <sup>3</sup>	Construct a total volume 2,000 m <sup>3</sup> underground concrete reservoir cell connected to the existing	\$2.0M
<b>TOTAL</b>			<b>\$10.5 M</b>

*Notes:*

1. Upgrade No. 3 is only needed for growth scenario 1. Even for the Growth Scenario 1, it is suggested that the City monitor the water demands in the growth areas. If the real demands are lower than the projected values based on the current servicing standard, the City doesn't need to construct the additional storage.
2. Pressure booster pumps are not included in the OPC.
3. Costs are based on 2023 industry pricing and are in Canadian dollars.
4. The OPC is a Class 4 cost estimate with an accuracy range of -30% to +50%.
5. The OPC includes 35% for engineering and contingency.
6. Actual costs may vary widely due to the pandemic and high inflation over the last 3 years.



## **7 Conclusions and Recommendations**

### **7.1 Existing Model Review**

Stantec reviewed the existing WaterCAD model, which was updated by the City based on the as-built data from 2013 to 2021. The updated WaterCAD model contains 641 km of watermains within the City limits.

Hydraulically, the water distribution system is divided into four pressure zones: the Water Treatment Plant Pressure Zone (WTPPZ at design HGL 919 m), East Hill Pressure Zone (EHPZ at HGL 940 m), South Pressure Zone (SPZ at HGL 930 m) and Queens Business Park Pressure Zone (QBPZ at current HGL 950 m and future HGL 955 m). Water is supplied to these pressure zones by the pumping facilities within the pressure zones or through pressure reducing valves. The WTP high lift pump station and Glendale pump station are servicing the users in the WTPPZ and convey water to other reservoirs and regional customers. The Clearview booster station, Mountview pump station and Lancaster pump station services the EHPZ and SPZ through the PRVs. The Queens pump station services the QBPZ. The pressure zone configuration and the pump stations remain the same since 2013 Master Plan Updates.

The pump data in the pumping facilities, i.e. pump curves, are updated based on the data provided by the City in the existing model review process.

### **7.2 Existing Model Calibration**

The City conducted intensive hydrant flow tests in 2021 and 2022. With the detailed SCADA pressure and flow data from each of the pumping stations, the boundary conditions of the hydrant flow tests were established for existing model calibration. The modeler utilized the valid 20 hydrant tests records and the boundary conditions to calibrate the existing model to an acceptable level, i.e., discrepancy within +/-10% between the hydrant flow test data measured in the field and the modeling results. The calibrated model is suitable for hydraulic performance evaluation and future planning.

### **7.3 Existing System Analysis**

The existing system analysis included a review of demand, design standard/level of service (LOS), and existing hydraulic performance. The per capita composite Average Day Demand (ADD) from 2016 to 2020 is 306 Lcpd, including the billed residential, ICI consumptions and 6.8% unaccounted water consumption or loss. Note that the calculated per capita ADD is lower than the current design residential per capita rate of 375 Lcpd, without considering the ICI demands. The current design unit rate is conservative compared to the unit rates calculated from the metered and billing data. Consequently, it is recommended to relax the current standard, allowing the existing infrastructure to accommodate additional future growth in the northern part of the City while being able to defer major upgrades proposed in the City of Red Deer 2013 Water Distribution Study.



## Water Model Update Conclusions and Recommendations

The billed demands and the calculated peaking factors were input into the existing system WaterCAD model for hydraulic performance analysis. The model results indicated that the existing water network, including the existing water distribution mains and the pump stations, have sufficient capacity to service the current water users within the City and convey the water to regional customers. However, some minor deficiencies were identified:

1. Certain nodes in the Edgar, Johnstone Park and Glendale area experience slightly lower than 300 kPa residual pressure during the daily operations, dropping to 277 kPa in PHD and 260 kPa during the Night fill period. However, no low-pressure complaints have been reported from these areas, implying that users in this area have become accustomed to the lower pressure levels.
2. Available fire flows are less than the desired levels in some locations in existing system, as indicated in **Appendix B**. However, there is no urgency to increase the available fire flows. It is worth noting that increasing the available fire flows is unlikely to lower the existing buildings' fire insurance premiums. The City can implement the proposed upgrades, outlined in **Appendix B**, to increase the fire flows while implementing other infrastructure upgrades, i.e. water or sewer pipe replacements due to poor physical condition.

