8.8 Utilities and Drainage

The quality of life City of Prince George residents enjoy can be attributed in part to having safe and reliable water supply, sewage disposal and storm water drainage systems.

As the community grows, more demand is placed on existing systems to serve new development. In many cases a growth component has been provided in the servicing infrastructure when first installed. However, depending on age and location of the infrastructure, growth demands may exceed the available capacity and upgrades may be required.

As the provision of utility and drainage servicing is both a significant component of development costs and the ongoing cost to maintain and to replace or renew the systems in the years that follow. With more awareness of and attention to the need to consider social and environmental aspects of serving community needs, economic realities are not the only component to be considered in the provision of utility and drainage infrastructure systems.

The policies derived in this section are reflective of these three aspects of sustainability in providing the community with water, sewer and drainage servicing.

Water Supply and Distribution

The source of the City of Prince George’s water supply is provided entirely from groundwater wells. Of the wells in continuous operation, three are large radial collector wells along the south bank of the Nechako River supplying 95% of the City’s water demand through a water distribution system that has expanded over the last decade.

The City’s water system provides for both domestic water demand and fire flow required for the land use served. Generally, the water system is a network of source wells, water mains, booster pump stations, reservoirs and pressure reducing valves. Transmission water supply mains convey water from the source wells to reservoirs and booster stations as water is distributed to customers within pressure zones. The boundaries of pressure zones are determined by elevation; pressure zones are interconnected by booster stations and pressure reducing valves.

Water storage reservoirs are sized to accommodate domestic and fire demand, with the construction of six new reservoirs in the last 2 decades, the provision of water storage has improved considerably.

Development activity in new greenfield areas is generally situated in higher elevations where new booster pump stations, pressure reducing valves and sometimes reservoirs are needed. These infrastructure demands add significant cost to development and increased operation, maintenance, and future renewal and replacement costs to the City.
Sewage Collection and Wastewater Treatment

The City's sewage collection system consists of a network of gravity sewer mains, force (pressure) mains and over thirty lift pump stations. The City operates five wastewater treatment facilities, the largest being the Lansdowne Wastewater Treatment Facility that serves the Bowl, College Heights, University Heights and Nechako/Hart areas of the City. Areas east of the Fraser River are served by the Blackburn, BCR and Danson wastewater facilities and a small system serves Western Acres, the semi-rural residential area at the extreme southwest corner of the City.

The Lansdowne facility is operating at 75% capacity, which should provide for the expected growth of the next 15 years. The Blackburn facility has had concerns with high spring discharges due to inflow and infiltration from snowmelt runoff and needs storage expansion to mitigate this condition. The BCR system has sufficient capacity to accommodate growth within the BCR and some of the Airport Light Industrial development; there is room to expand the treatment facility in future, but should not likely be required within the next 15 years. To accommodate build-out development in their respective catchment areas, the Danson facility needs to be upgraded within the 15 year horizon as does the Western Acres facility.

Storm Water Drainage

The City provides drainage for its road infrastructure using open ditches or storm sewers, usually depending on the adjacent land use and proximity of development. Curbing is usually provided, where storm sewers exist in roads. This provides for surface water to collect and channelize storm water runoff toward drains (catchbasins) that help to mitigate flooding of the road surface and adjacent properties.

Storm sewers are installed at sufficient depth in new residential development to accommodate the connection of perimeter foundation sub-drains in fine-grained soils such as silts and clays. In new multiple-family, commercial, institutional and light industrial developments, storm sewers are provided for the connection of roof drains and parking lot drainage systems.

Storm sewers, storm drainage management facilities and open channel systems are designed using conventional urban hydrology practices from rainfall intensity-duration-frequency (IDF) data derived from Environment Canada records and design storm events. Storm sewer infrastructure historically was designed using 2-year and later 5-year return periods. The current practice is to use a 10-year return period to adapt to more severe events that appear to be more frequent, possibly due to climate change.

