DISTRICT OF LANTZVILLE
WATER MASTER PLAN

PLANNING OUR TOMORROW

FINAL - NOVEMBER 2017

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INTRODUCTION

The District of Lantzville has undertaken a Water Master Plan to analyze existing constraints to community water provision, understand current community desires, and set directions for Lantzville's future water system.

Access to a safe, clean, and reliable water source has been a priority issue for Lantzville residents since prior to incorporation. For many years, Lantzville's community water supply has been insufficient to fully service existing residents and businesses in the Water Service Area or to allow any new development in the community. The District has been undertaking steps to address existing issues and is now planning for the future. The Water Master Plan is intended to guide infrastructure development that supports community planning directions.

A Water Master Plan is a long-term (i.e., 20-year) guiding document that is reviewed and updated over time to respond to emerging community directions. It outlines a series of recommendations for Councils to consider as the community evolves. The recommendations in the Water Master Plan are intended to be considered on an incremental basis, in response to community changes and ongoing monitoring.

It is important to understand that the Water Master Plan is a long-range plan – it does not provide engineering design or detailed directions; rather, it is intended to set long-term directions for water planning decision-making.

GOALS & OBJECTIVES

The following goals and objectives guide the Water Master Plan:

- **Access to Safe Drinking Water for Residents:** Existing and future residents in Lantzville should have the opportunity to connect to a clean, safe water source, reducing concerns about wells with inadequate quality or quantity.
- **Sustainable Future Water Supply:** A sustainable water supply provides secure access to water even as a community evolves and forces like climate change occur. This includes ensuring continued supply of water during abnormal or emergency conditions, as well as adequate supply for long-term changes in the community, including population growth and climate change.
- **Cost Effective Community Water:** Cost effective water delivery optimizes capacity and maintains the value of infrastructure assets through planned maintenance and renewal.
- **Responsible Community Water Use:** Maintenance of a water system that is affordable for the community and sustainable for the environment requires a commitment to conservation by all system users.

WATER DESIGN STANDARD

As part of the Water Master Plan, Koers & Associates Engineering Ltd. prepared the report *Water Demand Design Standard Review, 2017 Update* (see ***Appendix A***). The report studies current water system demand patterns, both within the District and in nearby water systems, analyzes design standards currently in use in the mid-Vancouver Island area, and recommends an updated Design Standard for existing and potential future land uses.

Based on analysis, the Water Master Plan recommends updating Lantzville's current Design Standard of 3,400 Litres/day per connection as follows:

Land Use Type	L/Day/Connection
Single-Family Residential	2,800- 3,000 L/day/connection
Multiple-Family Residential	1,080- 1,710 L/day/unit
Institutional, Commercial, Industrial	Assessed on a case-by-case basis considering proposed activities and engineering best practices
Properties not connected to the District's Community Water System	Remains at 3,400 L/day/connection

Refer to Section 4 for additional details.

WATER SERVICE EXTENSION

To help residents in Lantzville's different unserviced neighbourhoods consider their level of desire for community water, cost range scenarios were developed, estimated, and refined for individual properties to extend water servicing to and within their neighbourhood by developing a Local Area Service.

During the community-wide survey, estimates for each existing unserviced neighbourhood were presented and residents of that neighbourhood provided feedback on their level of support for extension of water.

This feedback was used to develop the following phasing for considering extension of water to unserviced parts of Lantzville:

- **Phase 1 Service Expansion Neighbourhoods:**
  - Consider expansion of water infrastructure to these neighbourhoods in the short- to medium-term, subject to approval of property owners in the neighbourhood and sufficient water supply
  - Phase 1 neighbourhoods included AW: Clark Drive Area, FW: Fernmar Road Area, and HW-1: Winds Residential Area
- **Phase 2 Service Expansion Neighbourhoods:**
  - Reassess neighbourhood desire for community water once Phase 1 expansion is complete
  - Phase 2 neighbourhoods included BW: Owen Road Area, GW: Aats Road Area, HW-2: Winds Estate Residential Area, and IW: Bayview Area

Phasing also recognized that larger development sites (e.g., the Village, East Lantzville, Upper Lantzville Ware Road Area, and Upper Lantzville Superior Road Area) may also advance water service expansion as part of new development. In these cases, sufficient water supply and required infrastructure would need to be provided.

During the Water Master Plan process, input indicated that a small number of properties outside the Water Service Area may desire community water for domestic use; however, being outside the Water Service Area currently limits opportunities to connect.

To allow water connections to properties outside the Water Service Area to be considered, while retaining a boundary that indicates the limits of planned water service, the Water Master Plan recommends updating OCP policy to allow requests for water service to properties outside the Water Service Area to be considered on a case-by-case basis, where they do not adversely affect the planned water system.

Refer to Section 5 for additional details.

WATER BUDGET SCENARIOS

Today, Lantzville's existing water supply is not sufficient to connect any additional existing residents or potential new development. The Water Master Plan analyzes water supply and demand scenarios and summarizes the potential water service extensions that could occur based on the phased addition of new supply.

Planning for long-term water supply is fundamental to ensuring sufficient water is available as the community evolves, preparing for unanticipated needs and setting aside sufficient funds for replacement or implementation of major projects.

The Water Master Plan considers the following existing/ potential water supply sources:

- **Existing Wells:** Lantzville's existing well field consists of five producing wells. The District has completed testing and upgrades of the wells to maximize yields to the extent possible. In August 2017, testing was completed to confirm dry season capacity and showed a production rate of **2,380 m^3/day**.
- **Lantzville/Nanaimo Water Agreement:** In 2014, the District of Lantzville and City of Nanaimo signed the Lantzville/Nanaimo Water Agreement which allows Lantzville to consider potential provision of Nanaimo water to parts of Lantzville's water supply system. The agreement stipulates that water connections will only be provided to properties within the Upper Pressure Zone and defines the number of potential connections.
- **Potential New Wells:** There is potential for additional groundwater sources within the District of Lantzville, via wells on private lands. As future development is considered in Lantzville, opportunities to secure additional groundwater sources to supply the District's water system may occur.
- **Other Supply Options:** Options not currently being explored in this Water Master Plan, such as additional capacity from the City of Nanaimo, connection with other water supply providers, or further water source identification may be revealed in the future as alternates or additions to the supply sources current known.

Water budgeting analyzes the relationship between water supply and water demand by existing parcels and potential future growth. Because Lantzville has an existing supply limitation, the Water Master Plan analyzes supply scenarios that describe how the addition of new supply sources could address existing deficit and potential future needs.

Four Water Budget Scenarios were developed to illustrate potential combinations of water supply and water demand allocation to existing and potential new neighbourhoods in Lantzville. The following broad summary statements can be observed in the scenarios:

- **Scenario A** maintains supply as existing and results in a water supply deficit based on existing connections. There is no water available for connecting existing unserviced residents or for any new growth.
- **Scenarios B1 and B2** add the supply from the Lantzville/Nanaimo Water Agreement which provides sufficient water for some existing parcels and some new development, but due to the limitations of the agreement, there would not be sufficient supply to service both existing neighbourhoods that may desire servicing and support infill and Village area development in the Lower Pressure Zone. Trade-offs would be required. The agreement does supply sufficient water to service all potential new development in the Upper Pressure Zone, phased at a rate of 50 units/year.
- **Scenario C** assumes an additional water supply will be secured that would be sufficient to service all existing parcels, plus all potential future growth that could be considered under the OCP Update, recognizing that full build-out within a 20-year time frame is unlikely.

It is recommended that provisions be made to implement water supply infrastructure that will accommodate Scenario C to be prepared for the broadest range of potential circumstances. Planning water system development to meet Scenario C is not intended to fetter the discretion of future Councils and the community to accept or deny any given rezoning or development application based on merits at the time.

Refer to Section 6 for additional details.

WATER CONSERVATION

Lantzville's high level of water conservation is partially attributable to the tiered water rate system that the District employs. The tiered rate structure rewards lower water users with lower water rates. As Lantzville considers implementation of the Lantzville/Nanaimo Water Agreement, Water User Rates will need to be reviewed and reconciled to ensure costs for Nanaimo water are recovered.

Lantzville residents show a high degree of water consciousness, undertaking initiatives to personally conserve water and participating in educational and incentive programs offered by the District of Lantzville and Regional District of Nanaimo. As Lantzville considers changes to the community water system, efforts should be continued to provide policy and materials that help Lantzville remain a water-aware community.

Refer to Section 7 for additional details.

CAPITAL IMPROVEMENTS

Water system planning entails looking ahead and determining what may be required to meet future demands, including expansion or replacement of the distribution network, securing additional water supply, and water storage capacity expansion. System planning also involves consideration of the remaining life of the various components and when replacement or upgrade will be required.

In 2015, Koers & Associates Engineering Ltd. developed the Water Supply & Distribution System Study that identified a number of existing anticipated upgrades to the community water system. With the completion of the Water Master Plan, potential upgrades identified in the 2015 Study have been updated and are summarized in table on the following page.

As infrastructure ages and delivery standards evolve, funding will be needed to maintain or replace components of the water system. The water service industry typically employs full cost accounting to understand the true cost of servicing the customer and ensure future revenue streams match these costs. The "full cost" not only includes current capital costs or debt and operating and maintenance costs, but also the costs to maintain and replace infrastructure in a sustainable manner. Financial planning to meet future water supply needs, in concert with managing existing infrastructure, will be key to long-term resiliency.

The District of Lantzville is completing Asset Management Planning to assess the replacement costs of existing infrastructure. This information, along with current operational costs, will inform regular reviews of water user rates to ensure sufficient revenue is being generated for renewal of the system.

It can be anticipated that future capital investments will be funded through a combined strategy that includes:

- **Senior Government Grants** for major infrastructure projects and water service expansion, recognizing that some projects may not be completed until such time a grant is obtained.
- **Water User Rates** that cover water use, minor capital upgrades, and ongoing maintenance and renewal of the system.
- **Parcel Tax** collected annually on each parcel to which domestic water is or can be provided, used to complete required capital upgrades.
- **Development Cost Charges** and other development funding for capital works driven by capacity increases needed to service growth. The District has an existing Development Cost Charges (DCC) program which should be reviewed from time to time to ensure the revenue calculations are reflective of expected construction costs and fully account for the growth share of infrastructure costs.

Refer to Section 8 for additional details.

Capital Improvements Summary Table

Ref. No.	Description	Quantity	Class 'D' Cost Estimate (2017 dollars, excl. GST)	Suggested Time Frame
1. WATER SUPPLY CAPACITY IMPROVEMENTS				
1.1	Implement the Lantzville/Nanaimo Water Agreement	n/a	$1,330,000 (connection fee)	Immediate
1.2	Reconnect Well #5	1	$50,000	Immediate
1.3	Secure Groundwater Licenses for each existing well	n/a	$6,500	Immediate
1.4	Pursue identification of a new water source for Lantzville to allow continued extension of the water system to existing residents and prepare for potential future demands.	1	By Development	Immediate
2. SYSTEM STORAGE IMPROVEMENTS				
2.1	Develop a new dual cell reservoir with a 158 m top water elevation to replace the function of the Aulds Rd. Reservoir, address storage shortfalls, and prepare for future expansion of the community water system	1	$900,000-$1,000,000	Immediate
3. FIRE FLOW IMPROVEMENT PROJECTS (COMMERCIAL, INSTITUTIONAL, INDUSTRIAL BENEFIT)				
3.1	Watermain Upgrade – Mart Rd and Industrial Rd (Metro to Harby Rd East)	175m of 200mm dia. 475m of 250mm dia.	$675,000	Ongoing - in Order of Priority Shown
3.2	Watermain Upgrade – Peterson Rd (Lynn to Lantzville)	300m of 250mm dia.	$360,000	
3.3	Watermain Upgrade – Lantzville Rd (Peterson to Harper)	450m of 250mm dia.	$540,000	
3.4	Watermain Upgrade – Harby Rd East (Peterson to Joy)	175m of 250mm dia.	$210,000	
3.5	Watermain Upgrade – Joy Way and Rossiter Rd (Peterson to Lancewood)	425m of 200mm dia.	$255,000	
3.6	Watermain Upgrade – Millard Dr (Peterson to Lancewood)	325m of 200mm dia.	$195,000	
3.7	Watermain Upgrade – Lynn Dr (Peterson to Lancewood)	325m of 200mm dia.	$195,000	
3.8	Watermain Upgrade – Lancewood Ave (Rossiter to Lynn)	250m of 200mm dia.	$150,000	
4. FIRE FLOW IMPROVEMENT PROJECTS (RESIDENTIAL AREA BENEFIT)				
4.1	Replace Limited Capacity Hydrants (not on map)	8 @ $3,700 ea.	$30,000	Ongoing - in Order of Priority Shown
4.2	Watermain Upgrade – Lantzville Rd (east and west of Superior)	1,500m of 200mm dia.	$900,000	
4.3	Watermain Upgrade – Huddlestone Rd	175m of 200mm dia.	$105,000	
4.4	Watermain Upgrade – Harper Rd	200m of 200mm dia.	$120,000	
4.5	Watermain Upgrade – Hall Rd	150m of 200mm dia.	$90,000	
4.6	Watermain Upgrade – Saxon Cross	150m of 150mm dia.	$80,000	
4.7	Watermain Upgrade – Forest Turn	150m of 150mm dia.	$80,000	
4.8	Watermain Upgrade – Clark Crescent	425m of 200mm dia. 100m of 150mm dia.	$310,000	
4.9	Watermain Upgrade – Geisler Pl and Chataway Pl	275m of 150mm dia.	$150,000	
5. OTHER WATER IMPROVEMENT PROJECTS				
5.1	Asbestos Cement (AC) Main Replacement (10- 12.5 km) (not shown on map)	600m/year for 15 years ($360,000/yr)	$5,400,000	Ongoing for 15 years
5.2	Watermain Looping Based on Future Development	As Required	By Development	Ongoing
5.3	Relocate PRV on Lantzville Rd to Ware Rd	1	By Development	TBD

ACTION SUMMARY

The outcome of the Water Master Plan is an outline of key actions, prioritized by suggested time frames, for Council consideration. Actual timing of implementation will be flexible, in response to community needs or emerging opportunities.

It is important that an adaptive management approach is taken when implementing the actions, so that when new opportunities or circumstances arise, Council and staff are able to make context-sensitive decisions to support the goals of the community. Refer to ***Section 9*** for details and budget information for the actions summarized below.

Immediate-Term Actions

Immediate-term actions are recommended to be considered for completion between 2018 and 2020. These include key high-priority actions and decisions that would be required to initiate expansion of or updates to Lantzville's water system:

- Implement the Lantzville / Nanaimo Water Agreement.
- Develop a new dual cell reservoir with a 158 m top water elevation to replace the function of the Aulds Rd Reservoir, address storage shortfalls, and prepare for future expansion of the community water system.
- Review and adjust Lantzville's Water User Rates and parcel tax, with the objective of maintaining a tiered structure, to reconcile with Nanaimo bulk water rates once confirmed and principles of the agreement.
- Reconnect Well #5.
- Secure groundwater licenses for each existing Lantzville well.
- Complete an Asset Management Plan, estimating replacement costs and timing for all current water infrastructure. Use the Asset Management Plan to inform annual reviews of Water User Rates and parcel tax to employ full cost accounting to balance revenue with anticipated system operation, maintenance, replacement, and growth.
- Pursue identification of a new water source for Lantzville to allow continued extension of the water system to existing residents and prepare for potential future demands.
- Continue with the ongoing watermain replacement program to improve fire flows and replace asbestos cement water mains (see Table 10, items 3, 4, 5 for prioritized replacement list).
- Once additional water supply has been secured, amend existing policy to allow unserviced properties adjacent to existing water service infrastructure to apply to connect to the community water system on a first-come first-served basis.
- Update OCP policy to allow properties outside the Water Service Area boundary to apply for domestic use (not landscape or agricultural use) water connections on a first-come first-served basis. Applications should be considered on a case-by-case basis, confirming connection will not adversely affect delivery of the planned water system.

Short-Term Actions

Short-term actions are recommended to be considered between 2020 and 2023 to support the start of phased expansion of Lantzville's water system.

- Prepare and implement a well head protection plan for Lantzville's well field to ensure the existing groundwater source remains protected for the future.
- Develop a Water System Service Bylaw that provides guidance on the Design Standard, community water use, and water servicing costs, including:
  - Adoption of the following recommended Design Standard for residential properties connected to the District's community water system:

Land Use Type	L/Day/Connection
Single-Family Residential	2,800- 3,000 L/day/connection
Multiple-Family Residential	1,080- 1,710 L/day/unit

  - » Guidance for assessment of water demands for all industrial, commercial, and institutional development on a case-by-case basis considering proposed activities and engineering best practices.
  - » Maintenance of the existing standard of 3,400 L/day/connection for properties outside the Water Service Area and not connected to community water.
- Develop policy that requires all new development under development permit to incorporate outdoor water saving strategies such as low water-use landscapes and smart irrigation technology and to provide a water budget as a component of their development permit application to calculate proposed water use.
- Continue to work with the City of Nanaimo on the Lantzville/Nanaimo Water Agreement, including revision of restrictive language that limits opportunities to service existing parcels in the Upper Pressure Zone.
- Continue with the ongoing watermain replacement program to improve fire flows and replace asbestos cement water mains (see Table 10, items 3, 4, 5 for prioritized replacement list).
- Take steps to establish Local Area Services in the for the following Phase 1 Service Expansion Neighbourhoods shown on Figure 18, subject to available water supply and approval by current residents:
  - » AW: Clark Drive Area
  - » FW: Fernmar Road Area
- Begin considering community water for areas identified as Development Driven Expansion Areas on Figure 18 as part of development approval processes. Where development-driven expansion is considered, the following may be required:
  - » Provision of a new source of community water supply by the development
  - » Water infrastructure design that allows for future extension to adjacent existing neighbourhoods desiring community water
- Complete an interim 5-year review/update of the Water Master Plan, including the following:
  - » Well Field Re-Rating, during dry season conditions.
  - » Design Standard Updates, considering water supply changes, actual water usage, and new trends.
  - » Water Budget Scenarios, comparing actual water use records with projected demands.
  - » Water User Rates, considering current asset management planning and water conservation.
  - » Capital Infrastructure Requirements, considering changes in system supply and demand and updated cost information.
  - » Water Service DCC Program, to ensure revenue calculations reflect expected capital costs and fully account the growth-related share of new infrastructure.

Medium-Term Actions

Medium-term actions are recommended to be considered for completion between 2023 and 2028. These include continued phased expansion of and upgrades to of the community water system.

- Monitor potential development that could reduce the water service extension costs for the Phase 1 Service Expansion Neighbourhood HW-1: Winds Residential. If, in five years after the date of this plan, development is not anticipated or neighbourhood residents bring forward a successful petition, take steps to establish a Local Area Service for water extension to the neighbourhood, subject to available water supply and approval by current residents.
- Continue with the ongoing watermain replacement program to improve fire flows and replace asbestos cement water mains (see Table 10, items 3, 4, 5 for prioritized replacement list).
- Investigate a septic storage conversion program that encourages or provides incentive to homeowners in transitioning existing septic tanks to non-potable water storage for outdoor water use after municipal sewer is extended.

- Complete a full 10-year review/update of the Water Master Plan, including the following:
  - A public engagement process to gauge current public interests and concerns on community water.
  - Well Field Re-Rating, during dry season conditions.
  - Design Standard Updates, considering water supply changes, actual water usage, and new trends.
  - Water Budget Scenarios, comparing actual water use records with projected demands.
  - Water User Rates, considering current asset management planning and water conservation.
  - Capital Infrastructure Requirements, considering changes in system supply and demand and updated cost information.
  - Water Service DCC Program, to ensure revenue calculations fully account the growth-related share of new infrastructure.

Long-Term Actions

Long-term actions are recommended for consideration beyond 2028, although could be completed sooner if community needs evolve. It is anticipated that the Water Master Plan will be updated at the end of 10 years to confirm the needs of the community at that time, and the actions will be updated to reflect these needs.

- When Phase 1 water service extensions are complete, reassess resident opinions about extending water services to the following Phase 2 Expansion Neighbourhoods shown on Figure 18:
  - BW: Owen Road Area
  - GW: Aats Road Area
  - HW-2: Winds Estate Residential
  - IW: Bayview

  Water extension to the Phase 2 Expansion Neighbourhoods may be considered in a shorter time frame if neighbourhood residents bring forward a successful petition.
- Continue with the ongoing watermain replacement program to improve fire flows and replace asbestos cement water mains (see Table 10, items 3, 4, 5 for prioritized replacement list).

Ongoing Actions

Ongoing actions including regular monitoring, management, and maintenance of the community water system and have no defined time frame.

- Continue ongoing annual monitoring of water use to identify changes in usage patterns and trends. If trends show changes in usage, consider updating the Design Standard to reflect current use.
- Use the Asset Management Plan to inform annual reviews of Water User Rates and parcel tax to employ full cost accounting to balance revenue with anticipated system operation, maintenance, replacement, and growth.
- Pursue senior government grants to supplement funding for infrastructure improvements and phased extension of water service to existing neighbourhoods.
- When new development proposals are considered, complete analysis and reporting on the water budget to confirm potential implications of the development.
- Continue to develop or partner on new educational materials and programs that encourage water conservation approaches for residential land owners, particularly as new residents enter the community.
- Continue to support the Rainwater Harvesting Incentive Program and consider new incentives and programs that encourage residents to make water smart choices.
- Encourage water users that are connected to community water but have existing wells to use well water for outdoor (non-potable uses), provided there are no impacts to the District's groundwater sources.
- Renew and replace aging infrastructure on an ongoing basis to maintain required levels of service based on risk analyses and cost-benefit priorities.

Refer to Section 9 for additional details.

1 | INTRODUCTION

The Water Master Plan is an opportunity to analyze constraints to community water provision, understand community desires, and set directions for Lantzville's water system in ways that allows the District to provide water that is affordable for the community, sustainable for the environment, and resilient for the future. Water Master Planning takes a long-term outlook, helping a community to prepare for a range of potential futures that could unfold.

1.1 ABOUT THE WATER MASTER PLAN

Access to a safe, clean, and reliable water source has been a priority issue for Lantzville residents since prior to incorporation. Today, Lantzville's municipal water is from groundwater, accessed via wells. The existing source provides high-quality water; however, water quantity has been a limitation to fully servicing existing residents and businesses in the Water Service Area, to providing water to properties that have quantity or quality issues, and to allowing any new development in the community.

Growth and development of the community will be guided by the Official Community Plan and decisions made by the community over time. The Water Master Plan is intended to guide infrastructure development that supports community planning directions.

Water infrastructure lasts for many decades – up to a century in some cases – and takes time to plan and implement. It is important to plan far into the future, even when not fully predictable today, to prepare for a range of scenarios that help District to stay ahead of its water demands, including potential unforeseen changes that may affect existing supply.

A Water Master Plan is a long-term (i.e., 20-year) guiding document that is reviewed and updated over time to respond to emerging community directions. It outlines a series of recommendations for Councils to consider as the community evolves. The recommendations in the Water Master Plan are intended to be considered on an incremental basis, in response to community changes and ongoing monitoring.

It should be noted that the Water Master Plan is based on information known today. Unforeseen changes, opportunities, or needs could occur in Lantzville, which may refine or redirect recommended directions. An adaptive management approach and regular updates to the Water Master Plan will be needed to address future community needs and opportunities.

It is important to understand that the Water Master Plan is a long-range plan – it does not provide engineering design or detailed directions; rather, it is intended to set long-term directions for water planning decision-making. In most cases, the plan does not make a decision on an issue, but rather provides the District with a strategy and recommendations that will lead to Council considering and implementing a decision. Detailed engineering design and negotiations are separate steps that will be needed to support implementation.

As with all planning documents, the Water Master Plan should be considered a living document that will evolve as the community grows. Recommendations in this plan are intended to be reviewed and adjusted annually to reflect changing community needs. All recommendations will be considered within the context of broader community planning and budget planning, and are subject to consideration and approval by Council.

The Water Master Plan is comprised of multiple components that must be considered together – Design Standards, community interests, water supply balanced with community growth, water conservation, and capital improvements are all part of the strategy. The Water Master Plan builds on previous studies and provides consolidated recommendations for consideration:

- **Water Design Standards:** Today, Lantzville has a single Design Standard (3.4 m^3/day or 3,400 liters/day) for all residential land uses. As Lantzville evolves, it may be prudent to recognize that different land uses will likely have variable water demands. ***Section 4*** proposes an updated future Design Standard for potential future land uses.
- **Community Water Service Expansion:** Over the years, some Lantzville residents with properties that are not connected to community water service have expressed a desire to obtain connection. Alternately, some residents have expressed preferences to remain on private wells. The Water Master Plan is an opportunity to study unserviced properties, identify preliminary costs to extend community water service to these areas, and gather neighbourhood input on preferences for community water extension. ***Section 5*** provides recommendations for potential community water service extension to currently unserviced properties.
- **Water Supply & Demand:** Currently all of Lantzville's community water supply comes from a single groundwater source. The existing groundwater source supply is insufficient to service additional existing residences within the Water Service Area and cannot provide supply for new development. ***Section 6*** considers future land use directions and growth potential to summarize the relationship between potential future water demand and potential future water supply.
- **Water Conservation:** Today, Lantzville residents use less water per capita than most other Vancouver Island communities. This water conscious attitude is likely attributable to a combination of metering, water user rates, education, and public awareness and concern about existing water supply limitations. Maintaining this water conservation attitude into the future will benefit the community and the environment and may lower or defer required infrastructure costs. ***Section 7*** proposes recommendations to help maintain high water conservation efforts by residents.
- **Capital Improvements:** To facilitate future water connections, investment in the District's water infrastructure will be required. ***Section 8*** identifies proposed infrastructure improvements for how the water distribution system over the next 20 years and the estimated costs to support these changes.

1.2 PROCESS

The Water Master Plan process was undertaken at the same time as Lantzville's OCP Update Process to align water servicing analysis with future potential land use directions being considered. Combined public consultation on the Water Master Plan and OCP Update was undertaking at key points in the process as shown on Figure 1 (page 5). Key points of public input included the following.

Community Launch Events & Questionnaire #1

At the onset of the Water Master Plan process the consulting team participated in Minetown Day to raise awareness about the process, provide background information, and obtain initial input from the community.

As a follow-up to this event, a Community Workshop was held on November 2, 2016 at Costin Hall to introduce early ideas and information to participants. As part of these events, a voluntary (i.e., non-statically valid) community questionnaire was circulated to collect initial ideas and help identify issues to explore further during the Water Master Planning process.

The questionnaire was available at the events and open online from Sept. 12 to Sept. 23 and Nov. 2 to Nov. 22, 2016. A total of 221 people participated in the survey. The water questions targeted early input on community attitudes towards extension of community water services, identification of concerns about water quality or quantity for unserviced areas, opinions on water user rates, and participation in water conservation activities. The input was used to consider how unserviced neighbourhoods would be identified and analyzed in the process. Refer to **Appendix B** for a summary of the results.

November 2, 2016 Community Workshop

Kitchen Table Meetings

Residents throughout the community were invited to host Kitchen Table Meetings in their neighbourhoods, providing neighbours an opportunity to talk in further detail about potential land use options, housing choices, and water servicing.

Between Nov. 22, 2016 and Jan. 12, 2017 a total of 13 Kitchen Table Meetings were held, each attended by 6 to 12 people. Participants submitted meeting notes and maps, and an individual response form was made available at the meetings and online to record individual opinions. 58 individual response forms were completed. Input received was used to test and refine potential options being considered for water servicing extension to unserviced neighborhoods. Refer to **Appendix C** for a summary of the results.

Community-wide Survey

To understand the community's preferences on potential directions being considered for the OCP Update and Water Master Plan, a Community-wide Survey was undertaken.

The survey was delivered via Canada Post to all households in Lantzville the week of March 15, 2017 and were required to be returned by Friday, April 7, 2017. The results were tabulated by a third-party market research and public opinion polling firm. 543 of the 1,482 circulated surveys were returned, indicating a response rate of 37.3%.

The Community-wide Survey collected input from the community as a whole, as well as from each unserviced water neighbourhood to collect specific preferences from individual neighbourhoods. Refer to **Appendix D** for a summary of the results.

