CIP 2010 Awards for Planning Excellence Submission: Olympic Village

Submitting Organization
The City of Vancouver in coordination with Millennium Water, the Vancouver Salt Company and the Consultant Team
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Olympic Village
Neighbourhood Planning

Summary

The Olympic Village is a sterling example of the City of Vancouver’s abiding commitment to the creation of sustainable, vibrant and livable communities. The newly constructed 2010 Winter Olympic Athlete’s Village comprises approximately 20% of the total 80 acres of SEFC land which historically was used for industrial purposes. These lands are one of the very last sections of Vancouver’s waterfront to undergo development and comprise both public and private land holdings. The Olympic Village went from Official Development Plan approval in 2005, site preparation and utility construction in 2006, building construction in 2007, and completion in November 2009. The City of Vancouver along with the developer completed a total of 1100 units of residential development with a 60,000 sq. ft. commercial village center, the restoration of the historic Salt Building and the construction of a 45,000 sq. ft. community and day care center. The Olympic Village achieves a high urban density for an inner city project constructed using a mid-rise format; it has a floor-area-ratio (FAR) of about 3.5 net on average across the sites;

Within this development, The City of Vancouver was responsible for the land assembly, planning, infrastructure development and the provision of 252 units of affordable housing as well as providing an overall community vision for the project. This vision included the creation of a socially integrated community; the impetus for the design and construction of a Neighbourhood Energy Utility; and the framework for the Public Spaces and Stormwater Management systems. The developer constructed the buildings, with the city negotiating and approving the design.

From the outset of the project, the commitment to develop the community to the highest standards of sustainable design was made by all parties. In February 2010, the Olympic Village was awarded the LEED (Leadership in Energy and Environmental Design) ND stage 2 platinum certification by the U.S. Green Building Council (USGBC) for a variety of factors, including its proximity to the downtown core, mix of uses, affordable housing, green buildings and habitat restoration. A total of 83 points were awarded (the highest number ever), leading the USGBC to name the Olympic Village “The Greenest Community in North America”. The Olympic Village also received points from USGBC for building the Neighbourhood Energy Utility, which is the City’s first renewable district heating system where all buildings are headed and cooled through sewer heat recovery. Points were also received for the “net zero building”, a building which produces as much energy as it consumes. In addition to the LEED Platinum certification for neighbourhood development, two buildings recently achieved LEED Gold certification, with more Gold and Platinum certifications expected to follow. This project is the largest assembly of LEED Buildings in the world. The City of Vancouver also committed to developing infrastructure in support of the Model Sustainable Community concept, introducing a significant set of design
principles focused on water distribution, storm water management, district energy, green space, transportation, and public facilities in support of this model.

The Olympic Village is a socially diverse and balanced community that includes:

- 188 units of Affordable housing developed by the City of Vancouver (designed and constructed for the City by Millennium SEFC Properties Limited), including both single and family accommodation in five buildings.
- An additional 64 units of subsidized Affordable housing for seniors in a building developed to a NET ZERO energy design standard (a building which produces as much energy as it consumes).
- A Neighbourhood Energy Utility, which is the City's first renewable district heating system,
- 110 units of Rental housing focused on market rents and owned by Millennium SEFC Properties Limited and providing a full range of accommodation from studio to two bedroom units.
- 738 units of Market housing in a range of sizes to accommodate all segments of the market.
- Community center with gymnasium, meeting rooms and exercise facilities
- A large day care facility with outdoor play space
- A facility in support of non-motorized boating which will be limited to the eastern reaches of the False Creek basin
- The restored Salt building - to be fitted out and used as a commercial center including a Brew pub, bakery, coffee plant and related commercial and retail spaces. The building will house an exhibit on the historic character of the neighbourhood.
- Retail focused on a Central Plaza within the village in order to generate a center of neighbourhood activity, including a mid-sized grocery store and community serving retail and services.
- An Experimental Urban Food Garden for the residents to explore opportunities and approaches to food production. The residential buildings also incorporate Urban Food Gardens for the residents.

The Olympic Village is a significant part of the overall Southeast False Creek Community plan, which at full build-out will be home to 12,000 to 16,000 people and will have six million square feet of highly integrated development. While maintaining heritage ties to the past, SEFC is planned as a global model of sustainable development based on environmental, social and economic principles where people will live, work, play, and learn. This complete community will ensure goods and services within walking distance and housing that is linked by transit an in proximity to local jobs.
Olympic Village
Neighbourhood Planning
Project Description

The Olympic Village (The home for athletes during the Vancouver 2010 Winter Olympics), is part of a larger overall development program initiated by the City of Vancouver and focused on the revitalization of the historic industrial lands on the South shore of False Creek. The area has played a significant role in Vancouver’s history - many key industries that helped build the city were located on or near this site. At various times over the last 100 years, sawmills, foundries, shipbuilders, railyards, metalworks, salt distributors, and warehouses have crowded the shoreline. Until recently, the Olympic Village was also home to the City’s public works yard (Cambie Yards).

The area is interconnected to the downtown core by mass transit systems at Main Street (the Expo Line) and the recently completed Canada Line at the Southern Cambie Street Bridge-head. The Olympic village completes the ‘living edge’ from Granville Island to the large residential development along Main Street that forms the eastern foreshore of the False Creek inlet.

The new community is linked into the Downtown Business and Entertainment core with two rapid transit lines, water based taxi services, an extensive seawall pedestrian and bicycle system, a streetcar link to Granville Island and a planned streetcar link past the Olympic Village to Science world, Chinatown, Gastown and back to the transportation hub at Waterfront Station. As a consequence, dependence on motor vehicle transportation has been significantly reduced.

