



Date:	March 5, 2025
To:	Simon Glass - Ainley Group
From:	Julien Bell – Agile Infrastructure
Project	Erin-Hillsburgh Water System Improvements
Subject	Erin-Hillsburgh Booster Pumping Station and West Erin Developments

TECHNICAL MEMORANDUM

1 INTRODUCTION

It is our understanding that the Town of Erin plans to upgrade and integrate their Erin and Hillsburgh water systems to address short- and long-term growth needs and improve system operations and redundancy. The long-term upgrades include new supply wells, storage and pumping facilities, and integrating the Erin and Hillsburgh water systems. The proposed upgrades will occur under a phased approach.

- Phase 1 upgrades consist of constructing a new elevated tank (ET) in east Erin and a new groundwater well north of Erin to supply the Erin water system.
- Phase 2 upgrades consist of interconnecting the Erin and Hillsburgh water systems, via a 5.1 km 250 mm watermain that generally follows the Elora-Cataract trail. Supporting the interconnection is a Booster Pumping Station (BSP) allowing the transfer of water from Erin to Hillsburgh and new water storage in Hillsburgh.
- Subsequent phases of upgrades will focus on expanding supply capacity and other capacity improvements to meet the system growth needs.

Additionally, major residential developments are expected in:

- Northeast Erin (Solmar Development)
- West Erin (Coscorp, Mattamy, and Empire Developments)
- South Hillsburgh
- North Hillsburgh

The objective of this memo is to outline the water servicing opportunities and constraints related to the Phase 2 Booster Pumping Station interconnecting Erin and Hillsburgh, as well as the servicing of the west Erin developments. The water servicing analysis assumes the Phase 1 ET and new Well E9 upgrades have been constructed and are operating in line with the recommendations of the *New Erin Operational Controls - New ET and Well E9 - Technical Memo* (Agile Infrastructure January 2025).

1.1 Basis of Analysis

The Town's existing WaterGEMS model of the Erin and Hillsburgh water system was used as the basis of the system hydraulic performance analysis. The existing model was developed in 2023 by WSP as part of the Erin Water Distribution System Modelling and was subsequently updated, by Ainley in 2024, with operational controls to allow for Extended Period Simulation as part of the *New Erin Operational Controls - New ET and Well E9* analysis.

The following performance criteria were utilized to evaluate the feasibility of the water operational alternatives:

- Water System Pressure:
 - Maintain a minimum peak hour pressure of 275 kPa.
 - Maintain a maximum average day pressure of 690 kPa.
- Fire Flow:
 - For new development areas in Hillsburgh:
 - 76 L/s for Singles and Detached Homes, as per Town Engineering Standards
 - 200 L/s for Townhouses Blocks as per FUS
 - For west Erin development:
 - 76 L/s for Singles and Detached Homes, as per Town Engineering Standards
 - 200 L/s for Townhouses Blocks as per FUS

1.2 Limitations

No modifications to the existing system infrastructure or system demands were made. Further, preliminary watermain layouts and demands were provided for the Solmar, Coscorp, Mattamy, and Empire Developments, which were consistent with those stated in the *Mattamy, Coscorp & Empire Developments Watermain Hydraulic Analysis – Report*; as such, these pre-existing development demands and model layouts were used.

Please refer to *New Erin Operational Controls - New ET and Well E9 - Technical Memo* for details on the model operational control modifications.

2 WATER SYSTEM OVERVIEW

Figure 1 Provides an overview of the Erin and Hillsburgh water systems.

2.1 Erin Water

The existing Erin water system is currently configured in two (2) pressure zones (PZ):

- The Mid Erin PZ (E-MPZ) is a relatively small pressure zone comprising the lands around 8 Line, Sideroad 17, and Erin Heights Drive.
- The Lower Erin PZ (E-LPZ) comprises the remaining Erin system servicing the extent of the Erin village settlement area.

The Erin water system is supplied via two groundwater wells, Well E7 (located on Sideroad 17) and Well E8 (Located on Eighth Line), located in the E-MPZ Water is supplied to the E-LPZ via a pressure sustaining valve (PSV) at Well E7 and a pressure reducing valve (PRV) on Erin Heights Drive east of Wesley Crescent. Further, the new 32 L/s Well E9 groundwater wells (Well E9) located on Wellington Road 23, approximately 1,100 m north of Pioneer Drive, was assumed to be constructed under this analysis.

Pressure is maintained in the E-MPZ managed through pressure tanks located on Delerin Crescent, while pressure in the E-LPZ is managed through the 1.7 ML tank located west of William Street and soon to be commissioned 3.4 ML ET located south of Wellington Road 124 and east of Erin Park Drive.

2.2 Hillsburgh Water System

The existing Hillsburgh water system is configured in two (2) PZs:

- The Upper Hillsburgh PZ (H-UPZ) zone comprises the lands north of Church Street, west of Barker Street and north of Orangeville Street.
- The Lower Hillsburgh PZ (H-LPZ) comprises the remaining Hillsburgh settlement area.

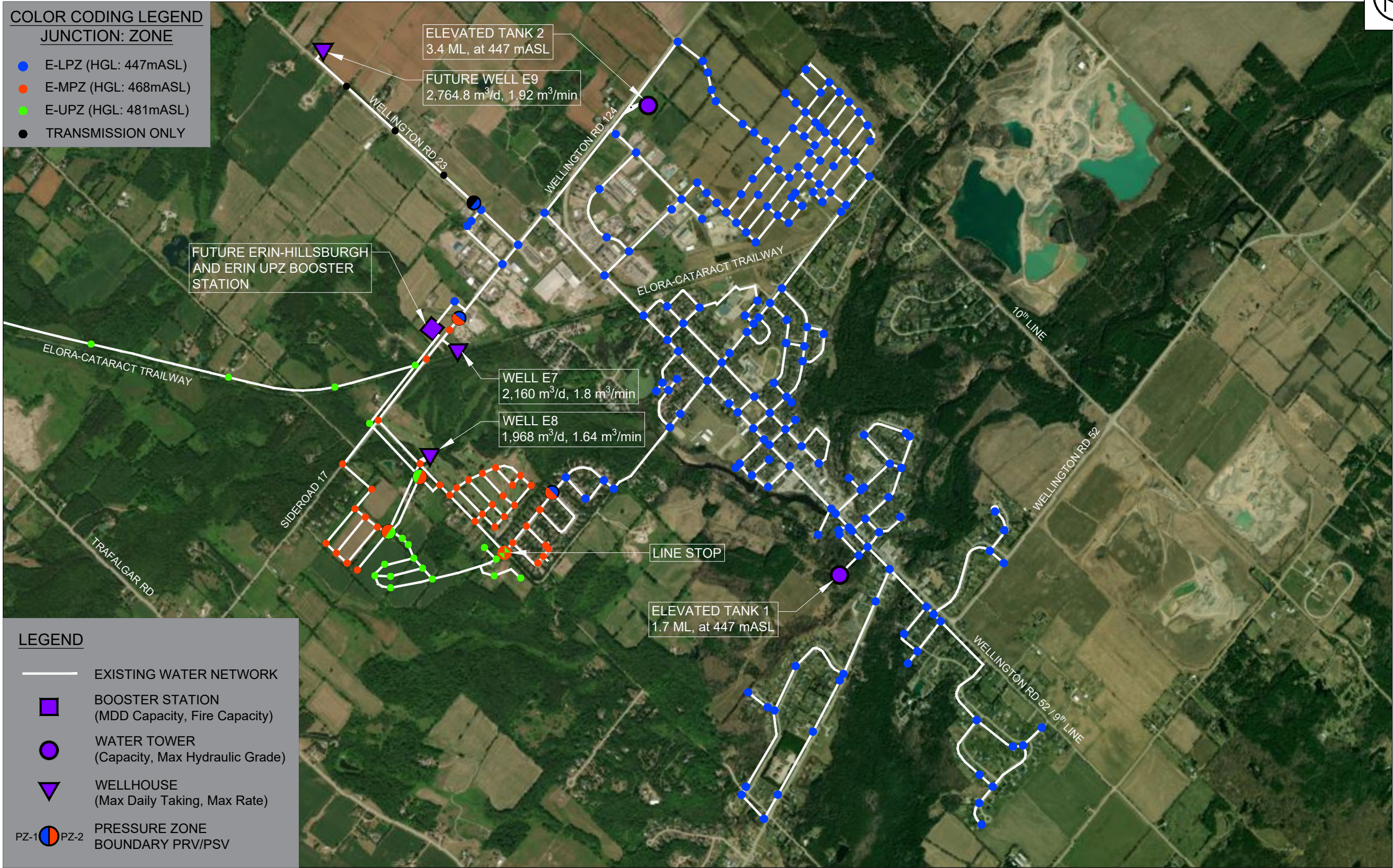
The two Hillsburgh PZs are typically operated independently, with the Well H2 and BPS (Hillsburgh Heights) supplying the H-UPZ and Well H3 (Glendevon) supplying the H-LPZ. Both PZs operate as closed PZs. There is potential to back-feed the H-LPZ from the H-UPZ via PRVs located on Barbour Drive at Orangeville Street and at the Hillsburgh BPS. Meanwhile, the Hillsburgh BPS can pump from the H-LPZ to the H-UPZ.

Limited storage is located in the H-LPZ, with 0.24 ML clearwell at Well H2. In the H-UPZ, 0.54 ML of storage is available at Well H2. The Hillsburgh Heights BPS provides fire flow for the system.