### 7.4 Emergency Response Analysis

Being proactive, the operations team requested the following three emergency responses planned out by simulating the emergency operations in the WaterCAD model:

1. Tracing analysis on the spill contamination migration: Extension Period Simulations were performed to track the migration of contaminants spilled within the pump stations. The resulting frontlines of the contaminant migration were plotted onto the maps to assist the operations team in planning valve shut-offs and public notifications.
2. Assessment on the impact from the 900 mm trunk shut-off: When the WTP high lift pump stations 900 mm discharge trunk is turned off, the flow delivered to the distribution system can only pass through the 500/400 mm diameter trunk. The 48-hour EPS model results indicated that, regardless the initial full percentages of the water reservoirs (75%-100%) and with or without the NRD regional demands, water pumped through the 500/400 trunk can meet the emergency LOS (minimum pressure of 140 kPa). However, operating the distribution system with the emergency LOS for an extended period will lead to consumer complaints and the low water levels in local reservoirs could compromise firefighting capacity.
3. Olymel fire pump operation impact evaluation: the WaterCAD model results, utilizing the available Olymel fire pump performance curve in the MDD simulation, indicated that if the suction side pressure is maintained at 140 kPa (20 PSI), the available fire flow can reach 281 L/s (4,465 gpm). However, with the Olymel fire pump in operation, the available fire flows in the Olymel and Civic Yards area will be limited to less than 75 l/s. i.e. There will be limited fire flow available outside the Olymel facility.



## **7.5 Growth Scenario Analysis**

The City has prioritized the development of three proposed growth areas: Queens Business Park, Hazlett Lake and the western area across of Hwy 2 of Hazlett Lake (Hazlett Lake west area). To postpone or delay the construction of the North Reservoir/ Pump Station and its dedicated 900 mm diameter fill line, the hydraulic model was revised to extend the existing Queens Business Park distribution system to serve these three growth areas. Six growth scenarios, based on the possible development directions, were developed, and assessed using the WaterCAD model. The model results indicated that, with the extended distribution system, it is possible to service all the growth areas with a few upgrades in the system, including:

1. Construction of sections of the proposed 600 mm and 500 mm diameter water trunks which were proposed in the 2013 Water Master Plan to facilitate future reservoirs west of Hwy 2, to service Hazlett Lake area.
2. Installing a 400 mm diameter watermain crossing Hwy 11A to accommodate the Hazlett Lake west industrial and commercial development.
3. Adding a 150 HP pump in the Queens Business Park reservoir pump station in addition to the existing four pumps.
4. Construction an underground reservoir cell with 2,000 m<sup>3</sup> volume (1,500 m<sup>3</sup> effective volume) to expand the existing Queens Business Park reservoir.

The OPC for the above major upgrades is \$10.5 Million in 2023 Canadian Dollars.

The upgrades Items 1 to 3 are needed for all the six growth scenarios. Note that the Queens Business Park reservoir expansion is only needed to support the full development of Growth Scenario 1 under the current design standard. If the actual demands are less than the demands projected with the current standard, the storage expansion is not recommended. In other growth scenarios, storage expansion is not necessary.

Considering that Edgar, Johnstone Park and Glendale subdivisions will have substandard residual pressures in the Growth scenarios, it is suggested City install pressure loggers in the water pipes within these neighbourhoods to monitor the residual pressures as the development in the growth area advances. In-house booster pumps can be installed to boost the pressure in the buildings' plumbing system if necessary. The developers should design the buildings according to low available fire flows in west portion of Area I in Growth Scenario 5.



## **Appendix A    Hydrant Flow Tests Results and Calibration Data**

**Test Results and Calibration Results**

Static Hydrant: 11039 Flow Hydrant 1: 11036 Flow Hydrant 2: 11037	HT22-1 - April 26/22					HT22-1 - April 26/22					Model Results	
	Time (start)	Time (stop)	Field Measurement			Field Measurement			Residual Pressure (kPa)	Model Result to field		
	6:46	6:54	Flow (GPM)	Flow Hydr. Pressure (PSI)	Static Pressure (PSI)	Flow (m3/hr)	Flow Hydr. Pressure (kPa)	Static Pressure (kPa)				
Starting Static case (No flowed)	6:46				40			276	326	19%		
Hydrant 1 Flowed	6:46		1400	13	34	316	90	234				
Hyd1 (both Flowed)	6:50	1150	6	32	261	55	221	236		7%		
Hyd 2 (both Flowed)	6:49		1060	7	32	245	46	221	236	7%		
Hydrant 2 Flowed	6:52	1407	13.5	35	119	93	241					
Stop static case (No Flowed)	6:54				47			324	326	1%		