Built Form

The building design for the Olympic Village was shaped by a key decision to not use the podium-and-point-tower hybrid building type found in many parts of Vancouver, seen across the water from the Village. The buildings are generally mid-rise, very urban (filling the block but with courtyards), often mixed-use with strong at-grade expressions that always “activate” and enliven the street, with the tallest buildings up to 12-13 stories. The project pushed the mid rise envelope while in some cases inventing new built-form types. Generally higher 11 ft floor-to-floor heights were used to accommodate the innovative radiant heating/cooling system in the ceilings. The circulation systems (hallways, stairs) were also made transparent as one approach to animating the public realm while also improving green/passive energy performance;
The Street grid for the Olympic Village involves an extension of the urban grid to the water, ensuring strong connectivity and urban integration when the larger area is eventually built-out. There are several innovative street right-of-way approaches including a typical width of 13 metres.

**Heritage Planning**

The Salt Building is a very significant landmark in the Southeast False Creek neighborhood. It is a heritage building located in the heart of the community on the NW corner of First Avenue and Manitoba Street. The Salt Building, which was built around 1930 to refine raw salt and converted in the 1980s as a paper recycling plant, has sat empty for a number of recent years. The Salt Building is interesting for a variety of reasons: its history; its location (which marks the original shoreline of False Creek); the fact that it is built on exposed timber piles; and its large, open interior, which is supported by elaborate roof trusses.

A foundation upgrade was completed and a basement was constructed at the north end of the building. The building was raised, rehabilitated, and the shell was upgraded for VANOC’s use as a social gathering place for the 2010 Winter and Paralympic Games. Following the Olympics, the tenant improvements will see the building used as a bakery, coffee shop, restaurant and brewpub.

**Public Realm**

Part of the success of the Olympic Village is due to the investment in the Public Realm. Extensive public realm improvements were completed and in some cases operational prior to the completion of the Olympic Village. A new 600 metre long waterfront path was built along the foreshore of the Olympic Village. It was a missing link in the seaside pathway system (Seawall) that links Vancouver’s entire inner waterfront from Coal Harbour to Kitsilano Beach. A second major feature of the development was the construction of a new island and intertidal fish habitat to allow for the re-introduction of native animal and plant species to the area. A third major feature of the development is the Olympic Plaza. Located within the centre of the development, it is proportional to the buildings that surround it, has activated edges through the use of adjacent retail, restaurants, and the seawall, and provides open views to the North Shore Mountains across the water. (Vancouver City Council recently approved a new view corridor from this plaza to the mountains).
Other improvements included:

- Separate paths for pedestrians and wheeled users
- Two pedestrian bridges
- 10 viewing platforms built at the water’s edge
- Planting of more than 200 trees along the waterfront path and on the island, plus planting of shrubs, perennials/groundcovers and grasses (most of which are native and drought tolerant)
- Planting of intertidal marsh plants on the island and foreshore
- Custom-designed benches and chairs
- Lighting on the walkways, pedestrian footbridge and viewing platforms
- Solar compacting garbage containers
- Public art integrated into the development, including a piece at the NEU Building that changes colour and brightness based on the energy use of the Village

Economic Sustainability

Prior to construction, a Community Benefit Agreement was signed between the City of Vancouver and the Developer. It was a contract that ensured that local community residents shared in the economic benefits associated with the development, and included the following:

- A legacy fund for an inner-city training program to develop pre-employment and construction skills, to provide job coaches, and to support employment retention;
- Over 100 inner-city residents were hired by the Olympic Village and their sub-trades, to work on the construction; and
- A goal to procure a significant portion of goods and services from inner-city businesses to build capacity and help create new jobs for inner-city residents.

The Olympic Village Community Benefit agreement was an important signal to companies that including the inner-city and aboriginal residents and businesses as part of their project can offer a business advantage. It was a great example of what happens when the City of Vancouver joins forces with a developer and community-based organizations to ensure that a community gets substantial economic revitalization support from the development of a project in their community.

Social Sustainability

The Olympic Village is meant to be a model for social integration and inclusion. Of the total 100 units within the development, 750 are market-rate condos, 110 are market-rate rental units,
and 252 units are proposed to be non-market social housing (188 units of social housing plus another 64 units for seniors). The 20% rate for social non-market housing is a target that has been included in many other developments within the City of Vancouver.

While the Public Realm provides an important component of social sustainability, giving residents access to green space and pedestrian opportunities, Urban Agriculture is a component of the entire design of the Olympic Village. Urban Agriculture has been integrated in the building and public realm design, based on design guidelines for urban agriculture that have now been approved for city-wide use;

**Environmental Sustainability**

The Vancouver City Council has designated the Olympic Village as a Sustainable Community with a series of design parameters and development strategies in support of this overall community objective. These objectives and strategies were developed in consultation with the broader community and the various professional groups involved with the conceptual planning of the project during the development and adoption of the Overall Development Plan (ODP). These strategies lie at the heart of the Regional ‘Livable Region’ plan and are focused on leadership towards a more sustainable urban community. The objectives outlined by the City of Vancouver included:

- A goal to achieve LEED™ Gold for all the buildings. All projects have achieved a significant improvement in energy performance than was originally targeted. The Gold designated buildings designed to a Gold rating are targeting 4 LEED™ energy points, while the buildings designed to a Platinum rating (the Community Center and NET ZERO seniors’ housing) targeting 10 Energy points.
- The elimination of potable water for irrigation and the use of plant species that would withstand the drier summer months typical of Vancouver’s climate.
- The use of energy supplied by the Neighbourhood Energy Utility based on Sewer heat recovery.
- The Application of Passive Design techniques in the planning and application of architectural and building systems, with incentives built into the zoning bylaw. Such incentives have since been translated into city-wide rules based on this model.
- The adherence to a Green Building Strategy developed by the City Sustainability Office and to be evaluated through application throughout the Millennium Water project. This strategy included:
  - Requirements for 50% Green Roofs throughout the building projects. This goal was exceeded -- plantings cover 57
percent of the roof area, or 3.5 acres.