COLOR CODING LEGEND
JUNCTION: ZONE

- E-LPZ (HGL: 447mASL)
- E-MPZ (HGL: 468mASL)
- E-UPZ (HGL: 481mASL)
- TRANSMISSION ONLY



LEGEND

- EXISTING WATER NETWORK
- BOOSTER STATION (MDD Capacity, Fire Capacity)
- WATER TOWER (Capacity, Max Hydraulic Grade)
- ▼ WELLHOUSE (Max Daily Taking, Max Rate)
- PZ-1 PZ-2 PRESSURE ZONE BOUNDARY PRV/PSV

NOT FOR CONSTRUCTION

NOTES	CONTRACT DRAWINGS Contractor must verify all dimensions and be responsible for same. Any discrepancies must be reported to the Engineer before commencing work. Drawings are not to be scaled. Drawings may not be used for any purpose other than that stipulated in the contract agreement between the consultant and the Engineer without the express written consent of Ainley & Associates Limited. Use of these drawings by any party for any other purpose is subject to the following caution. CAUTION: The information contained in this drawing is solely for the intended recipient. Any copying, distribution or use by others without the express written consent of Ainley & Associates Limited is prohibited. The recipient is responsible for confirming the accuracy and completeness of the information with the originator. The recipient assumes all risks and liabilities associated with the use of the drawings. The recipient will save and hold harmless Ainley & Associates Limited from any claims whatsoever associated with or related to the use of the drawings. The recipient will not reuse any portion of the drawings for any future project without the express written permission of Ainley & Associates Limited.	No. REVISIONS DATE INITIAL	Not Valid Unless Signed And Dated	PRELIMINARY	SCALE: H= 1:10000 V= N/A	DESIGN: S.D.G. DRAWN: M.L. CHECKED: S.D.G. DATE: JAN/2025	TOWN OF ERIN DEVELOPMENT OF HILLSBURGH AND ERIN WATER DISTRIBUTION SYSTEM MAP		AINLEY FILE: 123067 DRAWING No. SP1

2.3 Proposed Water System Upgrades

2.3.1 Phase 1 Upgrades

The following Phase 1 upgrades have been assumed to be in place when completing this analysis:

- Construction of a new 3.4 ML ET located south of Wellington Road 124 and east of Erin Park Drive, including the construction of a new 300 mm PVC watermain along Wellington Road 124 to tie into the existing 250 mm watermain on Side Road 17 road and 150 mm watermain on Erin Park Drive.
- New 32 L/s groundwater well (Well E9) located on Wellington Road 23 approximately 1,100 m north of Pioneer Drive, including a new 300 mm PVC watermain along Wellington Road 23 to tie into the existing 300 mm watermain at Shamrock Road and Sideroad 17.
- Buildout of the Solmar development consisting of the lands bounded by Wellington Road 124, Erin Park Drive, Erin Township Sideroad 15, and Settlement Boundary.

2.3.2 Phase 2 Upgrades

The following Phase 2 upgrades are being assessed as part of this review:

- The new Erin-Hillsburgh 250 mm diameter interconnecting watermain, which generally follows the Elora-Cataract trail.
- New Erin-Hillsburgh BPS connecting the Erin water system to the Hillsburgh system via the Erin-Hillsburgh watermain.
- New 3.74 ML storage servicing H-LPZ (for the purposes of this analysis the 5916/5952 Trafalgar Drive storage location was assumed);
- Potential upgrade of the existing Sideroad 17 watermain west of Wellington Road 23 to the new BPS from 250 mm to 300 mm.
- Buildout of the Mattamy, Coscorp & Empire Development South of Sideroad 17 north of Erin Heights Drive along 8 Line.



2.4 Facility Overview

Tables 1 to 3 provide an overview of the capacity, key geometries, and setpoint of the existing and proposed Erin and Hillsburgh Facilities.

TABLE 1 – STORAGE FACILITY OVERVIEW

Storage Facility	Pressure Zone	Type	Top Water Level (mASL)	Volume (ML)
Well E7 Clearwell	E-MPZ	Pumped	398.8	0.24 ¹
Well E8 Clearwell	E-MPZ	Pumped	~401.5	0.16 ¹
Erin ET	E-LPZ	Floating	447.0	1.7
New Erin ET (Phase 1)	E-LPZ	Floating	447.0	3.4
Well H3 Clearwell	H-LPZ	Pumped	436.0	0.24 ¹
Hillsburgh Heights Reservoir	H-UPZ	Pumped	476.0	0.54
New Hillsburgh ET (Phase 2)	H-LPZ	Elevated	485.0	2.95

1- Total storage, including contact time. The total available fire flow and emergency storage is assumed to be 50% of available storage.

TABLE 2 - PUMP/WELL FACILITY OVERVIEW

Well/Pump Facility	Pressure Zone	Design Flow (L/m)
Well E7 – High Lift (1 &2)	E-MPZ	1,800
Well E8 - Utility Pump	E-MPZ	1,740
Well E8 – Service Pump	E-MPZ	348
Well 9 – High Lift (Phase 1)	Well E9	1,920
Well H3 Clearwell	H-LPZ	456
Hillsburgh Heights BPS – Jockey	H-UPZ	274
Hillsburgh Heights BPS – Duty	H-UPZ	820
Hillsburgh Heights BPS - Fire	H-UPZ	2,400
Hillsburgh BPS -	H-UPZ	UKN
New Erin-Hillsburgh BPS (Phase 2)	H-LPZ	1,920

TABLE 3 – CONTROL VALVE OVERVIEW

Control Valve	Type	Upstream Zone	Downstream Zone	Setpoint (kPa)	Setpoint (HGL mASL)
Well E7 PSV	PSV/PRV	Upper - Erin	E-LPZ	670	467
Well E7 PRV ¹	PSV/PRV	Lower - Erin	E-MPZ	440	443
Well E7 Re-Circulation	PSV	Upper - Erin	Well E7 Clearwell	690	468
Well E8 Re-Circulation	PSV	Upper - Erin	Well E8 Clearwell	690	468
Well E9 – PSV	PSV	Well E9	E-LPZ	460	467
Erin Heights Drive PRV	PRV	Upper - Erin	E-LPZ	340	441.5
Barbour Drive PRV	PRV	Upper - Hillsburgh	H-LPZ	414 ²	484.2 ²
Hillsburgh BPS	PRV	Upper - Hillsburgh	H-LPZ	414 ²	477.2 ²

- 1- The Well E7 drawing lists the Well E7 valve as a PSV/PRV. The PSV function and set point were confirmed through the SCADA review and OCWA meeting. However, the PRV set point and function are assumed but not confirmed.
- 2- Setpoints not confirmed with operations.

3 PROPOSED ERIN DEVELOPMENTS

The attached figures present the approximate locations of the Coscorp, Mattamy, and Empire Developments.

Coscorp Development: The Coscorp development is located west of 8 Line and south of 17 Side Road, in the lands comprising the existing 5552 Eighth Line property. The proposed development comprises 192 single-family homes, 116 townhouses, and two (2) multi-family blocks for 110 apartments.

Mattamy Development: The Mattamy development is located west of 8 Line in the lands comprising the existing 5520 Eighth Line property. The proposed development consists of 192 single-family homes.

Empire Development: The Empire development is located east of Eighth Line and north of Erin Heights Drive, in the lands comprising the southern portion of the existing golf course. The proposed development comprises 197 single-family homes and 91 townhouses.

Table 4 summarizes each development's proposed demands, elevations, and required operating HGL.

TABLE 4 – WEST ERIN DEVELOPMENT OVERVIEW

	# Units	Max Day Demand (L/s)/(L/min)	Max Fire Flow (L/s)	Elevation Range (m)	Min HGL Requirement (m)
Coscorp Development	418	7.4 / 442	Singles & Detached 76 Townhouses 200 ²	398.5 – 426.5 426.5 - 436.5 ¹	455 (@ 275 kPa) 462 (@ 345 kPa)
Mattamy Development	192	3.4 / 205	Singles & Detached 76	430.0 – 445.4	474 (@ 275 kPa) 481 (@ 345 kPa)
Empire Development	288	5.1 / 308	Singles & Detached 76 Townhouses 200 ²	410.0 - 420.4	448 (@ 275 kPa) 455 (@ 345 kPa)
Total	898	15.9 / 955			

1- High-elevation lands in Coscorp development would be incorporated into the Mattamy development PZ.

2- Fire Flows for Townhouses assumed to be 200L/s as per Fire Underwriters Survey (FUS).

3.1 Pressure Zone Considerations

All three (3) developments are located within the E-MPZ Based on the proposed development grading, the Coscorp and Empire developments could integrate into the existing E-MPZ (HGL of 467 mASL). However, the elevations with the Mattamy development are too high to be adequately supported by the existing E-MPZ; as such, the Mattamy development will need to be supported by a new higher HGL PZ (E-HPZ).

3.2 Supply Considerations

The combined max day demands (MDD) of the three (3) developments is 15.9 L/s or 955 L/min, increasing the E-MPZ total MDD demand to 17.3 L/s or 1040 L/min and total PHD to 27.7 L/s or 1,660 L/min. The combined future MDD and PHD remain within the supply and total pumping capacity of Well E7 and Well E8. However, it is noted that the system's combined average daily demand of 9 L/s or 540 L/min exceeds the capacity of the Well E8 service pump; as such, an upgrade to the Well E8 service pump will be required to accommodate the increased demands.

The combined buildout of the Erin development will increase net system demands and reduce the total volume available to transfer from the E-MPZ to the E-LPZ. It is anticipated that the operational setpoint to activate the Well E7 high lift pumps and Well E8 utility pumps can remain; however, it is recommended that Wells E7, E8, and E9 be called on the same cycle as compared to the currently proposed cycling between sources.

3.3 Fire Flow Considerations

Wells E7 and E8's total sustainable capacity is a combined 59 L/s or 3,540 L/min; when subtracting the MDD of 17.3 L/s, the E-MPZ has a fire flow capacity of 41.7 L/s, well below the required 76 L/s and 200 L/s presented in Table 4.

The total combined storage at Wells E7 and E8 is 0.4 ML, of which 50% is assumed to be required to satisfy contact time requirements. The 0.2 ML allows for 27 L/s of sustained flow over a 2-hour period, potentially increasing the available fire flow to 69 L/s when accounting for the surplus supply capacity. The maximum theoretical capacity of 69 L/s approaches the 76 L/s target for residential properties but is less than half the required multi-family block objective.

However, it is noted that it is generally not standard practice to rely on well flows to support system fire flows, with the standard operational practice to rely on system storage to address fire flow needs. Using the E-MPZ storage alone, a 76 L/s fire flow can be sustained for 45 minutes, and the 200 L/s fire flow can be sustained for 16 minutes, well below the 2-hour target duration.

3.4 Prior Servicing Recommendations

Mattamy, Coscorp & Empire Developments Watermain Hydraulic Analysis - Report recommended that:

- Empire and Coscorp development be supported via direct connections to the existing Upper Erin PZ:
- A new pump station should be constructed to support the Mattamy development.

