

## 4 Sustainable Strategies

THE  
waterfront  
DISTRICT  
BELLINGHAM  WASHINGTON



## 4.0 Sustainability



The Waterfront District has the opportunity to shape and lead the Northwest, US and international thinking on sustainable strategies. Being developed as one of the nation's first LEED-Neighborhood Design projects, it will become known as one of the best examples for demonstrating that economic

vitality and environmental sustainability can thrive together.

Developed as a project under the pilot program; Leadership in Energy and Environmental Design for Neighborhood Development (**LEED-ND**) rating system, The Waterfront District will use the highest environmental and community planning standards to create an exceptional place to work, live and play.

### Background on LEED-ND

The United States Green Building Council (USGBC), in partnership with the National Resources Defense Council (NRDC) and the Chicago-based Congress for the New Urbanism (CNU), with assistance from the Urban Land Institute (ULI), created LEED-ND to rate development projects on their sustainability from a neighborhood perspective.

The LEED-ND rating system integrates the principles of smart growth, urbanism and green building into the first national system for neighborhood design. LEED-ND certification provides independent, third-party verification that a development's location and design meet accepted high levels of environmentally responsible, sustainable development.



Through a multi-year research and review process, the LEED-ND partners have identified draft criteria that will guide developments to achieve significant improvements in sustainability on both of these fronts, as well as related ones, such as water management and habitat preservation.

LEED-ND acknowledges that while about one-third of greenhouse gas emissions come from buildings, another third is generated in transporting people and goods between buildings. Therefore, sustainable development must include both buildings and their surrounding communities.

The intent of the rating system is to certify smart growth or sustainable development in a quantitative way. The rating system is organized into the following categories (points):

### Beyond LEED-ND

In addition to the criteria defined by the LEED-ND pilot program, the Port and City of Bellingham acknowledge there are other factors that drive a holistic approach to redevelopment of The Waterfront District.

The Triple Bottom Line (TBL or 3BL) captures an expanded spectrum of values and criteria for measuring organizational (and societal) success. TBL has become the dominant approach to public sector full cost accounting. The performance framework includes Environmental, Economic and Social Sustainability.

### Environmental Sustainability

A TBL endeavor reduces its ecological footprint by, among other things, carefully managing its consumption of energy and non-renewables. Because this redevelopment includes the cleanup of seven different state-listed sites, restoration of over three miles of sensitive marine shoreline, and re-use of vacated industrial structures to develop new waterfront facilities like the Clean Ocean Marina, The Waterfront District ranks very high in the LEED ND system. In TBL thinking, an enterprise which produces and markets a product should also bear the true cost of its ultimate disposal. Arguments that it costs more to be environmentally sound are often inaccurate when the course of the



business is analyzed over a longer period of time. Generally, sustainability reporting metrics are better quantified and standardized for environmental issues than for social ones.

**Economic Sustainability**

In order to create market incentives for implementation and long-term support, truly sustainable proposals must be efficiently designed and economically viable. The “bottom line” is shared by public and private sector property owners, investors, grant agencies, businesses and tax payers. A key economic strategy for the waterfront is to coordinate the integrated design of property cleanup and redevelopment. For example, it is very sustainable to design parks, roadways and building foundations to function as environmental remediation and stormwater management features within The Waterfront District. Creative engineering will ensure cost-effective projects that serve multiple functions and perform well over the long run.

**Social Sustainability**

Pertains to fair and beneficial business or development practices. A TBL company conceives a reciprocal social structure in which the well being of corporate, labor and other stakeholder interests are interdependent.

A triple bottom line enterprise seeks to benefit many constituencies, not exploit or endanger any group of them. A TBL business or development also typically seeks to “give back” by contributing to the strength and growth of its community with such things as health care, affordable housing, public amenities and education. Quantifying this bottom line is relatively new, problematic and often subjective.

**4.1 Sustainable Strategies**

As a target to address sustainability from a holistic approach, there are many strategies to be considered to highlight the best practices in sustainable development for The Waterfront District

**4.1.1 Water Conservation**

Potable water demand can be reduced by conservation and substituting reclaimed water for uses that don't require drinking water quality. Reclaimed and/or reused water comes from captured rainwater stored for reuse. The rainwater is relatively clean and can be reused for various functions such as flushing toilets and irrigating landscaping during dry periods. Another source comes from processing wastewater to a level of purification for uses that don't require potable water. A Membrane Bioreactor (MBR) process is a system for purifying and reclaiming water for other uses. This technology has been installed with individual building and district wide systems.



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**4.1.2 Energy Generation**

The Waterfront District provides a number of opportunities for energy generation. Many of these strategies may only contribute to small increments of energy production. A comprehensive energy policy should maximize renewable energy. New technologies will create additional opportunities to incorporate renewable energy in the future.

**Solar Power**



Power generation from photovoltaic (PV) cells is a mature technology being used throughout the world. Technological improvements continue to enhance the efficiency and reduce costs. A PV based district system would require large areas of land, this use should be prioritized for vertical surfaces. Federal, State and local incentives and tax credits provide typical payback times of between five (5) and ten (10) years. Resource maps indicate potential power generation of 3.5 – 4.0 KWh/m2/day.

**Ocean Power**

Tidal or wave power is an emerging field. There are several potential technologies that are being implemented around the world on an experimental and production basis. This is a renewable, low-impact technology. Some systems are visible above the water; other systems are anchored to the bottom and are not visible. These systems may not be feasible today due to regulatory and technological challenges. Since these technologies are placed off-site, they do not directly affect the master planning of the site. These concepts should be studied for use in the future.