Proposed Directions Review

A public open house was held on June 28, 2017 to provide residents an opportunity to review and provide comment on proposed directions being considered in the Water Master Plan and OCP Update. The Water Master Plan summarized proposed draft directions for water servicing extension, proposed infrastructure updates, and draft design standards.

A voluntary public response form was available at the open house and online from June 28 to July 10, 2017. 111 people attended the Open House and 45 people responded to the response form. Refer to **Appendix E** for a summary of the results.

June 28, 2017 Community Open House

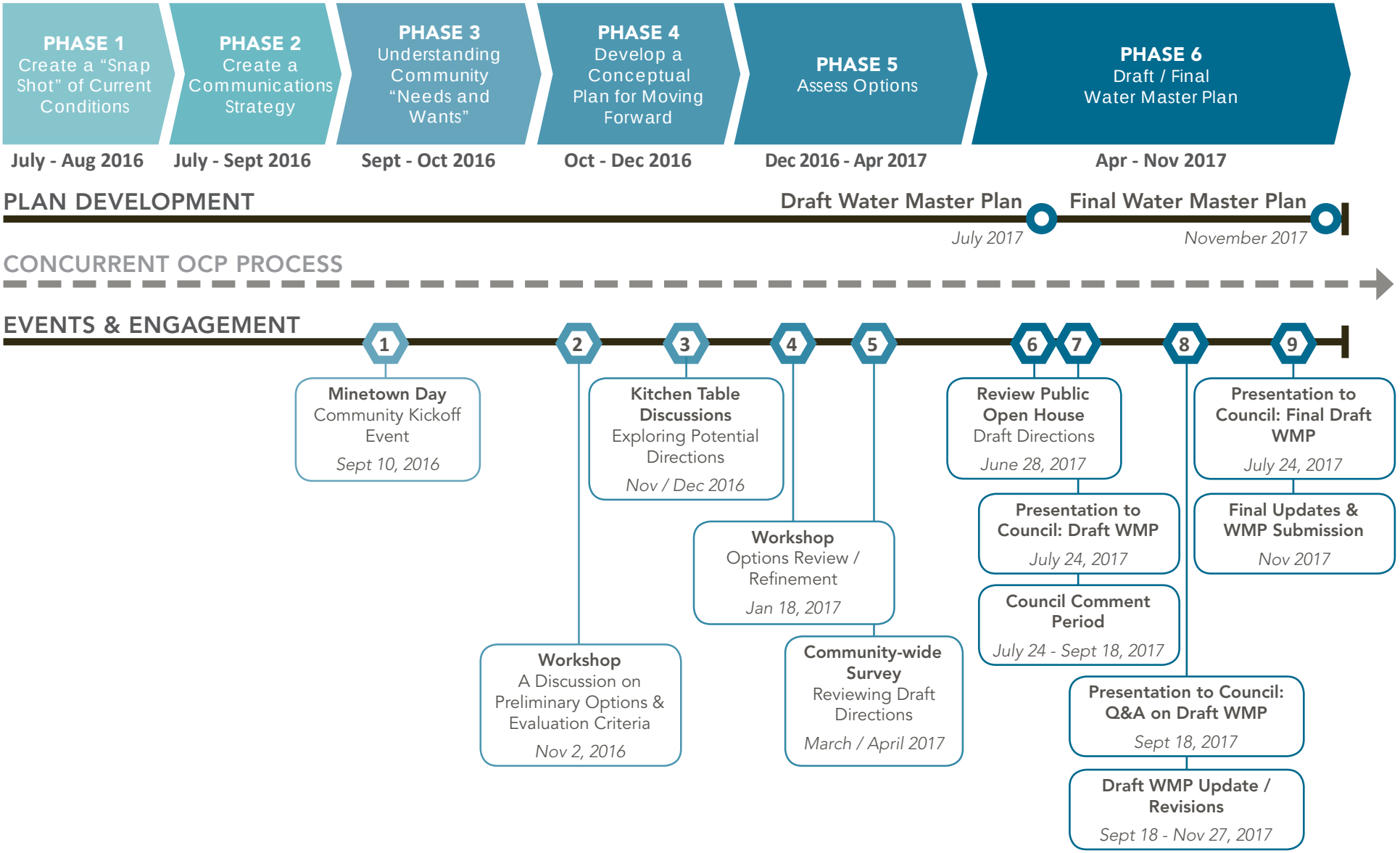
Draft Water Master Plan Review

A draft Water Master Plan was developed and presented for initial Council review and comment on July 24, 2017. Questions from that meeting were collected and reviewed. Responses and further information was presented at a Council update on September 18, 2017 and further questions and comments were collected.

A revised Draft Water Master Plan that addressed these questions was presented to Council on November 27, 2017.

The Water Master Plan process launched in Aug. 2016 with development of a draft plan completed in July 2017 and a final draft in November 2017. Figure 1 outlines the six phases in the Water Master Plan process. The Water Master Plan process was completed at the same time as an OCP Update to consider how future planning directions affect water demands.

Figure 1: Process Diagram



1.3 RELATED PLANS & POLICIES

OFFICIAL COMMUNITY PLAN

Lantzville's Official Community Plan (OCP) was first developed in 2005 and is being updated in 2017. The OCP is a policy document that describes a community's long-term vision and provides guidance on how this vision may be achieved.

The OCP guides the distribution and type of future growth in Lantzville. Understanding how much growth and where it may be anticipated in the community is important to projecting how much water may be required and how Lantzville's supply and distribution system would need to be improved to support Lantzville's potential growth.

The 2005 OCP identifies a Water Service Area which currently includes both serviced and unserviced residential, industrial, commercial, and institutional properties. It also provides policy direction on Lantzville's continued work to secure a reliable, long-term source for providing potable water.

Relevant policies in the 2005 OCP (and anticipated to be carried forward and updated in the 2017 OCP Update) include:

9.2.1 Water Sources and Protection:

1. The District will continue to work with local residents, landowners, development applicants, and neighbouring jurisdictions to develop additional water supply options.
2. The District will support the continued study of the aquifer within the municipality to acquire better understanding of its extent and degree to which community water supplies can be obtained and secured.
3. In the development of municipal infrastructure and facilities, the District will adhere to senior government policies and guidelines aimed at protecting groundwater, streams, and other watercourses.
4. Until adequate water supply for the community is developed, the District will limit new development to existing lots currently serviced with water system connections, and will require new subdivision proposals to develop a new water source adequate for the proposed development to standards satisfactory to District of Lantzville, and dedicate that source and related infrastructure to the municipality. The applicant will have to demonstrate that the new source and system will not impact the current system.
5. The District will encourage water conservation in homes and businesses, including the use of water-saving fixtures such as small tank and low-flush toilets, water efficient showers, aerated faucets, and drip irrigation systems.

9.2.2 Water Distribution System

1. The District will pursue the completion of the upgrade to its existing water supply and distribution system.
2. When additional water supply is acquired, the District will develop a phasing plan to extend the water distribution system to residents who are concerned about the quality and quantity of their water and who are not yet connected to the municipal system, and to potential development areas.
3. The District will not support use of the water supply for agricultural production or resource related uses.
4. The District does not generally support the extension of public water services to residential users in rural and agricultural areas of the community. Access to water service may be provided to address specific public health, safety, fire protection or environmental issues, or to create efficiencies in service infrastructure. Such extensions of water to rural and resource areas shall not result in any decrease in rural or resource lot sizes or increase in densities designated in this plan.

These policies may be updated as part of the 2017 OCP Update.

POLICY 3007-3 WATER SUPPLY AND CONNECTION POLICY

In 2006, Lantzville established a policy to clarify available water supply and identify how requests for new water connections would be considered. This current policy permits no new water connections or extensions to the municipal system until adequate water supply for the District is developed.

The policy further outlines steps forward should an additional water supply be secured:

- Completion of an update to the existing water supply, storage, and distribution engineering study (complete per the 2015 Water Supply & Distribution System Study, KAEL, 2015)
- Adoption of a new water capital plan
- Adoption of:
  - Development Cost Charges Bylaw (Bylaw No. 52, 2007)
  - Water Connection Fees Bylaw
  - Water Parcel Tax Bylaw
  - Water User Fees (Bylaw No. 124, 2016)
- Granting of extensions on a first-come-first served basis for properties within the OCP Urban Containment Boundary
- Payment for water line extensions by those properties benefiting from the water distribution extension
- Potential for the District to reassess water supply, distribution, and storage capacity at any time prior to authorizing additional connections

Water supply considerations in the policy are brought forward into the Water Master Plan.

LANTZVILLE/NANAIMO WATER AGREEMENT

In September 2014, the District of Lantzville and City of Nanaimo approved the Lantzville/Nanaimo Water Agreement that enables Lantzville and Nanaimo to work together to provide water in bulk from the Nanaimo Water System to serve Lantzville.

- The Nanaimo Water Agreement identifies a connection fee of $5,912.26 per dwelling unit (subject to an annual adjustment equal to the consumer price index). If connection were to proceed, the District of Lantzville would pay the connection fee for each of the 225 Upper Lantzville lots that are currently connected to the Lantzville Water System that would be serviced by the new Nanaimo connection.
- Future connections to new development connecting to the Nanaimo water system would be required to pay the connection fee at the time they connect.
- Lantzville has completed construction of the required connection to the Nanaimo Water System, but has not yet commenced the agreement, which would begin the purchase of water from Nanaimo.
- The current agreement applies to connections in the Upper Lantzville Pressure Zone only.
- The existing agreement provides servicing for a total of 436 existing lots (225 currently connected to community water + 211 not currently connected) as well as potential for servicing new development at a rate of up to 50 new connections/year (for a total of 1,000 units over a 20-year period).

LANTZVILLE SUBDIVISION AND DEVELOPMENT BYLAW NO. 55

Lantzville's Subdivision and Development Bylaw outlines requirements for all new development in the District. The existing bylaw requires that all new lots shall be provided with a connection to the municipal water system when such connections are available and if a connection is not available, confirmation is required that each new lot has the capacity to supply 3,400 litres (3.4 m^3)of drinking water per day from a well within the boundaries of the parcel.

The bylaw also requires that subdivision that creates three or more parcels of land where water servicing is intended to be provided from an onsite well, the applicant must provide a report from a professional hydrologist that confirms new wells will have no negative impacts on existing wells within a 150 metre radius.

2015 WATER SUPPLY & DISTRIBUTION SYSTEM STUDY

As a precursor to the Water Master Plan, Lantzville completed a Water Supply & Distribution Study in 2015 to analyze the existing water distribution system and consider the infrastructure requirements that may be needed to support water service connection for unserviced properties.

The Study provided a series of recommendations for improving the existing water supply and distribution system to:

- Maximize the yield of the existing well field
- Provide sufficient reservoir storage to meet projected future demands
- Meet recommended fire flow demand standards
- Strengthen the water distribution system
- Continue replacement of Asbestos Cement watermains
- Facilitate potential servicing of additional properties

Some recommendations from the Study have been completed and outstanding recommendations are brought forward and updated in the Water Master Plan.

2 | EXISTING WATER SYSTEM

Lantzville's existing water supply system was originally developed by the Lantzville Improvement District (LID) prior to municipal incorporation. Over the years, upgrades and improvements have been made to the system

2.1 HISTORY

The history of water in Lantzville began in 1955. Figure 2 provides a brief overview of key historical dates in the evolution of Lantzville's water system.

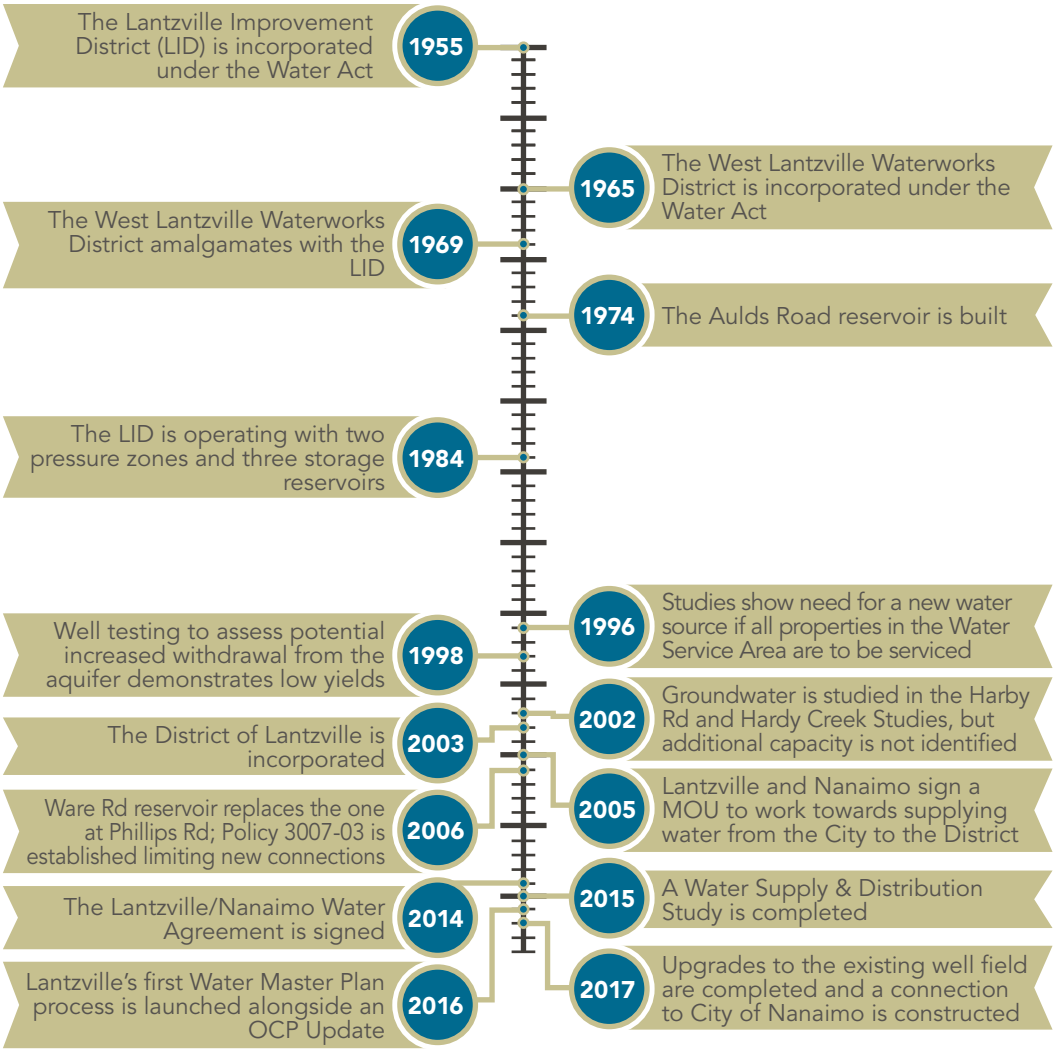


Figure 2: History of the Lantzville Water System

2.2 EXISTING WATER SUPPLY & DISTRIBUTION SYSTEM

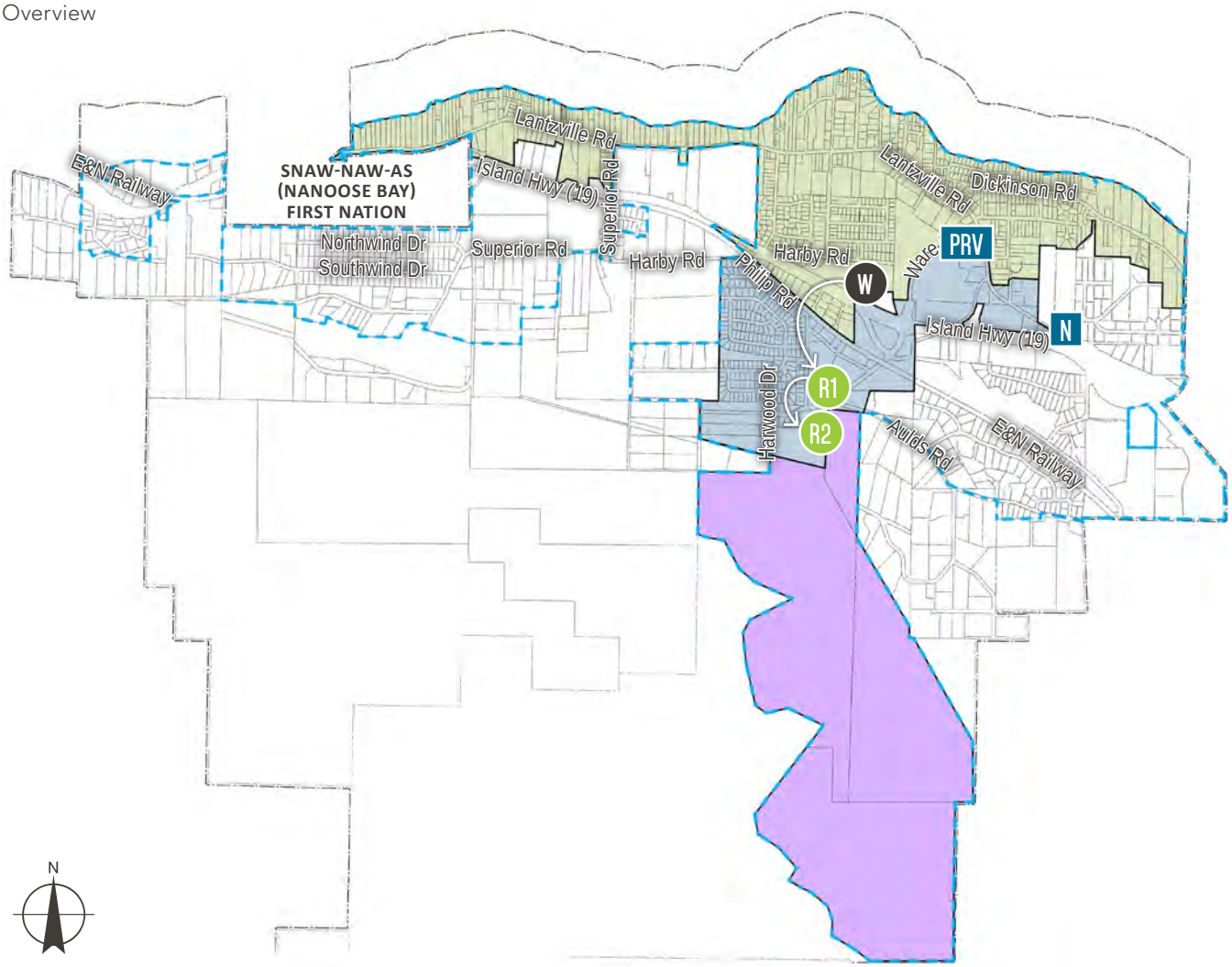
Figure 3 and the following descriptions outline key components of Lantzville's existing community water system.

Water Source

W WELL FIELD

Currently, Lantzville's only water supply is from five active groundwater wells located along Harby Road East. The wells were recently upgraded and assessed initially in March 2017 and again in August 2017, at the end of the dry season, by Lowen Hydrogeology Consulting Ltd. (LHC). The August 2017 assessment showed a well rating of 2,380 m^3/day, using the BC Ministry of Environment (1999) standard well rating formula, which includes a 30% safety factor (LHC, 2017b). This rating is insufficient to support new water connections.

Figure 3: Existing Water Supply & Distribution System Overview



Water Storage

R1 WARE ROAD RESERVOIR

From the well field, water is pumped to the District's main reservoir – Ware Road reservoir. The reservoir was constructed in 2006 with a storage capacity of 1,887 m^3. It is partially buried in the ground with two chambers This dual cell design provides the ability to drain one chamber for cleaning/repairs, while keeping the second in operation (KAEL, 2015). Water to the existing Lower Pressure Zone is distributed from the Ware Road reservoir.

R2 AULDS ROAD RESERVOIR

The Aulds Road Reservoir is located 200 m south of the Ware Road reservoir and is a pre-cast concrete circular tank 240 m^3 in size, built in 1974 (KAEL, 2015). It receives water pumped from the Ware Road reservoir for distribution to the existing Upper Pressure Zone.

Pressure Zones

Today, Lantzville's water system consists of two pressure zones – Lower and Upper – which together service 885 connections.

LOWER PRESSURE ZONE

The Lower Pressure Zone services approximately three-quarters of properties connected to the Lantzville Water System. The maximum elevation serviced by the Lower Pressure Zone is 97.25 m, and includes most serviced properties on the north side of Island Hwy (KAEL, 2015).

UPPER PRESSURE ZONE

The Upper Pressure Zone includes approximately one quarter of connected properties at the 143.6 m elevation and below. Currently, the system mainly includes properties within the Winchelsea area on the south side of Island Hwy and a few properties on the North side of the highway (KAEL, 2015).

UNSERVICED AREAS WITHIN THE WATER SERVICE AREA

The Water Service Area, established in the 2005 OCP, indicates areas planned for community water provision (existing and future). This boundary includes all Estate Residential, Residential, Commercial, and Industrial land use designations in Lantzville. The Water Master Plan is an opportunity to gauge resident desire for future water extension within the community.

FOOTHILLS DEVELOPMENT AREA

Foothills is a Comprehensive Development Area in the south of Lantzville. Per existing policy, the property owner will be responsible for obtaining water from on-site wells sufficient to meet District's Design Standards to service new development in the Foothills.

Distribution

Lantzville's watermains include 11,024 m of PVC (plastic) pipe and 15,359 m of asbestos cement (AC) pipe (KAEL, 2015). The AC pipes are being upgraded over time. The system also includes nominal lengths of Stainless Steel and Ductile Iron pipe for a total of 27,049 m of watermains (KAEL, 2015).

Water Management

PRV PRESSURE REDUCING VALVE

A pressure reducing value (PRV) was installed in 2000 and located at the corner of Ware Road and Lantzville Road linking the Upper and Lower Pressure Zones. It can be opened to supply water from the Upper Pressure Zone to the Lower if the Lower Zone pressure drops below a set threshold, which could occur if there was an unusually large demand (e.g., fire fighting demands).

N NANAIMO WATER CONNECTION

A connection between Lantzville's and Nanaimo's water systems has been constructed. This connection can currently provide an emergency water source and allows Council the option, through the implementation of the Lantzville/Nanaimo Water Agreement, to obtain water from Nanaimo to service existing properties and potential new development in the Upper Pressure Zone.

TREATMENT

After water is extracted from the well field and prior to entering the Ware Road reservoir, chlorine is injected in very small doses to eliminate the possibility of bacteria growth (DoL, 2014a).

MANAGEMENT / MONITORING

The District of Lantzville monitors water quality and quantity at the well field using a SCADA (Supervisory Control and Data Acquisition) system that collects data. In place since 2007, the SCADA system collects water level data from the wells, manages water treatment, and monitors water use. This information provides valuable details about Lantzville's water consumption.

2.3 COMMUNITY PRIORITIES

During initial engagement for the Water Master Plan, input was sought on priorities for the expansion of Lantzville's water system. Participants were asked to rank eight potential community water concerns to understand emerging community priorities. This input was used when considering goals and objectives and the elements to be further studied in the Water Master Plan.

The list was ranked in the following order by participants:

1. Long-term reliability of the water supply
2. Municipal property tax rates (i.e., costs for water distribution infrastructure development and maintenance)
3. Emergency water services throughout the community (i.e., fire suppression)
4. Municipal water user rates (i.e., cost for water bill)
5. Increasing water supply to allow more existing homes to connect to municipal water
6. Water conservation
7. Municipal water connection cost (i.e., cost to connected an unserviced lot to municipal water)
8. Increasing water supply to allow new development to occur

3 | GOALS & OBJECTIVES

The District of Lantzville endeavours to provide water in a way that is affordable for the community, sustainable for the environment, and resilient for the future.

The following goals and objectives guide the Water Master Plan:

- **Access to Safe Drinking Water for Residents:** Existing and future residents in Lantzville should have the opportunity to connect to a clean, safe water source, reducing concerns about wells with inadequate quality or quantity. To achieve this goal, the District will pro-actively plan required water supply and infrastructure that allows extension, over time, to areas that need or desire connection.
- **Sustainable Future Water Supply:** A sustainable water supply provides secure access to water even as a community evolves and forces like climate change occur. This includes ensuring continued supply of water during abnormal or emergency conditions, as well as adequate supply for long-term changes in the community, including population growth and climate change. Monitoring the water system regularly to analyze changes in supply and demand, and updating planning will be essential to maintaining a sustainable water system.
- **Cost Effective Community Water:** Cost effective water delivery optimizes capacity and maintains the value of infrastructure assets through planned maintenance and renewal. Required capacity expenditures to maintain the water system should be planned and implemented in an affordable and predictable manner and water user rates should be reviewed regularly to account for ongoing system renewal.
- **Responsible Community Water Use:** Maintenance of a water system that is affordable for the community and sustainable for the environment requires a commitment to conservation by all system users. Maintaining a tiered water rate structure, educating existing and new residents, and providing incentives for water conservation will be important to ensuring Lantzville continues to value and protect water as a precious resource.

4 | WATER DESIGN STANDARD

A Design Standard provides guidance on the amount of water that must be available for each connection to the community water system. This standard considers how much water will be needed to effectively service all connected properties when water demands are at their peak (e.g., on the hottest day of the year) as well as in emergency conditions.

4.1 INTRODUCTION

As part of the Water Master Plan, Koers & Associates Engineering Ltd. prepared the report *Water Demand Design Standard Review, 2017 Update*. The report studies current water system demand patterns, both within the District and in nearby water systems, analyzes design standards currently in use in the mid-Vancouver Island area, and recommends an updated Design Standard for existing and potential future land uses. The following section summarizes key findings from the report; see **Appendix A** for the full report.

4.2 EXISTING DESIGN STANDARD

Water Design Standard: The amount of water dedicated for each connection on the District water system. A Design Standard is used to determine how many connections that the District can supply, based on water supply ratings.

Lantzville's current Design Standard **per connection** is:

3,400 Litres/day per connection
(3.4 m^3/day per connection)

To analyze water use per capita (by each resident), the above number is divided by the average number of residents living in each Lantzville dwelling (2.5 per the 2016 Census). A per capita analysis allows comparison between Lantzville and other communities that utilize a per capita standard. Lantzville's current Design Standard **per capita** is:

3,400 ÷ 2.5 = 1,360 Litres/day per person
(1.36 m^3/day per person)

The above Design Standard was established prior to Lantzville's incorporation when the water system was operated by the Lantzville Improvement District.

4.3 ELEMENTS CONSIDERED WHEN DEVELOPING A DESIGN STANDARD

The District of Lantzville has a fully-metered system which has been tracking actual water use at individual water meters, as well as at bulk meters for the Upper and Lower Pressure Zones, for several years. This data shows trends on current water use in the District. It is important to recognize that in addition to actual water use, several other key elements must be considered when estimating potential future water demands. These considerations are incorporated into the Design Standard to help limit the potential for future shortfalls in the water supply.

4.3.1 NON-REVENUE WATER

Analyzing future water demands considers both revenue and non-revenue water.

Revenue Water: Water that is tracked through individual meters at each property and billed to customers.

Non-Revenue Water: Water that has been produced and is "lost" before it reaches the customer. Common sources of non-revenue water are listed below.

Sources of non-revenue water:

- Unbilled Authorized Consumption:
  - Watermain flushing
  - Sewer main flushing
  - Fire department training and actual fire fighting
  - Public spaces (e.g., parks) irrigation
  - Public facilities (e.g., outdoor washrooms)
- Apparent Losses:
  - Metering inaccuracies
  - Water theft
- Real Losses:
  - Leakage at reservoirs or on transmission and/or distribution mains
  - Leakage on connections to the customer's meter
  - Leakage on fire hydrants, air release valves, flushouts

The District maintains bulk meters at the Upper and Lower Pressure Zones to track all water used in the water supply system, accounting for both revenue and non-revenue water.

Non-revenue water can be determined by subtracting individual meter readings from the bulk meter readings:

Upper & Lower Pressure Zones Bulk Meters
— Sum of Individual Water Meters
Non-Revenue Water Consumption

The *Water Demand Design Standard Review, 2017 Update* analyzed non-revenue water consumption from 2011 through 2016, shown in Figure 4. The annual non-revenue water use during this time was between 11% to 30%, with a 5-year average of 20%. This amount is not unusual for a water system of Lantzville's size, age, and operating pressure. As water infrastructure ages, there is a risk of non-revenue water increasing. Preventative maintenance and replacement of aging equipment can help maintain or reduce non-revenue water consumption.