However, the proposed recommendation does not achieve the required target fire flow rate, 76 L/s, or a duration of 2 hours. It is noted that the 200 L/s fire flow target now identified for the multi-family blocks with the Coscorp and Empire development was not discussed.

While the report notes that the fire flow may be deficient and identifies the potential for supplementing fire flows from the E-LPZ, no detailed assessment of the available flow rates and/or required system upgrades were identified to achieve the desired fire flows.

4 WATER SYSTEM ANALYSIS

4.1 New Erin-Hillsburgh BPS Site Alternatives

The Town is currently exploring two (2) potential locations for the new Erin-Hillsburgh BPS:

- Adjacent to Well E7
- Adjacent to Well E8

The exact location of each Well E7 and Well E8 sites has yet to be determined; however, this analysis evaluates the required system upgrades and the relative system hydraulic performance of the two (2) alternative locations.

4.2 Servicing for West Erin Developments

Further, the analysis considers the servicing options to address pressure and fire flow needs for the West Erin developments:

- New BPS near Well E8 to support the new E-HPZ
- Integrated Erin-Hillsburgh BPS servicing both the Erin-Hillsburgh watermain and the new E-HPZ
 - With separate pumps and discharge header
 - With common pumps and discharge header
- Supplementing fire flows via transfers from the E-LPZ

4.3 Servicing Scenarios

The following servicing scenarios were reviewed based on the combined servicing requirements of the new Erin-Hillsburgh BPS, new E-HPZ, and West Erin Developments. Figures 1 to 9 further present the schematic representation of the different servicing scenarios.

- Existing System: Existing System
- **Scenario 1:** New EH BPS at WE7 and new E-HPZ BPS at WE8. Coscorp Development within the E-MPZ.
- **Scenario 2:** New EH BPS at WE7 and new E-HPZ supplied by common pumps from an integrated BPS.
 - 2a: Coscorp Development within the E-MPZ
 - 2b: Coscorp Development within the new E-HPZ
 - 2c: Coscorp Development within expanded E-LPZ
- **Scenario 3:** New EH BPS at WE8 and new E-HPZ supplied by common pumps from an integrated BPS. Coscorp Development within the E-MPZ.
- **Scenario 4:** New EH BPS at WE8 and new E-HPZ supplied by common pumps from an integrated BPS – With WE7 transferred to the E-L PZ.
 - Coscorp Development within the E-MPZ
 - Coscorp Development within the new E-HPZ
 - Coscorp Development within expanded E-LPZ

Note that for all scenarios the Empire Development is within the existing E-MPZ and the Mattamy Development is within the new E-HPZ.