Static Hydrant: 5116 Flow Hydrant 1: 6462 Flow Hydrant 2: 6463	HT22-2 - April 26/22					HT22-2 - April 26/22					Model Results	
	Time (start)	Time (stop)	Field Measurement			Field Measurement			Residual Pressure (kPa)	Model Result to field		
	9:36	9:45	Flow (GPM)	Flow Hydr. Pressure (PSI)	Static Pressure (PSI)	Flow (m3/hr)	Flow Hydr. Pressure (kPa)	Static Pressure (kPa)				
Starting Static case (No flowed)	9:36				54			372	361	-3%		
Hydrant 1 Flowed	9:36		1575	16	52	356	124	359				
Hyd1 (both Flowed)	9:42	1420	15	48	322	103	331	301		-9%		
Hyd 2 (both Flowed)	9:40		1470	15	48	334	103	331	301	-9%		
Hydrant 2 Flowed	9:44	1650	19.6	49.5	375	137	341	333		-2%		
Stop static case (No Flowed)	9:45				51			352	361	3%		

Static Hydrant: 5176 Flow Hydrant 1: 5106 Flow Hydrant 2: 5109	HT22-3 - April 26/22					HT22-3 - April 26/22					Model Results	
	Time (start)	Time (stop)	Field Measurement			Field Measurement			Residual Pressure (kPa)	Model Result to field		
	10:30	10:36	Flow (GPM)	Flow Hydr. Pressure (PSI)	Static Pressure (PSI)	Flow (m3/hr)	Flow Hydr. Pressure (kPa)	Static Pressure (kPa)				
Starting Static case (No flowed)	10:30				56			366	413	7%		
Hydrant 1 Flowed	10:32		1750	21	56	397	145	366				
Hyd1 (both Flowed)	10:34	1725	21	56	392	145	366	394		2%		
Hyd 2 (both Flowed)	10:33		1760	21.5	56	400	146	366	394	2%		
Hydrant 2 Flowed	10:35	1640	23.5	57.0	416	162	393					
Stop static case (No Flowed)	10:36				60			414	413	0%		

Static Hydrant: 5237 Flow Hydrant 1: 5236 Flow Hydrant 2: 10974	HT22-4 - May 19/22					HT22-4 - May 19/22					Model Results	
	Time (start)	Time (stop)	Field Measurement			Field Measurement			Residual Pressure (kPa)	Model Result to field		
	9:00	9:09	Flow (GPM)	Flow Hydr. Pressure (PSI)	Static Pressure (PSI)	Flow (m3/hr)	Flow Hydr. Pressure (kPa)	Static Pressure (kPa)				
Starting Static case (No flowed)	9:00				96			662	655	-1%		
Hydrant 1 Flowed	9:03		2230	34	76	506	231	524				
Hyd1 (both Flowed)	9:07	1900	25	60	431	172	414	414		0%		
Hyd 2 (both Flowed)	9:06		1760	22.9	60	404	156	414	414	0%		
Hydrant 2 Flowed	9:09	2130	32	62.0	464	221	565					
Stop static case (No Flowed)	9:09				96			676	655	-3%		

Static Hydrant: 4573 Flow Hydrant 1: 4572 Flow Hydrant 2: 4407	HT22-5 - April 26/22					HT22-5 - April 26/22					Model Results	
	Time (start)	Time (stop)	Field Measurement			Field Measurement			Residual Pressure (kPa)	Model Result to field		
	11:15	11:24	Flow (GPM)	Flow Hydr. Pressure (PSI)	Static Pressure (PSI)	Flow (m3/hr)	Flow Hydr. Pressure (kPa)	Static Pressure (kPa)				
Starting Static case (No flowed)	11:15				50			345	340	-1%		
Hydrant 1 Flowed	11:17		1525	16	46	346	110	331	314	-5%		
Hyd1 (both Flowed)	11:20	1360	13	43	309	90	296	266	266	-10%		
Hyd 2 (both Flowed)	11:19		1500	15.6	43	341	106	296	266	-10%		
Hydrant 2 Flowed	11:23	1610	16.5	45.0	365	126	310					
Stop static case (No Flowed)	11:24				47			324	340	5%		

**HGL calculations**

static hyd g.e.	Measured HGL (m)	Modeled HGL (m)
662	910	915
662	904	906

static hyd g.e.	Measured HGL (m)	Modeled HGL (m)
660	916	917
660	914	913
660	915	914

static hyd g.e.	Measured HGL (m)	Modeled HGL (m)
674	913	916
674	916	916

static hyd g.e.	Measured HGL (m)	Modeled HGL (m)
674	941	941
674	943	941

static hyd g.e.	Measured HGL (m)	Modeled HGL (m)
662	917	916
661	915	913
661	912	909
661	913	861
662	915	916