- Requirements related to building envelop design and thermal performance
- Requirements related to water consumption and the application of low flow fixtures and dual flush toilets
- Requirements related to the use of Energy Star Appliances (meeting current North American Energy performance standards)
- Requirements related to exterior lighting and light pollution.

In February of 2010, the Olympic Village was awarded the LEED (Leadership in Energy and Environmental Design) ND stage 2 platinum certification by the U.S. Green Building Council (USGBC) for a variety of factors, including its proximity to the downtown core, mix of uses, affordable housing, green buildings and habitat restoration. The Olympic Village is only the second neighbourhood in the world to receive this level of certification.

**Implementation**

The Olympic Village was truly a partnership between the City and the Developer. The overwhelming response from the project team focused on the need for an Integrated Design Process with strong leadership working towards an established and common goal. The Olympic Village went from Official Development Plan approval in 2005, site preparation and utility construction in 2006, building construction in 2007, and completion in November 2009. It was then handed over to the Vancouver 2010 Winter Olympic Committee to serve the Olympic Program. The private condominium buildings will be returned to Millennium SEFC Properties in April 2010 and will be made available to the purchasers for occupancy in summer 2010. The City Affordable housing will also then be occupied by selected rental applicants.

**Observations for Future Developments**

The City of Vancouver gained valuable knowledge in city-building from the Olympic Village experience, some of which have translated into new opportunities for the City of Vancouver, but can also be translated into new developments worldwide.

The legacy of the Olympic Village at City Hall will be how it changed “business as usual” in many ways. The Olympics-driven timing challenged how the City of Vancouver regulates and manages the design process, as an expedited, dynamic approach to development and building design
review was needed while not slipping on ultimate quality. The goal was to do better than we had done before with other large development initiatives, and also do it quicker because of the Olympic deadlines. This required a much more integrated approach, with civic representatives spending much more time than usual in the design professional’s offices working iteratively.

The Olympic Village not only changed the process at City Hall, but also provided changes for future developments. For example, extensive passive design performance improvements were achieved in the buildings through exclusions to the floor-space maximums (a strong incentive, or at least the removal of a dis-incentive). Many such exemptions have now been or are currently being built into our city-wide zoning system as an innovation legacy (exterior hallways and stairs, thru-units and other natural ventilation designs, passive solar shading, thicker insulated walls, height exemptions for solar or green roof access, etc). As well, opportunities for District Energy were being incorporated into many developments prior to the completion of the Neighbourhood Energy Utility at Olympic Village, based on the knowledge gained through this process.

There were significant sustainable components that were implemented for the first time in Vancouver. This identified a need for significant capacity building within the industry to improve both design and technical construction knowledge. The success of this project is it provides a tangible example of success to show designers, developers and contractors that Green Building and Sustainable Community objectives can be achieved without significant premiums.

Coupled with this is the ability to exceed goals through the implementation process rather than scale back through the project’s construction. As indicated before, targets for LEED buildings were exceeded on many points throughout the process. While many projects get “scaled back” from their goals during the construction phase, Olympic Village realized through the process that the bar could be raised during construction. As an example, the buildings in the Olympic Village were only supposed to be designed to achieve a LEED Silver Rating. As the partners realized a higher goal could be realized, LEED Gold became the standard.

Finally, and most important -- The Olympic Village is now the new global model for sustainability and liveability. Green is obviously one big definition of success for the Athletes Village, but the quality-of-life and livability in the Village is a key indicator of success as well. It will be some time before the Village is operating as a “normal” community for such observations, but so far the first residents – the athletes themselves – commented via the media on how the Olympic Village met those goals. The eyes of the world were on the Olympic Village during the games. It was Lisa Rochon, architecture critic of the Globe and Mail that said it best -- “The Olympic Village is a serious urban accomplishment.”
CIP 2010 Awards for Planning Excellence Submission: Olympic Village

Supporting Documentation
**City of Vancouver Portfolio**

**FACT SHEET: JULY 2008**

**Southeast False Creek and the Olympic Village**

**Southeast False Creek**
- Southeast False Creek is the last remaining large tract of undeveloped waterfront land near downtown Vancouver.
- The site comprises 32 hectares (80 acres), of which 20 hectares (50 acres) are owned by the City. The remainder is privately owned.
- The site is bounded by Cambie Bridge to the west, Main Street to the east, and 2nd Avenue to the south.
- The site is divided into seven areas (see map). The Olympic Village accommodation will be located in Area 2A.
- Development of the remaining City land (Areas 1A and 3A) will continue on 2020. Development on some of the private sites (Areas 1A, 2A, 3B and 3C) is occurring prior to the 2010 Winter Games and will continue to 2020 and beyond.