Since introducing design guidelines in 2001 for storm water management facilities, storm water detention ponds, dams, receiving open water channels, and road networks are now designed to accommodate a 100-year return.

Storm sewers with curbing are installed throughout the Bowl, College Heights and new residential developments in the Nechako and Hart areas north of the Nechako
River. A few commercial and light industrial areas in the BCR and Danson areas have storm sewers. There are, however, large areas in the Nechako and Hart where storm drainage is provided by ditches and swales (minor depressions between the edge of pavement and property line).

Two watershed drainage plans were completed in the past decade:

- Gladstone, Varsity and Trent Watershed Drainage Plans, December 2002 for three drainage basins in the College Heights and future Ospika South Neighbourhood Plan areas; and,
- Hudson’s Bay Slough Watershed Drainage Plan, January 2007 for the Cranbrook Hill, University of Northern British Columbia, west Bowl, central Bowl, Crescents, a portion of the Downtown, Gateway, and Hudson Bay Slough areas.

Within the last two decades, storm sewer infrastructure and drainage management facilities have received more attention from regulatory agencies administering the provincial Water Act and the federal Fisheries Act in the quality and volume of discharge conveyed by these facilities into receiving water courses. This has led to more demands on storm drainage facilities by introducing quality control features into manholes (sumps), and the design and installation of sediment removal and oil separator systems.

Currently, the industry practice is moving toward storm water management techniques that employ “volume-based” methods rather than “rate-based methods”. The objective is to use a low-impact development strategy. This strategy emphasizes conservation and use of on-site natural features, integrated with engineered, small-scale hydrologic controls to more closely mimic pre-development hydrology. The goal of low impact development is to prevent measurable harm to streams, lakes, wetlands and other natural aquatic systems from commercial, residential or industrial development sites.

**Objectives**

**Objective 8.8.1** Identify the location and extent of planned future water, sewer and drainage systems improvements required to support development consistent with the growth management objectives and policies within this Plan. The availability and capacity of existing water, sewer and storm drainage infrastructure that should connect to the improvements must be considered.

**Objective 8.8.2** Protect and promote the health and safety of the public, and the safety and integrity of public infrastructure.

**Objective 8.8.3** Reduce and/or effectively manage the impacts to the environment and the impacts of climate change.
Designation of Areas

Water and Sanitary Sewer Service Infrastructure
The existing major water and sanitary sewer infrastructure facilities indicated on Schedule B-14: Water Network Improvements and Schedule B-15: Sewer and Wastewater Treatment Improvements show approximately the servicing areas for each facility.

Waste Water Treatment Facilities
Lands are required for the expansion of existing wastewater treatment facilities and for the future development of new wastewater facilities at locations indicated on Schedule B-15: Sewer and Wastewater Treatment Improvements.

Storm Water Runoff and Drainage
Lands are required for storm water detention ponds, wetlands, and snow management facilities at locations indicated on Schedule B-16: Storm Network Improvements. Opportunities for sub-surface recharge or infiltration systems are also indicated.

Policies

General

Policy 8.8.1 The City should develop and maintain safe and efficient water, sanitary and storm sewer utilities that should accommodate the growth management objectives and policies within this Plan.

Policy 8.8.2 The City should develop storm water drainage facilities, consistent with the growth management objectives and policies within this Plan, that in new development or redevelopment areas provide for:

  a. the drainage of storm water and snow melt runoff from roadways to provide safe vehicle movement during summer and winter;
  b. the relief of groundwater from residential, commercial, institutional and light industrial building foundations where soils are not free-draining in new development areas;
  c. the safe management of storm water during heavy rainfall events to mitigate flooding;
  d. the abatement of sediments and deleterious substances from storm water and snow melt runoff; and
  e. opportunities for the reduction of storm water runoff volumes conveyed through piping systems to the natural watercourses.
Policy 8.8.3 To adapt to climate change, future development of infrastructure should be designed to: account for projected precipitation and temperature changes; withstand freeze-thaw cycles; and be more resilient to unexpected changes and extreme events. The City should undertake further study to determine the local impacts of climate change on infrastructure.