**Boundary conditions**

pre flow	6:45				two flows	6:49-50			
WTPPZ	Record value	modeled value	units		Boundary conditions	Record value	modeled value	units	
WTP discQ	1257	1237	m3/hr	-2%	WTP discQ	1623	1616	m3/hr	0%
GL discQ	415	429	m3/hr	3%	GL discQ	420	435	m3/hr	4%
QN InQ	0	0	m3/hr		QN InQ	0	0	m3/hr	
MV InQ	0	0	m3/hr		MV InQ	0	0	m3/hr	
NRD discQ	350	350	m3/hr	0%	NRD discQ	140	140	m3/hr	0%
NRD upP	697	699	kPa	0%	NRD upP	652	667.6	kPa	2%
CLV disQ	666	673	m3/hr	1%	CLV disQ	670	673	m3/hr	0%

pre flow	9:36				two flows	9:40-42			
WTPPZ	Record value	modeled value	units	modeled to Record	Boundary conditions	Record value	modeled value	units	modeled to Record
WTP discQ	1460	1437.6	m3/hr	-2%	WTP discQ	1636	1930	m3/hr	5%
GL discQ	415	436	m3/hr	5%	GL discQ	430	500	m3/hr	16%
QN InQ	0	0	m3/hr		QN InQ	0	0	m3/hr	
MV InQ	0	0	m3/hr		MV InQ	0	0	m3/hr	
NRD discQ	316	316	m3/hr	0%	NRD discQ	217	217	m3/hr	0%
NRD upP	660	693	kPa	2%	NRD upP	669.6	691	kPa	3%
CLV disQ	661.5	661.4	m3/hr	0%	CLV disQ	664.5	661	m3/hr	-1%

pre flow	10:26-30				two flows	10:33-34			
WTPPZ	Record value	modeled value	units	modeled to Record	Boundary conditions	Record value	modeled value	units	modeled to Record
WTP discQ	1495	1297	m3/hr	-13%	WTP discQ	2350	2164	m3/hr	-6%
GL discQ	414	416	m3/hr	0%	GL discQ	447.6	453	m3/hr	1%
QN InQ	0	0	m3/hr		QN InQ	0	0	m3/hr	
MV InQ	0	0	m3/hr		MV InQ	0	0	m3/hr	
NRD discQ	346	350	m3/hr	1%	NRD discQ	263	263	m3/hr	0%
NRD upP	675	692	kPa	3%	NRD upP	649	677	kPa	4%
CLV disQ	639.5	636.6	m3/hr	0%	CLV disQ	610	611	m3/hr	0%

pre flow	6:59				Two flow	9:05-06			
WTPPZ	Record value	modeled value	units	modeled to Record	WTPPZ	Record value	modeled value	units	modeled to Record
WTP discQ	1765	1616	m3/hr	-6%	WTP discQ	1765	1616	m3/hr	-6%
GL discQ	0	0	m3/hr	#DIV/0!	GL discQ	0	0	m3/hr	#DIV/0!
QN InQ	100	100	m3/hr	0%	QN InQ	100	100	m3/hr	0%
NRD discQ	315	315	m3/hr	0%	NRD discQ	315	315	m3/hr	0%
NRD upP	677	669	kPa	2%	NRD upP	677	669	kPa	2%
CLV disQ	472	472	m3/hr	0%	CLV disQ	472	472	m3/hr	0%

pre flow	11:14-15				Two flow	11:19-20			
WTPPZ	Record value	modeled value	units	modeled to Record	WTPPZ	Record value	modeled value	units	modeled to Record
WTP discQ	1392	1366	m3/hr	-2%	WTP discQ	1609	1904	m3/hr	5%
GL discQ	414	432	m3/hr	4%	GL discQ	426	446	m3/hr	5%
QN InQ	0	0	m3/hr		QN InQ	0	0	m3/hr	
MV discQ	332	246	m3/hr	-26%	MV discQ	326	246	m3/hr	-25%
NRD discQ	566	566	m3/hr	0%	NRD discQ	470	470	m3/hr	0%
NRD upP	646	672	kPa	4%	NRD upP	657	679	kPa	3%
CLV disQ	336.9	339	m3/hr	1%	CLV disQ	337	339	m3/hr	1%