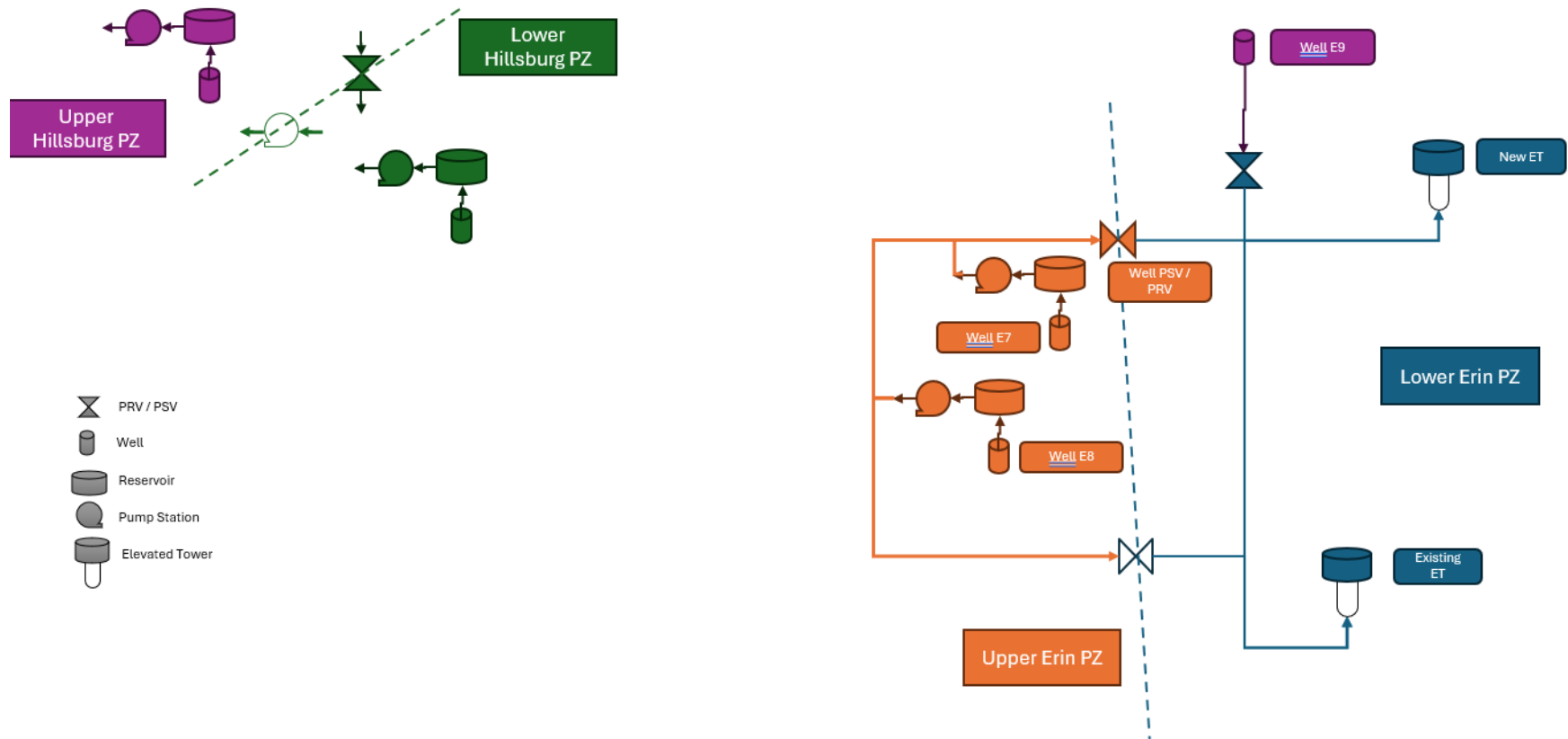


FIGURE 1 – EXISTING - WATER SYSTEM SCHEMATIC

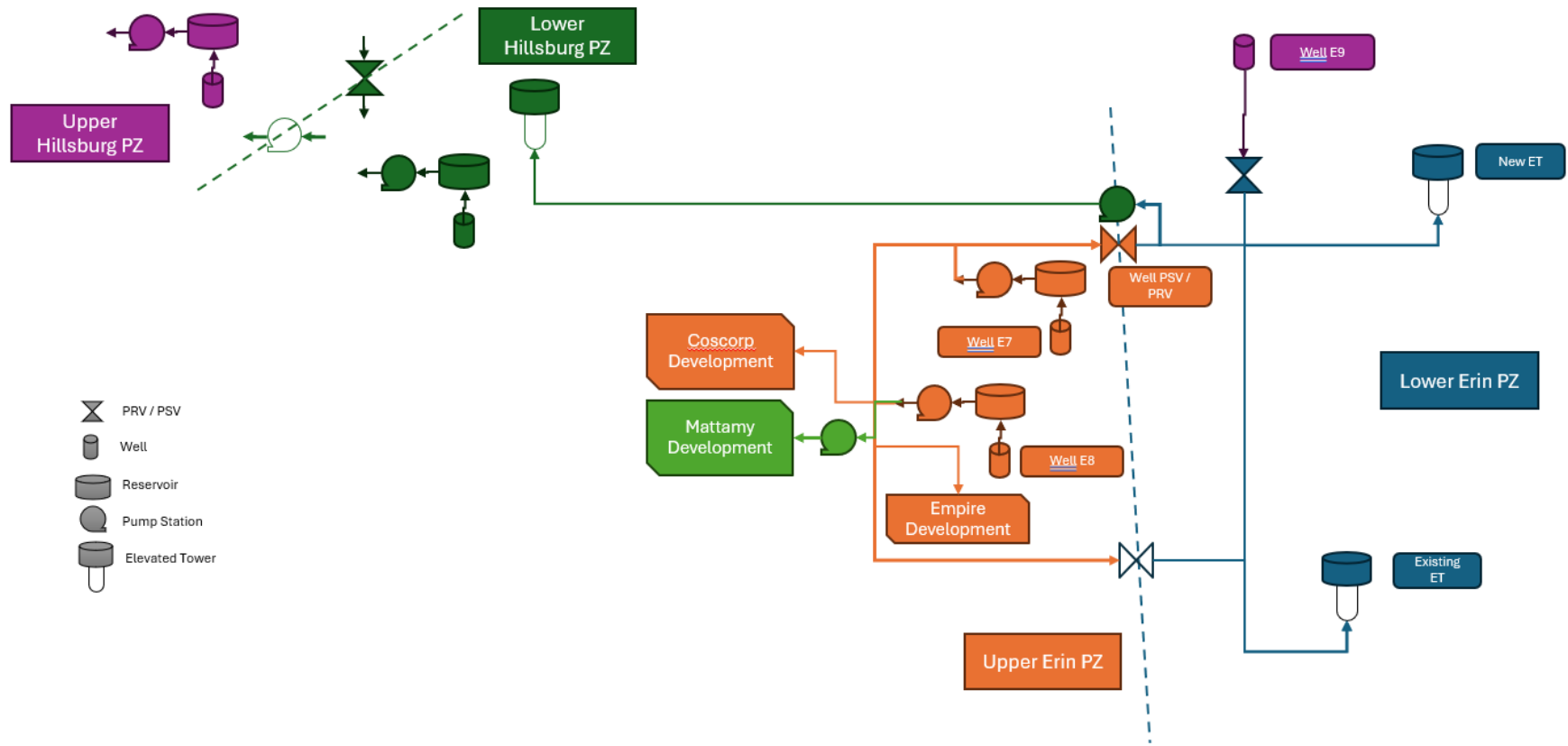


FIGURE 2 – SCENARIO 1: NEW EH BPS AT WE7 AND NEW HEPZ BPS AT WE8 - WATER SYSTEM SCHEMATIC

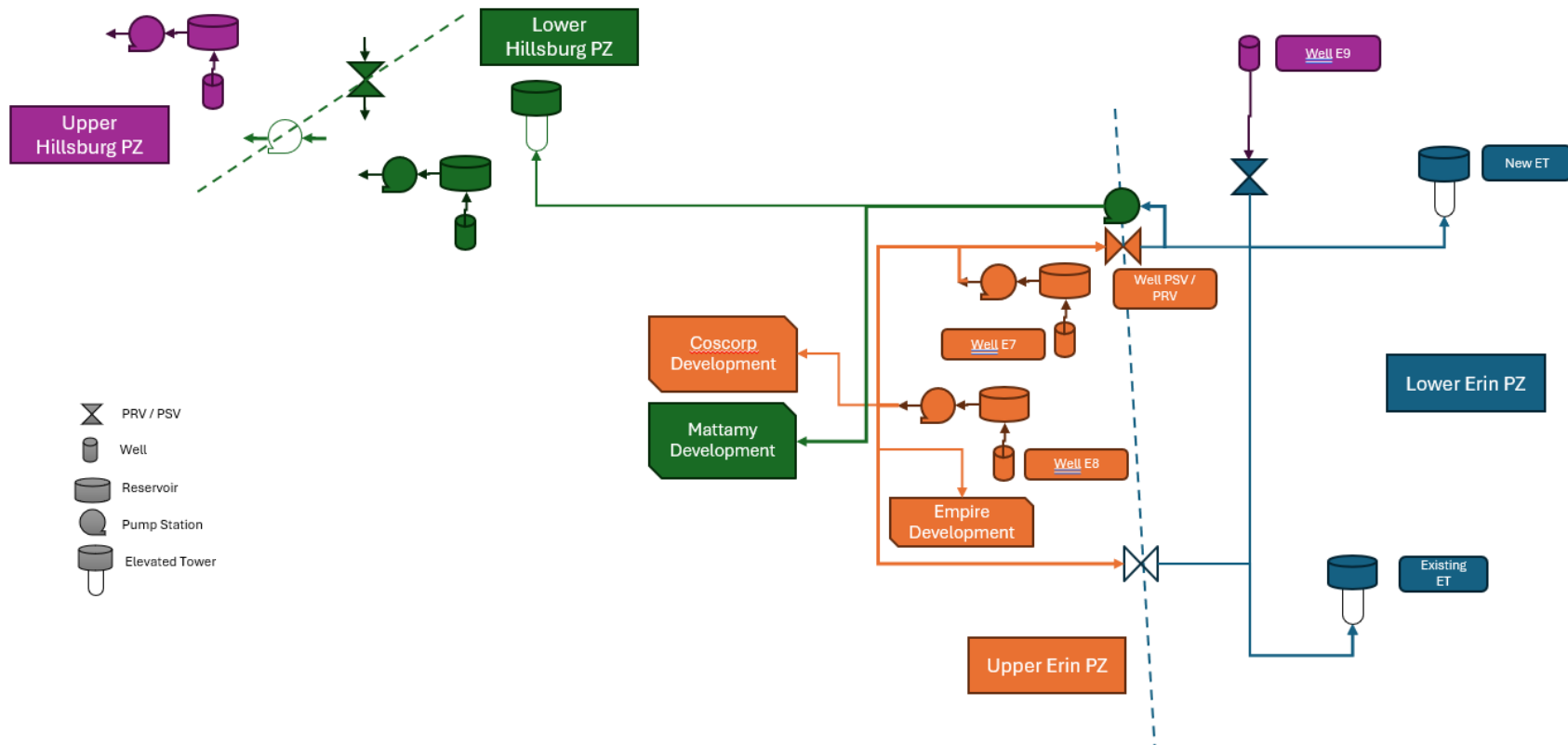


FIGURE 3 – SCENARIO 2A: NEW EH BPS AT WE7 AND NEW HEPZ BPS AT WE8 WITH - COSCORP DEVELOPMENT WITHIN THE UPPER ERIN PZ - WATER SYSTEM SCHEMATIC

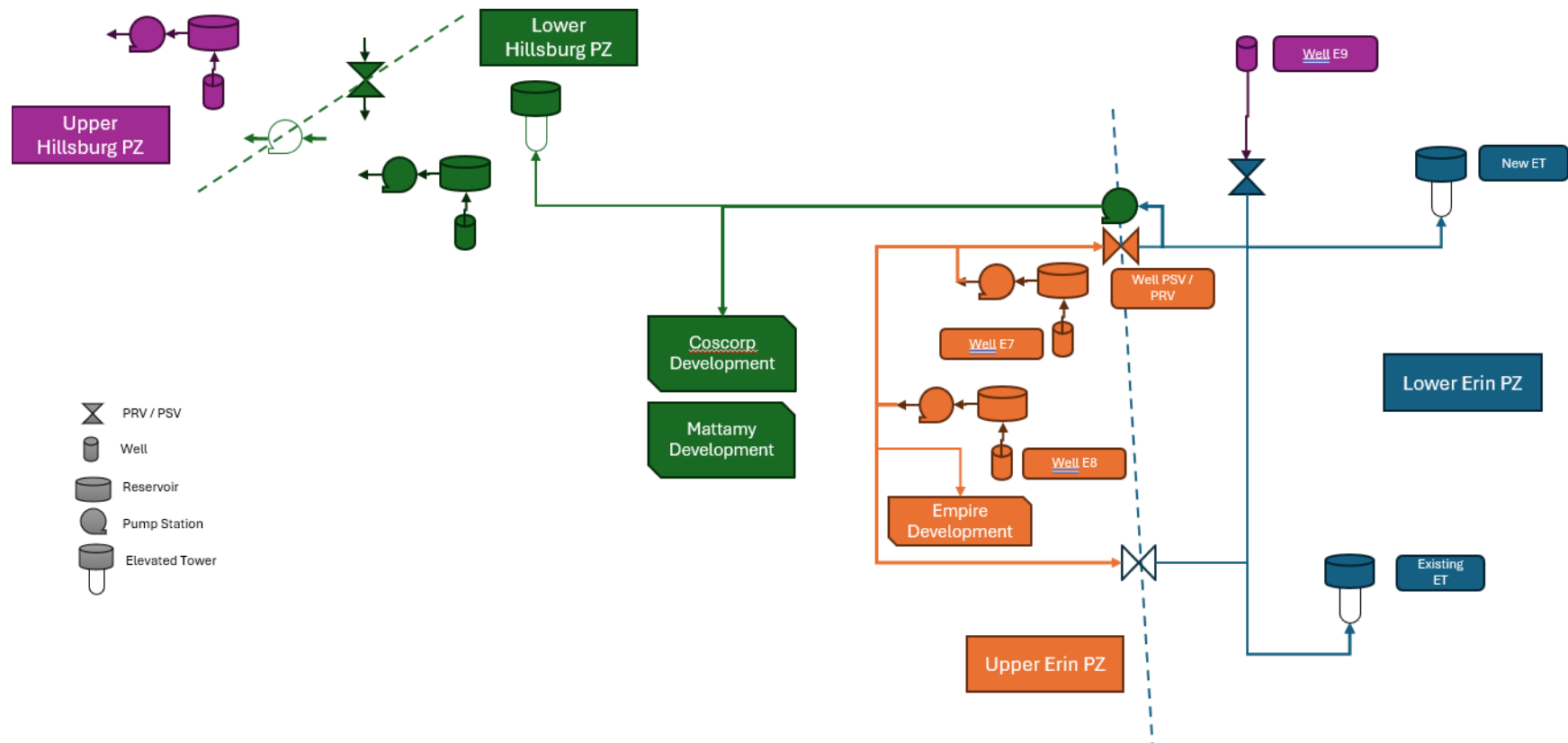


FIGURE 4 – SCENARIO 2B: NEW EH BPS AT WE7 AND NEW HEPZ BPS AT WE8 WITH - COSCORP DEVELOPMENT WITHIN THE NEW HIGH ERIN PZ - WATER SYSTEM SCHEMATIC