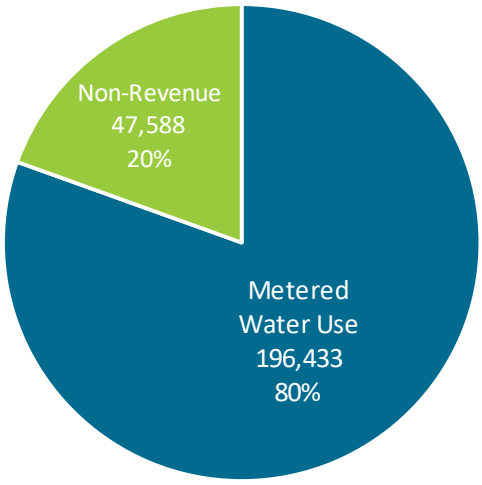


Figure 4: 5-Year Average Revenue and Non-Revenue Water Consumption (2012 - 2016)

While non-revenue water is not metered or billed, this volume needs to be accounted for as part of the Design Standard as the system generally requires this volume on a regular basis.

4.3.2 CLIMATE CHANGE

Climate change refers to a long-term shift in weather conditions, including both shifts in average conditions as well as shifts in extremes. Water supply may be particularly affected by climate change extremes such as dry spells and increased average temperatures that reduce availability of water.

BC's Ministry of the Environment's *Indicators of Climate Change for British Columbia 2016 Update* identifies the following trends which may affect future water supply (Government of British Columbia, 2017):

- Increased average temperature which may reduce moisture in the summer contributing to increased demand for irrigation and declines in groundwater supplies.
- Increased average precipitation which may help recharge groundwater aquifers; however, more extreme events could result in increased flooding and run-off.
- Drier summers which may result in more frequent and severe droughts that strain water supplies.
- Decreased snowpack which reduces the amount of runoff in spring and summer, reducing potential for groundwater recharge and reservoir filling.
- Sea-level rise along BC's coast, potentially straining infrastructure systems and intruding into groundwater supplies, notably in low-lying areas. The 2014 LHC Report reviewed the well field which is approximately 50 m above sea level and concluded that seawater intrusion is not currently an issue, although slightly higher alkalinity, chloride, sulphate, calcium, magnesium, and sodium were observed at Lantzville's Well #9 (LHC, 2014).

Buffers for potential climate change within the Design Standard and monitoring effects on the water supply and distribution system over time will be key to maintaining a clean, secure water supply for existing and future residents.

4.3.3 COMMUNITY TRENDS & BEHAVIOURS

Because most water in Lantzville goes to residential land uses, resident behaviour strongly influences water use. *The Water Demand Design Standard Review, Update 2017* analyzed trends in water use over the past 20 years. Figure 5 summarizes the annual water use demands during this period.

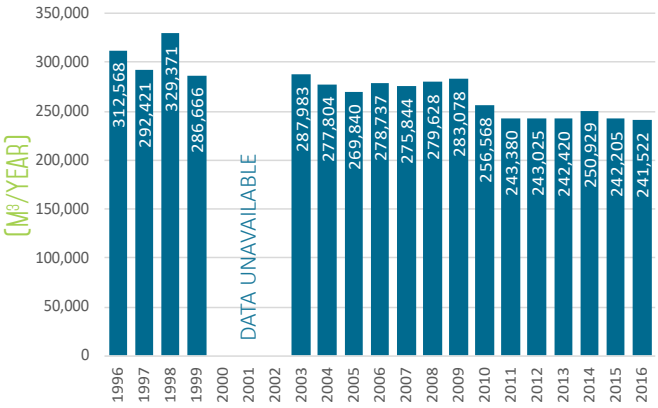


Figure 5: Annual Water Use Demands, 1996 - 2016

Results indicate that from 1998 to 2011, average day demands decreased by more than 25%. Since 2011, demands have remained relatively stable. Population change within the same period has been negligible.

Likely factors that may have contributed to water use reduction in Lantzville over the past 20 years include:

- Community awareness about Lantzville's limited groundwater supply;
- Public education about water conservation;
- Improved water-saving technologies including low water use appliances and low-flow irrigation systems;
- The District's tiered water rate structure, that includes increasing costs with increased consumption. The rate structure has been in place since before incorporation and was most recently updated in 2016.

It is important to consider that trends and behaviours will continue to evolve. New residents, growth, and/or reduced concerns about the availability of water may affect water use demands over time.

4.4 CURRENT WATER USE

Each of the 885 properties connected to Lantzville's water system is metered and the meters are read on a quarterly basis. The following trends can be observed about Lantzville's current water use.

4.4.1 MAXIMUM DAY DEMAND (TOTAL)

Maximum Day Demand: The maximum volume of water used for the entire community water system during a 24-hour period within a given year. This number is used to estimate the volume of water needed to supply water to the community.

Water Design Standards are developed to accommodate the peak, or Maximum Day Demand. Table 1 summarizes the Maximum Day Demands for Lantzville's community water system over the past 5 years (2002 - 2016).

Table 1: Lantzville's Community Water System Maximum Day Demands over the Past 5 Years

Year	Max. Day Demand (m^3/day)	Date
2012	1,351	July 14
2013	1,232	July 28
2014	1,421	July 14
2015	1,273	June 15
2016	1,192	July 28
5-year Average	**1,295**	

Lantzville's Maximum Day Demand has remained consistent over the past 5 years, partly attributable to the negligible change in population[1] and no new connections being added to Lantzville's community water system.

If new connections are added to the community water system, it is anticipated that the total Maximum Day Demands will increase accordingly.

1 Lantzville's population increased by 4 persons between 2011 and 2016 from 3,601 to 3,605 (Statistics Canada).

4.4.2 MAXIMUM DAY DEMAND (PER CAPITA)

Per Capita Demand: The maximum volume of water used by the average person using the community water system during a 24-hour period of a given year. This number allows estimation of future community demands as community population changes.

Table 2 summarizes Lantzville's Per Capita Maximum Day Demands over the past 5 years (2002 - 2016) based on an unchanging service population of 2,143 persons. The service population estimate is based on the 2011 Census population density of 2.46 capita per dwelling and an estimated 871 residential dwelling units (serviced from 840 individual water meters).

Table 2: Lantzville's Per Capita Maximum Day Demands over the Past 5 Years

Year	Max. Day Demand (lpc/day)*	Date
2012	631	July 14
2013	575	July 28
2014	663	July 14
2015	594	June 15
2016	556	July 28
5-year Average	**605**	

The Per Capita Maximum Day Demands have also remained relatively consistent over the past five years, suggesting water use behaviours in Lantzville have not changed substantially during this time.

***Note:** Maximum Day Demands are expressed in m^3/day for the entire community water system and in lpc/day for per capita analysis.

- m^3 = Cubic Metres
- lpc = Litres per Capita
- 1 m^3 = 1,000 litres

4.4.3 COMPARISON WITH OTHER VANCOUVER ISLAND COMMUNITIES

Comparing Lantzville's Maximum Day Demands with other Vancouver Island communities provides context about current community water use behaviours. Table 3 compares the Maximum Day Demand Per Capita of several Vancouver Island communities based on data from water studies completed by Koers & Associates Engineering Ltd. (KAEL, 2017).

Table 3: Lantzville's Per Capita Water Use Compared with Other Vancouver Island Communities

Community	Study Year	Max. Day Demand (lpc/day)
Lantzville	**2017**	**605**
Saltair	2016	580
Cumberland	2015	600
Ladysmith	2013	720
Nanaimo	1998	1,050
Parksville	1995	1,180
Qualicum Beach	2003	1,420
Campbell River	2017	1,685

Comparison with other jurisdictions shows Lantzville residents use less water on a per capita basis than most residents of other Vancouver Island communities. While Lantzville's current water conservation is excellent, it is important to be aware that changes within the community such as turnover of residents or the perception of increased security about the availability of water could affect water conservation practices.

4.4.4 SEASONAL WATER USE

Community water demands increase substantially in hot, dry summer months, with the Maximum Day Demand often 2 to 2.5 times higher than the Average Day Demand. This is because outdoor water use for activities like landscape irrigation increases substantially during the summer. Figure 6 below, shows Lantzville's average seasonal water use pattern from 2012 to 2014.

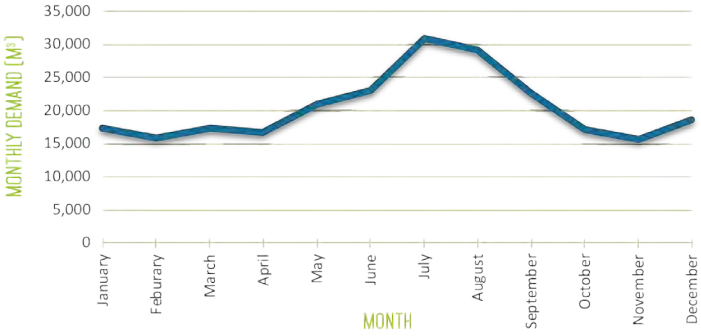
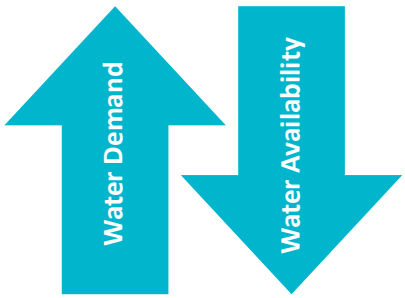


Figure 6: Lantzville's Seasonal Water Use Pattern

The *2015 Water Supply & Distribution Study* analyzed seasonal demands and identified that July and August have the highest water demands with February or November having the lowest. On average, 25% of the total annual water demand occurs during July and August and the Maximum Day Demand typically occurs in these months as well (KAEL, 2015). Figure 7 summarizes the relationship between water demand and water availability.



Conceptually, water demand and water availability share an inverse relationship. Typically, water availability is the lowest in late summer, which coincides with peak municipal demands. The Design Standard must plan to manage potential for water shortage during these critical times.

Figure 7: Conceptual Relationship between Water Demand and Water Availability

4.5 WATER DEMANDS BY LAND USE

Today, Lantzville uses one Design Standard for all residential land uses. Most current land uses in Lantzville are single-family residential; however, if development occurs in the Village or other areas, other land uses may be developed. The *Water Demand Design Standard Review, Update 2017* (see **Appendix A**) analyzed current demands by land use, as well as standards from other Vancouver Island communities, to consider if varied standards for different land uses warrant consideration.

4.5.1 CURRENT LAND USE DEMANDS

The *Water Demand Design Standard Review, Update 2017* analyzed individual water meter demands to determine annual demands for different land uses in Lantzville. Figure 8 summarizes average water consumption by land use over five years from 2012-2016 (KAEL, 2017).

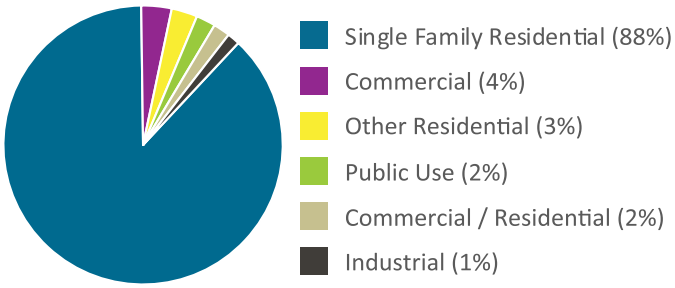


Figure 8: Proportion of Total Water Consumption by Land Use

Because residential land uses are the primary land use in Lantzville (823 of the 885 existing properties connected to community water are residential), they consume the greatest share of Lantzville's water. The large proportion of residential users indicates the importance of balancing residential water demands and supply.

Figure 9 summarizes the average annual demand per connection for each land use type from 2010 to 2014 (KAEL, 2015).

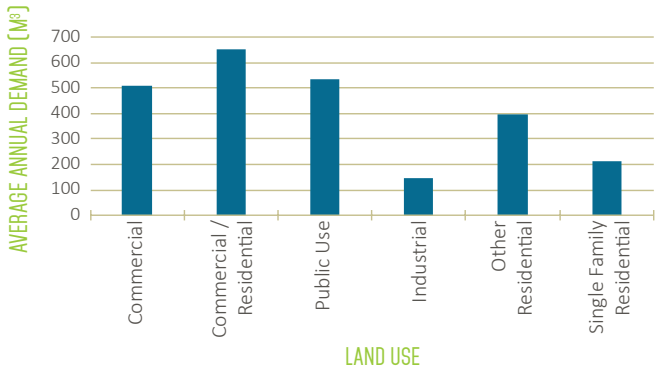


Figure 9: Average Demand Per Service Connection by Land Use

Residential land uses have the second lowest demand per service connection; industrial land uses have the lowest. Commercial and public uses have the highest demand, but because there are very few of these land uses in the District, they have significantly less influence on the overall system demands than residential land uses.

The *Water Demand Design Standard Review, Update 2017* also analyzed residential lots of different sizes and locations to consider if these parameters affect demands. The analysis indicated a general correlation between increased demand and larger lot size, which is most likely attributable to more water use on exterior landscape areas (KAEL, 2017). Typically, indoor water use does not vary substantially between residential land uses regardless of lot size; however, outdoor water use varies widely. Smaller lots and multiple-family lots typically use less water due to less landscape requiring watering.

The analysis did not reveal a significant difference in consumption based on lot location within Lantzville (i.e., lots of similar size had similar demands regardless of if they were located in the Upper Pressure Zone, Lower Pressure Zone, or on the waterfront) (KAEL, 2017).

The analysis suggests there may be rationale to consider different Design Standards for different types of residential land uses. The proposed Design Standard recommends different standards for single-family and multiple-family land uses to recognize the potential variation in future water demands and allowing a more refined approach to help make future management decisions.

4.5.2 PROPOSED DESIGN STANDARD

While the primary consideration for the Design Standard is the Maximum Day Demand per capita, the standard must also consider cumulative water requirements for non-revenue water (e.g. utility flushing, public space and facilities, etc.), leakage, peak hour demands, fire flows, mechanical failures and system maintenance, climate change, and emergencies. These requirements are factored into the proposed Design Standard.

Based on analysis and engineering best practices, the Design Standard ranges in Table 4 are proposed. It is suggested that the higher ranges may be applied to larger acreage properties, while the lower ranges may apply to smaller lots.

Table 4: Proposed Design Standards

Land Use Type	Estimated Population Density (no. people living in one dwelling)	Proposed Design Standard	
		L/Day/Person	L/Day/Connection
Single-Family Residential	2.4- 2.5	1,150- 1,250 L/day/person	2,800- 3,000 L/day/connection
Multiple-Family Residential	1.2-1.9	900 L/day/person	1,080- 1,710 L/day/connection
Institutional, Commercial, Industrial	Varies: Non-residential land uses have highly variable water demands. Lantzville has a small number of these uses, so it is suggested that water demands for each institutional, commercial, and industrial development be assessed independently based on proposed development.		

Because Lantzville does not currently have multiple-family land uses, and therefore no data to confirm actual water use for this land use, the proposed Design Standard is based on standards used in other communities and assumptions about outdoor water use. The Design Standard is set intentionally high for initial planning, with opportunity to consider reduction when analysis of actual water use in Lantzville can be completed.

4.5.3 COMPARISON OF DESIGN STANDARD WITH ADJACENT COMMUNITIES

The proposed Design Standard considers alignment with other local communities that have similar climatic conditions and population behaviour including Parksville, Nanaimo, and Fairwinds / Nanoose (RDN). Consistency between Design Standards in adjacent communities is important, especially with the potential implementation of the Lantzville/ Nanaimo Water Agreement. The following table compares residential Design Standards established in adjacent communities and the proposed District of Lantzville Design Standard. Currently, Nanaimo and Parksville do not have multiple-family residential Design Standards; however, Fairwinds / Nanoose does.

Table 5: Comparison of Design Standards in Adjacent Communities

Residential Land Use	Proposed District of Lantzville	City of Nanaimo	City of Parksville	Fairwinds / Nanoose (RDN)
Single-Family Residential	1,150- 1,250 L/day/person	1,135 L/day/person	1,364 L/day/person	1,160 L/day/person
Multiple-Family Residential	900 L/day/person	-	-	424- 914 L/day/person

4.6 DESIGN STANDARD RECOMMENDATIONS

Prior to adopting an updated Design Standard, obtain additional water supply and increase community water storage (see ***Section 8***).

Once sufficient supply and storage is available:

1. Develop a Water System Service Bylaw that provides guidance on the Design Standard, community water use, and water servicing costs, including:
   - » Adoption of the following recommended Design Standard for residential properties connected to the District's community water system:

Land Use Type	L/Day/Connection
Single-Family Residential	2,800- 3,000 L/day/connection
Multiple-Family Residential	1,080- 1,710 L/day/unit

   - » Guidance for assessment of water demands for all industrial, commercial, and institutional development on a case-by-case basis considering proposed activities and engineering best practices.
   - » Maintenance of the existing standard of 3,400 L/day/connection for properties outside the Water Service Area and not connected to community water.
2. Continue ongoing annual monitoring of water use to identify changes in usage patterns and trends. If trends show changes in usage, consider updating the Design Standard to reflect current use.
3. Re-rate the well field capacity every five years minimum, during dry season conditions.
4. Review and consider adjusting the Design Standard every five years minimum, considering water supply changes, actual water usage, and new trends.

5 | WATER SERVICE EXTENSION

An objective of the Water Master Plan is to consider potential phasing for future community water service expansion. This section summarizes community input on potential water servicing extension and recommends phasing scenarios.

5.1 HOW THE COMMUNITY WATER SYSTEM IS FUNDED

How the various elements of a community water system are funded, including both initial capital investment and ongoing renewal and operations of the system, influence decisions about investments and phasing in the system.

5.1.1 COMMUNITY-WIDE COMPONENTS

Many components of the community water system service all users. Costs for these components are shared amongst users, funded by water user rates and general taxation, and supplemented by senior government grants and development (Development Cost Charges and development contributions), as available. Key community-wide components include:

- **Aquifer monitoring, well maintenance, operations, and pipe upgrading:** After initial capital investment to build parts of the water system, ongoing monitoring and maintenance are required for a resilient water system. Recent well field upgrades have been completed and there is an ongoing program to replace old pipes and upgrade pipe sizes where needed for fire flows in Lantzville's existing community water service. Water user rates are set and reviewed regularly to generate funds to complete the ongoing operation, maintenance, and renewal of these community-wide components.
- **Lantzville/Nanaimo connection:** This connection, constructed in 2017, provides an emergency back-up and provides an option for the District to commence the Lantzville/Nanaimo Water Agreement to begin purchasing water from Nanaimo.
- **Reservoir capacity expansion:** Current engineering practice sizes reservoirs to accommodate Maximum Day Demand + Fire Storage + Emergency Storage. Based on this formula, the Aulds Road reservoir is significantly undersized and the Ware Road reservoir is slightly undersized. A solution that addresses this storage deficit is needed to meet current service demands and to allow for future expansion of the community water service (KAEL, 2015).

5.1.2 NEIGHBOURHOOD COMPONENTS

Water distribution pipes carry water from reservoirs to different neighbourhoods and benefit those living in each individual neighbourhood. In some of the Lantzville Water Service Area, water distribution pipes exist, therefore new infill parcels in these areas could connect if water supply was available without pipe extension. Costs associated with extending pipes to new development or subdivision of large parcels (e.g., in the Village area) would be paid for as a part of new development, so no additional community costs are incurred under new large development scenarios. However, when water pipes need to be extended to existing developed neighbourhoods that do not currently have community water (unserviced neighbourhoods), the costs of the pipe extensions to these areas are a new community cost, paid by the residents that will benefit from the service. Pipe extensions to water unserviced neighbourhoods are typically funded by one or more of the following three approaches:

Grants

From time-to-time, Senior Governments provide grant funding for a portion of community infrastructure projects. Examples of relevant past grants include the B.C. Community Water Improvement Program, New Building Canada Fund- Small Communities Fund, and the Clean Water and Wastewater Fund. Grant funding can often provide up to two-thirds of the cost of a project.

These opportunities are competitive and often focus on communities that have health risks related to inadequate infrastructure. Lantzville has been successful on past grants applications for expansion of the sanitary system.

Grant funding should be pursued to offset individual costs in existing neighbourhoods where servicing extension is being considered, recognizing that timing and availability of grants for water service cannot be guaranteed.

Strengths of this Funding Option:

- Could partially offset costs to existing landowners

Challenges of this Funding Option:

- Competitive and difficult to secure
- Timing is based on availability of grant funding from senior government

Individual Land Owners (Local Area Service)

In previously-developed Lantzville neighbourhoods such as the Winds or Clark Drive, the establishment of a Local Area Service (LAS) may be considered to support infrastructure development for that neighbourhood.

The establishment of a LAS requires approval of property owners within the proposed LAS using one of the following three methods:

- A petition signed by at least 50% of property owners representing at least 50% of the assessed value of land in the proposed LAS.
- Council initiative, as long as 50% of property owners representing at least 50% of the assessed value of land in the proposed LAS do not petition against the establishment of the LAS.
- A referendum vote by electors in the proposed LAS.

A municipality can borrow money to install the water distribution infrastructure for the LAS, to be repaid over a defined time period (typically 20 years) through a tax on properties within the LAS. LAS charges are paid annually as a separate line item on a property tax bill. If subdivision takes place within the LAS during the repayment period, new lots would contribute to the tax and late-comer fees may apply, thereby lowering individual costs by sharing the costs between more properties.

Strengths of this Funding Option:

- Can be completed as soon as local neighbourhood approval is obtained, borrowing arranged, and design complete

Challenges of this Funding Option:

- Existing residents bear the full cost of the new infrastructure

Development

Often, expansion of community water supply (and sanitary infrastructure) corresponds with planned community growth. These systems are expanded as an area 'develops', typically into single or multiple-family homes, through rezoning and subdivision. Construction of the required infrastructure is a condition of development.

In the case of extending water services to previously developed, but unserviced areas, development of adjacent larger sites may play a role in reducing the costs of extending water services to the existing unserviced areas.

During rezoning of large development properties, there are opportunities to negotiate developer contributions to offset the impacts of the new development on the community. Often these negotiations include trade-offs, such as higher density development. One item that may be negotiated through new development is servicing. In this scenario, the District could wait until a significant new development application came forward adjacent to an existing unserviced neighbourhood and determine if there is an opportunity for this new development to contribute to the extension of water distribution pipes to this area, effectively reducing the costs to extend water for existing residents.

Strengths of this Funding Option:

- Lowers costs to existing individual landowners

Challenges of this Funding Option:

- Driven by development opportunities – no guaranteed time frame
- May result in higher-density adjacent development

5.1.3 WATER SERVICING COSTS FOR EXISTING UNSERVICED AREAS

To connect to the community water system, costs for individual residents in existing unserviced areas typically include the following four components:

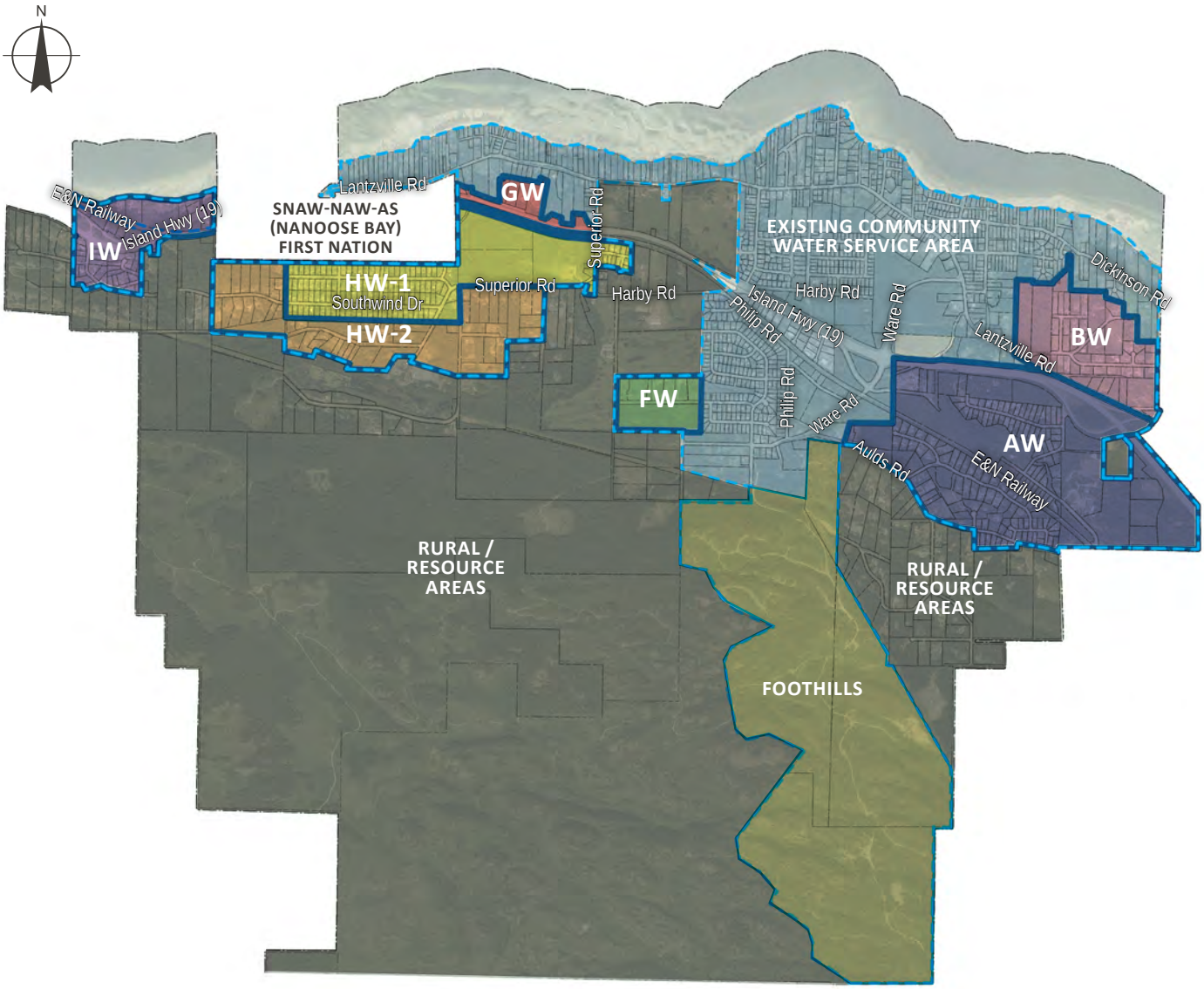
1. **Local Area Service fees** to extend water infrastructure to the neighbourhood. This cost would vary by neighbourhood based on factors such as the distance to connect to the existing water service, distance between houses, and number of residents within the neighbourhood to split the costs. See ***Section 5.4*** for preliminary estimates.
2. **A one-time water service connection fee** per dwelling unit, currently approximately $6,000 for a single-family residence[1], subject to annual adjustment. The connection fee is set by the District and may be required to align with City of Nanaimo connection fees if the Lantzville/Nanaimo Water Agreement is commenced.
3. **One-time costs to connect pipes from the watermain at the property line to buildings on an individual property**. This cost would vary by property based on the distance, ground materials, potential obstructions, or other factors that differ from one property to the next. It is recommended that residents obtain a contractor estimate to determine individual costs for this on-lot connection when considering water service extension costs.
4. **Ongoing water utility bills** based on consumption.

When establishment of a Local Area Services for water extension is being considered for a neighbourhood, it will be important for individual property owners to consider their complete individual costs of the service when choosing whether or not to support the LAS. Individual cost benefits, such as property value increases or insurance cost savings, would also vary by property and would be an individual consideration in this decision.

1 Costs for other types of development such as commercial, multiple-family, industrial, or institutional also would pay a connection fee, typically based on a m^3 calculation of the building area.

5.2 UNSERVICED NEIGHBOURHOODS IN THE WATER SERVICE AREA

Today, about two-thirds of properties within Lantzville's Water Service Area are connected to community water. The remaining one-third, in the seven unserviced neighbourhoods shown on Figure 10 below and described on the following page, as well as properties within rural/resource areas outside the existing Water Service Area, rely on private wells for water.