**Olympic Village**
- Area 2A of Southeast False Creek is the first phase of City-owned land to be developed. It will become Vancouver’s Olympic Village for the 2010 Winter Games.
- Area 2A is about seven hectares (17 acres) in size. At Games time in 2010, all 20 hectares (50 acres) of City land will be used as the Olympic Village.
- Vancouver’s Olympic Village will comprise 18 permanent buildings in Area 2A, as well as temporary structures in Areas 1A and 3A. It will primarily be a residential community, but will also include an office, team facilities and commercial/retail space.
- The Olympic Village will house up to 2,400 athletes and officials.
- The Vancouver Organizing Committee for the 2010 Olympic and Paralympic Winter Games (VANOC) will outfit and operate the Olympic Village from November 2009 to April 2010.
- Site preparation, road construction and utility installation began in July 2006.
- All building and roadwork will be completed by November 2009.
- Crews have moved 800,000 tonnes of soil to date (about 14,000 truck loads).
CITY OF VANCOUVER

FACT SHEET: NOVEMBER 2005

Southeast False Creek
Seawall

Overview

The new waterfront path being built along the foreshore of Southeast False Creek (SEFC) Area 2A is about 600 metres long. It is one of the final pieces of a seamless pathway system that will follow Vancouver's entire inner waterfront from Coal Harbour to Kitsilano Beach, creating a scenic path for pedestrians, cyclists and wheelchair users.

To build the new island, wharves and pile, 42,000 cubic metres of material was removed from sub-foreshore and intertidal areas and replaced with about 60,000 cubic metres of imported crushed rock, cobbles, gravel, sand and boulders.

Construction Details

The new SEFC waterfront will include:

- separate paths for pedestrians and wheeled users
- two bridges: one, a 40-metre long steel truss bridge over the inlet with mid-span support and the other an eight metre abutment bridge over Kits Park seawall
- timber boardwalk around the inlet using Douglas Fir pressure-treated with waterborne AECQ process (complies with best management practices for the use of treated wood in aquatic environments)
- 10 viewing platforms built at the water's edge (aeros of timber and three using precast)
- granite seating blocks at the inlet and east foreshore
- structural soil cells to support growth of big trees
- planting of more than 200 trees along the waterfront path and on the island, plus planting of shrubs, perennials/groundcovers and grasses
- planting of herbaceous native plants on the island and foreshore
- architectural features such as benches, seating and lookouts reclaimed from on-site excavations
- custom-designed benches and chairs
- lighting on the walkways, pedestrian footbridge and viewing platforms
- solar compacting garbage containers

Phase 2 of Area 2A SEFC waterfront construction (which includes areas adjacent to the community centre, and connecting to Expo 86 dining) will start January 2009, and be completed September 2009.

TIMELINE

- Construction of Area 2A SEFC waterfront is divided into four distinct phases
  1. DECKING REMOVAL AND INLET REMEDIATION
     Waterfront construction started in January 2006 with removal of debris and fill followed by installation of a temporary cofferdam for inlet remediation
  2. SHEET PILE AND PIILINGS (island construction)
     Started in July 2006, and was completed in March 2007
  3. TOWNHOME DEVELOPMENT (planning, island construction, riprap placement)
     Started August 2006, and was completed February 2007
  4. WATERFRONT CONSTRUCTION (landscaping, bridge construction, and lighting)
     Started in May 2007, and Phase 1 will be completed May 2008
     The seawall path portion of Phase 1 work was opened to the public in December 2007

Phase 2 of Area 2A SEFC waterfront construction (which includes areas adjacent to the community centre, and connecting to Expo 86 dining) will start January 2009, and be completed September 2009.
Important Project Dates

- **July 7, 2009** — Vancouver was awarded the 2010 Olympic and Paralympic Winter Games. Southeast False Creek is shown as a future site of Vancouver’s Olympic Village.
- **July 2005** — Official Development Plan approved by Vancouver City Council.
- **January 2006** — Site preparation began.
- **March 10, 2006** — Ground-breaking ceremony.
- **October 12, 2006** — Oxide Village receives site approval at Public Hearing.
- **January 2007** — Excavation for building foundations began.
- **June 2009** — Construction of Olympic Village buildings started.
- **November 1, 2009** — City of Vancouver to hand over completed Olympic Village buildings to VANOC.
- **April 7, 2010** — VANOC to return the Olympic Village to the City of Vancouver.

**After the 2010 Winter Games**

- **After the 2010 Winter Games**, the buildings of the Olympic Village will become permanent residential housing, with a focus on housing for families.
- **Area 2A** is the first phase of a new mixed-use community, and will house approximately 3,000 residents in about 1,100 residential units (250 of which are affordable housing, and another 120 are rental housing).
- While retaining its role for the past, **Southeast False Creek** is planned as a model sustainable development based on environmental, social and economic principles where people are, work, play and learn. This community will provide goods and services within walking distance and housing that is linked by transit and a promenade to areas.
- **Area 2A** buildings will be a showcase of sustainable development designed to LEED® Gold with LEED® Platinum® for the community centre. These buildings will reduce waste, energy and water usage as well as provide opportunity for food production.
- **When fully developed**, Southeast False Creek will have 60 million square feet of development. This will include more than 5,000 residential units; a two-size community centre and non-motorized housing facilities; three to five licensed childcare facilities; two out-of-school care facilities; an elementary school; interfaith spiritual centre; restoration of five heritage buildings and 10 hectares (26 acres) of park.
- Shoreline works include a new habitat for a large marine mammal and duck, bridge, boardwalk, and seawall Greenway and Blouin way.
- Other unique features include urban agriculture, rainwater management, green roof and a neighbourhood energy system.
- By 2020, Southeast False Creek will be home to up to 15,000 people.
- LEED® is Leadership in Energy and Environmental Design, and is the North American standard for measuring green building performance.