### Geothermal Power

There are no known local resources of geothermal power in the area. As the site has contamination issues and capping the contamination is the most likely remediation strategy, these types of energy technologies may be precluded.

### Wind Power



Wind power is a mature technology using a renewable resource. The intermittency of wind can be an issue if it makes up a large portion of the total supply; it is less of a problem as a supplemental energy source. Because so much power is generated by higher wind speeds, much of the energy comes in short bursts.

Peak wind speeds also may not

coincide with peak demand for electrical power. Localized wind maps show the area around the waterfront as fair for wind power development. Large district type facilities have a significant aesthetic impact to consider.

### Micro Hydro Power

This technology would utilize the Lake Whatcom raw water pipeline for power generation. Previous studies have demonstrated some potential for this resource to be tapped for power production. These studies should be updated to reflect current technologies, costs and regulatory issues. Another technology related to this utilizes the inherent pressure and/or flows

within piped utility systems for power generation. Micro turbine generators are installed in conjunction with pressure reducing valves in water systems to generate electricity. These technologies recover energy normally lost, are small and unobtrusive and have no or low environmental impacts.

### Biomass Energy

This technology refers to carbon based materials that can be used as fuel or for the production of fuel. Anaerobic digesters, which break down biodegradable materials, yield organic wastes and methane which can be burned as a fuel source. Plants processed into ethanol through fermentation or distillation are typically categorized as biofuels. Biodiesel derived from plants or algae are also considered biofuels. Operation of these types of facilities requires a renewable supply of inputs or a dedicated waste stream from another process. Anaerobic digesters can utilize any kind of carbon based waste, the source materials would have to be separated and conveyed to the facility for processing. These types of facilities would require dedicated land area for equipment, storage areas for inputs and/or outputs and may require transportation of inputs and waste products.

### Mining Waste Heat

This technology refers to reclaiming waste heat from sewer pipelines and other waste heat sources. Waste heat is tapped to produce hot water which can be used to heat buildings.

## 4.1.3 Greenhouse Gas Emission Reduction Opportunities

Reducing greenhouse gas emissions (GGE) involves a complex and synergistic approach. The proposed development, compact, urban and dense, will reduce GGE from a traditional suburban development with low densities and required trips for jobs and services. Development in this area will link to downtown and strengthen the immediate vicinity with jobs, goods and services. Transit and non-motorized connections will substantially reduce vehicular trips for residents in the general

vicinity. Many strategies embedded in previous sections also directly contribute to reducing GGE.

Energy used for heating and cooling buildings is the single biggest contributor to GGE in the country. Any GGE reduction strategy should start with promoting high efficiency buildings and reducing or eliminating electrical energy used for thermal needs. Strategies, including green roofs, natural ventilation and solar orientation should be used as fundamental design principles. Our region is fortunate to have significant energy produced by hydro-electric power which is considered low or neutral for GGE. Maximizing energy production from renewable energy sources such as solar, wave, tidal, wind or biomass provide many benefits.

### 4.1.4 Wastewater Treatment

A newer treatment approach being implemented around the world is membrane bioreactors (MBR). The MBR in its present forms constitutes a complete plant for the treatment of sewage. The basic MBR consists of two processing steps - a bioreactor, in which aerobic bacteria digest organic material in the presence of dissolved oxygen, and a membrane module, in which relatively pure water separates from the suspension of organic matter and bacteria.

There are many reasons for utilizing this newer technology, some of the advantages over conventional treatment are:

- Improved water quality
- Allows wastewater reuse for irrigation, non-potable or potable needs
- Reduces wastewater discharge fees, potable water costs and preserves existing system capacities
- Provides water for non-potable applications where fresh water is in short supply
- Lowers capital costs in new systems
- Easily modified to expand treatment capacities, can be phased to match development
- Lowers operational and maintenance costs

The technology is still improving and greater use of these systems will help reduce the costs of imple-

mentation. Advanced treatment of the reclaimed water could also expand the potential uses. This technology may also become an energy generator in the future by converting from an aerobic digestion process to an anaerobic digestion process. Methane gas is produced from the anaerobic process which would fuel the process and generate surplus electricity. It is estimated that the energy content of typical sewage inflow is about five times the energy required to run the treatment process.

### 4.1.5 Stormwater Management

Stormwater collected from non-automobile related surfaces such as green roofs, sidewalks and public open spaces are generally cleaner and does not need much treatment for reuse. Stormwater collected from streets and parking lots typically contain higher concentrations of automobile pollutants. Reclamation and reuse of stormwater for irrigation and other non-potable uses such as toilet flushing would require collection and storage facilities. District type systems should be evaluated in comparison to individual building provided systems. District systems could be located in the right-of-way minimizing the need for additional land area. The soil environmental conditions may prohibit infiltration of stormwater on the site.



Water quality treatment options include mechanical filtration, vegetative filtration and higher technology membrane systems. Mechanical filtration utilizes catch basins and underground vaults for grit and pollutant separation. Vegetative filtration utilizes plants, soils, bioswales and biological processes to separate and absorb the pollutants. Membrane Bioreactor systems provides the highest levels of water purification for non-potable uses. Low Impact Development (L.I.D.) techniques utilize a combination of mechanical and vegetative filtration and infiltration to remove pollutants and manage stormwater.

A combination of these innovative sustainable systems will be evaluated for use in appropriate areas within The Waterfront District.