LEGEND

- Lantzville Water Service Area (2005 OCP)
- Area with Existing Community Water Service
- Unserviced Neighbourhood within the Water Service Area (see next page for description of each)
- Foothills (serviced via water source implemented by land owner)
- Rural / Resource Areas outside the Water Service Area (not currently planned for future water service)

Figure 10: Overview of Lantzville's Existing Water Supply

The OCP Update identifies 14 Lantzville neighbourhoods, identified as A through N, based on location and land use. The Water Master Plan utilizes these neighbourhood identifiers for the seven unserviced neighbourhoods and adds the letter "W" to specify them as a water neighbourhood. For example, neighbourhood AW is the portion of the neighbourhood identified as "A" in the OCP Update without current water service.

AW: Clark Drive Area

- Approx. 160 existing unserviced lots
- Areas without water Include residential properties on Clark Dr W, Parklands Pl, Blackjack Dr, Alger Rd, Clark Dr, Aulds Rd, Arbutus Cres, David Pl, Elm Rd
- Includes Aspengrove School site

BW: Owen Road Area

- Approx. 50 existing unserviced lots
- Areas without water Include residential properties on Lantzville Rd, Rosalyn Cres, Schook Rd, Wayne Pl, Owen Rd, Nestor Way

FW: Fernmar Road Area

- Approx. 8 existing unserviced lots
- Areas without water Include residential properties on Fernmar Rd

GW: Aats Road Area

- Approx. 5 existing unserviced lots
- Areas without water Include residential properties on Aats Rd

HW-1: Winds Residential Area

- Approx. 133 existing unserviced lots
- Areas without water Include residential properties on Superior Rd, Harley Dr, Beliveau Rd, Normarel Dr, Eastwind Dr, Southwind Dr, Northwind Dr, Westwind Dr

HW-2: Winds Estate Area

- Approx. 56 existing unserviced lots
- Areas without water Include estate residential properties on Superior Rd, Stone Rd, Hobsons Rd, Normarel Dr, Lorenzen Ln, Southwind Dr

IW: Bayview Area

- Approx. 49 existing unserviced lots
- Areas without water Include estate residential properties on Bayview Park Dr, Rumming Rd, Dawn Rd, Sabre Rd

5.3 INITIAL PUBLIC INPUT ON EXTENSION OF COMMUNITY WATER

At the onset of the Water Master Plan process, a voluntary community questionnaire was undertaken to collect initial input that would help identify issues to be explored further in the process. The questionnaire targeted input from participants both currently connected to community water and those not connected.

Participants Currently on Community Water

Participants were asked their level of support for extending community water to other parts of Lantzville that need or want access to community water. Figure 11 suggests that about half of participants would support extension of community water to other residential areas, and a further 24% would consider extension, depending on the cost to them.

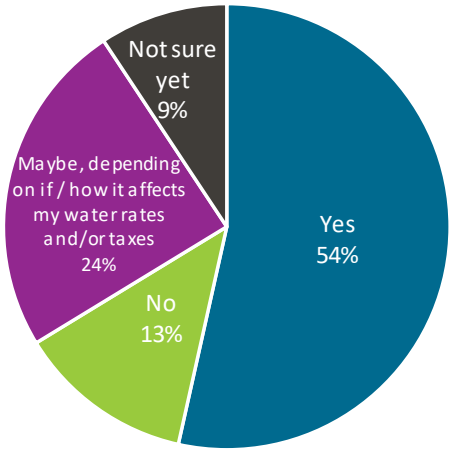


Figure 11: Support by Participants Currently Connected to Community Water for Extending Community Water to Residential Areas that Need/Want Community Water

Participants Not Currently on Community Water

The questionnaire also requested early input from those who are not currently connected to the community water system to understand aspects to be further investigated.

Participants were asked if they would like to be connected in the future. As shown in Figure 12, feedback to this question was mixed with about half responding no, a third responding yes, and the remainder unsure at this time. Because this early input included feedback from all unserviced community members, including rural areas and the different neighbourhoods, a need to look more closely at the needs and wants of individual neighbourhoods as the process progressed was identified.

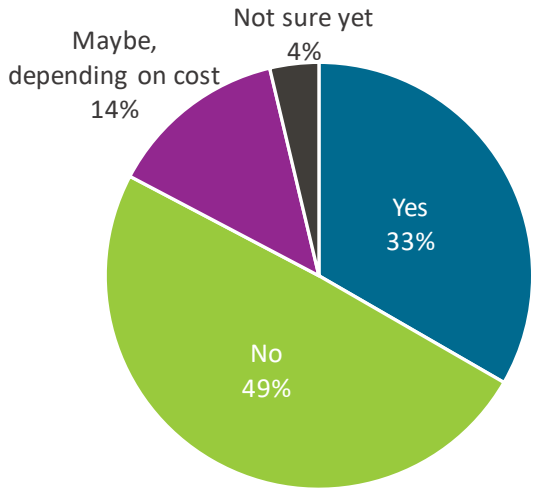


Figure 12: Desire for Future Connection to Community Water from Participants not Currently Connected (including all unserviced neighbourhoods and rural areas)

Throughout the process, input was also sought on potential issues with private water supply. As shown in Figure 13, early input suggested about three-quarters of participants felt their current water supply was sufficient, with 10% identifying potential concerns with water capacity and 15% identifying potential concerns with water quality. Identified water quality concerns included boron, iron, sulphur, manganese, arsenic, and coliform/e.coli.

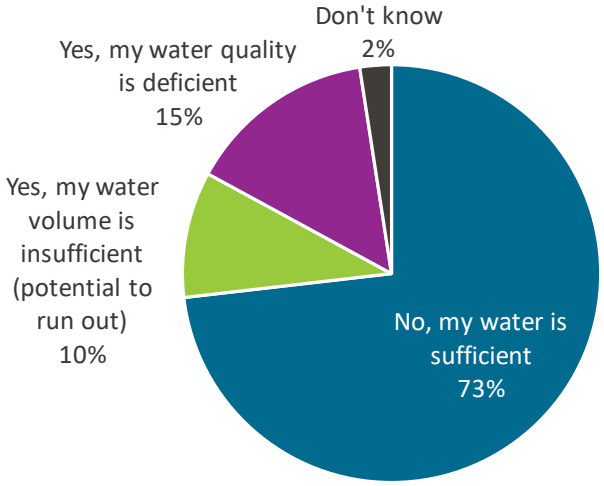


Figure 13: Known Issues with Private Water Supply from Questionnaire Participants

5.4 NEIGHBOURHOOD OPTIONS

To help residents in Lantzville's different unserviced neighbourhoods consider their level of desire for community water, cost range scenarios were developed, estimated, and refined for individual properties to extend water servicing to and within their neighbourhood by developing a Local Area Services.

The community cost to bring water to an unserviced neighbourhood is based on the length of distribution pipe required. This cost is divided among the parcels connecting to determine per parcel costs. Where there are more lots to divide the costs (e.g., areas with smaller lots or multiple-family lots) the cost per parcel is typically less. Where pipes must be extended long distances between the neighbourhood and existing water distribution network or large lots increase pipe distance between each property, costs are typically higher.

Estimated costs are based on infrastructure costs to extend water service pipe to the neighbourhood and are per parcel, per year, for a financing period of 20 years. The cost ranges developed were rough estimates (+/- 30%) to gauge public opinion and used 2016 Dollars based on conceptual layout (all costs are as of October 2016 when the ENR Construction Cost index was 10,434). Factors including detailed design, inflation, and unknown constraints will affect these estimates.

The estimated neighbourhood costs represent the costs for extending water distribution infrastructure to and throughout each neighbourhood. These costs do not include one-time individual property owner costs including the water service connection fee and costs to connect pipes from the watermain at the property line to buildings on an individual property (see ***Section 5.1.3***). Residents would need to consider individual costs in addition to the neighbourhood costs.

The options were drafted and reviewed with the community through the Kitchen Table Meetings and January 18, 2017 Community Workshop to verify and refine the options being considered. The refined scenarios were tabled for community response during the Community-wide Survey.

Each neighbourhood had two or three potential scenarios:

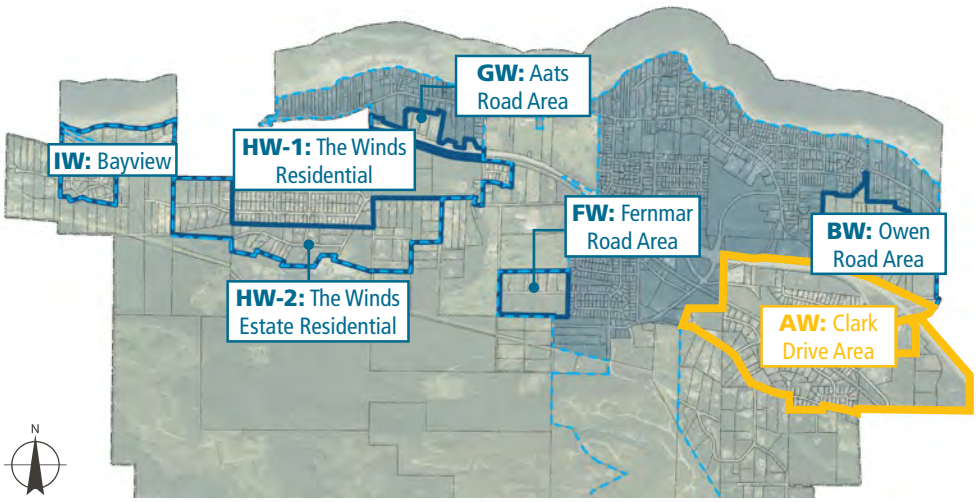
- **Option A:** Community water extension is not pursued in the time frame of the Water Master Plan (10- 20 years).
- **Option B:** Community water is extended with no outside financial assistance from new development or grants. Cost ranges represent the cost of extension split between the existing number of parcels in the neighbourhood and assumes there will be no significant subdivision in currently unserviced areas within the planning period. If grants or subdivision were available, costs may be reduced.
- **Option C:** In neighbourhoods adjacent to identified potential future development areas (i.e., large lots that could be subdivided under the 2005 OCP), community water is extended to be adjacent to the existing neighbourhood as a condition of new development, reducing the infrastructure costs to then extend water service to existing properties. Areas FW, GW, and IW are not adjacent to areas with potential for significant new development under the 2005 OCP, so do not include Option C.

The following pages summarize the scenarios presented and feedback from each neighbourhood collected during the Community-wide Survey. Survey responses were filtered by neighbourhood to confirm that participants only provided input on the unserviced area in which they identified as owning property. Other responses were excluded because they would not be part of the neighbourhood that would be potentially funding infrastructure to service the neighbourhood.

The filtering process indicated that some participants provided input on areas outside their unserviced area. Many of these responses may include participants who reside in other neighbourhoods (e.g., Area C) which are already serviced by water, but the participants may not have water service at their property due to existing policy limiting new connections.

Section 5.6 proposes phasing for future water service extensions based on this input.

AW: CLARK DRIVE AREA



**The estimated costs below represent costs for extending water distribution infrastructure to and through a neighbourhood. One-time individual property owner costs, including the connection fee and costs to connect pipes from the watermain at the property line to buildings on an individual property, would be in addition to the neighbourhood costs outlined below.*

Estimated Number of Existing Parcels: 160

Estimated Costs*

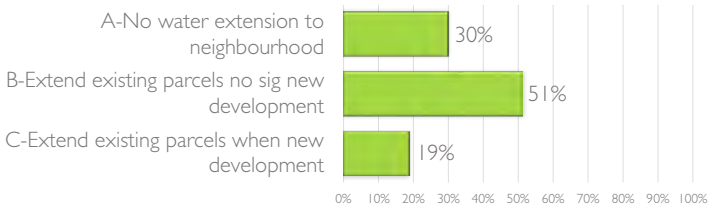
Because Area AW is adjacent to existing water distribution infrastructure and costs would be split between a larger number of lots, costs to extend community water service to this area are lower than other neighbourhoods.

Option	Estimated Cost Range per Parcel**
OPTION A: No community water extension to this neighbourhood.	$0
OPTION B: Extension to existing parcels only (no significant new development).	$1,550 to $1,800/yr for 20 years
OPTION C: Extension to existing parcels when adjacent new development occurs.	$1,350 to $1,650/yr for 20 years

*** Costs ranges are Class D estimates (+/- 30% accuracy) in 2016 dollars and based on conceptual layout. Factors including detailed design, inflation, and unknown constraints would affect estimates.*

Public Feedback

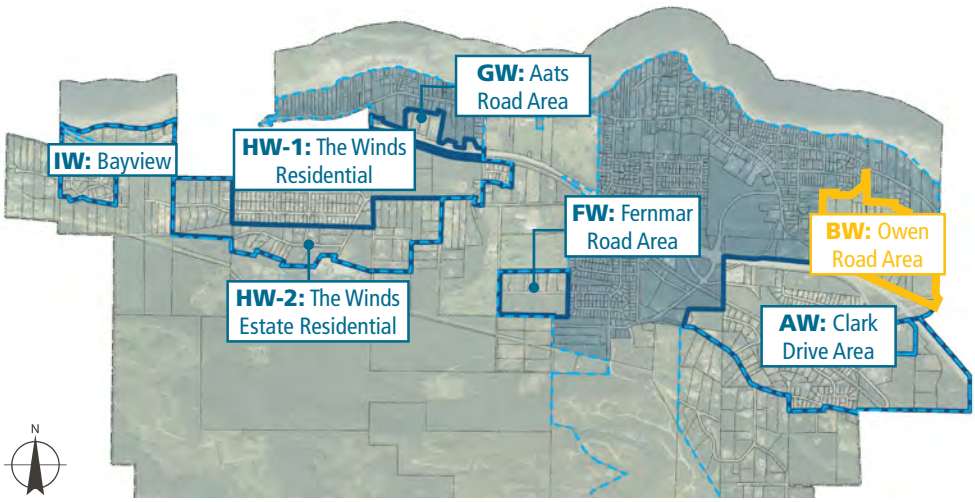
- Number of Community-wide Survey participants from Area AW: 53
- Approx. number of lots in Area AW: 160
- The results indicate that 70% of survey participants supported water extension to Area AW, with just over half (51%) preferring extension in the absence of significant new development to lower the cost (Option B)



Summary

There appears to be sufficient support in Area AW to warrant short-term consideration for water service extension, subject to neighbourhood approval, even in the absence of new development.

BW: OWEN ROAD AREA



**The estimated costs below represent costs for extending water distribution infrastructure to and through a neighbourhood. One-time individual property owner costs, including the connection fee and costs to connect pipes from the watermain at the property line to buildings on an individual property, would be in addition to the neighbourhood costs outlined below.*

Estimated Number of Existing Parcels: 50

Estimated Costs*

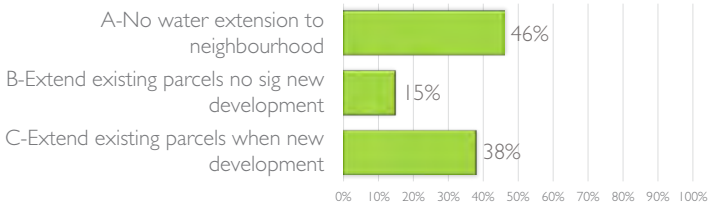
Extension of servicing infrastructure to Area BW would require lengthy distribution pipes and costs which would be divided between a relatively small number of lots, leading to higher servicing costs. If future development occurred in this area, watermains would be brought closer to existing residential areas, significantly reducing costs for existing residents.

Option	Estimated Cost Range per Parcel**
OPTION A: No community water extension to this neighbourhood.	$0
OPTION B: Extension to existing parcels only (no significant new development).	$2,500 to $2,950/yr for 20 years
OPTION C: Extension to existing parcels when adjacent new development occurs.	$1,900 to $2,250/yr for 20 years

*** Costs ranges are Class D estimates (+/- 30% accuracy) in 2016 dollars and based on conceptual layout. Factors including detailed design, inflation, and unknown constraints would affect estimates.*

Public Feedback

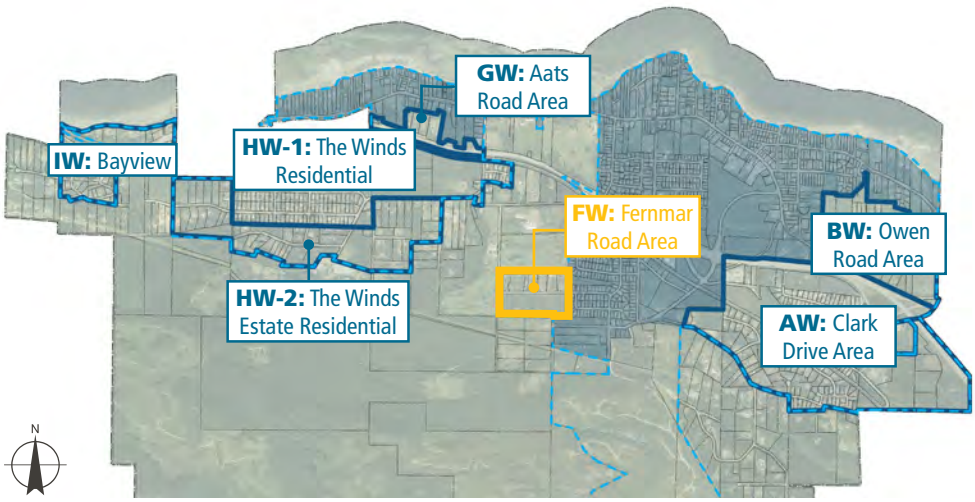
- Number of Community-wide Survey participants from Area BW: 26
- Approx. number of lots in Area AW: 50
- The results indicate that just over half of participants (54%) support water extension to Area BW, with most preferring to wait for new development to lower the cost (Option C)



Summary

Feedback suggests that opinions about water extension to Area BW are mixed. It is recommended that extension be deferred to later phases, with further consideration if new adjacent development occurs in the area, potentially reducing costs for existing residents.

FW: FERNMAR ROAD AREA



**The estimated costs below represent costs for extending water distribution infrastructure to and through a neighbourhood. One-time individual property owner costs, including the connection fee and costs to connect pipes from the watermain at the property line to buildings on an individual property, would be in addition to the neighbourhood costs outlined below.*

Estimated Number of Existing Parcels: 8

Estimated Costs*

Area FW is a small water service neighbourhood, but is directly adjacent to existing water infrastructure helping to limit potential extension costs. No new significant development is anticipated adjacent to the site, although water servicing and upcoming sewer phasing, may provide opportunity for large lots in this area to consider subdivision based on the 2005 OCP 'Residential' land use designation. This assumption is not included in the below calculations, but if subdivision occurred, individual costs would be reduced by being split between more parcels.

Option	Estimated Cost Range per Parcel**
OPTION A: No community water extension to this neighbourhood.	$0
OPTION B: Extension to existing parcels only (no significant new development).	$2,050 to $2,450/yr for 20 years

*** Costs ranges are Class D estimates (+/- 30% accuracy) in 2016 dollars and based on conceptual layout. Factors including detailed design, inflation, and unknown constraints would affect estimates.*

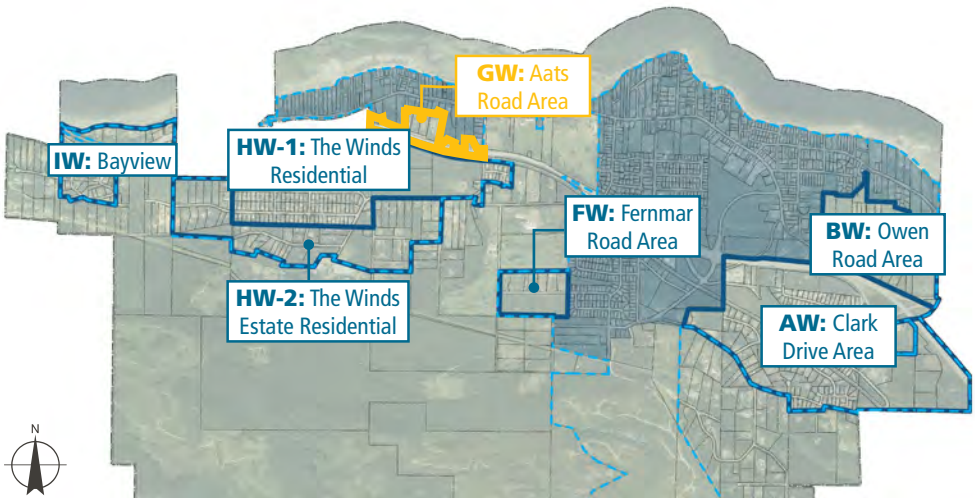
Public Feedback

- Survey sample size too small to provide meaningful results
- Direct discussion with area residents should be undertaken when considering potential connection to confirm majority preference
- Implications of new subdivision made possible by upcoming sewer servicing should be considered in future neighbourhood discussions

Summary

Given the close proximity of Area FW to existing infrastructure, short-term consideration for water service extension, subject to neighbourhood approval, may be warranted.

GW: AATS ROAD AREA



**The estimated costs below represent costs for extending water distribution infrastructure to and through a neighbourhood. One-time individual property owner costs, including the connection fee and costs to connect pipes from the watermain at the property line to buildings on an individual property, would be in addition to the neighbourhood costs outlined below.*

Estimated Number of Existing Parcels: 5

Estimated Costs*

Area GW is a small water service neighbourhood and would require a significant distance of watermain extension to allow connection. There is no anticipated significant future development in this area that would further reduce costs, resulting in high servicing costs for this area.

Option	Estimated Cost Range per Parcel**
OPTION A: No community water extension to this neighbourhood.	$0
OPTION B: Extension to existing parcels only (no significant new development).	$3,600 to $4,250/yr for 20 years

*** Costs ranges are Class D estimates (+/- 30% accuracy) in 2016 dollars and based on conceptual layout. Factors including detailed design, inflation, and unknown constraints would affect estimates.*

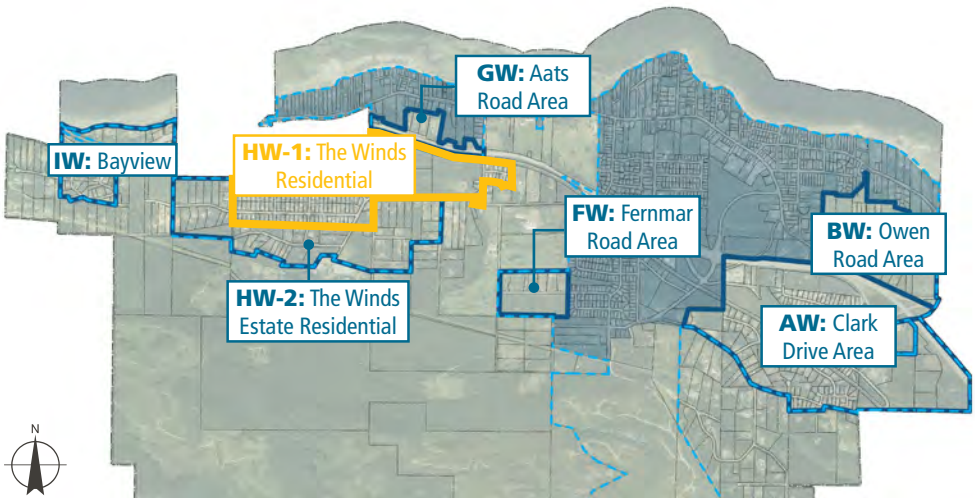
Public Feedback

- Survey sample size too small to provide meaningful results
- Direct discussion with area residents should be undertaken when considering potential connection to confirm majority preference

Summary

Given the limitations to efficiently service Area GW, it is recommended to be considered in later phases.

HW-1: WINDS RESIDENTIAL AREA



**The estimated costs below represent costs for extending water distribution infrastructure to and through a neighbourhood. One-time individual property owner costs, including the connection fee and costs to connect pipes from the watermain at the property line to buildings on an individual property, would be in addition to the neighbourhood costs outlined below.*

Estimated Number of Existing Parcels: 133

Estimated Costs*

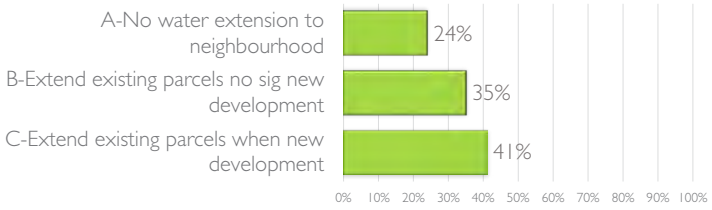
Area HW-1 is separated from existing water infrastructure by rural lands, contributing to a higher overall cost to extend water service to the neighbourhood. Because there are many lots in the area, costs would be split between more residents helping reduce individual costs. The Winds is adjacent to a large potential development site which would reduce the cost of servicing extension if developed; however, there are mixed opinions in the community about development of this site.

Option	Estimated Cost Range per Parcel**
OPTION A: No community water extension to this neighbourhood.	$0
OPTION B: Extension to existing parcels only (no significant new development).	$1,900 to $2,100/yr for 20 years
OPTION C: Extension to existing parcels when adjacent new development occurs.	$900 to $1,050/yr for 20 years

*** Costs ranges are Class D estimates (+/- 30% accuracy) in 2016 dollars and based on conceptual layout. Factors including detailed design, inflation, and unknown constraints would affect estimates.*

Public Feedback

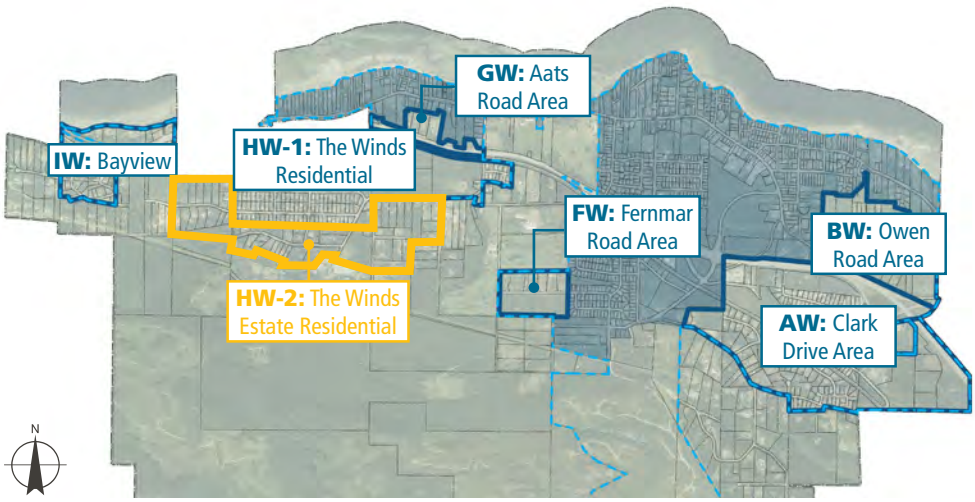
- Number of Community-wide Survey participants from Area HW-1: 49
- Approx. number of lots in Area HW-1: 133
- The results indicate that just over three-quarters of participants (76%) support water extension to Area HW-1, with a mixed preference for extending in the absence of new development (Option B) and preferring to wait for new development to lower the cost (Option C)



Summary

There appears to be sufficient support in Area HW-1 for short-term consideration for water service extension, subject to neighbourhood approval. Opinions about whether this should coincide with future development or in the absence of development are mixed, likely attributable to the varied opinions about development in the area.

HW-2: WINDS ESTATE AREA



**The estimated costs below represent costs for extending water distribution infrastructure to and through a neighbourhood. One-time individual property owner costs, including the connection fee and costs to connect pipes from the watermain at the property line to buildings on an individual property, would be in addition to the neighbourhood costs outlined below.*

Estimated Number of Existing Parcels: 56

Estimated Costs*

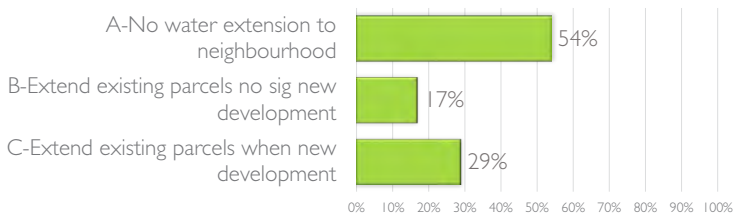
Area HW-2 is the estate residential portion of the Winds. The large lot sizes in this area require lengthy distribution infrastructure shared between a limited number of residents, which in turn, contributes to higher servicing costs. If future development occurred in adjacent areas, it would bring servicing mains closer to the neighbourhood, reducing the costs to a degree, but costs would remain relatively high due to the large estate lot frontages.