**History**

The home of First Nations people for hundreds of years, False Creek was first visited by Europeans in 1859 when an English sea captain named Richardson ventured into the waterway thinking it would be a shortcut to Burrard Inlet. Disappointed, he named it False Creek.

Southeast False Creek has played a significant role in Vancouver’s history. Many key industries that helped build the city were located on or near this site. At various times over the last 100 years, sawmills, factories, shipyards, rail yards, metalworks, salt distribution, and warehouses have crowded the shoreline. Until recently, the area was home to the City’s Cannery Works Yard.
Southeast False Creek and Olympic Village

vancouver.ca/olympicvillage

March 27, 2008

CIP AWARD SUBMISSION | OLYMPIC VILLAGE
Key Performance Indicators

P1 Energy Consumption in Buildings
Millennium Water includes approximately 1.4 million sq. ft. of above grade residential and mixed-use development. The residential units are designed with an integrated heating and cooling system that combines together, neighbourhood energy supply, passive design, high performance building envelopes, radiant ceiling heating and cooling and integrated heat recovery and garage ventilation heat sinks. The fully integrated approach is expected to reduce energy consumption by 40%.

P2 Neighbourhood Use of Renewable and Waste Energy
The City of Vancouver implemented a Neighbourhood Energy Utility based on Sewer Heat recovery across the full SEFC planning area. This technology is based on extracting waste energy from the main downtown sewer and this heat source is backed up by natural gas fired peaking boilers that allow for alternate energy sources in the future - should natural gas supply and cost become untenable. It is anticipated that 65% of the energy requirements of the project will be provided from this renewable source.

P3 Housing Affordability
Millennium Water offers three housing types: affordable, subsidized by the City social housing program, rental – provided by Millennium under a 20 year agreement to maintain these units in a market rental pool and market housing with units ranging in size from 550 sq. ft. to penthouse accommodation at 3,500 sq. ft.

P4 Land Use Diversity
Millennium Water lands support a diversity of use – including private residential, affordable housing, commercial retail, potential live work, community amenities and public realm. The site also provides extensive park space and direct access to the waterfront.

P5 Proximity of Daily Destinations
The Millennium Water commercial center provides retail components that serve many of the daily community needs all within walking distance of all units. These facilities include grocery, drug and a range of small service retail stores including both mid and high range restaurant facilities. A full function Community Center is within walking distance to all occupants along with in-building amenity facilities.
P6 Jobs Proximity
SEFC is located adjacent to the central business district and is connected to the center of commerce by diverse public transit systems that involve involve approximately a 10-minute commute.

P7 Proximity to Civic Amenities
Millennium Water contains a full service community center with day care, exercise, meeting and boating center. All the major Vancouver Cultural facilities are within a 10-minute public transit ride of the project.

P8 Transit Supported Density
The project has a significant work force dealing with the Commercial component, the public amenities and service jobs related to the infrastructure. The surrounding transit systems support this work force with most of the travel routes being addressed by some form of public transit (as noted above).

P9 Transit Proximity and Quality
Millennium Water has direct access to five major transportation systems including: Skytrain to the east, the Canada line to the west, a proposed streetcar system running along 1st Avenue to the south, along with a bus route on 2nd Avenue. To the north the seawall links to the pedestrian and bike path system in conjunction with the water taxies across False Creek to the downtown commercial core.

P10 Pedestrian Route Connectivity and Safety
The Village includes extensive pedestrian and bike paths that link into the well established water front systems and the commuting pathways that link south and east. The public realm is developed with extensive natural stone paving material to improve quality and encourage pedestrian circulation.

P11 On-Site Stormwater Infiltration
The Project storm water management includes both permeable materials including green roofs, landscaped areas, park space and open pavers. Hard surfaces are connected into a storm water management system that collect and processes all storm water on site before any discharge into the False Creek basin. Building storm water is collected and stored and integrated with the use in irrigation, toilet flushing and cooling.

P12 Potable Water Use Reduction
The Village utilizes an extensive rainwater collection system that is used to offset potable water use. The buildings include low flow plumbing fixtures, dual flush toilets and rainwater use for toilet flushing and irrigation. Potable water use is reduced by approximately 40%.
P13 Tree Canopy Intensity
Historically during the industrial use of the site the entire precinct was treeless. The landscape planning has placed a strong emphasis on tree planting and the streetscapes have been developed to provide building shading along with aesthetically pleasing public walkways.

P14 Open Space Proximity and Quality
A strong emphasize has been placed on creating open space with community amenities to offset the density of the zero lot line residential buildings. The site contains 1.5 hectares of open public space and all dwelling units are within 400 meters of these spaces.

P15 Natural Habitat Protected, Restored, Enhanced or Created
The City of Vancouver implemented the design of the Habitat Island set within False Creek that significantly enhanced the natural foreshore habitat. The Hinge Park provides a significant wild life and waterfowl refuge that will encourage the return of birds and other wetland inhabitants.

P16 Agricultural Land Maintained or Enhanced
There was no agricultural land in the precinct – as such agricultural land has not been retained. The City is developing a large Experimental Garden precinct to the west of Parcel 4. This will be available to the community and the adjacent school (when constructed) to experiment with food production potential within the project.