**Water and Sanitary Sewer Utilities, Drainage and Growth Management**

Policy 8.8.4 Water and sanitary sewer utilities and drainage servicing required for all development, whether or not consistent with the growth management objectives and policies within this Plan, shall:

a. be determined from:
   - neighbourhood plans approved by Council resolution;
   - water and sewer infrastructure servicing studies prepared by a qualified professional engineer; and,
   - storm water management plan(s) prepared by a qualified team consisting of a professional engineer, environmental professional, and other professionals as required;

b. based on City design guidelines, standards, and other requirements adopted by bylaw, provide capacity sufficient for the proposed development and for future lands to be served beyond the proposed development; and,

c. meet all applicable servicing requirements regulated by the provincial and federal governments.

**Water Supply and Distribution**

Policy 8.8.5 The City should continue to expand the pumping capacity at wells PW 660, PW 605 and PW 601 and extend transmission capacity from these collector wells to accommodate the growth management strategy. It is recommended that:

- No new City-owned water supply wells be developed at other locations in the City to serve new development; and,
- Existing City-owned wells within the urban boundary should not be expanded, or should be de-commissioned from regular use, where provision can be made to extend transmission water mains from the water network supplied by the Nechako collector wells.
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Policy 8.8.6 As there is a moderate to high risk of contamination from industrial or commercial activity on lands above the groundwater capture zones, it is recommended that the City:

- Restrict the expansion of industrial and commercial development within the capture zones of the Nechako collector wells;
- Consider reducing or restricting industrial development expansion in capture zones for active City wells located in other areas of the City; and,
- Conduct condition assessments of City-owned water supply, storage and distribution facilities to determine remaining service life and sufficiency to accommodate the growth management objectives and policies within this Plan.

Policy 8.8.7 Where water infrastructure renewal is planned for the replacement of sub-standard or old infrastructure, new infrastructure shall be sized to accommodate new development or re-development in accordance with the growth management objectives and policies within this Plan.

Policy 8.8.8 New water supply and distribution main network improvements, pump station upgrades, pressure reducing valve installations, and water reservoirs should be planned, designed, prioritized and constructed to accommodate future needs as defined in the growth management objectives and policies within this Plan. The approximate location of significant water service improvements expected within the next 15 years are shown on Schedule B-14: Water Network Improvements and include:

- Boundary Road Water Main (under construction at time of this bylaw);
- Extension of water supply main from Boundary Road/Highway 97 intersection to Danson Reservoir (PW827);
- Extension of water main along Northwood Pulpmill Road from Aberdeen Road to Clubhouse Drive;
- Extension of water main from Bear Road to Bunce Road;
- Looping of water main from Heyer Road to Leland Road;
- Extension of water main west on Chief Lake Road from near Sabayam Road to Foothills Boulevard;
- Airport/Boundary Road water reservoir;
- Upgrade of booster station at west end of Yellowhead (Hwy 16) Bridge (PW623);
- Extension of water main along Malaspina/Cowart Road to connect
- New water well source for Western Acres; and,
The following water service projects as required for future development when demand warrants:

- Extension of water main from Rec Place Road to Westwood Drive
- Extension of water main along River Road from Foley Crescent to booster station PW623;
- Pressure reducing valve with tie-in to transmission main from Hart water booster station (PW650) to Vellencher reservoir (PW817);
- Installation of pressure reducing valves in Ospika South area between Pressure Zone 6 and 4 to serve areas below 700m elevation;
- Water main extension along North Nechako Road west of Foothills Boulevard;
- Extension of water main eastward on Chief Lake Road from near Sabayam Road to Hwy 97; and,
- Water main extension and upgrade from Blackburn Road south to Midland Road, to facilitate the servicing of South East ¼ of District Lot 630, Cariboo District, Except Plan 18283, subject to a phased development agreement.

