WATER

theme overview
planning & design decisions
goals
maintain health of aquatic ecosystem
reduce the demand for potable water resources
minimize lifecycle costs of water infrastructure
detailed design tasks
fostering sustainable living

Land development disturbs and alters natural hydrological systems. This affects the quality and quantity of water that is available to support healthy ecosystems and human lifestyles. Sustainable urban neighbourhoods protect the quality and quantity of the community's water resources through effective stormwater management, the efficient and appropriate use of lower volumes of water, and by designing low-impact and cost-effective water infrastructure.

theme overview

why is this theme important?

Water can be considered from three perspectives: as a natural system, as a human need, and as infrastructure.

Even within Canada where water is seemingly plentiful, the potential supply of water is certainly finite. As more water is withdrawn from the ground for consumption, less water becomes available to recharge the wells, irrigation ditches, and the sensitive ecosystems of creeks, rivers, and wetlands.

Canadians in major urban city centres are among the largest water consumers in the world and although the country has a plentiful supply, these supplies are feeling the stresses of population growth, an increased standard of living, urbanization, and the uncertain impacts of climate change. These major stress factors will likely increase water demands and decrease available water supplies in the future. Climate change impact studies, for example, suggest that the trends of earlier snowmelt runoffs, lower precipitation with warmer, wetter winters and longer, hotter and drier summers will soon become the norm.

Water supply and quality is impacted by conventional engineering systems which contain and pipe water underground, and release it into treatment facilities and larger waterbodies. Creative, contextual designs combined with financial incentives can assist in developing low-impact designs for water infrastructure that balance the natural hydrological cycle, minimizing long term costs and sustaining this resource.

why is water important to emerald hills urban village?

Strathcona County is located within the Beaver Hills sub-watershed, which is part of the much larger North Saskatchewan Watershed. The community purchases its water from Epcor, which withdraws it from the North Saskatchewan River. Recent water data suggests that the supply from the North Saskatchewan may be diminishing in supply. For example, the natural volume of water in the North Saskatchewan River at Edmonton during the 2006 summer was the 12th lowest level on record.

From a municipal standpoint, designing and planning for water conservation makes financial sense. By reducing water demand and wastewater generation, it is possible for municipalities to defer expensive capital investment projects for water supply and wastewater treatment infrastructure.

Strathcona County has committed to being part of Alberta's Water for Life Strategy. The Water for Life Strategy has outlined strategies committed to protecting the quality and quantity of Alberta's water resources including the maintenance of a safe, secure drinking water supply, a healthy aquatic ecosystem, and a reliable quality water supply for a sustainable economy.

how can emerald hills urban village impact on this theme?

The Emerald Hills Urban Village has an opportunity to be a leader in water resource management through the incorporation of stormwater strategies that improve infiltration rates with water efficient technologies and a soft path approach to water management.

summary table of goals and strategies for water

goals	charrette process strategy
Maintain health of aquatic ecosystem.	Infiltrate stormwater runoff within or adjacent to the Village.
	Use natural habitat and landscape to intercept, absorb and restore quality of stormwater runoff.
Reduce the demand for potable water resources.	Design in conformance with standardized green building rating protocols.
Minimize lifecycle costs of water infrastructure.	Use wastewater as a resource.

planning & design decisions

general intent of this strategy / Managing stormwater close to where it initially falls emulates the natural pattern of stormwater penetration, and reduces the amount of water that requires municipal treatment or that is being discharged in a deteriorated state.

Capture for reuse - slow the flow - Infiltrate while conveying (Sketch taken from design charrette).

Permeable surfaces can be integrated into parking lots.

Additional runoff is conveyed to natural stormwater facilities off-site

Swales and ditches can be incorporated to help infiltrate stormwater runoff.

goal / maintain health of aquatic ecosystem.

strategy one / infiltrate stormwater runoff within or adjacent to the village.

area i: institutional, residential,commercial
- Permeable surfaces are used to infiltrate stormwater where it falls.
- Courtyards are landscaped for maximum infiltration.
- Swales in East-West greenway infiltrate stormwater while conveying additional runoff to North-South corridor.

area ii: residential, commercial
- Permeable surfaces are used to infiltrate stormwater where it falls.
- Courtyards are landscaped for maximum infiltration.
- Swales in East-West greenway infiltrate stormwater while conveying additional runoff to North-South corridor.

area iii: residential, commercial
- Permeable surfaces are used to infiltrate stormwater where it falls.
- Courtyards are landscaped for maximum infiltration.
- Swales in East-West greenway infiltrate stormwater while conveying additional runoff to North-South corridor.