P17 Access to Locally Produced Food
The City will encourage locally grown food consumption from the local farmers markets, and will provide lands as noted for the production of food on site. The individual suites have access to food production gardens located within the site.

P18 Watershed Protection
The City of Vancouver’s infrastructure design provides extensive protection of the existing False Creek basin and the surrounding Watershed through the implementation of appropriate run-off controls and edge treatments along with extensive ecological restoration of the industrial landscape.
Integration of building systems

The Southeast False Creek Millennium Water Olympic Village project began with an Integrated Design Workshop attended by some 120 interested contributors and members of the project team – including the design team, the builders and the approving authorities. This group also drew from community based expertise in the planning and implementation of Sustainable Communities and Green Building design. The workshop was facilitated by Canadian Mortgage and Housing Corporation (CMHC) and orchestrated by Vancouver’s Lighthouse Sustainability Center working with Bill Reed as the chair. The participants attended an extensive briefing on the history and background and the City of Vancouver expectations for the project before being divided into select groups to focus on a range of key issues. From these ‘blue sky’ sessions, a series of Key Objectives and Key Performance Indicators were established and the teams went on to evaluate how each strategy might integrate into a collective approach to the development of the community.

It was recognized from the outset of the project that the objectives would only be achieved through a fully integrated approach that began with innovative attitudes to site planning, site infrastructure and passive design and was then followed by the development of building designs and systems that built on the basic integration with the site wide infrastructure. Keeping in mind that the aspiration was to embrace environmental stewardship along with social stewardship and financial sustainability.

This approach could only be taken given the City of Vancouver’s commitment to the development of the Neighbourhood Energy Utility and the further application of innovative approaches to storm water collection and treatment. Further, the City committed to a new form of development not previously applied in Vancouver that essentially followed the more traditional European city planning model of zero lot line mid rise development with inner block courtyards. This model of development gave direction to the development of more socially integrated living environment supported by carefully manicured public spaces and recreational amenities that would support the higher densities.

The planning process embraced the need to fully integrate the key land use parameters with the transportation opportunities and to build on the integration of storm water treatment with the public parks and recreational facilities.
Throughout the planning and design the City planning team and Millennium’s consultant team worked to explore, develop and implement design solutions that focused on integration across the six themes of energy, land use, waste water, transportation, the natural environment and financial stability. In particular:

- The land use integration focused on the relationship between the residential opportunities and the employment in the downtown core – supported by the transportation opportunities that exist and that are planned for the site. There are multi modal connections for both public transit, bicycles, pedestrians and water born transit that all interconnect with the site – directly into the downtown commercial core.

- Housing choices and distribution across the site focus on the creation of a diverse and multi-level social community with ample provision for children, seniors and families. The building designs do not distinguish between these housing types and considerable care has been taken to create a diverse and highly articulated architecture that creates a sense of mixed and dynamic community.

- The infrastructure provided by the city and focused on the provision of District Energy and local stormwater run-off provided opportunities within the buildings and public spaces for innovative and sustainable solutions. The Thermal Energy Utility allowed the building designers to evaluate and apply low temperature radiant technologies that advantaged the efficiencies available across the site. Building on the use of passive design as a means of controlling energy and resource consumption.

- The redevelopment of the natural environment - long destroyed by the industrial past, allowed the development of natural bioswales for the treatment of stormwater run off. Further the historic shoreline was enhanced through the development of a new island habitat for wild life – to replace shoreline lost to infill along the seawall edge of the Olympic Village site. This Habitat island has already drawn spawning fish and BC birdlife to its shores.

- Within the buildings the key environmental drivers have been carefully integrated to provide a solution that optimizes both energy consumption, while providing the highest possible level of individual comfort. These systems combine together passive approaches to form and function while improving building envelope performance, and installing systems with multiple levels of control that respond directly to occupant comfort needs.

- The design also fully integrates the use of Green roofs to reduce heat island impacts while using rainwater run off from these areas to significantly reduce potable water consumption. Stored rainwater is used for toilet flushing and is integrated into the evaporative cooling ponds that modify the internal courtyard environments.
• The Parkade Exhaust systems are integrated into the waste heat recovery and cooling systems and this heat is used to precondition the potable water used for domestic consumption. This system integrates four different functions together - parkade ventilation, cooling heat sinks, cooling heat recovery and domestic hot water.

Each of the systems provided has an aggregated impact on the financial performance of the building systems and on the longer term costs to the occupant. While at this stage in the evolution of Sustainable Community building the capital cost has been higher than the cost of conventional construction, much of this cost can be attributed to the learning curve and knowledge building amongst the design team and the general contractors and trades. It is anticipated that the type of assessment and knowledge sharing available through the Challenge Series (www.thechallengeseries.ca) will ensure that greater financial benefits accrue to the developer, builder and owner as these technologies become more integrated and interdependent.
Project Images: Overview of Site

Aerial image of the City of Vancouver. The Southeast False Creek development area, totaling 65 acres, is shown in pink.

Illustrative plan for Southeast False Creek, updated June 2009. From the Southeast False Creek Official Development Plan.
Project Images: *History of Site*

Arial photo of Southeast False Creek (circa 1945). The industrial history of SEFC included a prolific shipyard at the site.