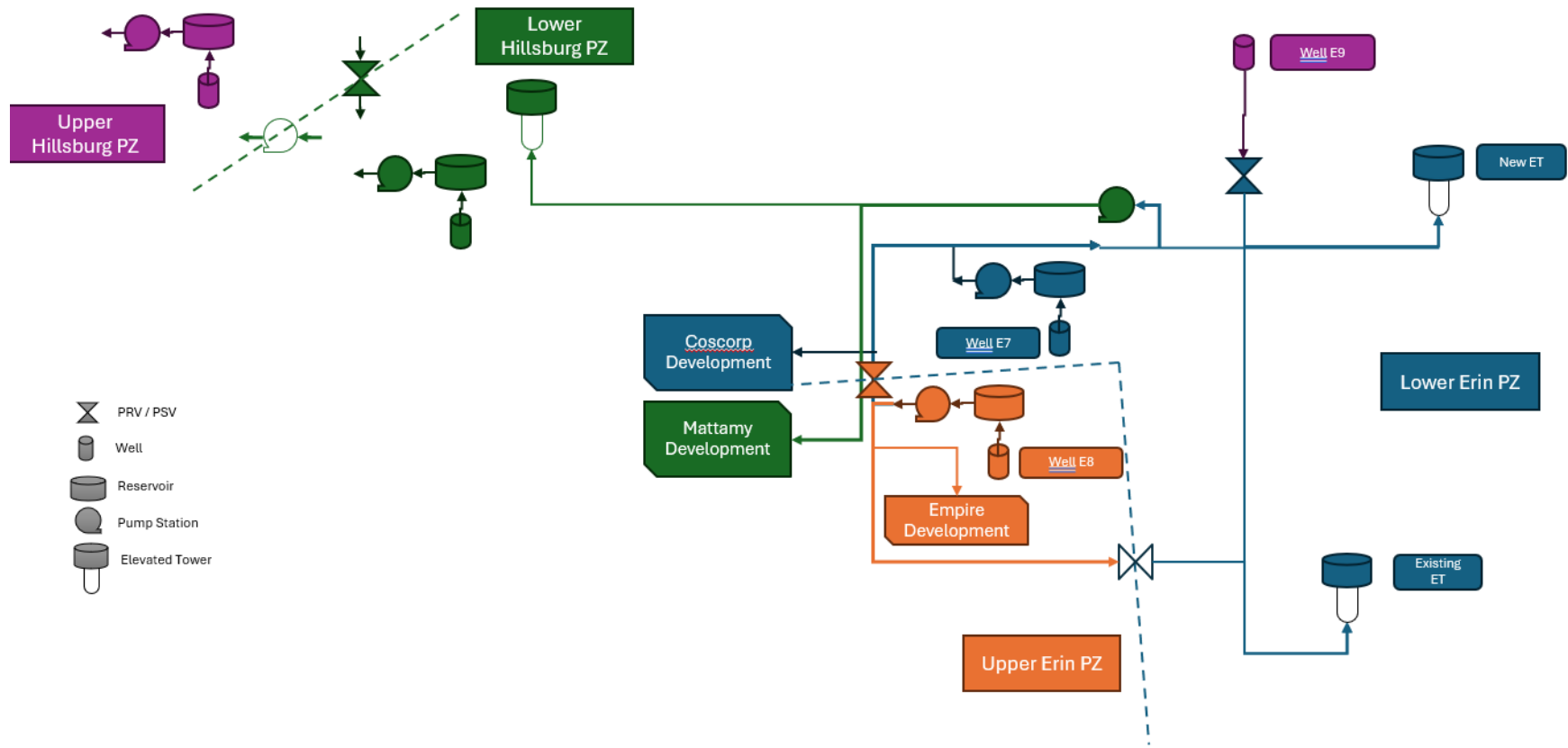


FIGURE 5 – SCENARIO 2C: NEW EH BPS AT WE7 AND NEW HEPZ BPS AT WE8 WITH - COSCORP DEVELOPMENT WITHIN THE LOWER ERIN PZ - WATER SYSTEM SCHEMATIC

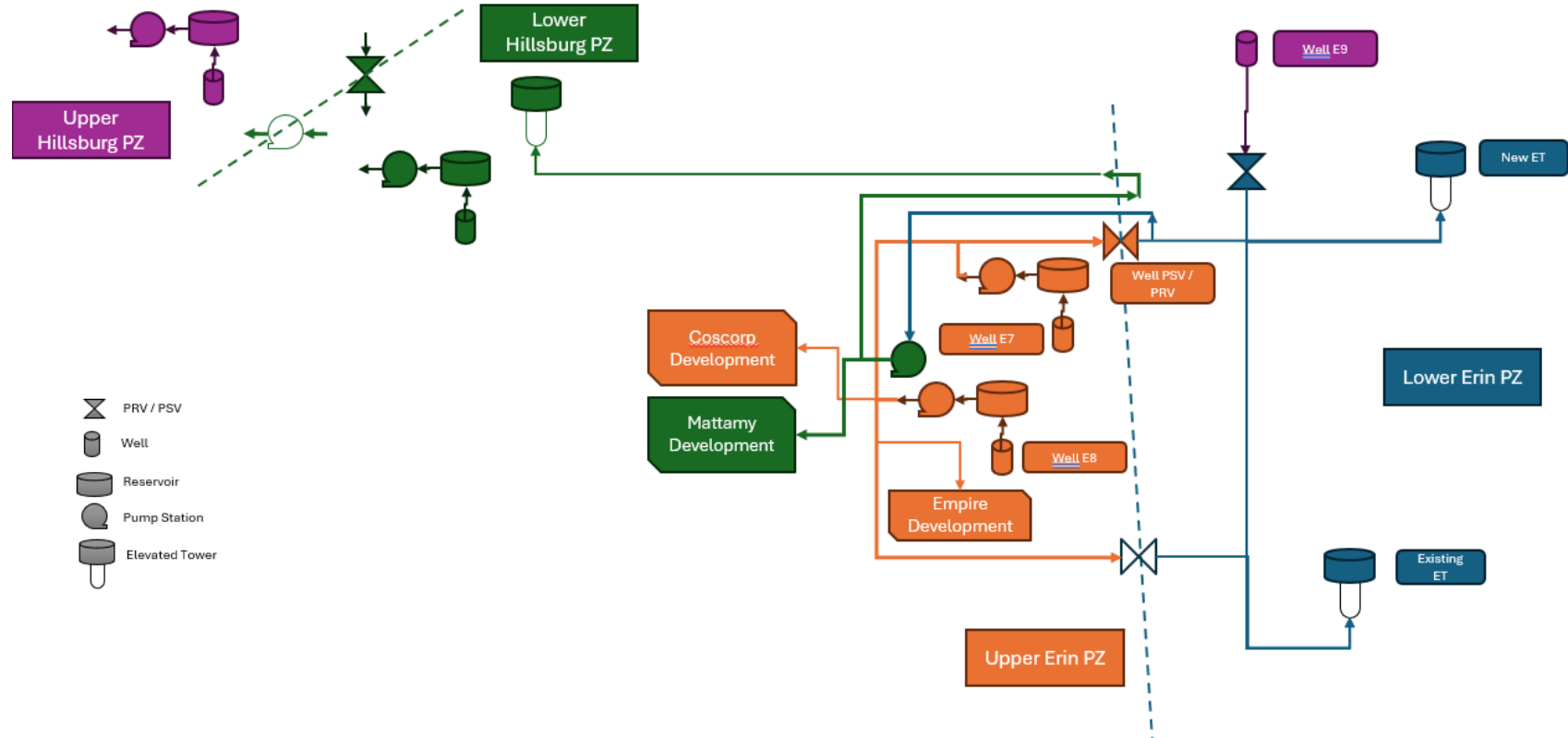


FIGURE 6 – SCENARIO 3: NEW EH BPS AT WE8 - WATER SYSTEM SCHEMATIC

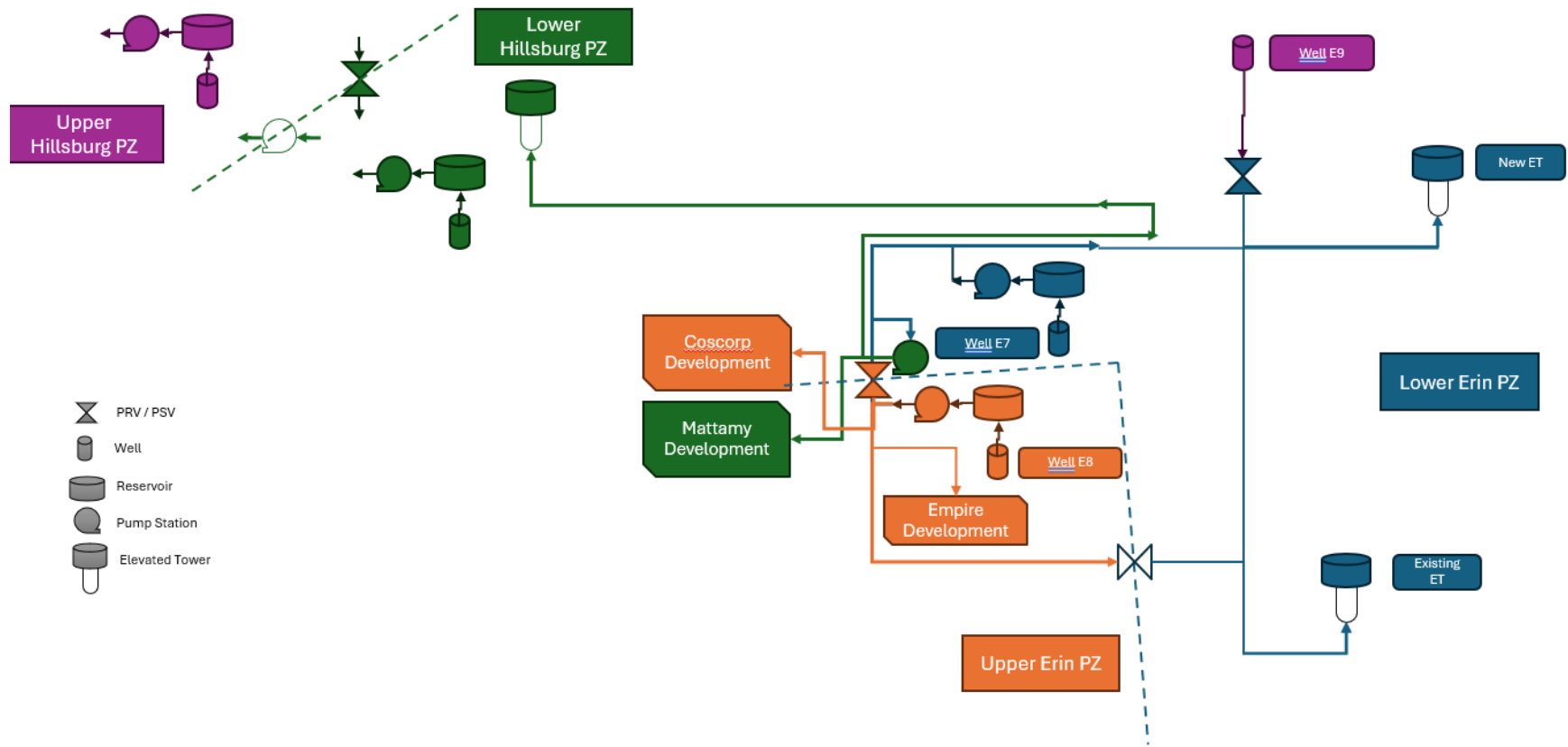


FIGURE 7 – SCENARIO 4A: New EH BPS at WE8 – With WE7 transferred to the Lower Erin PZ- COSCORP DEVELOPMENT WITHIN THE UPPER ERIN PZ - WATER SYSTEM SCHEMATIC