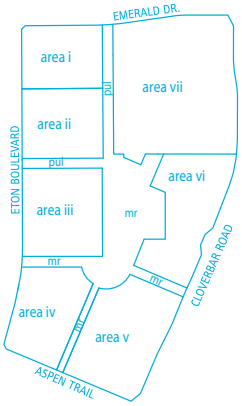
municipal reserve & public utility lot
- Wherever possible permeable surfaces are used to minimize runoff.
- Runoff moves generally south to north.
- The natural hydrological pattern of a small basin drainage system is adopted, with stormwater runoff infiltrating where it falls and being conveyed to ponds where necessary.
- Small detention areas and swales support infiltration throughout the Village.

area iv: residential
- Permeable surfaces are used to infiltrate stormwater where it falls.
- Courtyard areas and street landscaping absorb and reduce runoff.
- Private yards are designed like small sponges.
- Surface areas for driveways are kept to a minimum.
- Roll up curbs with concrete outlets direct stormwater to grass swales/ditches on the perimeter.

area v: residential
- Permeable surfaces are used to infiltrate stormwater where it falls.
- Courtyard areas and street landscaping absorb and reduce runoff.
- Private yards are designed like small sponges.
- Surface areas for driveways are kept to a minimum.
- Roll up curbs with concrete outlets direct stormwater to grass swales/ditches on the perimeter.

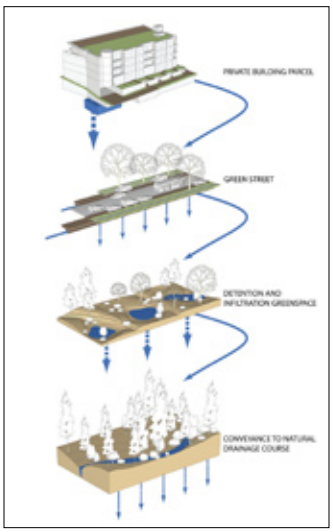
area vi: residential, commercial
- Roadways and parking areas are kept to a minimum.
- Permeable surfaces are used to infiltrate stormwater where it falls.

area vii: commercial, residential
- Permeable surfaces are used to infiltrate stormwater where it falls.
- Stormwater management functions are integrated into the commercial parking field, with medians catching and treating runoff.



planning & design decisions

general intent of this strategy / Natural habitats have an immense capability to remove pollutants from stormwater run-off prior to it being discharged to a receiving body of water.



Stormwater Treatment Train

Semi-public spaces for lower density units are integrated with stormwater approach.

Stormwater management functions are integrated into the design of the parking field.

Stormwater management functions are integrated into the design of corridors.

Swales and ditches can be incorporated to help infiltrate stormwater runoff.

goal / maintain health of aquatic ecosystem.

strategy two / use natural habitat and landscape to intercept, absorb and restore quality of stormwater runoff.

area i: institutional, residential,commercial

- Landscape form is used to direct excess stormwater to swales in East-West greenway.
- Swales are engineered to absorb and restore quality of stormwater.

area ii: residential, commercial

- Landscape form is used to direct excess stormwater to swales in East-West greenway.
- Swales are engineered to absorb and restore quality of stormwater.
- Courtyard provides opportunity for water feature to absorb and treat stormwater runoff.

area iii: residential, commercial

- Landscape form is used to direct excess stormwater to swales in East-West greenway.
- Swales are engineered to absorb and restore quality of stormwater.
- Courtyard provides opportunity for water feature to absorb and treat stormwater runoff.

municipal reserve & public utility lot

- Onsite and hospital stormwater ponds and constructed wetlands are engineered to treat water naturally.
- Swales in North-South corridor and streets infiltrate while conveying runoff.
- Vegetated swales are incorporated along East-West greenways.
- East-West greenway infiltrates rainwater and runoff from adjacent areas.
- Swales from southern parcels can discharge into Municipal Reserve as needed.

area iv: residential

- Swales in North-South greenway and streets infiltrate while conveying runoff.
- Landscape buffers in the laneways incorporate trees and other vegetation.
- Landscape islands are located in select locations.
- Greenways are dedicated at the front of each unit.

area v: residential

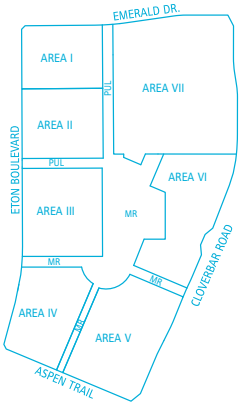
- Swales in North-South greenway and streets infiltrate while conveying runoff.
- Landscape buffers in the laneways incorporate trees and other vegetation.
- Landscape islands are located in select locations.
- Greenways are dedicated at the front of each unit.

area vi: residential, commercial

- Landscape buffers in the parking area incorporate trees and other vegetation.

area vii: commercial, residential

- Depressed vegetated medians both treat water and convey it to the greenway. This prevents overland flow and expanses of ice.
- Landscape buffers in the parking area incorporate trees and other vegetation.



planning & design decisions

general intent of this strategy / Sustainable water use is in large part related to the amount consumed. While some of this is linked to the way a site is developed, much of it is associated with water use in buildings. Green building rating protocols have a detailed framework and series of strategies for addressing the building scale water resource issues.