Option	Estimated Cost Range per Parcel**
OPTION A: No community water extension to this neighbourhood.	$0
OPTION B: Extension to existing parcels only (no significant new development).	$4,300 to $5,050/yr for 20 years
OPTION C: Extension to existing parcels when adjacent new development occurs.	$2,250 to $2,700/yr for 20 years

*** Costs ranges are Class D estimates (+/- 30% accuracy) in 2016 dollars and based on conceptual layout. Factors including detailed design, inflation, and unknown constraints would affect estimates.*

Public Feedback

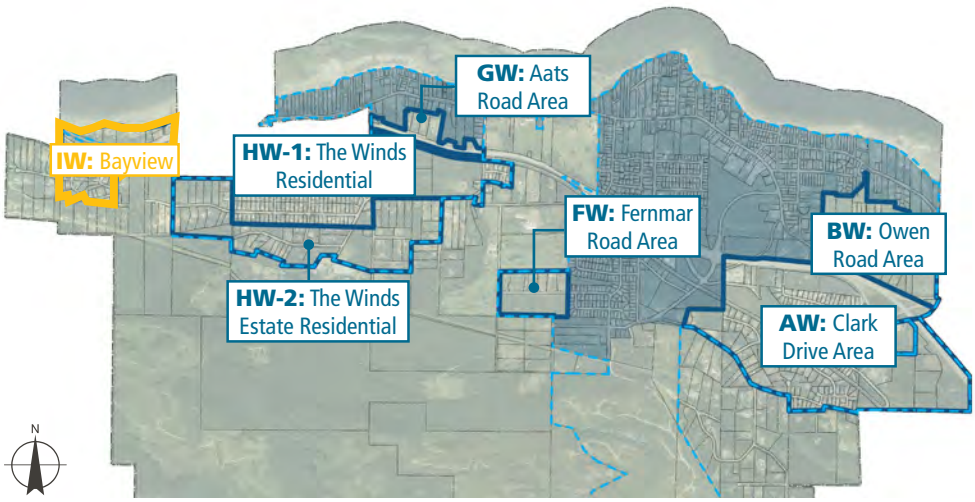
- Number of Community-wide Survey participants from Area HW-2: 24
- Number of lots in Area HW-2: 56
- The results indicate that just over half of participants (54%) do not support water extension to Area HW-2 at this time.



Summary

Feedback suggests there may not be sufficient support at the current time to pursue servicing extension to the Estate Residential area of the Winds. Neighbourhood opinions should be reassessed once other phases are complete.

IW: BAYVIEW AREA



**The estimated costs below represent costs for extending water distribution infrastructure to and through a neighbourhood. One-time individual property owner costs, including the connection fee and costs to connect pipes from the watermain at the property line to buildings on an individual property, would be in addition to the neighbourhood costs outlined below.*

Estimated Number of Existing Parcels: 49

Estimated Costs*

Area IW is the furthest neighbourhood within the Water Service Area to which to extend water. The neighbourhood is relatively distant from the existing watermains and complicated by community boundaries. The land use for this area is estate residential, which limits opportunity for future development that could lower servicing costs. The distance and limited number of lots result in relatively high water extension costs.

Option	Estimated Cost Range per Parcel**
OPTION A: No community water extension to this neighbourhood.	$0
OPTION B: Extension to existing parcels only (no significant new development).	$3,300 to $4,000/yr for 20 years

*** Costs ranges are Class D estimates (+/- 30% accuracy) in 2016 dollars and based on conceptual layout. Factors including detailed design, inflation, and unknown constraints would affect estimates.*

Public Feedback

- Number of Community-wide Survey participants from Area HW-1: 9
- Number of lots in Area HW-1: 49
- The results indicate that over three quarters (78%) of survey participants do not support water extension to Area IW

Summary

There appears to be insufficient support in Area IW to warrant consideration for water service extension to this neighbourhood at this time. Neighbourhood opinions should be reassessed once other phases are complete.

5.5 WATER QUALITY & QUANTITY IN UNSERVICED NEIGHBOURHOODS

Over the years, residents using private wells have identified concerns about water quality and quantity. Input suggests concerns can vary by neighbourhood and by individual property, with one neighbour having sufficient high-quality water adjacent to a landowner with concerns about quality and/or quantity. The Community-wide Survey continued the line of questioning about water quality and quantity, although it should be recognized that some individual property owners may be reluctant to identify water quality or quantity issues due to concerns about property values.

Well Testing

Well testing of individual wells is voluntary. Private landowners may choose to test their wells to determine the safety and reliability of their water supply, but it is not required. Often wells are tested during purchase of property, but this information may not be readily available. The Community-wide Survey requested public input on well testing.

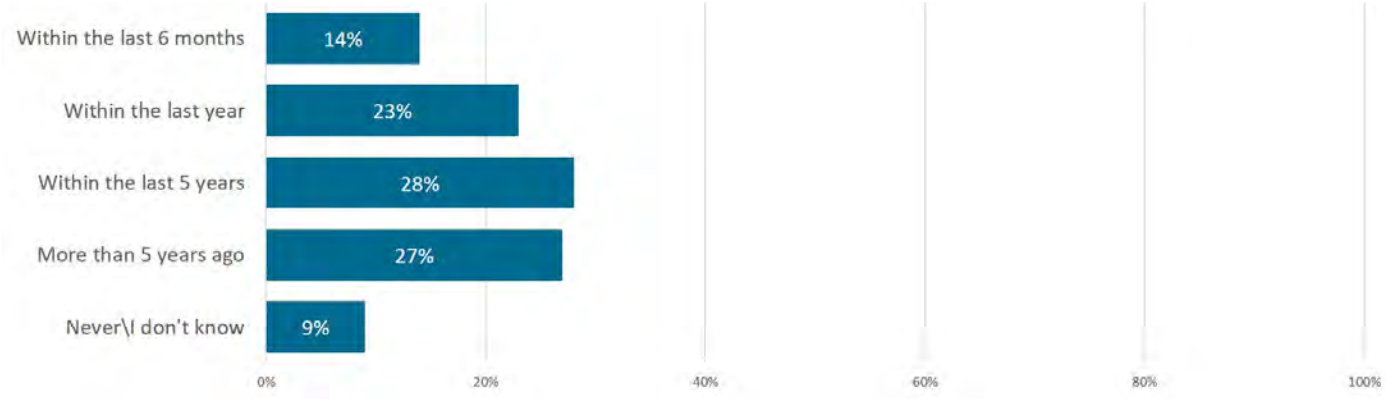


Figure 14: Community-wide Survey Feedback on Well Testing

Water Quality

The Community-wide Survey responses showed similar results to initial input suggesting that about three-quarters of residents feel they have acceptable water quality.

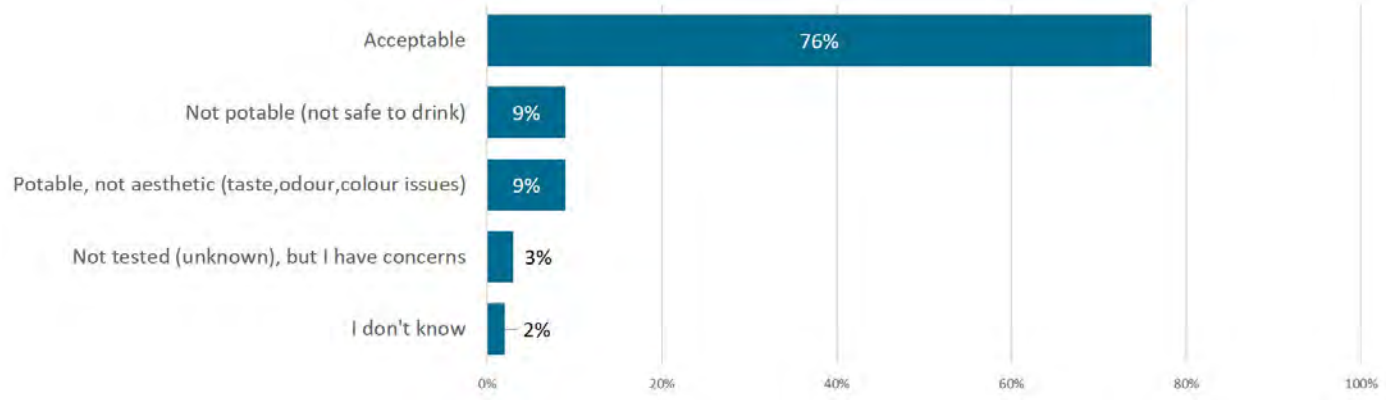


Figure 15: Community-wide Survey Feedback on Water Quality

Analysis of the results by neighbourhood showed the following trends:

- Area AW: Clark Drive showed the highest level of concern about water quality at 29%
- Area HW: The Winds showed the second highest level of concern about water quality at 19%
- Areas BW: Owen Road Area and IW: Bayview showed lower levels of concern about water quality at 15% and 13% respectively

Water Quantity

During the process, residents expressed concerns about long-term water quantity, especially if new wells are developed. The primary concern identified is that new wells will reduce the water available for existing wells, leading to water quantity reductions over time.[1] Just over 70% of Community-wide Survey participants felt their existing water quantity was sufficient.

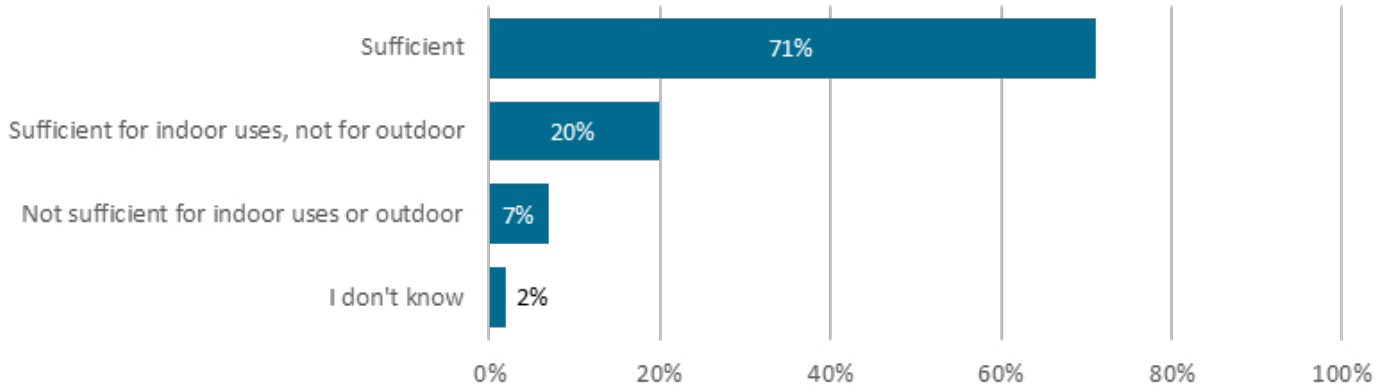


Figure 16: Community-wide Survey Feedback on Water Quantity

Analysis of the results by neighbourhood showed the following trends:

- Area AW: Clark Drive showed the highest level of concern about water quantity at 42%
- Area IW: Bayview showed the second highest level of concern about water quantity at 30%
- Area BW: Owen Road showed the third highest level of concern about water quantity at 24%
- Area HW: The Winds showed the lowest level of concerns about water quantity at 15%

Fire Protection

Because fire hydrants are located on existing community water supply lines, areas without community water do not have access to fire hydrants. Almost three-quarters of Community-wide Survey participants would like fire hydrants within their neighbourhood. Extension of water service for the sole purpose of fire protection (not drinking water), is not a standard practice, because the infrastructure required for only a fire protection system would be similar in scope and cost to installing a complete drinking water system. However, fire protection is a key benefit of an expanded community water system[2].

Figure 17: Community-wide Survey Feedback on Fire Protection

1 Lantzville's existing subdivision bylaw requires new subdivision to three or more properties to complete hydrogeological analysis to confirm existing wells will not be affected; however community concerns about cumulative impacts remain.
2 Lantzville has a Fire Underwriters Survey that guides fire protection for the entire community, including areas without fire hydrants.

5.6 WATER SERVICE EXTENSION PHASING

The following map shows an anticipated sequence for extending water services to properties within the Water Service Area, recognizing that needs or opportunities could affect implementation. Four key variables affect water service phasing:

- **Infrastructure Sequencing:** Like sewer, water infrastructure is typically phased in a logical manner, extending from existing watermain lines to adjacent neighbourhoods, before extension out to more distant neighbourhoods.
- **Neighbourhood Interest:** The costs to extend water infrastructure (i.e., water distribution pipes) to an existing neighbourhood will be paid by existing residents through establishment of a Local Area Service (LAS). For a LAS to be created, at least 50% of the neighbourhood must be in support (see ***Section 5.1.2***). Water will typically be offered in earlier phases to neighbourhoods that demonstrate stronger support for water service.
- **Water Resiliency:** Water quality and quantity are key considerations for extending community water, with priority consideration for areas that may have risks. In addition, grant funding may have greater potential where issues exist. Generally, water quality and quantity concerns appear to align with neighbourhood interest for community water service.
- **Future Development:** When new development occurs, municipal services are expanded with construction of required infrastructure as a condition of development or density bonus. If new development occurs adjacent to existing unserviced neighbourhoods, costs to extend water service to existing neighbourhoods may be reduced.

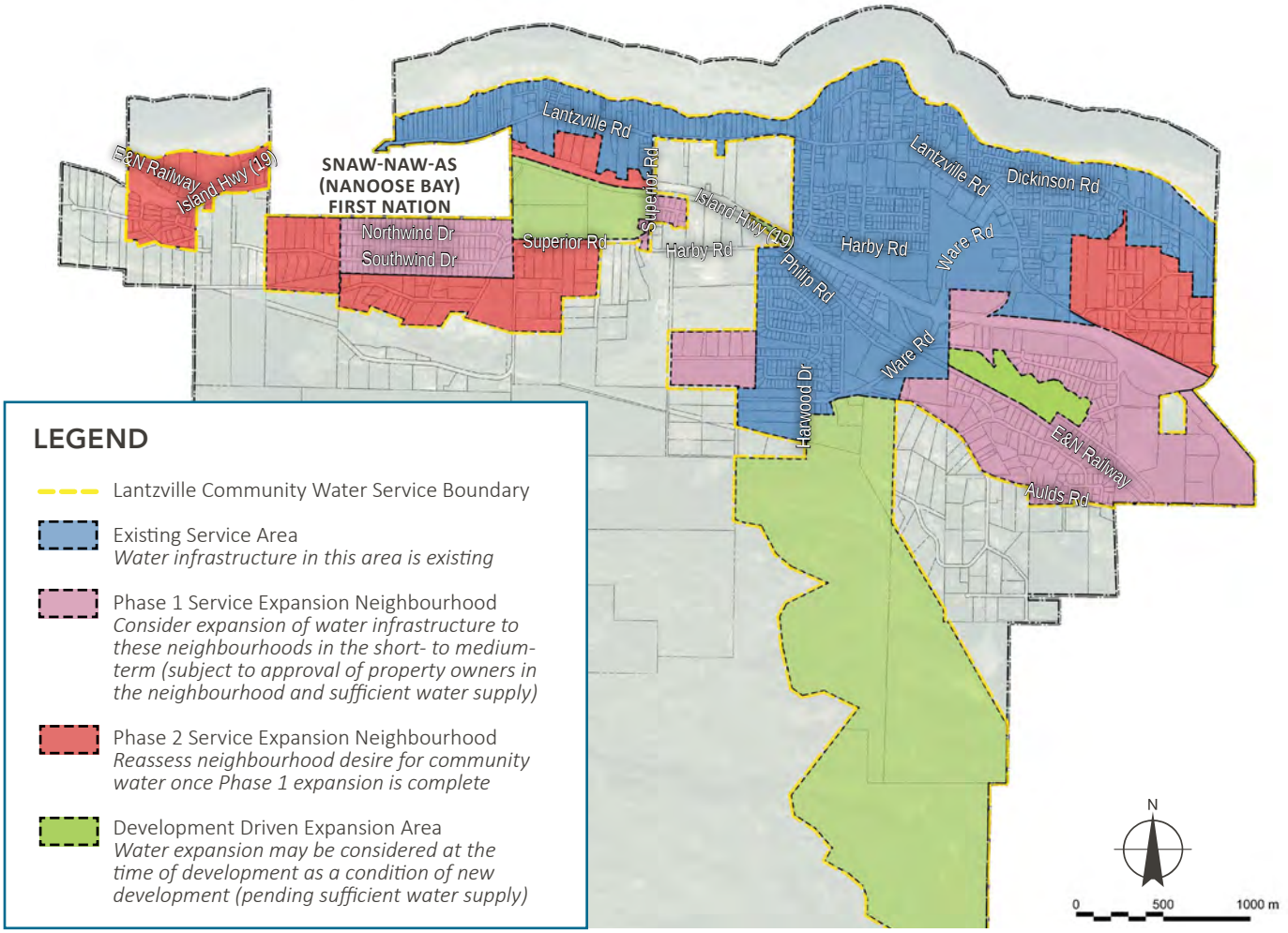


Figure 18: Proposed Phasing for Future Water Service Extension

5.7 WATER SERVICE EXTENSION OUTSIDE THE WATER SERVICE AREA

The Water Service Area boundary was established in the 2005 OCP, and is maintained in the 2017 OCP Update to identify the extents of planned water service for Lantzville. The boundary generally includes all commercial, industrial, residential, and estate residential land use designations. Rural properties and resources lands, including agricultural properties, are not included.

During the Water Master Plan process, input indicated that a small number of properties outside the Water Service Area may desire community water for domestic use, often in locations where existing or future water service is adjacent or in close proximity. However, being outside the Water Service Area currently limits opportunities to connect.

To allow water connections to properties outside the Water Service Area to be considered, while retaining a boundary that indicates the limits of planned water service, the Water Master Plan recommends updating OCP policy to allow requests for water service to properties outside the Water Service Area to be considered on a case-by-case basis, where they do not adversely affect the planned water system.

5.8 WATER SERVICE EXTENSION PHASING RECOMMENDATIONS

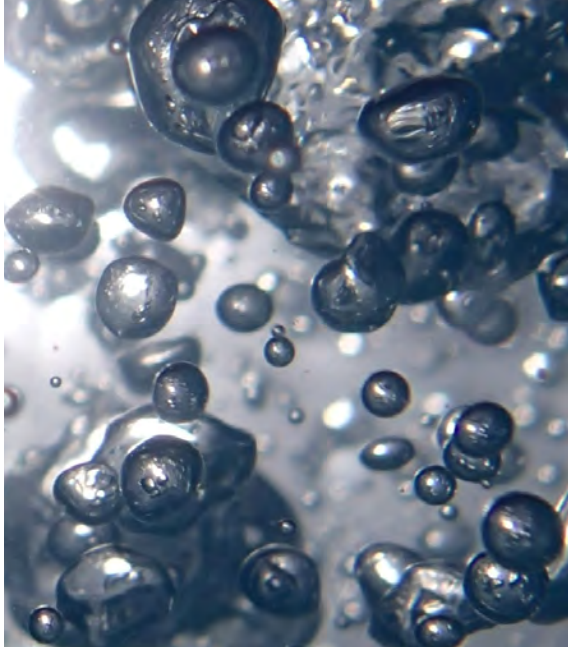
Prior to allowing any future water service connections or water service extension to any existing neighbourhoods, obtain additional water supply and increase community water storage (see ***Section 8***).

Once sufficient supply and storage is available:

1. Amend existing policy to allow unserviced properties adjacent to existing water service infrastructure to apply to connect to the community water system on a first-come first-served basis.
2. Update OCP policy to allow properties outside the Water Service Area boundary to apply for domestic use (not landscape or agricultural use) water connections on a first-come first-served basis. Applications should be considered on a case-by-case basis, confirming connection will not adversely affect delivery of the planned water system.
3. Take steps to establish Local Area Services in the for the following Phase 1 Service Expansion Neighbourhoods shown on Figure 18, subject to available water supply and approval by current residents:
   - AW: Clark Drive Area
   - FW: Fernmar Road Area
4. Monitor potential development that could reduce the water service extension costs for the Phase 1 Service Expansion Neighbourhood HW-1: Winds Residential. If, in five years after the date of this plan, development is not anticipated or neighbourhood residents bring forward a successful petition, take steps to establish a Local Area Service for water extension to the neighbourhood, subject to available water supply and approval by current residents.
5. When Phase 1 water service extensions are complete, reassess resident opinions about extending water services to the following Phase 2 Expansion Neighbourhoods shown on Figure 18:
   - BW: Owen Road Area
   - GW: Aats Road Area
   - HW-2: Winds Estate Residential
   - IW: Bayview

   Water extension to the Phase 2 Expansion Neighbourhoods may be considered in a shorter time frame if neighbourhood residents bring forward a successful petition.
6. Begin considering community water for areas identified as Development Driven Expansion Areas on Figure 18, as part of development approval processes. Where development-driven expansion is considered, the following may be required:
   - Provision of a new source of community water supply by the development
   - Water infrastructure design that allows for future extension to adjacent existing neighbourhoods desiring community water

6 | WATER BUDGETING: SUPPLY & DEMAND



Communities undertake water supply and demand budgeting to compare potential community demands with how much water is and could be available to ensure water supply remains resilient as the community evolves. This section reviews capacity of Lantzville's existing and potential future water supply against estimated future demand based on policies in the Official Community Plan.

6.1 BACKGROUND

Typically, an objective of Water Master Planning is to stay ahead of community demand for water, recognizing planning, community desires, and Council decisions will influence how quickly or slowly water demands will increase. Having a strategy in place and implementing steps over time to meet this potential demand is part of a resilient water strategy.

Lantzville's existing water supply is from groundwater accessed via wells on Harby Road East. This existing supply is insufficient to service any additional existing properties in Lantzville or to support new development.

To address water limitations, the District has improved the existing well infrastructure, reviewed the Design Standard (see ***Section 4***), and taken steps towards securing additional water sources, including entering into the Lantzville/Nanaimo Water Agreement. Extension of the water system will require decisions about if and when to commence purchasing water from Nanaimo and/or to develop other potential water supply sources.

The Water Master Plan analyzes water supply and demand scenarios and summarizes the potential water service extensions that could occur based on the addition of new supply.

In preparing the scenarios, it is important to recognize that well yields and water quality can vary over time due to a number of factors such as climate change, recharge area modification, or earth movements (e.g., earthquakes or blasting). All data used in the Water Master Plan is subject to ongoing monitoring and updates.

Future projections of both population growth and water supply are estimates only. Actual numbers are influenced by a wide range of variables including individual land owner decisions, water conservation innovations and technology changes, environmental variables, and more. Actual water use will be higher or lower than the predictions; however, the budget provides a useful yardstick for long-term planning.

6.2 PRESSURE ZONES

Pressure Zone: A pressure zone is an area of water service supplied from a constant storage source such as a reservoir. A water distribution system is divided into pressure zones.

Currently, Lantzville has two pressure zones – the Upper Pressure Zone and the Lower Pressure Zone (refer to ***Section 2.2*** for details). During water budgeting, potential for the addition of a third pressure zone was considered as an option. This zone, called the Middle Pressure Zone, could be considered to service unserviced areas in the southeast end of Lantzville around Clark Drive.

The potential need for a Middle Pressure Zone arises from limitations in the current Lantzville/Nanaimo Water Agreement. The agreement stipulates that:

- Nanaimo water may only be used to service the Upper Pressure Zone. Properties in the Lower Pressure Zone must be connected to District of Lantzville groundwater or other sources.
- The agreement allocates Nanaimo water to supply connections to up to **436** existing developed parcels in Upper Lantzville, **225** of which are the existing Winchelsea parcels that are currently connected to Lantzville water and **211** potential connections for currently unserviced existing properties in the Upper Pressure Zone. Schedule "A" of the agreement indicates these would supply the Winds area.
- The current Lantzville/Nanaimo Water Agreement differentiates between allocation of connections to existing and new development and does not confirm that allocated new connections could be used to connect existing unserviced properties.

Existing unserviced properties in the Upper Pressure Zone that require servicing from an elevation above that which can be supplied by the Lower Pressure Zone (<97.25 m) include:

Unserviced Neighbourhood*	Approx. No. of Existing Parcels for Potential Future Connection
Area AW: Clark Drive	160
Area BW: Owen Road	44
Area FW: Fernmar Road	8
Area HW-1: Winds Residential	133
Area HW-2: Winds Estate	56
Area IW: Bayview (Upper)	40
Approx. Total Parcels for Potential Connection	**441**

** Note: Area GW: Aats Road and Area IW: Bayview (lower) are in the Lower Pressure Zone.*

The number of unserviced existing properties in the Upper Pressure Zone (**441**) exceeds the number of unallocated available connections in the Lantzville/Nanaimo Water Agreement (**211**) by approximately **230** (441- 211 = 230).

The potential creation of a Middle Pressure Zone would allow an alternate water source (existing Lantzville groundwater or new water supply) to be available to service the **160** existing properties in the Clark Drive Area. This could support potential for short-term water supply extension to all properties identified as Phase 1 Service Expansion Neighbourhoods (see Figure 18), including AW: Clark Drive (160), FW: Fernmar Road (8), and HW-1: Winds Residential (133).

There would be also potential to service a portion (approximately 70 units) of the Phase 2 Service Expansion Neighbourhoods (see Figure 18); however, there would be about **70** additional connections needed to service all of the unserviced existing properties in the Upper Pressure Zone. While residents in the Phase 2 did not indicate a strong desire for connection at this time, planning to allow future consideration for expanded water service to all existing properties in the Upper Pressure Zone may be warranted. Options may include:

- Amendment of the Lantzville/Nanaimo Water Agreement to support allocation of new connections to service either existing or new development.
- Identification of additional water supply that would provide opportunity for Lantzville water to service remaining existing units.

POTENTIAL PRESSURE ZONES

Figure 19 outlines the potential future pressure zones.

LOWER PRESSURE ZONE

The Lower Pressure Zone would remain as existing, with a top water elevation of 97.25 m. The area would continue to be serviced by Lantzville groundwater via the Ware Road reservoir.