**Sewage Collection and Wastewater Treatment**

**Policy 8.8.9**

Consider the impact of the proposed new regulations under the Fisheries Act endorsed by the Canadian Council of the Ministers of the Environment (CCME) to City wastewater treatment facilities and prepare a review report that outlines measures necessary to implement the regulations as part of future facility upgrades.

**Policy 8.8.10**

New sanitary sewer and wastewater treatment, shall be planned, designed, prioritized and constructed to accommodate future needs as defined in the growth management objectives and policies within this Plan. The approximate location of future sewer main extensions and upgrades, and wastewater treatment facility upgrades expected to be required within the next 15 years are shown on *Schedule B-15: Sewer and Wastewater Treatment Improvements* and include:

- Boundary Road Sanitary Trunk Main (under construction at time of this bylaw);
- Extension of sewer trunk main from Boundary Road/Highway 97 intersection to Pacific Street and lift station PW123;
• Upgrade of Blackburn Wastewater Treatment facility;
• Upgrade of Mackus Road lift station (PW115);
• Twinning of trunk sanitary sewer influent main on Vance/Cowart Road from Weibe Road to the Lansdowne Wastewater Treatment Facility;
• Expansion of effluent storage lagoon at Western Acres;
• Upgrade to Danson Wastewater Treatment facility;
• The following sewer main extensions, lift station upgrades and wastewater treatment facility upgrades as required for future development when demand warrants:
  o Extension of sewer trunk main parallel to Tyner Boulevard north of University Heights;
  o Extension of sewer trunk main from Southridge Ave to Park Drive;
  o Sewer extension along Sintich Road from Hwy 97S to Boundary Road and Penn Road;
  o Upgrade to lift station on Weisbrod Road (PW120);
  o Extension of sewer trunk main on North Nechako Road west of Foothills Boulevard; and
  o Sewer servicing extension and upgrade for the South East ¼ of District Lot 630, Cariboo District, Except Plan 18283, in the south Blackburn Neighbourhood, subject to a phased development agreement.

Drainage and Storm Water

**Policy 8.8.11** Any planning for stormwater drainage should take into consideration an ecosystem approach and prioritize watercourses for protection.

**Policy 8.8.12** Consider and, where opportunities exist, implement low impact development and other storm runoff volume-based discharge reduction strategies for new development and re-development to reduce the requirement to increase existing storm sewer and drainage facilities.

**Policy 8.8.13** Utilize available techniques, such as sensitivity analyses, to consider climate change impact on storm drainage facilities.

**Policy 8.8.14** New storm drainage facilities, shall be planned, designed, prioritized and constructed to accommodate future needs as defined in the growth management objectives and policies within this Plan. The approximate location future storm sewer main extensions and upgrades, storm detention facilities and groundwater recharge...
facilities expected to be required within the next 15 years are shown on Schedule B-16: Storm Network Improvements, and include:

- Storm water detention ponds/wetland facilities for Gladstone Watershed, Fraser Bench Lands, University Heights and Airport Light Industrial Lands;
- Fraser Bench storm water outfall to Fraser River;
- Storm water recharge system upstream of Lansdowne Creek Discharge;
- Upgrade storm sewer to 1500mm diameter (dia.) on Winnipeg Street/Massey Boulevard from 15th Avenue to 17th Avenue; and,
- The following storm water drainage facilities improvements or upgrades as required for future development when demand warrants:
  - Varsity Watershed storm water detention ponds and new storm sewers;
  - University Heights storm sewer trunk mains down escarpment;
  - Snow management facility(s) for new development;
  - Expansion of Shane Creek detention pond and downstream storm sewer mains;
  - Installation of 525mm dia. storm sewer diversion main on 10th Ave between Laurier Crescent and Burden Street;
  - Storm water detention facilities at Airport Hill Subdivision; and,
  - Outfall and storm sewer to Nechako River between Rustad Road and Stevens Drive.