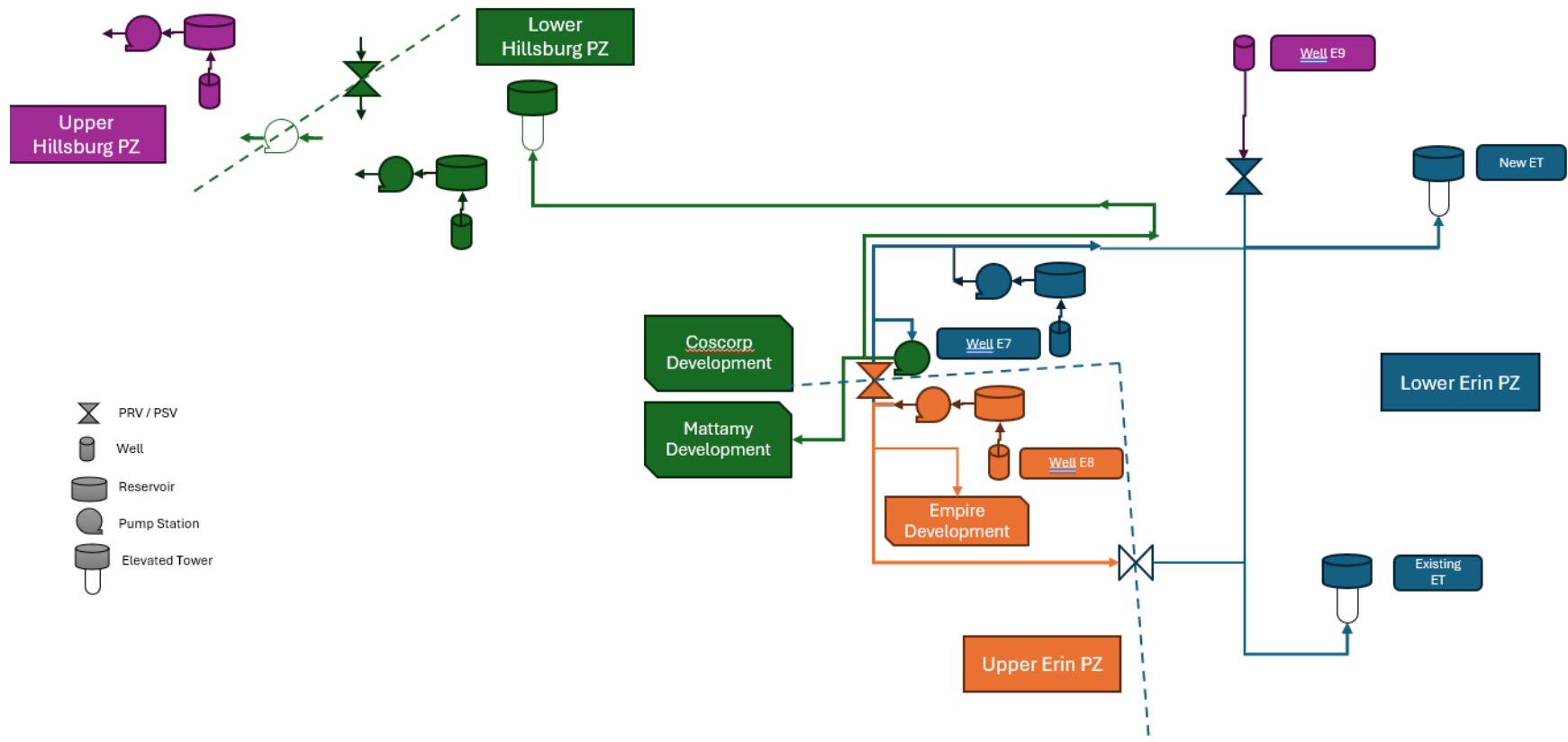


FIGURE 8 – SCENARIO 4B: NEW EH BPS AT WE8 – WITH WE7 TRANSFERRED TO THE LOWER ERIN PZ- COSCORP DEVELOPMENT WITHIN THE NEW HIGH ERIN PZ - WATER SYSTEM SCHEMATIC

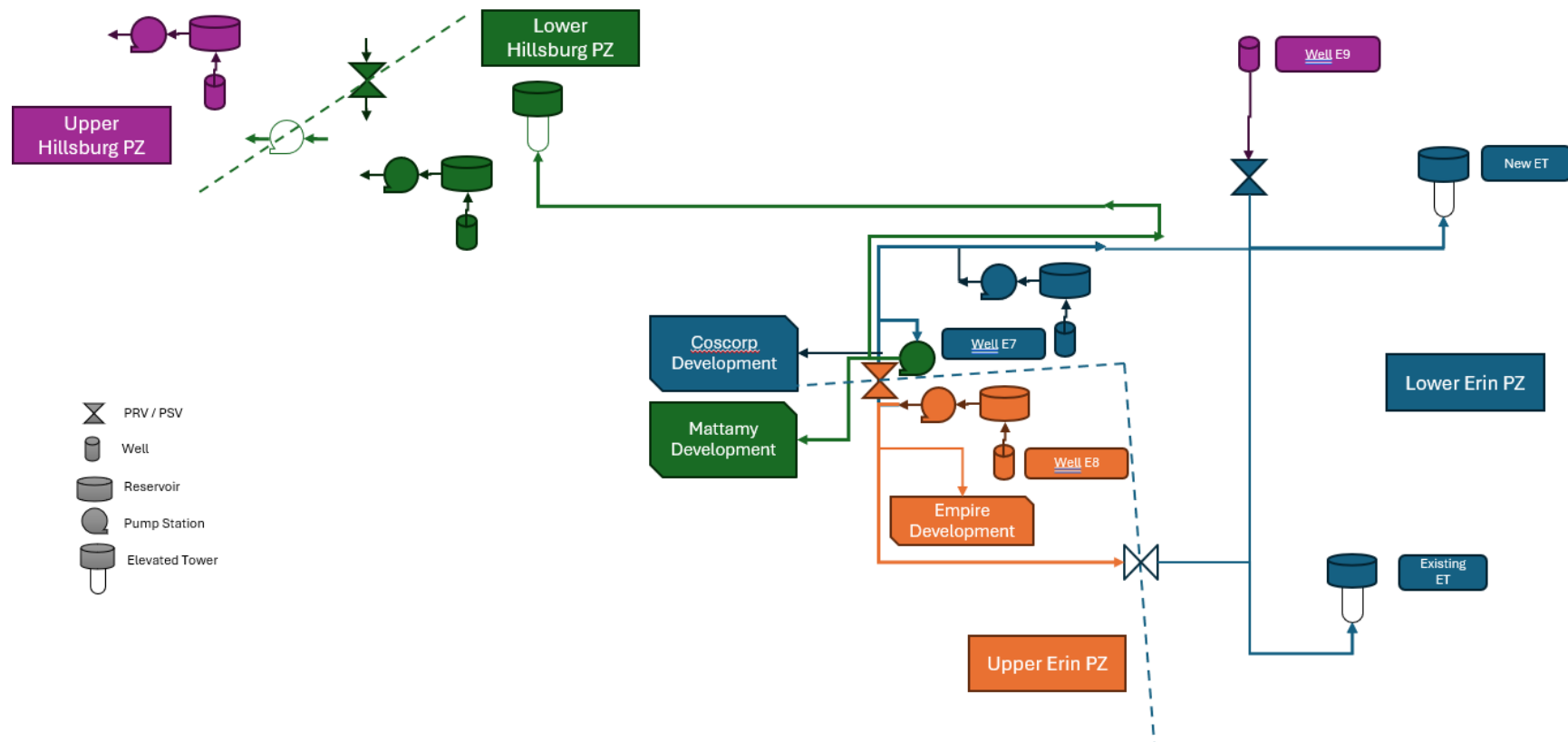


FIGURE 9 – SCENARIO 4C: NEW EH BPS AT WE8 – WITH WE7 TRANSFERRED TO THE LOWER ERIN PZ- COSCORP DEVELOPMENT WITHIN LOWER ERIN PZ
- WATER SYSTEM SCHEMATIC



4.4 Analysis Results

4.4.1 System Pressures and Pressure Zone Boundaries

A review of the West Erin Developments found that:

- Empire Development:
 - The location and the elevations of the Empire development (410-420 mASL) are well suited to integrate directly into the existing E-MPZ (HGL of 465 mASL).
 - Due to the Empire development's location, it would be difficult to integrate the development into the new E-HPZ.
- Coscorp Development:
 - The location and elevations of the Coscorp development (398-436 mASL) are well suited to integrate directly into the existing E-MPZ (HGL of 465 mASL).
 - There is potential for the northern half of the Coscorp development (Elevation 398-426 mASL) to be serviced via the E-LPZ (447 mASL), providing improved fire flow capacity to the multi-family block located in the northeast. However, elevations in the development's southern half (426- 436 mASL), including the second multi-family block in the southeast, are too high to be serviced off the E-LPZ.
 - There is potential for the development to be integrated into the new E-HPZ, which may support improved fire flow capacity to the multi-family blocks. The new E-HPZ (minimum HGL of 481 mASL) is well suited to the elevations in the southern half of the development (426- 436 mASL); however, it would result in pressure exceeding 700kPa in the northern half of the development.
- Mattamy Development
 - The existing E-MPZ (HGL of 465 mASL) cannot provide sufficient pressure to the Mattamy development as the elevations are too high (430-445 mASL).
 - The location of the Mattamy Development makes it difficult to service the site at a new higher HGL without the construction of a new BPS and twinning of watermains.
 - Increasing the existing E-MPZ to meet the minimum pressure requirements within the Mattamy development would result in high pressure, in excess of 700 kPa, within a portion of the existing E-MPZ. Increasing the HGL would require upgrading the existing Well E7 and E8 pumps and the pressure tank facility.
 - The minimum desired HGL of 481 mASL aligns well with the H-LPZ target HGL of 481 to 485 mASL, providing an opportunity to service the Mattamy Development in an integrated manner with the new Erin-Hillsburgh BPS and H-LPZ.



- Expansion of the Lower Erin Pressure Zone (E-LPZ)
 - It may be possible to transition Sideroad 17 and the northern half of Line 8 to the E-LPZ. This would include transferring Well E7 to the Lower Erin PZ.
 - Transition Sideroad 17 and the northern half of Line 8 may be required and/or help facilitate:
 - Servicing the northern half of the Coscorp development.
 - Support the construction of the new Erin-Hillsburgh BPS at the Well E8 site.
 - Transferring Well E7 to the E-LPZ would eliminate supply redundancy within the E-MPZ.