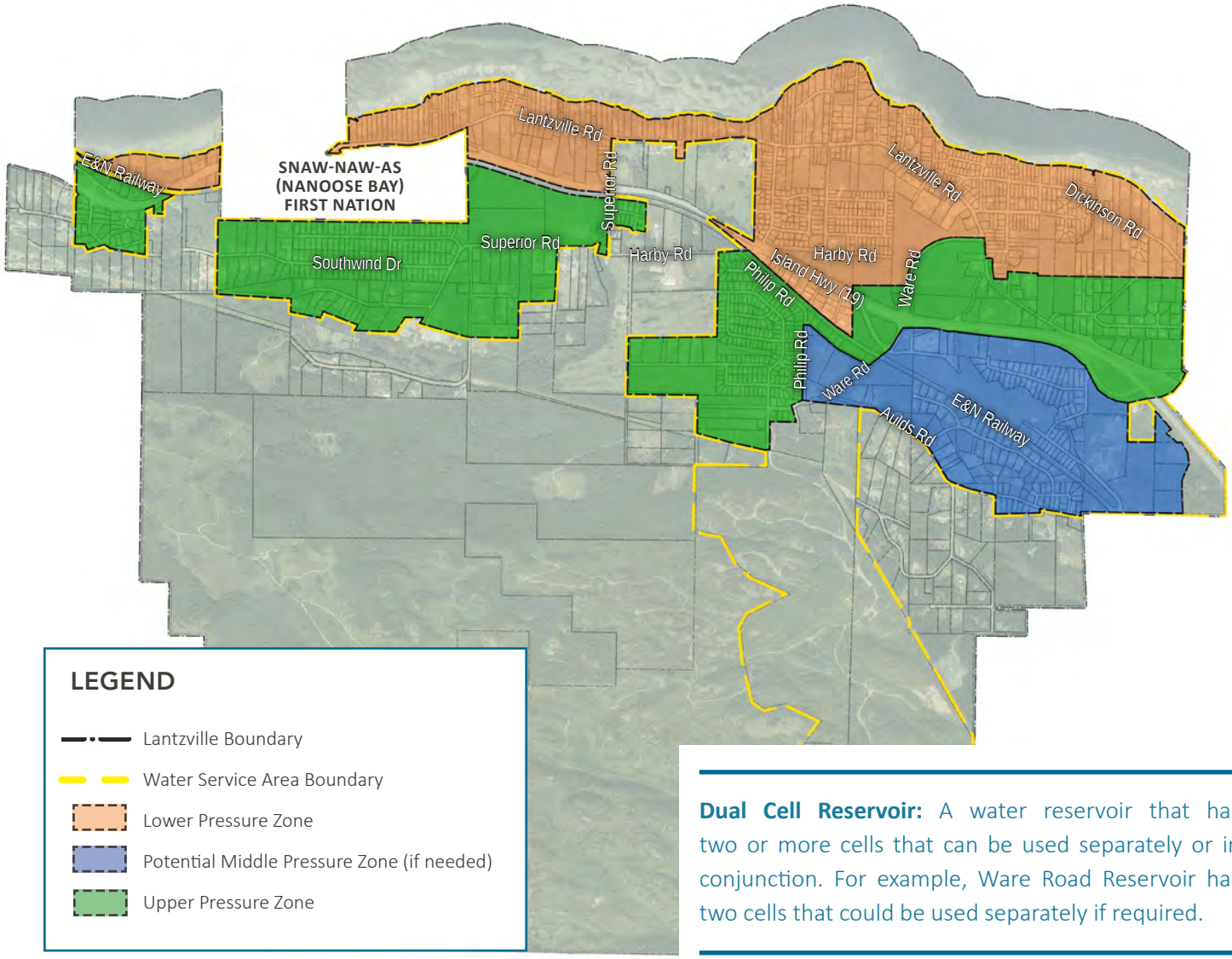
UPPER PRESSURE ZONE

The Upper Pressure Zone would include properties to the extent of the Water Service Area above the 97.25 m elevation, with potentially the exception of the Clark Drive Area. The Upper Pressure Zone could be serviced by a proposed new dual cell reservoir with a top water elevation of 158 m, supplied by water from Nanaimo or alternate sources.

POTENTIAL MIDDLE PRESSURE ZONE

The potential Middle Pressure Zone would include properties in the Clark Drive Area. The area would be serviced by the proposed new dual reservoir at the 158 m elevation, using Lantzville water pumped from Ware Road Reservoir or alternate sources.

The Middle Pressure Zone would only be required under the current terms of the Lantzville/Nanaimo Water Agreement. If minor amendments to the agreement were completed to allocate "new" connections to "new or existing" development and to update Schedule "A" to consider all existing parcels in the Upper Pressure Zone implementation would be streamlined, and the Potential Middle Pressure Zone would likely not be required.



Dual Cell Reservoir: A water reservoir that has two or more cells that can be used separately or in conjunction. For example, Ware Road Reservoir has two cells that could be used separately if required.

Figure 19: Potential Future Water Pressure Zones

6.3 WATER SUPPLY

Planning for long-term water supply is fundamental to ensuring sufficient water is available as the community evolves, preparing for unanticipated needs, and setting aside sufficient funds for replacement of infrastructure or implementation of major projects. With a long-term outlook, sources can be planned and secured over time, being kept in reserve until such time they are needed to supplement existing sources. Communities typically adopt this long-term outlook, planning decades in advance, to ensure new sources come online before demand exceeds supply. The Water Master Plan considers existing, as well as future, potential supply sources.

6.3.1 EXISTING WELLS

The existing well field consists of five producing wells (#4, #5[1], #6a, #9, and #12) and a number of inactive test wells. Groundwater levels in the aquifer fluctuate throughout the year, lowering as much as 3 m (10') during the hot, dry summer months when water is in highest demand and there is little to no aquifer recharge (LHC, 2014).

In 2014, the District retained Lowen Hydrogeology Consulting Ltd. (LHC) to review pumping tests completed in July/August 2014 on the four producing wells being used at that time (#4, #6, #9, and #12). LHC analyzed well drawdown interference (i.e., how much use of one well affects water levels in adjacent wells) and long-term capacity. Tests showed that the combined capacity of the four active wells was 2,027 m^3/day. The report stated that drilling additional well sites at the well field was not advisable due to the combined water level drawdown during simultaneous pumping (LHC, 2014).

In 2015, further analysis was completed to identify opportunities to improve the efficiency of the existing wells. Wells can become inefficient due to design flaws and deposition of fine grained material around the well screens. Analysis suggested Lantzville wells were operating at an efficiencies between 28% to 73%, and suggested that upgrades to the wells could help increase yield at the well field (LHC, 2015).

Once upgrades were complete, retesting was undertaken in March 2017 and revealed an increased production rate to 3,100 m^3/day (LHC, 2017a); however, it was recommended that testing of the entire well field be completed at the end of the dry season to determine the seasonal low yield capacity.

In August 2017, testing was completed as recommended and showed a lower production rate of only 2,380 m^3/day at the end of the dry season (LHC, 2017b). Summer 2017 was an exceptionally dry year; however, climate change observations suggest that these extremely dry summers may become increasingly common.

A specific challenge for using groundwater supply as a community water source is its lack of visibility. Unlike surface sources, groundwater cannot be visibly monitored, making it more difficult to fully predict the sources that replenish a groundwater supply and affects the ability to predict water availability. Ongoing groundwater monitoring is used to help identify if a source is being depleted; however, little can be done to increase water available in the absence of replenishment through natural cycles.

Table 6 (next page) summarizes upgrades that have been completed to the wells and capacity ratings from July/August 2014 (prior to upgrades), March 2017 (after upgrades were completed), and August 2017 (at the end of the 2017 dry season).

The Water Master Plan assumes an availability of **2,380 m^3/day** from the well field source, based on the most recent dry-weather testing.

6.3.2 LANTZVILLE/NANAIMO WATER AGREEMENT

In 2014, after many years of negotiation, the District of Lantzville and City of Nanaimo signed the Lantzville/Nanaimo Water Agreement which allows Lantzville to consider potential provision of Nanaimo water to parts of Lantzville's water supply system, in exchange for payment to the City of Nanaimo.

1 In 2002/2003 Well #5 was abandoned due to its interference with Well #6, which showed no increase in overall water production with both wells running. With the replacement of Well #6 with Well #6a, Well #5 was retested and confirmed to provide benefit when running with the new well.

In 2017, Lantzville completed construction of a physical connection to the Nanaimo Water System. Council now has the option, through Council resolution, to initiate the purchase of water from Nanaimo. At the time of commencement, the District would be required to pay a connection fee of approximately **$1.33 million** for the **225** Upper Pressure Zone connections in the Winchelsea neighbourhood that are already connected to Lantzville community water and would become serviced by Nanaimo water.

If Council resolved to commence the Lantzville/ Nanaimo Water Agreement, water would become available to service up to **436** existing properties in the Upper Pressure Zone (**225** Winchelsea connections + an additional **211** unserviced existing properties). Water supply for new development in the Upper Pressure Zone could also be supplied at a rate of **50** new connections/ year.

The agreement stipulates that water connections will only be provided to properties within the Upper Pressure Zone, requiring properties within Lantzville's other Pressure Zone(s) to be serviced via alternate sources.

The Water Master Plan assumes an availability of **1,265 m³/day** of water supply for the **436** initial connections and the cumulative addition of **145 m³/day** every year to support the **50** new development connections (**2,900 m³/day** after a period of **20 years**).[2]

6.3.3 POTENTIAL NEW WELLS

There is potential for additional groundwater sources within the District of Lantzville, via wells on private lands. As future development is considered in Lantzville, opportunities to secure additional groundwater sources to supply the District's water system may occur.

The Water Master Plan scenarios in the next section suggest an approximate supply that would need to be obtained to service all existing properties in Lantzville, as well as to achieve full build-out of the OCP and to look beyond a 20-year horizon.

6.3.4 OTHER SUPPLY OPTIONS

As the community evolves, options for the future should continue to be explored. Options not currently being explored in this Water Master Plan, such as additional capacity from the City of Nanaimo, connection with other water supply providers, or further water source identification may be revealed in the future as alternates or additions to the supply sources current known.

2 The water supply estimate for the City of Nanaimo connection is based on Lantzville's proposed residential Design Standard of 2,800 - 3,000 l/day/connection (see Section 4), assuming an average of 2,900 l/day/connection (2.9 m³/day/connection) and multiplied by the number of connections stipulated in the Lantzville/Nanaimo Water Agreement.

Table 6: Existing Well Capacity Ratings in 2014 and 2017

Well #	Combined Well Capacity July/Aug 2014 (m³/day)	Upgrades Completed	Combined Well Capacity March 2017 (m³/day)	Combined Well Capacity August 2017 (m³/day)
#4	728	▶ Well back-flushed and rehabilitated ▶ New pump and variable frequency drive	803	539
#5	-	▶ Well to be brought back online	420	349
#6/#6a	543	▶ New well installed to replace #6	801	675
#9	190	▶ Well back-flushed and rehabilitated ▶ New pump and variable frequency drive	518	434
#12	566	▶ Well back-flushed and rehabilitated ▶ New pump and variable frequency drive	562	383
Max. Combined Capacity	**2,027**		**3,104**	**2,380**

6.4 WATER BUDGETING: SUPPLY & DEMAND

Water budgeting analyzes the relationship between water supply and water demand by existing parcels and potential future growth. Water Master Plans are often based on ultimate potential community build-out. Because Lantzville has an existing supply limitation, the Water Master Plan analyzes supply scenarios that describe how the addition of new supply sources could address existing deficit and potential future needs. This approach assumes that water supply additions for Lantzville will be phased and describes how much and which parts of the community could potentially be serviced as new supply sources are considered.

6.4.1 INTRODUCTION

The concept of water budgeting parallels other budgeting exercises, for example, financial budgeting:

Financial Budgeting:

Money In – Money Out = Excess or Deficit

Water Budgeting:

Water In (Water Supply) – Water Out (Water Demand) = Water Excess or Deficit

In both forms of budgeting, circumstances change over time and budgets need to be regularly reviewed, with adjustments made, to reflect actual circumstances.

On the **Water Supply (Water In)** side of the budget, ***Section 6.3*** outlines potential water supply options for Lantzville. Decisions are yet to be made about which supply options to implement.

On the **Water Demand (Water Out)** side of the equation, ***Section 5*** summarizes community engagement about desires for extension of the community water system. Water demand will be driven by extending connections to existing unserviced parcels, as well as potential growth through infill and development of new parcels. The 2017 OCP Update considers ranges of potential densities and distribution of this potential growth over a 20-year time frame. The Water Master Plan includes budgeting for this potential future build-out of the OCP, recognizing this estimate is very approximate and will be influenced by a range of local and external factors. Actual growth should be considered during water budget reviews and updates.

6.4.2 UNCERTAINTIES AND ADAPTIVE MANAGEMENT

Uncertainties and future decisions will affect water supply and demand, for example:

- Changes to the well field and related aquifer performance over time, including the potential effects of climate change.
- Water conservation behaviour of Lantzville residents and potential changes in behaviour driven by factors such as fewer restrictions on available water or refinements in public awareness or pricing.
- Future desire for extension of community water to existing unserviced neighbourhoods.
- Provision of community water to new development, considering the amount and form of land use (typically less water per capita is needed for multiple-family developments than for single-family or large lot developments).
- Individual landowner decisions to subdivide properties.
- Decisions about potential additional water supply, such as identification of additional groundwater wells or implementation of the Lantzville/Nanaimo Water Agreement.

All of these uncertainties will change over time, as water supply decisions are made and development approvals and implementation are phased incrementally.

6.4.3 WATER BUDGETING SCENARIOS FRAMEWORK & ASSUMPTIONS

Four Water Budget Scenarios shown in Table 7 and Table 8 illustrate potential combinations of water supply and water demand allocation to existing and potential new neighbourhoods in Lantzville.

The Water Budget Scenarios consider the range of potential community growth that could be considered during the time horizon of the 2017 OCP Review, providing a planning-level projection of water demands over the next 20 years.

Demand budgeting is based on Maximum Day Demand – the day of the year in which most water is used (typically during the summer). The Design Standard outlined in ***Section 4*** is the basis for calculating the Water Budget Scenarios.

The intent of the Water Budget Scenarios is to illustrate if and how maximum water demands can be met. The scenarios do not imply that this level of growth will be actually supported by the community or approved by Council. Decisions about water supply improvements or additions and extensions of community water service to existing or new parcels will be made incrementally, and will evolve based on current community will.

Due to the inherent uncertainty of long-range planning, an Adaptive Management approach is warranted. The Water Master Plan strives to provide clarity around the trade-offs and effects of potential changes in supply or demand. An Adaptive Management approach will require a review of water budgeting when major changes are considered, including changes in supply, significant addition of connections for existing or new parcels, changes to the Design Standard, or changes to water conservation approaches. The approach will also include comparison of actual supply and demand over time.

Assumptions for calculating the budget scenarios include:

- Water supply for Foothills is supplied by the developer and is not included in the calculations.
- All existing water connections will be maintained, with budget allocations based on the Design Standard outlined in ***Section 4***.
- New water connections to existing unserviced and proposed new parcels are based on the Design Standard outlined in ***Section 4***.
- Supply from the Lantzville/Nanaimo Water Agreement will be implemented before other potential new sources, as no alternate sources are secured at this time. If alternate sources are secured and supply is confirmed prior to implementation of the Lantzville/Nanaimo Water Agreement, water budget scenarios should be updated accordingly.
- The water supply allowance for future development is in the maximum range of anticipated units within the term of the 2017 OCP Update (20 years). The water budget also estimates the proportion of single-family, multiple-family, and secondary or senior suites in each neighbourhood.
- Water budgeting considers cumulative demand at the end of a 20-year period. The maximum 2017 OCP build-out may or may not occur within that period – it is common that OCP allowances for growth are not achieved within the OCP time frame.
- An allocation of 15 m^3/day is provided for indoor potable water use at Aspengrove School. It is recommended that outdoor use be from non-community sources (e.g. rainfall capture and well water combinations).
- Small infill development in areas beyond Phase E sewer extension (refer to Map No. 8 of the 2005 OCP) is not assumed in the scenarios, as these areas are not anticipated to have the sanitary sewer connections that would be required to allow subdivision within a 20-year time frame. Large lots with significant development potential are considered as having subdivision potential as they may be have developer-driven sewer extension.

6.4.4 WATER SCENARIO TABLES

The following two tables summarize the supply and demand scenarios:

- **Potential Water Supply** (Table 7): Identifies potential sources of water supply that could be added.
- **Potential Water Demand and Allocation** (Table 8): Summarizes what parts of Lantzville could/could not be serviced (by colour) and how much of the available supply (by percent) is dedicated to each part of Lantzville.

Table 7: Potential Water Supply

Potential Water Supply Source	Potential Available Supply (m^3/day)			
	Scenario A	Scenario B1	Scenario B2	Scenario C
Existing Well Field	2,380	2,380	2,380	2,380
Lantzville/Nanaimo Water Agreement (to service 436 existing units)	-	1,264	1,264	1,264
Lantzville/Nanaimo Water Agreement (to service 50 new units/year for 20 years)	-	2,900	2,900	2,900
New Water Source*	-	-	-	1,630+
Total Combined Potential Supply	**2,380**	**6,544**	**6,544**	**8,174+**

** Actual available supply from a potential new water source is unknown at this time. The supply number shown in the table (1,630+ m^3/day) represents an approximate amount that would be necessary to service all potential growth outlined in Scenario C based on build-out population numbers in the OCP and limitations of the Lantzville/Nanaimo Water Agreement.*

Table 8: Potential Water Demand and Allocation

Potential Allocation Area	Allocated % of Total Potential Supply			
	Scenario A	Scenario B1	Scenario B2	Scenario C
Lower Pressure Zone				
▶ Existing Connections	81%	29%	29%	23%
▶ Existing Unserviced Properties	0%	0%	0%	1%
▶ New Minor Potential Infill	0%	0%	1%	1%
▶ New Village Potential Development (west of Ware Rd)	0%	0%	6%	11%
Potential Middle Pressure Zone (if required)				
▶ Existing Unserviced Properties	0%	7%	9% (option)	6%
▶ Clark / Ronald / Hase Potential Infill	0%	0%	5%	4%
▶ Other Potential Infill	0%	0%	1%	1%
Upper Pressure Zone				
▶ Existing Connections	27%	10%	10%	8%
▶ Existing Unserviced Properties	0%	9%	9% (option)	10%
▶ New Village Potential Development (east of Ware Rd)	0%	8%	8%	6%
▶ Fernmar Potential Infill	0%	2%	2%	2%
▶ Ronald/Ware Road Potential Infill	0%	2%	2%	2%
▶ Winds East (Superior Rd) Potential Infill	0%	10%	10%	7%
▶ Lantzville East (Care Precinct)	0%	2%	2%	1%
▶ Other Potential Infill	0%	8%	8%	7%
Unallocated (Surplus) Potential Water Supply	**-(8%)**	**13%**	**7%**	**10%**

Fully Supplied Partially Supplied Not Supplied

6.4.5 WATER BUDGETING SCENARIOS

Each scenario summarizes a conceptual budget that matches available water supply to the demand that could be satisfied by this supply.

SCENARIO A

Scenario A represents the status quo, if no new water supply is added.

Water Supply

- From existing well field using the well rating of 2,380 m^3/day (LHC, 2017b)
- Cumulative Total = **2,380 m^3/day**

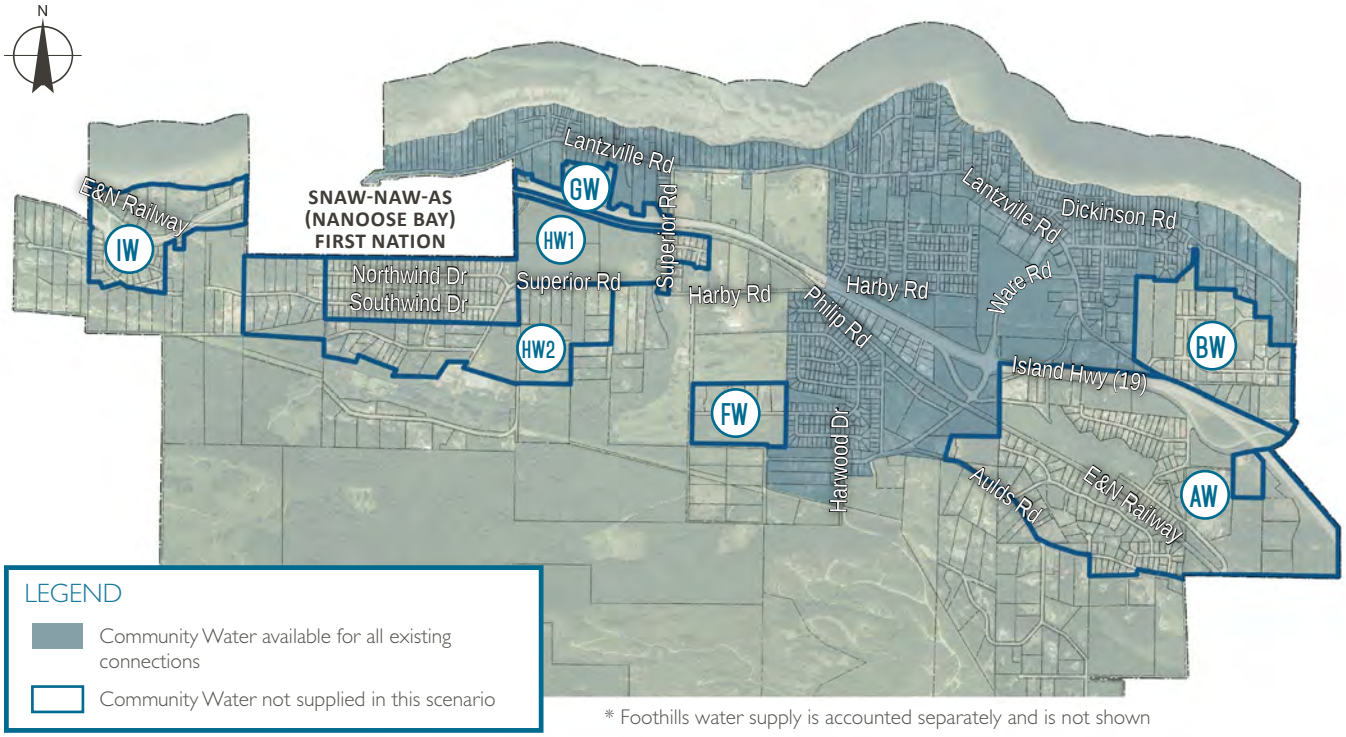
Water Demand and Allocation

Water supply <u>would</u> be sufficient to service:

- <u>All</u> 885 existing water connections, with a minor "technical deficit" of water supply (demand exceeds supply by 8%)

Water supply <u>would not</u> be sufficient to service:

- <u>Any</u> additional existing parcels
- <u>Any</u> new infill or development in Lantzville



* Foothills water supply is accounted separately and is not shown

Figure 20: Scenario A Potential Servicing Allocation

B SCENARIOS

The 'B' scenarios consider the addition of the City of Nanaimo water supply per the Lantzville/Nanaimo Water Agreement and looks at different ways to allocate potential connections, recognizing that while a number of new connections will be available, supply will not be sufficient to meet all future potential demand. A number of different scenarios could be considered; the scenarios shown in the Water Master Plan are illustrative of decisions and trade-offs that would need to be considered based on the limitations of the supply and the terms of the Lantzville/Nanaimo Water Agreement.

Water Supply

- From two sources:
  - From existing well field using the well rating of 2,380 m^3/day (LHC, 2017b)
  - Implementation of the Lantzville/Nanaimo Water Agreement which may provide 436 connections (1,264 m^3/day) for existing properties, plus 50 new connections per year over 20 years at 2.9 m^3/connection (2,900 m^3/day after 20 years) in the Upper Pressure Zone
- Cumulative Total = **6,544 m^3/day,** of which 2,900 m^3/day is made available incrementally (addition of 145 m^3/year) over 20 years for new development in the Upper Pressure Zone
- The following limitations govern how available water supply can be distributed:
  - New connections from the Lantzville/Nanaimo Water Agreement must be used for the Upper Pressure Zone.
  - Lantzville's OCP prioritizes the Village area for future development; however, a large portion of the Village is in the Lower Pressure Zone (areas west of Ware Road), which cannot be supplied by Nanaimo water under the current agreement. Lantzville's existing groundwater supply is not sufficient to service a large portion of potential future development in the Village.
  - There is more than sufficient supply to service new development to the range of units identified in the OCP in Upper Pressure Zone areas, phased over the 20-year agreement period.
  - The Lantzville/Nanaimo Water Agreement dedicates connections for up to **436** existing developed properties in Upper Lantzville, **225** of which are the existing Winchelsea neighbourhood connections, leaving **211** potential connections for currently unserviced existing properties in the Upper Pressure Zone. Schedule "A" of the agreement suggests these connections would be allocated to the Winds, although there is a discrepancy between the number of lots written in the agreement and the number of lots shown on Schedule "A". There are not enough existing connections dedicated by the agreement to service all existing properties in the Upper Pressure Zone.
  - Water from the Lower Pressure Zone could be used to supplement water demands in the Upper Pressure Zone or Potential Middle Pressure Zone; but water in the Upper Pressure Zone cannot supplement supply in the Lower Pressure Zone due to limitations in the Lantzville/Nanaimo Water Agreement.
- The scenarios shown in the Water Master Plan look at different ways to distribute available water under the existing or amended terms of the Lantzville/Nanaimo Water Agreement. Further amendment to the agreement, or development of alternate water supply sources, could also be considered to address these limitations.

SCENARIO B1

Scenario B1 prioritizes connections to existing neighbourhoods that have identified potential support for water connection, working within the current limits of the Lantzville/Nanaimo Water Agreement. In this scenario, water from the Lower Pressure Zone would be pumped up to a Middle Pressure Zone for distribution to existing parcels in neighbourhoods that expressed potential desire for community water extension. This approach limits supply available for new connections in the Lower Pressure Zone that could support future infill or development in the Village area.

Water Demand and Allocation

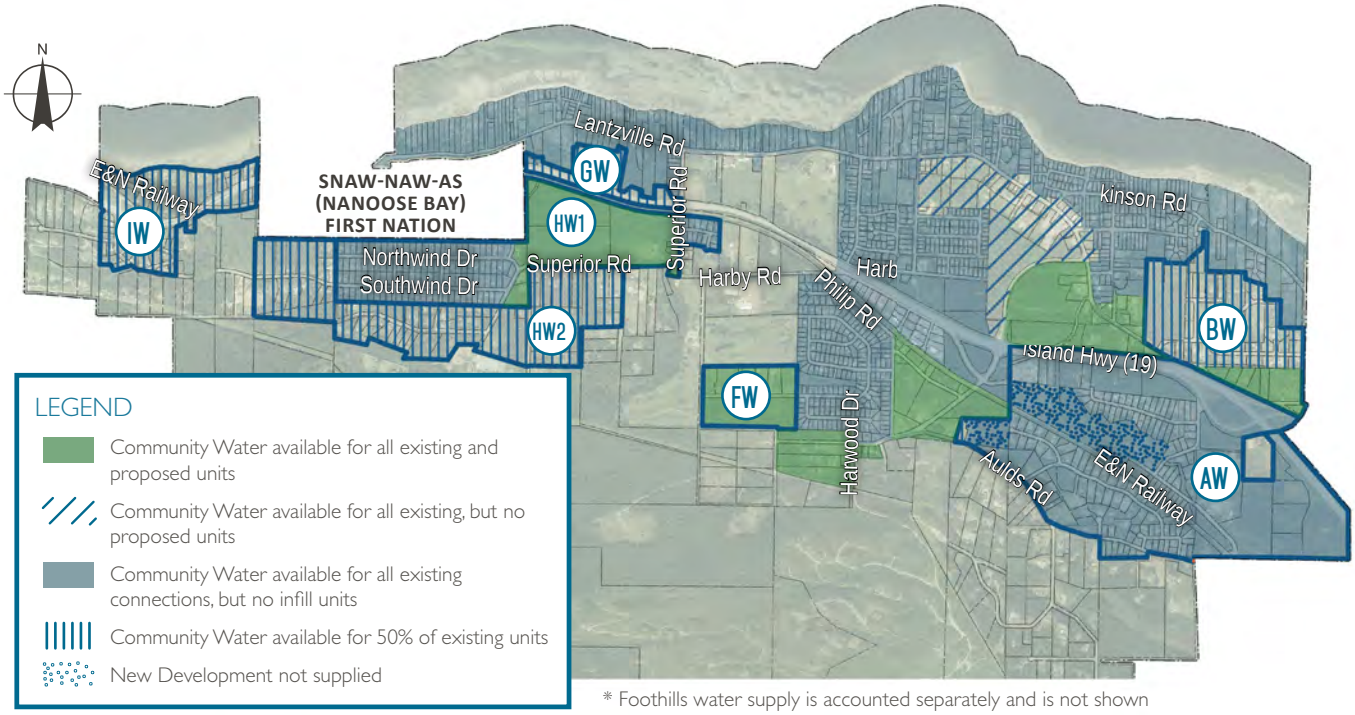
Based on potential water supply cumulative total of 6,544 m^3/day:

Water supply would be sufficient to service:

- All 885 existing water connections
- All existing parcels in the following Phase 1 unserviced neighbourhoods that expressed potential desire for community water extension (see Figure 18 on page 39), pending Local Area Service financing approval:
  - AW: Clark Drive Area
  - FW: Fernmar Road Area
  - HW-1: Winds Residential
- Half of existing parcels in the following Phase 2 unserviced neighbourhoods (see Figure 18 on page 39), recognizing these areas did not express strong support for community water service during the Water Master Plan:
  - BW: Owen Road
  - GW: Aats Road
  - HW-2: Winds Estate
  - IW: Bayview
- All new potential development in the Upper Pressure Zone, at a rate of 50 units/year, including Village areas east of Ware Road, East Lantzville, and Upper Lantzville areas around Ware Road and Superior Road

Water supply would not be sufficient to service:

- The remaining half of existing parcels in the Phase 2 unserviced neighbourhoods (see Figure 18 on page 39)
- Any new development in the Lower Pressure Zone (no infill and no development in the Village west of Ware Road)
- Any new development in the Clark Drive Area



* Foothills water supply is accounted separately and is not shown

Figure 21: Scenario B1 Potential Servicing Allocation

SCENARIO B2

Scenario B2 does not consider development of a Middle Pressure Zone, allocating available connections from Winchelsea to support potential infill and new development in the Lower Pressure Zone. This would limit the number of connections available for existing parcels in the Upper Pressure Zone, unless amendments could be made to the Lantzville/Nanaimo Water Agreement to allow available connections to service either new or existing parcels.