A glimpse into SEFC's shipyard viewed from the Northeast Shore of False Creek (1945)
Project Images: *History of Site*

Industry leaves SEFC. The retreat of industry from SEFC left much of the land in disuse. Community Initiative and guidance from the City of Vancouver drove the desire to reclaim these central lands.
Project Images: Site before work commenced

Charting Potential: The SEFC Site prior to development. Image looking south onto unused brownsite.

The SEFC site prior to development looking north to False Creek, Downtown Vancouver, and the Northshore mountains.

From the ghosts of industry past: the Vancouver Salt Building, erected in 1930, was left as a remainder of the site’s previous industrial role and as a mark of the historic shoreline of False Creek.

Underutilized waterfront space at the SEFC site prior to development.

A history of industry left a heavy footprint of contamination on the soil of SEFC.

Going from industry to community: rectifying mistakes of the past for future promise. Initial development stages involved extensive, and essential site remediation.
An illustrative plan of the Olympic Village by landscape architects Durante Kreuk highlights the intensity of vegetation on the rooftops throughout the site. Combining intensive and extensive green roofing, fifty percent of the overall area is vegetated.
Project Images: Passive Design Elements

Elements of passive design used at Millennium Water SEFC.

Top Image from Left to Right:
- ORIENTATION The first step to passive building design is understanding the parameters of the building site. Taking into account the relationship between the path of the sun and a building’s form is a priority. This diagram illustrates the climatic variation on each side of a building’s façade (in the northern hemisphere).
- SHADING DEVICES Shading devices can be designed to block the sun’s rays to avoid overheating in the summer (when the sun is at a high angle) and to allow the sun to heat the building in the winter (when the sun is at a low angle).
- EXTERIOR VS INTERIOR SHADING The choice of shading devices can greatly affect a building’s cooling capacity. Shades on the exterior of a building block the sun before it meets the building envelope. Interior shades allow the sun’s energy to penetrate the window, heating up the building’s interior.
- CROSS-VENTILATION Cross-ventilation is a cheap and simple way to ventilate a building with fresh air. It can also be implemented as part of a passive cooling strategy.
- ENVELOPE AND INSULATION A building must have a well-insulated envelope to perform well in terms of energy efficiency. Effective wall assemblies and insulation prevent heat and moisture diffusion. Windows and window frames must be selected and installed efficiently in order not to compromise the envelope’s overall performance.

BUILDING MASSING AND ORIENTATION The total surface area of the envelope will determine the efficiency of a building. The more surface area, the more opportunity for heat loss or excessive heat gains through the envelope.
Project Images: *Building Architecture*

View of the Millennium Water site as it nears completion

Parcel 6

Parcel 6

Parcel 9

Parcel 11: The Community Centre

Parcel 5

Parcel 10
Project Images: Building Architecture

The level of detail and planning invested in Olympic Village building landscapes is evident as one views the courtyard of Parcel 6.

Constructed from a piece of traditional storm sewer pipe, the curious tunnel bridge at Hinge Park brings stormwater infrastructure typically hidden from the public eye.
Project Images: *Salt Building restoration*

The restored 1930 Salt Building facing the public ‘shipyard’ plaza.

Salt Building wooden interior structure.

The ship rib light fixtures surrounding the public plaza.
One of the hallmark projects of the Olympic Village is the seniors’ affordable housing project that is targeting Net Zero annual energy use. This is the first multi-unit residential building in Canada to pursue Net Zero, and a huge step toward the City’s ultimate goal of carbon neutral buildings. The SEFC Net Zero building will achieve its goal through a comprehensive approach to energy use reduction in combination with heat recovery and renewable energy systems. The building will be heated using waste heat recovered from an adjoining grocery store. The remainder of the building’s energy use will be offset through the production of hot water using roof-mounted solar thermal technology.
Project Images: *Energy Centre*

The False Creek Community Energy Centre, nestled under the Cambie Street Bridge

The artists’ rendering of the Energy Centre’s sculpted stainless steel hand. The fingernails are LED lighting fixtures that will change colour to reflect the amount of green energy being produced by the system.

Artists renderings of the Energy Centre
Project Images: *Community Centre*

From early scale models to laying the sod on the green roof, the community centre becomes a reality. The building is aiming for LEED Platinum Certification.
Project Images: Waterfront Development and Hinge Park Plans

Artist's rendering of the waterfront at Southeast False Creek showing Habitat Island (far left), the "Canoe" bridge (centre), and mixed shoreline including seawall, boardwalk, and areas for pedestrian water access.

Hinge Park becomes a reality, from sketches to illustrative plans to construction photos. The wetland will remediate stormwater with its winding channels and plantlife. An elementary school and community demonstration garden will be built adjacent to the park.

An illustrative plan of the Community Centre highlighting access to the waterfront and the non-motorized boating facility. The west end of the centre will house a waterfront restaurant. The daycare facility will include a play area on the roof, overlooking False Creek.
Project Images: *Waterfront (Seawall)*

Views of the Southeast False Creek seawall.
Project Images: Waterfront (Pedestrian Bridge)

A signature installation along the waterfront, a 40-metre pedestrian bridge frames the tidal amphitheatre. The Canoe Bridge is designed to evoke the ribs of canoes and kayaks, celebrating the non-motorized boating area to its north. Its walkway is steel grating, allowing views to the water below, and creating fewer shadows on the water to maximize habitat value.