4.4.2 Fire Flow Needs

A review of the Fire Flows in the E-MPZ found that:

- There is insufficient existing capacity in the E-MPZ to support the required target of 76 L/s for single-family homes and 200 L/s for the multi-family block.
 - When accounting for the proposed development, the E-MPZ pumping capacity has a fire flow capacity of 41.7 L/s.
 - The total combined storage at Wells E7 and E8 is 0.4 ML, of which 50% is assumed to be required to satisfy contact time requirements. The 0.2 ML allows for 27 L/s of sustained flow over a 2-hour period.
- To support the target fire flows, either of the following alternatives are required:
 - Supplement fire flow through transfers from the E-LPZ.
 - Construct up to 1.45 ML of additional storage within the E-MPZ to support the required fire flows of 200 L/s for 2 hours.
- The capacity of fire flow that can be transferred from the E-LPZ is limited by the elevation of the ET and the Sideroad 17 watermain capacity.
 - The existing 250 mm watermain on Sideroad 17 limited peak available flow transfer to:
 - 130 L/s to Well E7 site and potential new Erin-Hillsburgh BSP.
 - 90 L/s to Well E8 site and potential new Erin-Hillsburgh BSP.
 - The following development sites without additional pumping
 - 80 L/s to the Coscorp development lower (north) multi-family block
 - 30 L/s to the Coscorp development upper (south) multi-family block
 - 50 L/s to the Empire development.
 - 140 kPa can not be supported to all points within the Mattamy development.
 - Upgrading the Sideroad 17 and Eight Line Watermain to 300 mm would increase available flow transfers to:
 - >200 L/s to Well E7 site and potential new Erin-Hillsburgh BSP (~870 m of upgrade).



- 160 L/s to Well E8 site and potential new Erin-Hillsburgh BSP (~1,770 m of upgrades).
- The following development sites without additional pumping
 - 130 L/s to the Coscorp development lower (north) multi-family block (~1,410 m of upgrades)
 - 50 L/s to the Coscorp development upper (south) multi-family block (~1,410 m of upgrades)
 - 70 L/s to the Empire development (~1,960 m of upgrades).
 - 140 kPa can not be supported to all points within the Mattamy development.
- To support 200 L/s fire flow to the Coscorp and Empire development multi-family block, the following is required:
 - Upgrading the Sideroad 17 watermain to 300 mm.
 - Support fire flow via the new E-HPZ and pumping from the Erin-Hillsburgh BSP at the Well E7 Site.
 - New 300 mm watermain from the new Erin-Hillsburgh BSP to the new E-HPZ with PRV connections to the Coscorp and Empire Developments
 - Additional storage would be required to support 200 L/s fire flow if the pumping was to occur via a new pump station located at Well E8, either as a dedicated pump station or as part of the Erin-Hillsburgh BPS.
- The 76 L/s fire flow to the Mattamy development requires pumping via a new BPS either integrated as part of the new Erin-Hillsburgh BPS or as a new dedicated BPS located near the Well E8 Site.
 - If the BPS is integrated as part of the new Erin-Hillsburgh BPS, no storage would be required to achieve the 76 L/s fire flow regardless of the Erin-Hillsburgh BPS location (Well E7 or Well E8).
 - If the BPS is configured as a new dedicated BPS located near the Well E8 Site, storage would be required. Available fire flow without storage would be limited to:
 - 57 L/s, consisting of 30 L/s of flow transfer from the E-LPZ and 27 L/s from the combined Well E7 and E7 storage, if no watermain upgrades are applied.
 - 63 L/s consisting of 35L/s of flow transfer from the E-LPZ and 27 L/s from the combined Well E7 and E7 storage; if the existing 250 mm watermain from Shamrock Road to the Well E7 size is upsized to 300 mm (~870 m of upgrade).
 - 77 L/s consisting of 55L/s of flow transfer from the E-LPZ and 27 L/s from the combined Well E7 and E7 storage if the existing 250 mm watermain



from Shamrock Road to the Well E8 size is upsized to 300 mm (~1,770 m of upgrades).

- The potential back feeding from the new H-LPZ ET is limited due to the size, 250 mm diameter, and length, 5.1 km, of the interconnecting watermain:
 - 70 L/s to the Upper Erin PZ.
 - 50 L/s to the new Higher Erin PZ.

4.4.3 New High Erin Pressure Zone (E-HPZ) Pump Station

A review of pumping options for the new E-HPZ found the following:

- Integrating as part of the new Erin-Hillsburgh BPS:
 - The minimum desired HGL of the new High Erin of 481 mASL PZ (to support the higher elevations within the Coscorp and Mattamy development) aligns well with the H-LPZ target HGL of 481 to 485 mASL, providing an opportunity to service the Mattamy development in an integrated manner with the new Erin-Hillsburgh BPS and H-LPZ.
 - The MDD and PHD for the new E-HPZ are approximately 6 L/s and 10 L/s, well within the BPS current projected firm capacity of 32 L/s. As such, the integration can likely be accommodated through either:
 - Utilizing the existing station's firm capacity or
 - Adding an additional duty pump.
 - There is sufficient capacity in the interconnecting watermain to allow the new H-LPZ ET to supply the new E-HPZ average demands via gravity. However, this approach would result in 100 kPa of pressure fluctuation within the PZ.
 - Dedicated fire pumps would be required to support fire flows.
 - The fire pumps should be sized to support the 200 L/s fire flow to the multi-family blocks in the Coscorp development.
 - A dedicated 300 mm watermain from the new Erin-Hillsburgh BPS to the new E-HPZ is required to support fire flow requirements.
 - PRV connection to the E-HMPZ off the 300 mm watermain near the lower (north) Multi-Family Blocks and near the Empire development is needed to support the target 200 L/s fire flow.
 - There is flexibility in the configuration and operation of the new Erin-Hillsburgh BPS:
 - Can be operated with a single header with:
 - Fix speed pumps operating off the new H-LPZ ET
 - Variable frequency drive (VFD) pump with a target discharge pressure when not filling the new H-LPZ ET
 - Can be operated with two headers and separate discharges.
 - Locating the Erin-Hillsburgh BPS at the Well E7 site can allow 200 L/s fire flow without additional storage.



- Constructing a new dedicated BPS near the Well 8 site.
 - Can optimize the new E-HPZ HGL to suit the development needs.
 - The pump station will need to be multi-pumps with VFD to target a discharge pressure.
 - The location of the new pump station and configuration of the existing water system will require up to 1.45 ML of storage to be constructed to support the target fire flow of 200 L/s.

4.4.4 New Erin-Hillsburgh BPS – Site Options

Locating the New Erin-Hillsburgh BPS near the Well E7 has the following considerations:

- Can be integrated without requiring modifications to the existing configuration and/or operation of the E-MPZ.
- To support 200 L/s fire flow to the west Erin developments.
 - Requires upgrading the existing Sideroad 17 watermain from Wellington Road 23 to the BPS from 250 mm to 300 mm.
 - Construction of additional storage is not required.
- Support the servicing of the new E-HPZ:
 - Would require the construction of a new dedicated 300 mm watermain from the BPS to the Mattamy development. A new E-MPZ watermain on 17 Sideroad from Eight Line to the Coscorp Development is still required to service the Coscorp Development.

Locating the New Erin-Hillsburgh BPS near the Well E8 has the following considerations:

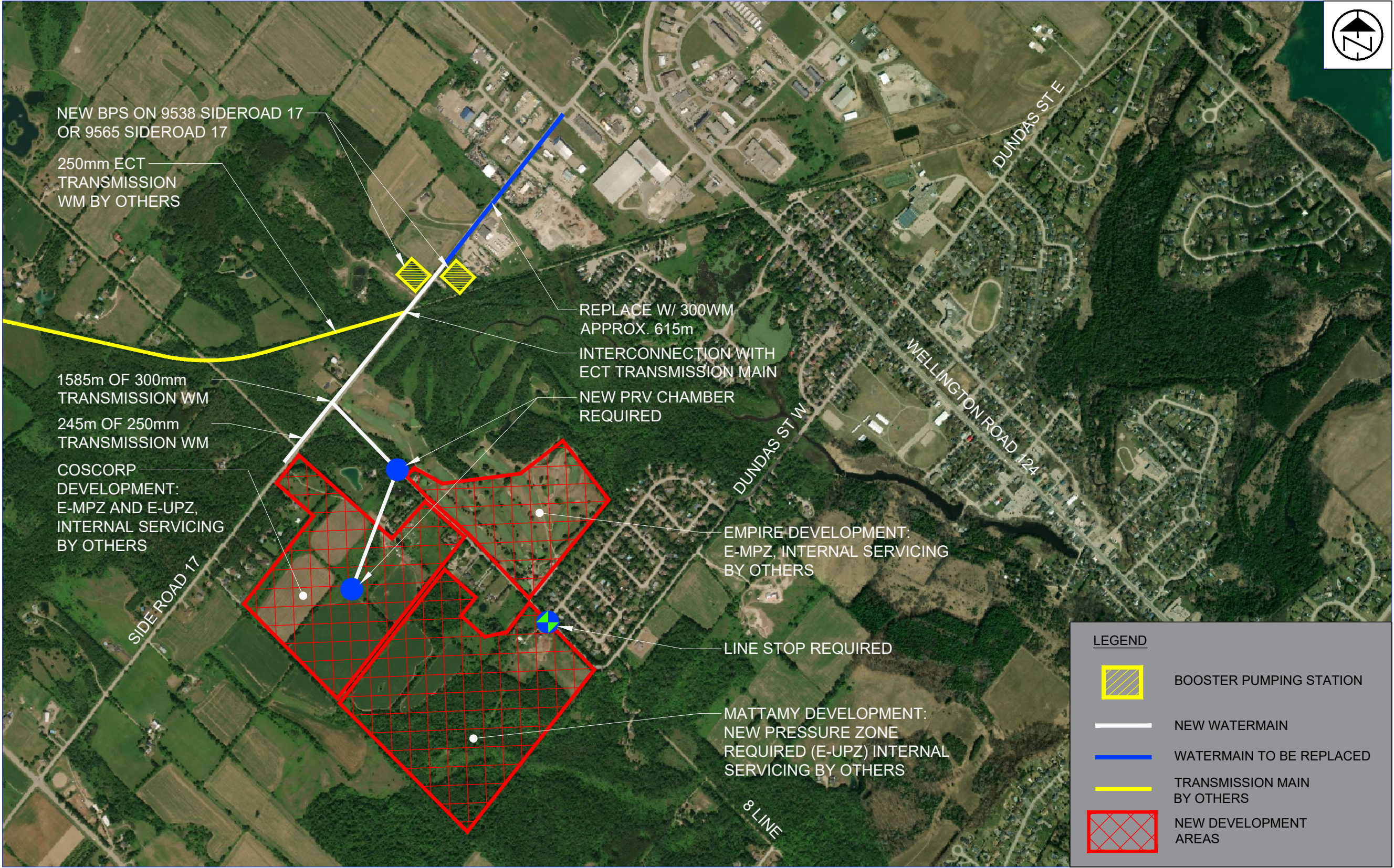
- To avoid modifying the existing configuration of the existing Upper Erin PZ would require the construction of two (2) new watermains (See Figure 6):
 - A new supply main from Well E7 to Well E8 connecting to the E-LPZ.
 - A new discharge main from Well E8 to the Erin-Hillsburgh interconnection watermain.
- Alternatively, it would require a transition of Sideroad 17 and the northern half of Line 8 to the Lower Erin Pressure Zone. This would include transferring Well E7 to the Lower Erin PZ (See Figures 7 to 9).
 - Supply would be provided via the existing 250 mm watermain.
 - A new Discharge main from Well E8 to the Erin-Hillsburgh interconnection watermain would still be required.
- Support the servicing of the new High Erin PZ:
 - The construction of a new dedicated 300 mm watermain from the BPS to the Mattamy development would be required.
- Construction of additional storage is required to support 200 L/s fire flow to the west Erin Developments.