Water Demand and Allocation

Based on potential water supply cumulative total of 6,544 m^3/day:

Water supply would be sufficient to service:

- All 885 existing water connections
- Half✧ of existing parcels in the following Phase 1 unserviced neighbourhoods that expressed potential desire for community water extension (see Figure 18 on page 39), pending Local Area Service financing approval. Given Local Area Service boundaries, servicing options may include:
  - AW: Clark Drive Area + FW: Fernmar Road Area (amendment required to Schedule "A" of the agreement)
  - HW-1: Winds Residential (no amendment required to Schedule "A" of the agreement)
- All minor infill throughout the Lower Pressure Zone where there is existing water service
- Approx. 40%- 50% of development in the Village west of Ware Road
- All new potential development in the Upper Pressure Zone, at a rate of 50 units/year, including Village areas east of Ware Road, East Lantzville, and Upper Lantzville areas around Ware Road, Superior Road, and Clark Drive

Water supply would not be sufficient to service:

- The remaining half of existing parcels in the following Phase 1 unserviced neighbourhoods that expressed potential desire for community water extension (either AW: Clark Drive or HW-1: Winds Residential could not be serviced)
- Any of the Phase 2 existing unserviced neighbourhoods in the Water Service Area (see Figure 18 on page 39):
  - BW: Owen Road
  - GW: Aats Road
  - HW-2: Winds Estate
  - IW: Bayview
- The remaining 50%- 60% of the Village west of Ware Road

✧ *If amendment to the Lantzville/ Nanaimo Water Agreement was made to allow available connections to service either new or existing parcels, potentially all the Phase 1 existing parcels could be serviced.*

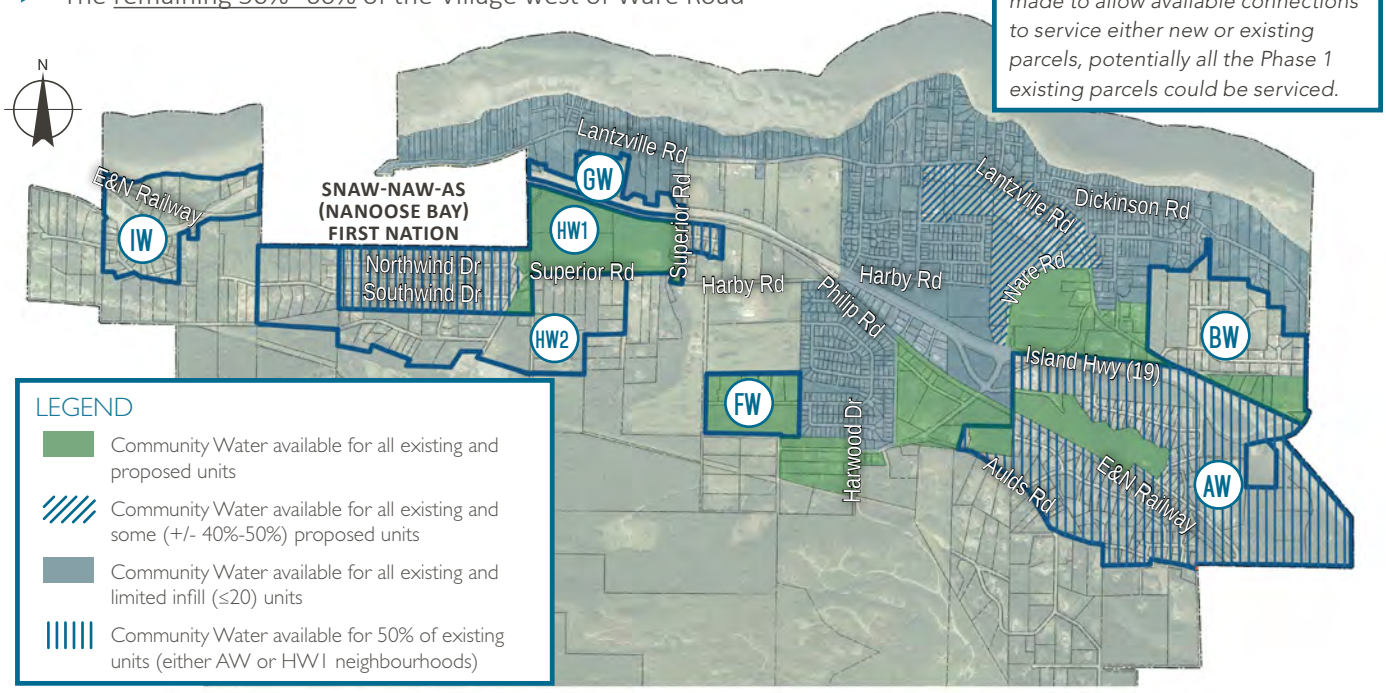


Figure 22: Scenario B2 Potential Servicing Allocation

* Foothills water supply is accounted separately and is not shown

SCENARIO C

Scenario C considers how much water supply would be required to service all existing and potential new growth per the OCP growth projections.

Water Supply

- From three sources:
  - From existing well field using the well rating of 2,380 m^3/day (LHC, 2017b)
  - Implementation of the Lantzville/Nanaimo Water Agreement which may provide 436 connections (1,264 m^3/day) for existing properties, plus 50 new connections per year over 20 years at 2.9 m^3/connection (2,900 m^3/day after 20 years) in the Upper Pressure Zone
  - Addition of a new water supply (source to be determined) connected to the community water system. Based on existing units and estimated growth from the OCP, the required supply would be approximately 1,630+ m^3/day
- Cumulative Total = **8,174+ m^3/day** of which 2,900 m^3/day is available incrementally over 20 years for new development

Water Demand and Allocation

Water supply would be sufficient to service:

- All 885 existing water connections
- All existing unserviced parcels in Lantzville, pending Local Area Service financing approval
- All minor infill in existing serviced areas
- All potential proposed units in the 2017 OCP Update, recognizing actual growth will be per community support and Council approval
- **Notes:**
  - All new potential connections in the Upper Pressure Zone will be at a maximum rate of 50 units/year per the Lantzville/Nanaimo Water Agreement
  - Addition of a new water source will be required to achieve this scenario. Potential sources could include additional groundwater, expansion of the Lantzville/Nanaimo Water Agreement, or other sources

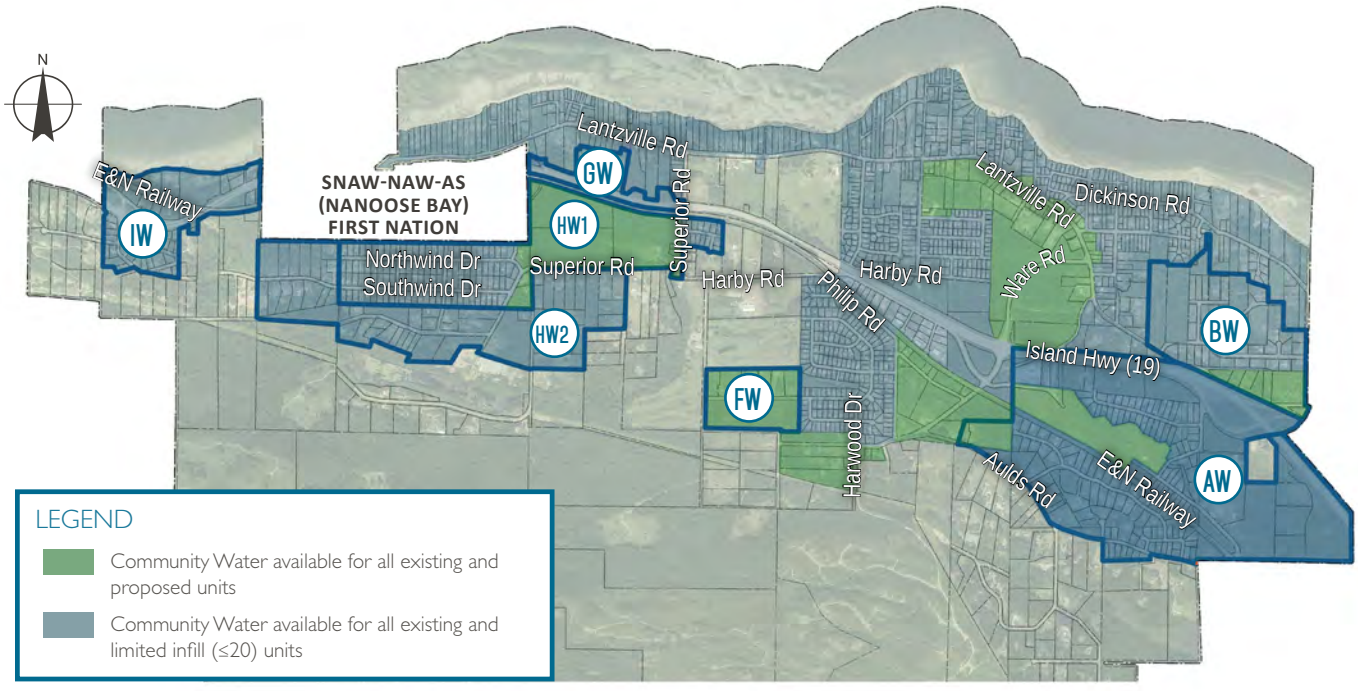


Figure 23: Scenario C Potential Servicing Allocation

* Foothills water supply is accounted separately and is not shown

6.4.6 COMPARISON OF SCENARIOS

The following broad summary statements can be observed in the scenarios:

- **Scenario A** maintains supply as existing and results in a water supply deficit based on existing connections. There is no water available for connecting existing unserviced residents or for any new growth.
- **Scenarios B1 and B2** add the supply from the Lantzville/Nanaimo Water Agreement which provides sufficient water for some existing parcels and some new development, but due to the limitations of the agreement, there would not be sufficient supply to service both existing neighbourhoods that may desire servicing and support infill and Village area development in the Lower Pressure Zone. Trade-offs would be required. The agreement does supply sufficient water to service all potential new development in the Upper Pressure Zone, phased at a rate of 50 units/year. It is possible that new water supply, if early in the 20-year period, may allow more growth than would be available solely under the Lantzville/Nanaimo Water Agreement in the Upper Pressure Zone. Ultimately, the Lantzville/Nanaimo Water Agreement could supply a significant number of parcels, but would not be sufficient to service all potential future growth that could be considered under the OCP Update and the existing agreement has limitations that restrict opportunities to supply all existing parcels.
- **Scenario C** assumes an additional water supply is secured that would be sufficient to service all existing parcels, plus all potential future growth that could be considered under the OCP Update, recognizing that full-build-out within a 20-year time frame is unlikely. New water supply could be a condition of development of the properties shown on the Phasing Map (Figure 18 on page 39) as 'Development Driven', and also, perhaps, a development condition for some Village area development.

6.4.7 SUMMARY

The Water Budget Scenarios provide a high level comparison of trade-offs to expand and maintain a resilient water service in Lantzville. An Adaptive Management approach is recommended to address the many uncertainties that will affect future expansion of the water system and should consider:

- Monitored performance of the existing well field and aquifer
- Monitored water use data for various land use types and consideration for Design Standard updates based on data
- Amount of improved groundwater supply or identification of a new Lantzville water supply
- Additional proven water conservation practices that lead to a sustained lower demand across the community
- Some existing units in Lantzville not requesting community water supply
- Less growth than the build-out anticipated in the 2017 OCP Update
- Changes to conditions of the Lantzville/Nanaimo Water Agreement
- Other circumstances that may arise

During rezoning reviews, a report on implications that new development will have on the water budget should be considered. A major review of water budget demand and allocation should be undertaken in tandem with long-term capital budgeting and major water projects, at least once in each five year period.

For purposes of long-term planning, it is recommended that provisions be made to implement water supply infrastructure that will accommodate Scenario C to be prepared for the broadest range of potential circumstances. Planning water system development to meet Scenario C, while consistent with 2005 OCP policies, is not intended to fetter the discretion of future Councils and the community to accept or deny any given rezoning or development application based on merits at the time.

6.5 WATER BUDGETING RECOMMENDATIONS

1. Prepare and implement a well head protection plan for Lantzville's well field to ensure the existing groundwater source remains protected for the future.
2. Work towards securing additional water supply for Lantzville (see ***Section 8*** for recommended actions).
3. Continue to work with the City of Nanaimo on the Lantzville/Nanaimo Water Agreement, including revision of restrictive language that limits opportunities to service existing parcels in the Upper Pressure Zone.
4. Plan and design water supply, storage, and distribution infrastructure to accommodate Scenario C to be prepared for the broadest range of potential circumstances, recognizing implementation will be incremental and responsive to community evolution (see *Section 8* for recommended infrastructure).
5. Review and update water budget scenarios every 5 years minimum, comparing actual water use to projections.
6. When new development proposals are considered, complete analysis and reporting on the water budget to confirm potential implications of the development.

7 | WATER CONSERVATION

An average Lantzville water user consumes approximately 320 litres of water per average day. This is at the low end of consumption rates reported by Vancouver Island Communities, where the average is around 700 litres per person per day. Given Lantzville's water supply limitations, maintaining these conservation efforts over the long-term will be important.

7.1 Water User Rates

Lantzville's high level of water conservation is partially attributable to the tiered water rate system that the District employs and was most recently updated in 2016. The tiered rate structure rewards lower water users with lower water rates. If a user conserves water and stays within the first tier, they pay the lowest water rate. As a user surpasses each tier, the amount paid per cubic meter of water used increases.

To understand people's perceptions about the community water rate structure, participants were asked in Questionnaire #1 about their understanding and support for the current tiered rate structure. Figure 24 suggests that the majority of residents on community water understand the current rate structure and Figure 25 suggests the majority of community water users support the existing tiered rate structure, with some mixed opinions that the rates are either too high or too low.

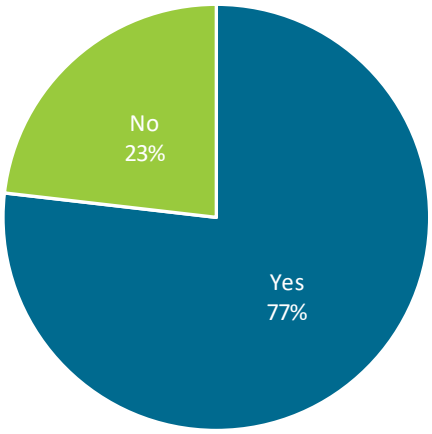


Figure 24: Awareness of Tiered Rate Structure

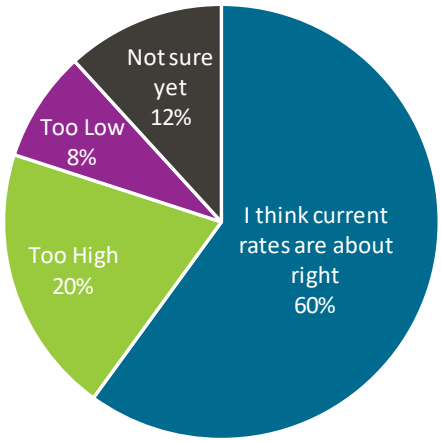


Figure 25: Support for Existing Rate Structure

Prior to implementation of the Lantzville/Nanaimo Water Agreement, Water User Rates will need to be reviewed and adjusted. It is anticipated that through the agreement, Lantzville will pay a bulk rate to Nanaimo for all water used in Lantzville. In addition, the Lantzville/Nanaimo Water Agreement includes a policy in principle that the amount paid by consumers for water in Lantzville should not be lower than the amount paid by consumers in Nanaimo.

It is recommended that once the bulk water rate from Nanaimo is confirmed, and prior to implementation of the Lantzville/Nanaimo Water Agreement, Lantzville review and update the existing tiered Water User Rate Structure to ensure that water system revenue is reconciled with costs to be paid to Nanaimo and the principles of the Lantzville/Nanaimo Water Agreement are met. It is recommended that in this process, Lantzville maintain a tiered water rate that will continue to be used to continue encouraging conservation.

It is important to recognize that Water User Rates are typically reviewed and adjusted annually to respond to actual water use, maintenance and operations requirements, etc.

7.2 RESIDENT WATER CONSERVATION ACTIVITIES

Lantzville residents, unlike many other residents in Canada, have long understood the implications of scarcity of supply and have recognized that water is not a limitless resource. Continually seeking ways to maintain levels of service, while decreasing per capita demand helps slow the need for major capital investments and helps maintain a resilient supply.

During initial input, participants were also asked their level of participation in common water conservation activities. As shown in Figure 26, Lantzville residents participate heavily in a wide range of water conservation activities. Generally, indoor conservation actions, such as using low-flow fixtures and practicing low water use behaviours are very high. Input suggests that conservation activities for outdoor water use are not as broadly adopted at this point. Because outdoor water use contributes significantly to a community's overall water use, opportunities may exist to further encourage outdoor water savings including designing xeriscape or low water-use landscapes, using absorbent soils, developing water retention and collection strategies, implementing water-smart irrigation systems, and other emerging strategies.

With respect to indoor use, advances in technology will continue reducing water use. Over time, it can be anticipated that household renovation, appliance replacement, and water technologies will continue to support per capita water use reduction, although improvements may not be as significant in Lantzville given the already existing high rate of conservation.

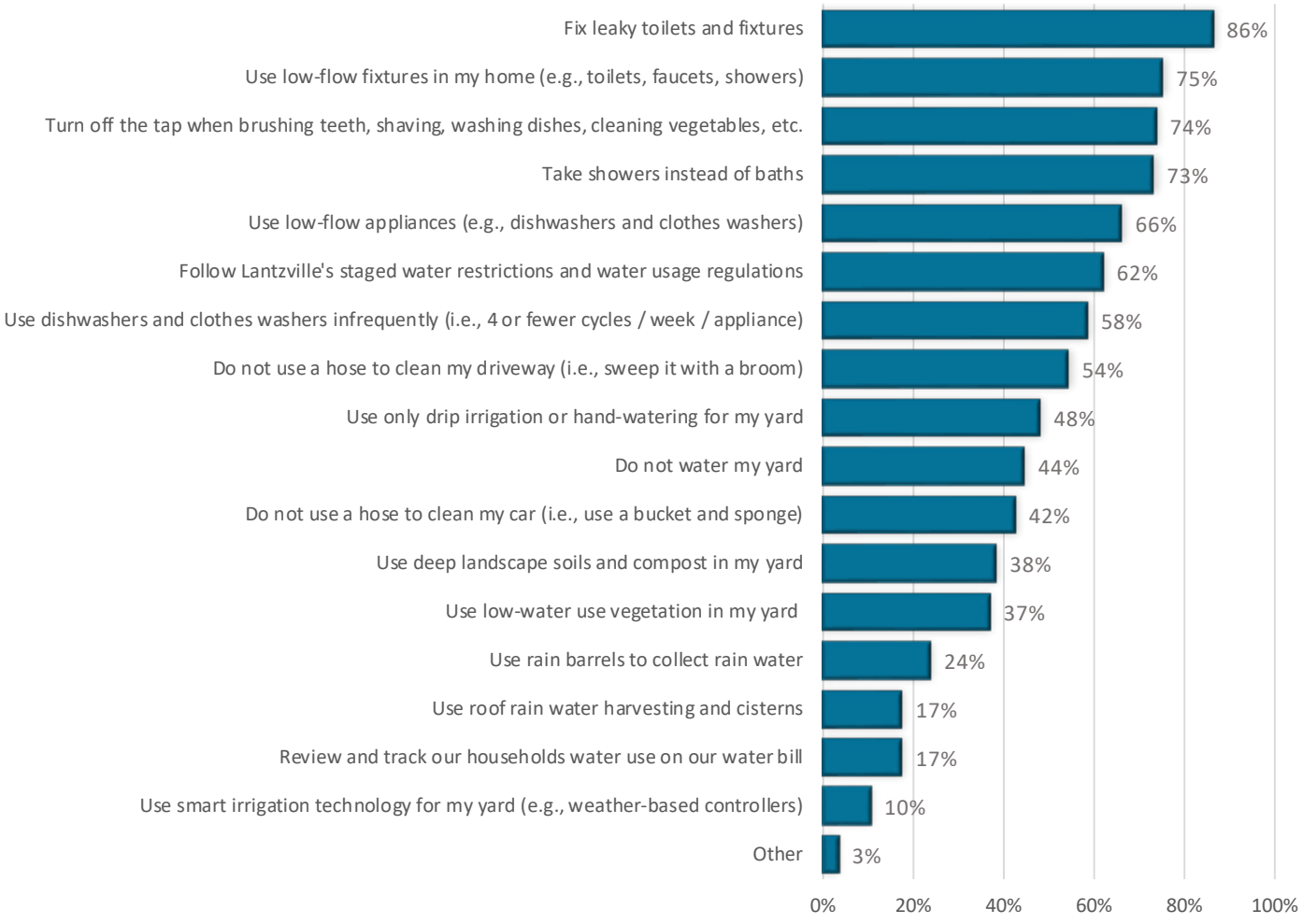


Figure 26: Lantzville Resident Participation in Common Water Conservation Activities

7.3 COMMUNITY WATER CONSERVATION INITIATIVES

7.3.1 CURRENT COMMUNITY WATER CONSERVATION INITIATIVES

In addition to Water User Rates, the District of Lantzville employs a number of water conservation initiatives that encourage residents to use water wisely. Key programs include:

- **Water Restrictions:** Lantzville, along with all water purveyors in the Regional District of Nanaimo, has adopted consistently defined water restriction stages. The District manages when each stage is implemented and communicates the restrictions to residents.
- **Education:** Educational materials provide water conservation advice for personal water use and for low impact development. Lantzville provides water conservation information for residents through the District's Water website. In addition, Lantzville participates in the RDN's Watersmart program which provides communities throughout the region with advice, programs, and opportunities that encourages residents to conserve water. Continuing to provide up-to-date information about water use and conservation in Lantzville will support a water-efficient community.
- **Metering:** Lantzville's community water system is fully metered. Metered systems have been shown to significantly reduce water use by raising individual homeowner awareness of water consumption. In addition, Lantzville's existing metering system gathers data on water use by each connection in the community. This system provides opportunity for the District to identify potential leaks in the system by flagging excessive consumption or significant changes in water use.
- **Incentive Programs:** The Regional District of Nanaimo has incentive programs available to all residential property owners in the Regional District of Nanaimo. These currently include a Rainwater Harvesting Incentive Program available to those who install or update a rainwater harvesting system in existing or new homes and a Watersmart Garden Rebate Pilot Program for landscape efficiency upgrades including irrigation system efficiency improvements and soil and mulch amendment. Incentive programs will be updated from time-to-time based on current knowledge and technologies.

7.3.2 PUBLIC INPUT ON POTENTIAL COMMUNITY CONSERVATION INITIATIVES

During the Kitchen Table Meetings and online input opportunities, participants were asked for feedback on various water conservation opportunities that may warrant future consideration in Lantzville. Table 9 summarizes general indications of the level of importance participants identified for various initiatives.

Table 9: Potential Water Conservation Initiatives

Water Conservation Initiative	Very Important	Mod. Important	Not Important
Consider increasing the overall water user rates to encourage property owners to reduce water consumption.	18%	34%	47%
Consider increasing the higher tier water user rates to encourage property owners to reduce water consumption.	29%	58%	21%
Provide educational materials to residents to help them implement improvements to their homes, properties, and behaviour that support water conservation.	66%	32%	11%
Support policy that requires new development to incorporate water-saving elements such as low-flow fixtures and low water-use landscape areas / low volume irrigation (if used).	71%	29%	0%
Develop policy that encourages water users that are connected to community water but have existing wells, to use well water for outdoor (non-potable uses) and community water for indoor (potable uses) only.	74%	26%	11%
Increase incentives / support for water savings initiatives (e.g., rainwater harvesting and re-use).	42%	37%	13%
Develop stricter water restrictions for outdoor watering during the summer months.	39%	26%	37%

The feedback suggests that further increases to the water user rates at the current time may be less desirable than encouraging voluntary water conservation through enhanced development requirements and education.

Public input also identified additional opportunities that may warrant future consideration such as encouraging conversion of existing septic tanks for rainwater storage after a property connects to the community sanitary system. This practice is used in other communities and precedents exist to support the creation of policy and practices that support safe conversions.

7.4 WATER CONSERVATION RECOMMENDATIONS

1. Review and adjust Lantzville's Water User Rates and parcel tax, with the objective of maintaining a tiered structure, to reconcile with Nanaimo bulk water rates once confirmed and principles of the agreement.
2. Develop policy that requires all new development under development permit to incorporate outdoor water saving strategies such as low water-use landscapes and smart irrigation technology and to provide a water budget as a component of their development permit application to calculate proposed water use.
3. Continue to develop or partner on new educational materials and programs that encourage water conservation approaches for residential land owners, particularly as new residents enter the community.
4. Continue to support the Rainwater Harvesting Incentive Program and consider new incentives and programs that encourage residents to make water smart choices.
5. Encourage water users that are connected to community water but have existing wells to use well water for outdoor (non-potable uses), provided there are no impacts to the District's groundwater sources.
6. Investigate a septic storage conversion program that encourages or provides incentive to homeowners in transitioning existing septic tanks to non-potable water storage for outdoor water use after municipal sewer is extended.

8 | CAPITAL IMPROVEMENTS

As a community evolves, infrastructure must be renewed or developed to pro-actively address future community needs. The Water Master Plan identifies capital improvements that are anticipated to support the community's planned evolution, based on the OCP. These upgrades will be phased over time in response to actual community growth, funding, and Council direction.

8.1 RECOMMENDED CAPITAL IMPROVEMENTS

Water system planning entails looking ahead and determining what may be required to meet future demands, including expansion or replacement of the distribution network, securing additional water supply, and water storage capacity expansion. System planning also involves consideration of the remaining life of the various components and when replacement or upgrade will be required.

A water supply and distribution system is comprised of many components. The lifespan of each component in the system can vary – some smaller components have a useful life as short as 15 years, while larger infrastructure like reservoirs lasts well over 50 years. Large diameter water distribution mains typically have an expected life of 40 to 80 years.

Given this long life of system components, it is important to plan early to develop a system that meets current and future needs of the community. This will help ensure that components are correctly sited and sized. Planning will also support system upgrades as new technologies emerge.

In 2015, Koers & Associates Engineering Ltd. developed the Water Supply & Distribution System Study that identified a number of existing anticipated upgrades to the community water system. With the completion of the Water Master Plan, potential upgrades identified in the 2015 Study have been updated and are summarized in Table 10.

The following capital improvements are recommended for consideration during the next 20 years to maintain the current system and support expansion to accommodate existing properties and potential growth identified in the 2017 OCP Update. While the improvements would be phased incrementally and reviewed and refined as needs are confirmed, this long-range planning helps ensure short-term investments will support a range of long-term scenarios.

8.1.1 SUMMARY OF RECOMMENDED MAJOR CAPITAL IMPROVEMENTS

The following summary discusses the major capital projects outlined in Table 10 and graphically shown in Figure 27.

1 WATER SUPPLY CAPACITY IMPROVEMENTS

1.1 Implement the Lantzville/Nanaimo Water Agreement

Construction of the Lantzville/Nanaimo physical water connection was completed in 2017. If Council decides to commence the agreement to purchase Nanaimo water, there is a requirement to pay a one-time connection fee for the existing Upper Pressure Zone residences connected to community water that will be serviced by Nanaimo water. This fee is based on the agreement's connection fee of $5,912.26 per single-family dwelling unit for 225 units, totaling approximately $1,330,000.

1.2 Reconnect Well #5

In 2002/2003 Well #5 was abandoned due to its interference with Well #6. With the replacement of Well #6 by Well #6a, Well #5 was retested and confirmed to provide benefit when running with the new well. Well reconnection is recommended to increase the capacity of the well field.