Rain barrels help capture rainwater for harvesting.

Raingardens can be used where rainwater is not collected.

Front loading washers save both water and energy.

Low flow showerheads significantly potable water use.

Green roofs help manage stormwater run-off at the building scale.

Stormwater infiltration can occur in small spaces.

goal / reduce the demand for potable water resources.

strategy / design in conformance with standardized green building rating protocols.

area i: institutional, residential, commercial

- Buildings are designed to meet water-related credits from LEED, Built Green, and/or other protocols. This includes such issues as low-flow water fixtures, natural stomrwater management, and water harvesting and reuse.

area ii: residential, commercial

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area iii: residential, commercial

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municipal reserve & public utility lot

- Low water demand and drought resistant vegetation is incorporated into the open spaces and greenway corridors in order to minimize use of potable water.

area iv: residential

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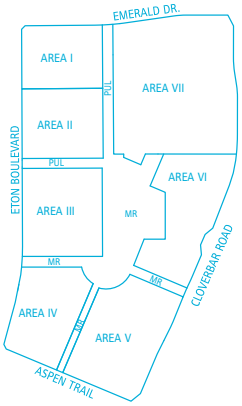
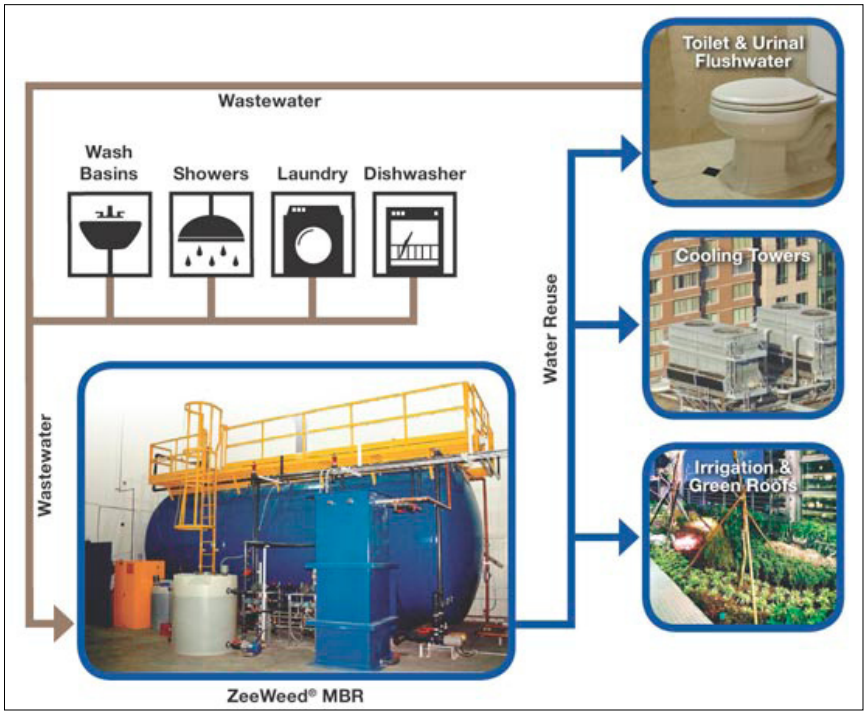


planning & design decisions

general intent of this strategy / Adopting a circular approach to water and wastewater resources reduces the impact on municipal infrastructure, thereby decreasing the long-term costs associated with delivering and treating water.

Wastewater technology can handle all onsite wastewater treatment.



Bio filters for wastewater treatment are appropriate for use in residential buildings.