5 RECOMMENDATION

Based on the hydraulic analysis, the following is the preferred Erin-Hillsburgh Booster Pumping Station and West Erin Developments water servicing alternative from a hydraulic and operational perspective:

- The New Erin-Hillsburgh BPS be located near the Well E7 site as:
 - Support the integration of the new BPS into the existing system without needing to re-configure the existing system PZ, operational strategies, and/or twinning existing watermains.
 - Requires the least amount of watermain upgrades to achieve the desired pressure and fire flow servicing criteria within the new development areas in West Erin.
 - Can support the desired target fire flow of 200 L/s in the Coscorp and Empire developments without the need to construct additional storage.
 - Allows for servicing the lower Hillsburgh PZ (H-LPZ) and new proposed High Erin PZ (E-HPZ) from a common BPS operating with a common target HGL.
- The following infrastructure configurations and upgrades are recommended to support the West Erin developments (Scenario 2A).
 - The higher elevation lands (generally areas above 426 mASL) within the Coscorp and Mattamy developments should be serviced via a new High Erin PZ (E-HPZ).
 - The new High Erin PZ (E-HPZ) should be supplied via the new Erin-Hillsburgh BPS and operate at the same target HGL as the lower Hillsburgh PZ (H-LPZ) (approximately 481 to 485 mASL).
 - The existing 250 mm watermain on Sideroad 17 watermain from Wellington Road 23 to the BPS be upgraded to 300 mm.
 - That the Empire Development and the lower lands (northern half) within the Coscorp Development can be serviced via direct connections to the existing Mid Erin PZ (E-MPZ) and the existing 250 mm watermain. However, PRV connections off the new High Erin PZ (E-HPZ) and 300 mm watermain, near Well E8, will be required to support the 200 L/s target fire flows.
 - That a dedicated 300 mm watermain be constructed from the BPS to the new High Erin PZ (E-HPZ). The watermain would twin the existing 250 mm Upper Erin PZ watermain on Sideroad 17 and Eight Line.
 - The watermain should follow the Eight Line to allow for the construction of a PRV near Well E8 to support 200 L/s fire flow within the Empire development.



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NOTES

CONTRACT DRAWINGS

Contractor must verify all dimensions and be responsible for same. Any discrepancies must be reported to the Engineer before commencing work. Drawings are not to be scaled. Drawings may not be used for any purpose other than that stipulated in the contract agreement between the consultant and the Engineer without the express written consent of Ainley & Associates Limited. Use of these drawings by any party for any other purpose is subject to the following caution.

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5.1 Erin-Hillsburgh Booster Pump Station – Conceptual Design Operational Point

To support the design of the new Erin-Hillsburgh BPS, the following system curve scenarios were developed:

- **Scenario 1:** Filling of the new H-LPZ storage (assuming the 5916/5952 Trafalgar Drive storage location):
 - 5.1 km 250 mm watermain that generally follows the Elora-Cataract trail supporting the interconnection of the Erin and Hillsburgh water systems.
 - 400 mm watermain from the Elora-Cataract trail to the new ET, along and/or parallel to Trafalgar Drive.
 - High and low ranges based on the typical operational range of the new storage.
- **Scenario 2:** Peak hour demand to the new E-HPZ; assuming supply to the highest elevation service within the PZ:
 - 300 mm watermain from the BPS to the Mattamy Development.
 - Mix of local 250/300 mm watermain to the service location.
 - High and low ranges based on meeting 275 kPa and 345 kPa at the highest elevation service.
- **Scenario 3:** Supplying max day demand + 76 L/s fire flow to new E-HPZ; assuming fire flow to the highest elevation service within the PZ:
 - 300 mm watermain from the BPS to the Mattamy Development.
 - Mix of local 250/300 mm watermain to the service location.
 - Based on meeting 140 kPa.
- **Scenario 4:** Supplying max day demand + Supply 200 L/s fire flow to the multi-family block within the new E-HPZ:
 - 300 mm watermain from the BPS to the multi-family block.
 - Based on meeting 140 kPa.

For all scenarios, the system curves incorporate the BPS suction-side system curve as follows:

- 300 mm watermain from the New Erin ET to the Erin-Hillsburgh BPS.
- Based on maintaining 140 kPa suction pressure.
- High BPS suction pressure scenario based on:
 - Well, E7, E8, and E9 are on, and the new Erin ET is at the top of balancing storage.
- Low BPS suction pressure scenario based on:
 - Well, E7, E8, and E9 are off, and the new Erin ET is at the bottom of balancing storage.

Figure X presents the resultant system curves, while Table 5 summarizes the resulting design point.



TABLE 5 – ERIN-HILLSBURGH BPS DESIGN POINTS

System Curve Scenario	Design Flow (L/s)	Total Dynamic Head (Low) (m)	Total Dynamic Head (High) (m)
H-LPZ ET – Filling	32	41	53
E-HPZ – PHD	11.5	25	40
E-HPZ – Fire Flow	82	24	38
E-HPZ – 200 L/s Fire Flow	206	42	68

Erin-Hillsburgh BPS - System Curves

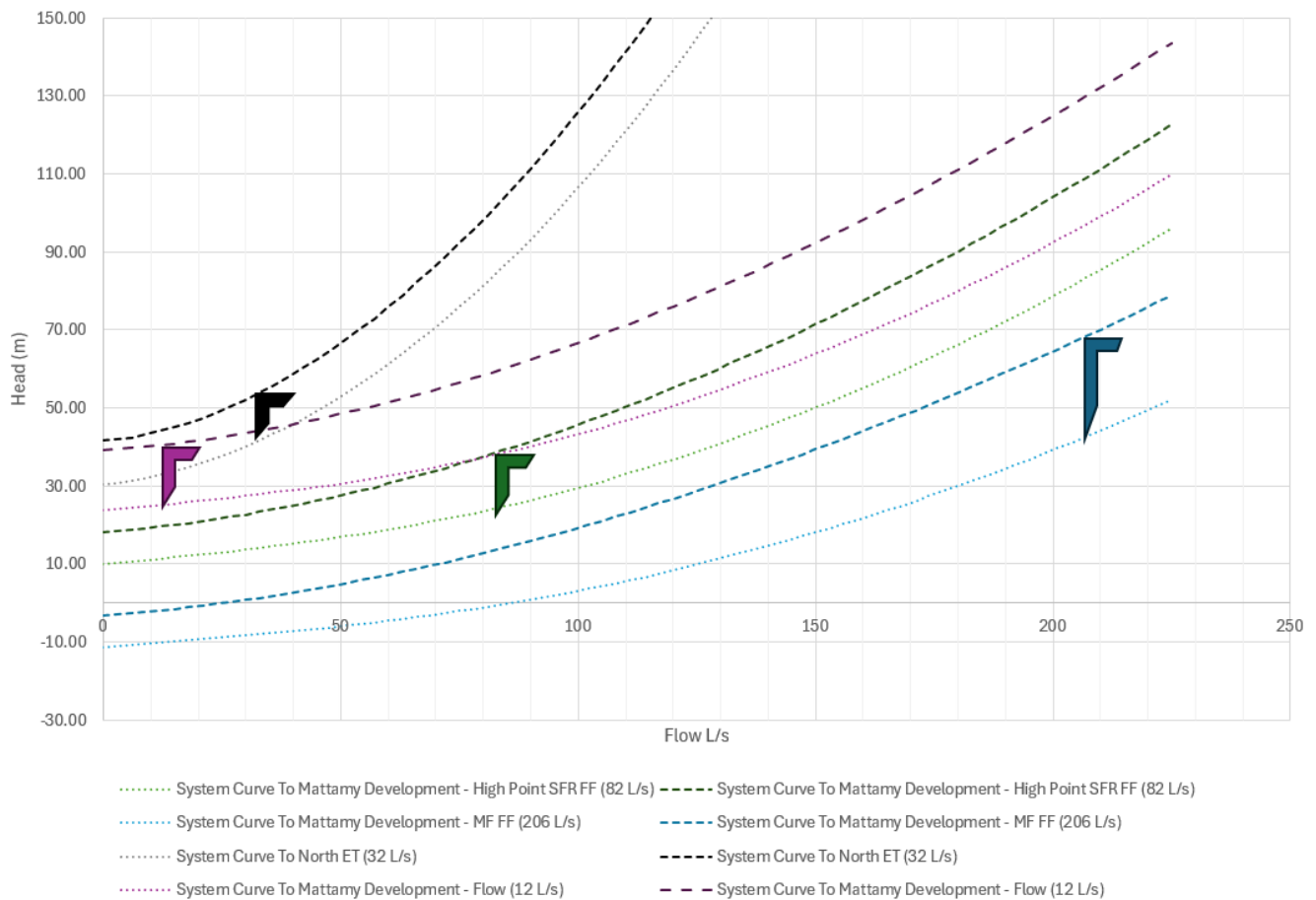


TABLE 5 – ERIN-HILLSBURGH BPS SYSTEM CURVES