1.3 Secure Groundwater Licenses for Wells

The Water Sustainability Act passed in May 2014 requires municipalities to obtain a license from the provincial government for the extraction of water from the ground. The license requires payment of a one-time application fee of $5,000, in addition to an annual fee of $2.25/1,000 m^3) of water extracted. Based on recent annual water use of about 250,000 m^3/year annual fees would be approximately $565.

1.4 Pursue Identification of a New Water Source

The water budget models (see ***Section 6***) show there is a water supply deficit to service all existing residents and to fulfill potential long-term growth as envisioned in the OCP, due to limited existing groundwater supply and limitations of the Lantzville/Nanaimo Water Agreement.

Identifying future water sources would increase resilience of the system and allow the community to be well-prepared for the future. It is anticipated new sources would be negotiated as part of future development.

2 SYSTEM STORAGE IMPROVEMENTS

2.1 New Reservoir

The existing Aulds Road reservoir, built in 1974, is in poor condition and is undersized for both existing and potential future storage requirements. The current top water level of the reservoir is 143.6 m geodetic, resulting in a static operating pressure below acceptable design minimums for several properties in the area.

A new reservoir with a top water elevation of 158 m geodetic is proposed to replace the function of the Aulds Road reservoir and provide expanded capacity. The reservoir would be a dual (two-cell) reservoir, sized to compensate for existing storage capacity deficiencies and accommodate potential future requirements. Dual cell reservoirs are recommended for all new concrete reservoirs for maintenance; this design could also allow, if required, for separation of storage between water from Nanaimo that would service the Upper Pressure Zone, and Lantzville well field water that would service other areas of Lantzville (recognizing there may be additional design and infrastructure costs for a separated system).

The cost estimate is based on construction of a two-cell reservoir and includes watermain connection to the Ware Road Reservoir and Nanaimo Water Connection.

3 FIRE FLOW IMPROVEMENT PROJECTS (COMMERCIAL, INSTITUTIONAL, INDUSTRIAL)

3.1 - 3.8 Watermain Upgrades

The *2015 Water Supply & Distribution Study* identified several watermain upgrades to improve firefighting capabilities in and around the Village Core area and adjacent areas in the Lower Pressure Zone. Many of these projects also address the need to replace existing asbestos cement watermains. Priorities include:

- Mart Rd and Industrial Rd (Metro to Harby Rd East)
- Peterson Rd (Lynn to Lantzville)
- Lantzville Rd (Peterson to Harper)
- Harby Rd East (Peterson to Joy)
- Joy Way and Rossiter Rd (Peterson to Lancewood)
- Millard Dr (Peterson to Lancewood)
- Lynn Dr (Peterson to Lancewood)
- Lancewood Ave (Rossiter to Lynn)

4 FIRE FLOW IMPROVEMENT PROJECTS (RESIDENTIAL)

4.1 Replace Limited Capacity Fire Hydrants

The *2015 Water Supply & Distribution Study* recommended that the District continue with its replacement program of the older fire hydrants that have limited firefighting capabilities. Eight older hydrants were identified in the Lower Pressure Zone for replacement consideration:

- No. 23- Huddlestone Rd park entrance
- No. 54- 7311 Lynn Rd
- No. 57- 7305 Millard Rd
- No. 59- 7339 Rossiter Rd
- No. 60- 7299 Rossiter Rd
- No. 61- 7292 Harby Rd E
- No. 62- 7340 Harby Rd E
- No. 72- 7032 Leland Rd

4.2 - 4.9 Watermain Upgrades

The *2015 Water Supply & Distribution Study* identified a number of watermain upgrades to improve firefighting capabilities in residential areas. In addition, many of these projects address the need to replace existing asbestos cement watermains. Priorities for these upgrades include the eight following locations:

- Lantzville Rd (east and west of Superior Rd)
- Huddlestone Rd
- Harper Rd
- Hall Rd
- Saxon Cross
- Forest Turn
- Clark Crescent
- Geisler Pl & Chataway Pl

5 OTHER WATER IMPROVEMENT PROJECTS

5.1 Asbestos Cement (AC) Main Replacement

The *2015 Water Supply & Distribution Study* recommended the District continue with its AC main renewal/replacement program, preferably in advance of any proposed road rehabilitation requirements within the area. With the completion of priorities noted above, there will be approximately 9 km of AC main remaining in the District. A budget of $360,000/year would allow for replacement of all remaining AC pipe over 15 years. While most replacements will be within previously developed areas, if new development occurs in locations with existing AC water mains, AC main replacement should be part of development negotiations.

5.2 Looping through Future Development

There are several locations where future development may offer the ability to construct additional looping within the water system strengthening the distribution system and improving fire flows throughout the community, per engineering best practices. As part of future development proposals, the District should review and, where applicable, require looping as part of development.

5.3 Relocation of PRV on Lantzville Rd to Ware Rd

The *2015 Water Supply & Distribution Study* recommended relocation of the PRV as part of potential development of the Ware Rd/Lantzville Rd area to address water pressure issues. It is not anticipated this would affect the terms of the Lantzville/Nanaimo Water Agreement; staff would coordinate with the City of Nanaimo prior to implementation.

8.1.2 CAPITAL COST SUMMARY

Table 10 on the next page summarizes the above projects in a capital cost summary table for planning and budgeting. Detailed design development and confirmation of costs will be required for all projects prior to implementation. Estimates are derived from Koers & Associates Engineering Ltd. in-house construction cost data for watermain construction projects in the mid-Vancouver Island area. All costs are as of June 2017 when the ENR Construction Cost index was 10,699. Costs for infrastructure can vary widely depending on site constraints, design, market forces, and other variables.

Cost are Class 'D' (feasibility study) estimates, made without preliminary design input. The cost estimates include a 25% allowance for legal, construction, financial, administration, and engineering costs.

Suggested time frames for implementation are included in the table to provide planning horizons for implementation, recognizing implementation should be flexible to address emerging opportunities or needs:

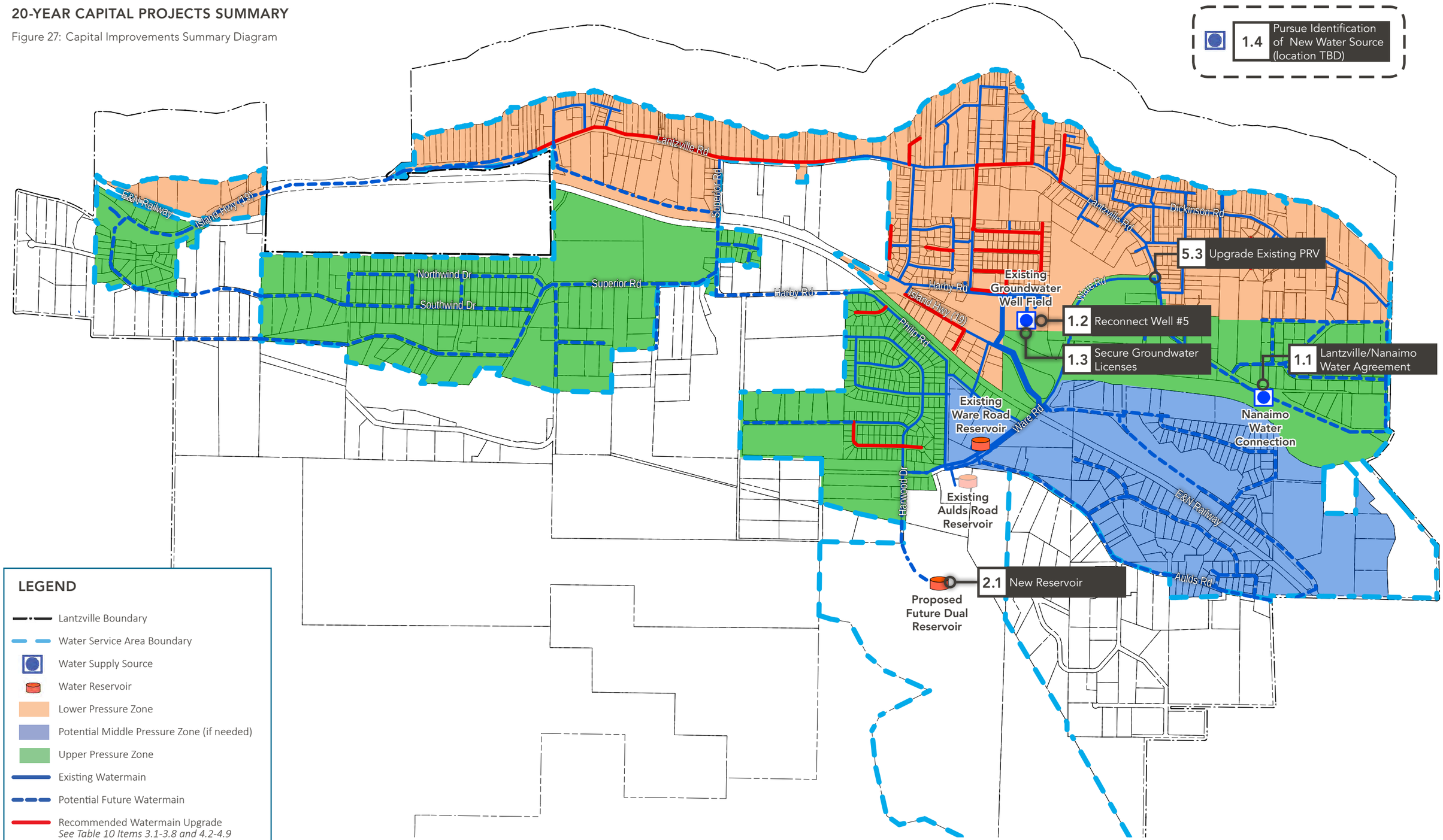
- Immediate: 1 to 2 year time frame
- Short: 3 to 5 year time frame
- Medium: 6 to 10 year time frame
- Long: Beyond 10 year time frame
- Ongoing: No defined time frame / implementation based on community evolution

Table 10: Capital Improvements Summary Table

Ref. No.	Description	Quantity	Class 'D' Cost Estimate (2017 dollars, excl. GST)	Suggested Time Frame
1. WATER SUPPLY CAPACITY IMPROVEMENTS				
1.1	Implement the Lantzville/Nanaimo Water Agreement	n/a	$1,330,000 (connection fee)	Immediate
1.2	Reconnect Well #5	1	$50,000	Immediate
1.3	Secure Groundwater Licenses for each existing well	n/a	$6,500	Immediate
1.4	Pursue identification of a new water source for Lantzville to allow continued extension of the water system to existing residents and prepare for potential future demands.	1	By Development	Immediate
2. SYSTEM STORAGE IMPROVEMENTS				
2.1	Develop a new dual cell reservoir with a 158 m top water elevation to replace the function of the Aulds Rd Reservoir, address storage shortfalls, and prepare for future expansion of the community water system	1	$900,000-$1,000,000	Immediate
3. FIRE FLOW IMPROVEMENT PROJECTS (COMMERCIAL, INSTITUTIONAL, INDUSTRIAL BENEFIT)				
3.1	Watermain Upgrade – Mart Rd and Industrial Rd (Metro to Harby Rd East)	175m of 200mm dia. 475m of 250mm dia.	$675,000	Ongoing - in Order of Priority Shown
3.2	Watermain Upgrade – Peterson Rd (Lynn to Lantzville)	300m of 250mm dia.	$360,000	
3.3	Watermain Upgrade – Lantzville Rd (Peterson to Harper)	450m of 250mm dia.	$540,000	
3.4	Watermain Upgrade – Harby Rd East (Peterson to Joy)	175m of 250mm dia.	$210,000	
3.5	Watermain Upgrade – Joy Way and Rossiter Rd (Peterson to Lancewood)	425m of 200mm dia.	$255,000	
3.6	Watermain Upgrade – Millard Dr (Peterson to Lancewood)	325m of 200mm dia.	$195,000	
3.7	Watermain Upgrade – Lynn Dr (Peterson to Lancewood)	325m of 200mm dia.	$195,000	
3.8	Watermain Upgrade – Lancewood Ave (Rossiter to Lynn)	250m of 200mm dia.	$150,000	
4. FIRE FLOW IMPROVEMENT PROJECTS (RESIDENTIAL AREA BENEFIT)				
4.1	Replace Limited Capacity Hydrants (not on map)	8 @ $3,700 ea.	$30,000	Ongoing - in Order of Priority Shown
4.2	Watermain Upgrade – Lantzville Rd (east and west of Superior)	1,500m of 200mm dia.	$900,000	
4.3	Watermain Upgrade – Huddlestone Rd	175m of 200mm dia.	$105,000	
4.4	Watermain Upgrade – Harper Rd	200m of 200mm dia.	$120,000	
4.5	Watermain Upgrade – Hall Rd	150m of 200mm dia.	$90,000	
4.6	Watermain Upgrade – Saxon Cross	150m of 150mm dia.	$80,000	
4.7	Watermain Upgrade – Forest Turn	150m of 150mm dia.	$80,000	
4.8	Watermain Upgrade – Clark Crescent	425m of 200mm dia. 100m of 150mm dia.	$310,000	
4.9	Watermain Upgrade – Geisler Pl and Chataway Pl	275m of 150mm dia.	$150,000	
5. OTHER WATER IMPROVEMENT PROJECTS				
5.1	Asbestos Cement (AC) Main Replacement (10- 12.5 km) (not shown on map)	600m/year for 15 years ($360,000/yr)	$5,400,000	Ongoing for 15 years
5.2	Watermain Looping Based on Future Development	As Required	By Development	Ongoing
5.3	Relocate PRV on Lantzville Rd to Ware Rd	1	By Development	TBD

DISTRICT OF LANTZVILLE - WATER MASTER PLAN
20-YEAR CAPITAL PROJECTS SUMMARY

Figure 27: Capital Improvements Summary Diagram



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8.2 FINANCIAL MANAGEMENT

Lantzville's water infrastructure has been developed over the past 70 years. In previous years, senior government programs have played a significant role in supporting funding of infrastructure in small communities. Trends suggest that funding through senior government programs may be uncertain, although it remains important for Lantzville to position itself to take advantage of this funding as available.

As infrastructure ages and delivery standards and consumer expectations evolve, funding will be needed to maintain or replace components of the water system. The water service industry typically employs full cost accounting to understand the true cost of servicing the customer and ensure future revenue streams match these costs. The "full cost" not only includes current capital costs or debt and operating and maintenance costs, but also the costs to maintain and replace infrastructure in a sustainable manner. Financial planning to meet future water supply needs, in concert with managing existing infrastructure, will be key to long-term resiliency.

The District of Lantzville is completing Asset Management Planning to assess the replacement costs of existing infrastructure. This information, along with current operational costs, will inform regular reviews of water user rates to ensure sufficient revenue is being generated for renewal of the system.

It can be anticipated that future capital investments will be funded through a combined strategy that includes:

- **Senior Government Grants** for major infrastructure projects and water service expansion, recognizing that some projects may not be completed until such time a grant is obtained.
- **Water User Rates** that cover water use, minor capital upgrades, and ongoing maintenance and renewal of the system.
- **Parcel Tax** collected annually on each parcel to which domestic water is or can be provided, used to complete required capital upgrades.
- **Development Cost Charges** and other development funding for capital works driven by capacity increases needed to service growth. The District has an existing Development Cost Charges (DCC) program which should be reviewed from time to time to ensure the revenue calculations are reflective of expected construction costs and fully account for the growth share of infrastructure costs.

8.3 CAPITAL IMPROVEMENT & FUNDING RECOMMENDATIONS

1. Undertake phased implementation of the capital recommendations identified in Table 10.
2. Complete an Asset Management Plan, estimating replacement costs and timing for all current water infrastructure.
3. Use the Asset Management Plan to inform annual reviews of Water User Rates and parcel tax to employ full cost accounting to balance revenue with anticipated system operation, maintenance, replacement, and growth.
4. Review and update capital infrastructure requirements every five years minimum, considering changes in system supply and demand (see ***Section 6***) and updated cost information.
5. Review and update the water service DCC program every five years minimum, to ensure revenue calculations reflect expected capital costs and fully account the growth-related share of new infrastructure.
6. Pursue senior government grants to supplement funding for infrastructure improvements and phased extension of water service to existing neighbourhoods.
7. Renew and replace aging infrastructure on an ongoing basis to maintain required levels of service based on risk analyses and cost-benefit priorities.

9 | ACTIONS

Over the years, the District of Lantzville has been working to address water supply questions. Emerging options have been identified that could support expansion of the community water system. Implementing changes to the water system should occur thoughtfully and be monitored carefully to support the evolution and maintenance of a resilient system for the future.

9.1 ACTION SUMMARY

The preceding sections of the Water Master Plan outline alternatives towards recommendations intended to assist Lantzville in achieving community goals related to water supply and distribution, including:

- Allowing potential for access to safe drinking water for all properties in Lantzville
- Securing a sustainable future water supply
- Developing a cost effective water system
- Continuing to encourage responsible and low-demand community water use

Achieving these goals will require incremental capital improvements, alongside planning and policy that monitors and updates directions as the community evolves.

The tables on the following pages outline key actions, prioritized by suggested time frames, for Council consideration. Actual timing of implementation will be flexible, in response to community needs or emerging opportunities.

It is important that an adaptive management approach is taken when implementing the actions, so that when new opportunities or circumstances arise, Council and staff are able to make context-sensitive decisions to support the goals of the community.

9.1.1 RECOMMENDED IMMEDIATE-TERM ACTIONS

Immediate-term actions are recommended to be considered between 2018 and 2020. These include key high-priority actions and decisions that would be required to initiate expansion of or updates to Lantzville's water system.

Table 11: Recommended Immediate-Term Actions (1-2 year time frame)

Suggested Priority	Description	Reference No.	Budget Estimate*
1	Implement the Lantzville/Nanaimo Water Agreement.	8.1 (Table 10)	$1,330,000
2	Develop a new dual cell reservoir with a 158 m top water elevation to replace the function of the Aulds Rd Reservoir, address storage shortfalls, and prepare for future expansion of the community water system.	8.1 (Table 10)	$900,000-$1,000,000
3	Review and adjust Lantzville's Water User Rates and parcel tax, with the objective of maintaining a tiered structure, to reconcile with Nanaimo bulk water rates once confirmed and principles of the agreement.	7. 1	Staff Time
4	Reconnect Well #5.	8.1 (Table 10)	$50,000
5	Secure groundwater licenses for each existing Lantzville well.	8.1 (Table 10)	$6,500
6	Complete an Asset Management Plan, estimating replacement costs and timing for all current water infrastructure. Use the Asset Management Plan to inform annual reviews of Water User Rates and parcel tax to employ full cost accounting to balance revenue with anticipated system operation, maintenance, replacement, and growth.	8.2/8.3	Staff Time
7	Pursue identification of a new water source for Lantzville to allow continued extension of the water system to existing residents and prepare for potential future demands.	8.1 (Table 10)	By Development
8	Continue with the ongoing watermain replacement program to improve fire flows and replace asbestos cement water mains (see Table 10, items 3, 4, 5 for prioritized replacement list).	8.1 (Table 10)	$1,320,000
9	Once additional water supply has been secured, amend existing policy to allow unserviced properties adjacent to existing water service infrastructure to apply to connect to the community water system on a first-come first-served basis.	5.1	Staff Time
10	Update OCP policy to allow properties outside the Water Service Area boundary to apply for domestic use (not landscape or agricultural use) water connections on a first-come first-served basis. Applications should be considered on a case-by-case basis, confirming connection will not adversely affect delivery of the planned water system.	5.2	Staff Time

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9.1.2 RECOMMENDED SHORT-TERM ACTIONS

Short-term actions are recommended to be considered for completion between 2020 and 2023. These include updates to start phased expansion of Lantzville's water system.

Table 12: Recommended Short-Term Actions (3-5 year time frame)

<table>
<tr><th>Suggested Priority</th><th>Description</th><th>Reference No.</th><th>Budget Estimate*</th></tr>
<tr><td>1</td><td>Prepare and implement a well head protection plan for Lantzville's well field to ensure the existing groundwater source remains protected for the future.</td><td>6.1</td><td>$10,000</td></tr>
<tr><td>2</td><td>Develop a Water System Service Bylaw that provides guidance on the Design Standard, community water use, and water servicing costs, including:
Adoption of the following recommended Design Standard for residential properties connected to the District's community water system:<table><tr><th>Land Use Type</th><th>L/Day/Connection</th></tr><tr><td>Single-Family Residential</td><td>2,800- 3,000 L/day/connection</td></tr><tr><td>Multiple-Family Residential</td><td>1,080- 1,710 L/day/unit</td></tr></table>
Guidance for assessment of water demands for all industrial, commercial, and institutional development on a case-by-case basis considering proposed activities and engineering best practices.
Maintenance of the existing standard of 3,400 L/day/connection for properties outside the Water Service Area and not connected to community water.</td><td>4.1</td><td>Staff Time</td></tr>
<tr><td>3</td><td>Develop policy that requires all new development under development permit to incorporate outdoor water saving strategies such as low water-use landscapes and smart irrigation technology and to provide a water budget as a component of their development permit application to calculate proposed water use.</td><td>7.2</td><td>Staff Time</td></tr>
<tr><td>4</td><td>Continue to work with the City of Nanaimo on the Lantzville/Nanaimo Water Agreement, including revision of restrictive language that limits opportunities to service existing parcels in the Upper Pressure Zone.</td><td>6.4</td><td>Staff Time</td></tr>
<tr><td>5</td><td>Continue with the ongoing watermain replacement program to improve fire flows and replace asbestos cement water mains (see Table 10, items 3, 4, 5 for prioritized replacement list).</td><td>8.1 (Table 10)</td><td>$1,980,000</td></tr>
<tr><td>6</td><td>Take steps to establish Local Area Services in the for the following Phase 1 Service Expansion Neighbourhoods shown on Figure 18, subject to available water supply and approval by current residents:
AW: Clark Drive Area
FW: Fernmar Road Area</td><td>5.2</td><td>Local Area Service</td></tr>
</table>

Suggested Priority	Description	Reference No.	Budget Estimate*
7	Begin considering community water for areas identified as Development Driven Expansion Areas on Figure 18 as part of development approval processes. Where development-driven expansion is considered, the following may be required: ▶ Provision of a new source of community water supply by the development ▶ Water infrastructure design that allows for future extension to adjacent existing neighbourhoods desiring community water	5.6	By Development
8	Complete an interim 5-year review/update of the Water Master Plan, including the following: ▶ Well Field Re-Rating, during dry season conditions. ▶ Design Standard Updates, considering water supply changes, actual water usage, and new trends. ▶ Water Budget Scenarios, comparing actual water use records with projected demands. ▶ Water User Rates, considering current asset management planning and water conservation. ▶ Capital Infrastructure Requirements, considering changes in system supply and demand and updated cost information. ▶ Water Service DCC Program, to ensure revenue calculations reflect expected capital costs and fully account the growth-related share of new infrastructure.	4.3 / 4.4 / 6.5 / 8.3 / 8.4 / 8.5	$20,000

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9.1.3 RECOMMENDED MEDIUM-TERM ACTIONS

Medium-term actions are recommended to be considered for completion between 2023 and 2028. These include continued phased expansion of and upgrades to the community water system.

Table 13: Recommended Medium-Term Actions (6-10 year time frame)

Suggested Priority	Description	Reference No.	Budget Estimate*
1	Monitor potential development that could reduce the water service extension costs for the Phase 1 Service Expansion Neighbourhood HW-1: Winds Residential. If, in five years after the date of this plan, development is not anticipated or neighbourhood residents bring forward a successful petition, take steps to establish a Local Area Service for water extension to the neighbourhood, subject to available water supply and approval by current residents.	5.4	Local Area Service
2	Continue with the ongoing watermain replacement program to improve fire flows and replace asbestos cement water mains (see Table 10, items 3, 4, 5 for prioritized replacement list).	8.1 (Table 10)	$3,300,000
3	Investigate a septic storage conversion program that encourages or provides incentive to homeowners in transitioning existing septic tanks to non-potable water storage for outdoor water use after municipal sewer is extended.	7.6	Staff Time
4	Complete a full 10-year review/update of the Water Master Plan, including the following: ▶ A public engagement process to gauge current public interests and concerns on community water. ▶ Well Field Re-Rating, during dry season conditions. ▶ Design Standard Updates, considering water supply changes, actual water usage, and new trends. ▶ Water Budget Scenarios, comparing actual water use records with projected demands. ▶ Water User Rates, considering current asset management planning and water conservation. ▶ Capital Infrastructure Requirements, considering changes in system supply and demand and updated cost information. ▶ Water Service DCC Program, to ensure revenue calculations reflect expected capital costs and fully account the growth-related share of new infrastructure.	4.3 / 4.4 / 6.5 / 8.3 / 8.4 / 8.5	$100,000

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9.1.4 RECOMMENDED LONG-TERM ACTIONS

Long-term actions are recommended for consideration beyond 2028 and have lower priority at this time, although could be completed sooner if community needs evolve. It is anticipated that the Water Master Plan will be updated at the end of 10 years to confirm the needs of the community at that time, and the recommended projects will be updated to reflect these needs.

Table 14: Recommended Long-Term Actions (10+ year time frame)

Suggested Priority	Description	Reference No.	Budget Estimate*
1	When Phase 1 water service extensions are complete, reassess resident opinions about extending water services to the following Phase 2 Expansion Neighbourhoods shown on Figure 18: ▶ BW: Owen Road Area ▶ GW: Aats Road Area ▶ HW-2: Winds Estate Residential ▶ IW: Bayview Water extension to the Phase 2 Expansion Neighbourhoods may be considered in a shorter time frame if neighbourhood residents bring forward a successful petition.	5.5	Local Area Service
2	Continue with the ongoing watermain replacement program to improve fire flows and replace asbestos cement water mains (see Table 10, items 3, 4, 5 for prioritized replacement list).	8.1 (Table 10)	$3,300,000

** Budget estimates are provided for planning information only. Cost are Class 'D' (feasibility study) estimates, made without preliminary design input. The cost estimates include a 25% allowance for legal, construction, financial, administration, and engineering costs, Costs for infrastructure can vary widely depending on site constraints, design, market forces, and other variables. Budget estimates should be refined during detailed design and planning for each project is undertaken.*

9.1.5 RECOMMENDED ONGOING ACTIONS

Ongoing actions including regular monitoring, management, and maintenance of the community water system and have no defined time frame.

Table 15: Recommended Ongoing Actions (No defined time frame)

Suggested Priority	Description	Reference No.	Budget Estimate*
	Continue ongoing annual monitoring of water use to identify changes in usage patterns and trends. If trends show changes in usage, consider updating the Design Standard to reflect current use.	4.2	Staff Time
	Use the Asset Management Plan to inform annual reviews of Water User Rates and parcel tax to employ full cost accounting to balance revenue with anticipated system operation, maintenance, replacement, and growth.	8.3	Staff Time
	Pursue senior government grants to supplement funding for infrastructure improvements and phased extension of water service to existing neighbourhoods.	8.6	Staff Time
	When new development proposals are considered, complete analysis and reporting on the water budget to confirm potential implications of the development.	6.6	Staff Time
	Continue to develop or partner on new educational materials and programs that encourage water conservation approaches for residential land owners, particularly as new residents enter the community.	5.3	Staff Time
	Continue to support the Rainwater Harvesting Incentive Program and consider new incentives and programs that encourage residents to make water smart choices.	5.4	Staff Time
	Encourage water users that are connected to community water but have existing wells to use well water for outdoor (non-potable uses), provided there are no impacts to the District's groundwater sources.	5.5	Staff Time
	Renew and replace aging infrastructure on an ongoing basis to maintain required levels of service based on risk analyses and cost-benefit priorities.	8.7	As required


AMCO
1/2

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OLD

APPENDICES

APPENDIX A: Water Demand Design Standard Review, 2017 Update – Koers & Associates Engineering Ltd.

APPENDIX B: Community Input Summary #1 Minetown Day Event & Questionnaire #1

APPENDIX C: Community Input Summary #2 Kitchen Table Meetings

APPENDIX D: Community-wide Survey Summary Report

APPENDIX E: Draft Review Open House Summary Results

APPENDIX A:

Water Demand Design Standard Review, 2017 Update – Koers & Associates Engineering

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Draft Review Open House Summary Results

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