Solar Aquatic Systems provide wastewater treatment.

goal / minimize lifecycle costs of water infrastructure.

strategy / use wastewater as a resource.

area i: institutional, residential,commercial
- Provide for on-site wastewater treatment reducing the amount of sewage going to municipal treatment.
- Reuse wastewater to replace potable water use.

area ii: residential, commercial
- Provide for on-site wastewater treatment reducing the amount of sewage going to municipal treatment.
- Reuse wastewater to replace potable water use.

area iii: residential, commercial
- Provide for on-site wastewater treatment reducing the amount of sewage going to municipal treatment.
- Reuse wastewater to replace potable water use.

municipal reserve & public utility lot
- Water is harvested for irrigation of open space and greenway corridors.

area iv: residential
- Provide for on-site wastewater treatment reducing the amount of sewage going to municipal treatment.
- Reuse wastewater to replace potable water use.

area v: residential
- Provide for on-site wastewater treatment reducing the amount of sewage going to municipal treatment.
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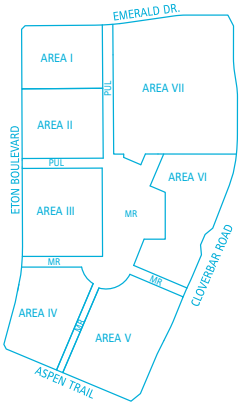

Swales are used to capture and treat stormwater.

detailed design tasks

general intent / This section highlights design tasks flagged during the charrette process as needing to be addressed during the detailed design process. LEED for Neighbourhood Development prerequisites and credits are to be satisfied.

Enhance the natural permeability of site surfaces.

Water feature integrated into the built environment.

detailed design tasks

- Detailed assessment of site surfaces / soils required to determine effective impermeability.
- Design grading to direct water to infiltration areas.
- Determine feasibility of green roofs and landscape roofs for all buildings.
- Determine if capacity of swales is enough to achieve 100% of treatment requirements, or if other Best Management Practices are required.
- Develop a clear and common infiltration/detention goal and corresponding Best Management Practice implementation for each area of the site.
- Where rainwater is not collected for harvesting, consider rain gardens.
- Analyze rainfall capture vs irrigation and plumbing needs to assess water harvesting and reuse feasibility.
- Design buildings to incorporate cisterns and two-pipe water supply systems.
- Identify appropriate locations for rain barrels, and design rain water leaders to discharge into barrels.
- Specify low-flow fixtures and size demand assumptions accordingly.
- Verify process for including water meters in all units.
- Determine which on-site treatment technology / method is most appropriate and feasible (for example, on site primary treatment, secondary treatment using membrane filtration, solar aquatic secondary treatment system, bioponics).

related leed-neighbourhood development credits

- LEED ND SSL Prerequisite 2: Proximity to Water and Wastewater Infrastructure (Option 2)
- LEED ND GCT Credit 3: Reduced Water Use (Option 2)
- LEED ND GCT Credit 3: Reduced Water Use (Option 1)
- LEED ND GCT Credit 9: Stormwater Management (Option 2 - 3 points)
- LEED ND SSL Prerequisite 4: Wetland and Water Body Conservation (Option 3)
- LEED ND SSL Prerequisite 6: Floodplain Avoidance (Option 1)
- LEED ND GCT Credit 9: Stormwater Management (Option 2 - 3 points)

See www.usgbc.org for more information.

fostering sustainable living

general intent / The detailed design decisions that enable sustainable development at Emerald Hills Urban Village must also foster sustainable living. The Strategies and Initiatives/Activities identified below represent an initial framework and point of departure for generating a Fostering Sustainable Living Program at the Urban Village. They are intended to provide the integrated design team with the sustainable living lens that is to be applied to all detailed design decisions. It is recognized that these lists will evolve and be refined as the detailed design for the Urban Village emerges.

Community maintained xeriscape demonstration project.

strategies

- Ensure detailed design of built environment celebrates water and supports adoption of low-water lifestyles.
- Incorporate monitoring and feedback into all buildings.
- Engage all Village citizens in creating a water-wise lifestyles program.
- Create partnerships with local NGOs working on water issues.
- Promote awareness-builidng and community mapping.
- Leverage green purchasing power to buy water saving products.
- Introduce community-based social marketing (CBSM) programs to foster water-wise lifestyles.
- Promote education and awareness-building celebrating water.

Use signage to raise awareness.

initiatives / activities

- Water art features integrated into built environment.
- Village xeriscape demonstration garden.
- Water timers on exterior hoses.
- High quality showerheads to encourage showers over baths
- Highly visible resident water use meters.
- Soft Path for Water - joint initiative of Polis Project & Friends of the Earth Canada http://www.polisproject.org/polis2/PDFs/Nutshell.pdf .
- Celebraton of Water engaging Village residents and businesses.
- Village Water Challenge between buildings, with adjacent neighbourhoods.
- 'Water-Wise' section in the "Living Smart at the Village" intranet handbook.
- Village / community mapping of water smart products, services and opportunities.
- Water-Wise - a CBSM program to foster lifestyles that use water wisely.

Highly visible resident water use meters.