Vancouver Mayor Sam Sullivan officially opened the new seawall on May 28th, 2008
Project Images: Waterfront (Ampitheatre)

“It’s artful, capricious, fun to the senses, beautiful. The landscape architecture of the Olympic Village waterfront is a thousand times more progressive than other waterfronts we’ve done.”
Larry Beasley, former Director of Planning, City of Vancouver
Project Images: *Waterfront (Habitat Island)*

Habitat Island was constructed to make up for habitat that was lost when another area of the False Creek shoreline was filled to enable development. The island includes vertical snags, native vegetation and a natural shoreline, which have attracted bald eagles and a variety of waterfowl.
Project Images: *Public Spaces*

A wetland winds through it, with songbird houses and places where kids can clamber on rocks and poke in mud.
Many artifacts relating to these industries... are of considerable heritage value. They evoke the experience of working here, where big machines shifted and sorted materials, engines roared and gears complained... In the 1950s, 5 per cent of Vancouver’s work force, or 7,400 people, worked in industries on False Creek. The power of these in situ artifacts to evoke the experience of work is very important; they provoke us to think about what kind of work was done here, how it got done, and who did it.

Foreshore Lands Statement of Significance, 2004
Project Images: *Pocket Park Concepts*

Pocket Park is designed for families, offering opportunities for imaginative play without formal playground equipment. The original Camron gantry crane, painted yellow, will be installed overhead to recall the site's industrial heritage.
Project Images: Plaza Concept

A vibrant commercial focus along Manitoba Street from First Avenue to False Creek is to act as a “heart” for the community, anchored by the Salt Building... and a community square. SEFC Official Development Plan

Top: Concept sketches show the mid-size grocery store and community-serving retail and services that will open onto Shipyard Plaza. Buildings feature arcades (recessed storefronts), creating a variety of public walking and gathering spaces.

Left: Illustrative plan of the public plaza. The curves rise naturally as the landscape grade changes, creating seating areas. The plaza features granite pavers and is permeable, allowing absorption of stormwater. A children’s water play area is located at the plaza’s north end.
Project Images: Plaza Construction and completed details

The Shipyard Plaza recalls a huge lofting floor, with sweeping lines on the pavement outlining various sections of a ship’s hull. Elsewhere throughout the village, inset lines in paving surfaces will mark the locations of the False Creek shoreline as it shifted over time.
Project Images: Children’s Playgrounds and Details

Rooftop amenities: From green roofs to playgrounds

Big Belly solar trash compactor installed on the SEFC Seawall.
Project Images: Seats at Waterfront

Views along the seawall at Southeast False Creek, including granite block amphitheatre, solar-powered trash compactors, stepping stones to Habitat Island, naturalized shoreline sections and oversized "gull" chairs on boardwalk.
CIP 2010 Awards for Planning Excellence Submission: Olympic Village

Additional Supporting Documentation

Education and Capacity Building:
The Challenge Series from Chapters 1 to 6 (bound separately)

News Publications:
Going for the Gold: Sewage Heat Recovery System to serve Olympic Village

World Class Innovation Showcased in Olympic Site
Education and Capacity of Building

The **Challenge Series** provides a thoughtful and educational review of **SEFC** and the **Millennium Water** Project. This evaluation and analysis is focused on the key development ‘stories’ that underlie the initiation, design and construction of this unique community that is making serious strides towards sustainability. Each story captures the essence of the development program and the technical resolutions that make the Olympic Village a model of sustainable development. The Challenge Series is designed, produced and distributed under a participant sponsorship program, drawing on the knowledge and expertise of the design team, the municipal authorities and the construction firms responsible for the delivery of the project. The circulation includes members of the design community, real estate developers and marketing teams, municipal authorities, government agencies and construction and manufacturing agencies associated with the real estate industry both in Canada and around the globe.

The ‘case study’ documentation is available in printed format suitable for assembly into a comprehensive record of the project, and in various electronic media – including web page access, email circulation, and presentation formats suitable for discussion and educational activity by those providing sponsorship.

The Chapter titles are illustrated in the six Front Cover illustrations provided here.

To date the web page at www.thechallengeseries.ca has received some 36,500 page views from 12,100 individuals from 91 countries, and promises to be a major focus of the National and International media during the 2010 Olympics in February 2010 - as interest in Vancouver’s commitment to **Sustainable Communities** and **Green Capital** draws media attention.
THIRD QUARTER 2008

Vancouver's Olympic Village Converts Sewage to Energy

Connecting Indy's New Midfield Terminal

Malaysia's Gas District Cooling

TECO Prepares for Future

Time to Look at Biomass?

Bioenergy at Work

Annual Conference in Review

International District Cooling Conference Preview

and more...

INTERNATIONAL DISTRICT ENERGY ASSOCIATION

www.districtenergy.org
Going for the **GOLD:**

Sewage heat recovery system to serve Olympic Village

The waterfront community of Southeast False Creek (outlined in yellow) will contain the Vancouver Olympic Village, which is now under construction. Scheduled to be completed by Nov. 1, 2009, the Olympic Village will be used by the Vancouver Organizing Committee for the Winter Games, then returned to the city of Vancouver as market and social housing.

Chris Baber, MEng, Project Manager; Southeast False Creek Neighbourhood Energy Utility; Richard Curren, MEng., Vice President, FVB Energy Inc.

The world will be coming to Vancouver, B.C., for the 2010 Olympic and Paralympic Winter Games, when more than 5,000 athletes from 80-plus countries will compete for medals in 86 sporting events. Athletes will be lodging in the Olympic Village, located on the shores of southeast False Creek near downtown Vancouver. Southeast False Creek is an 80-acre historic industrial brownfield site that is being developed as a mixed-use model community based on environmental, social and economic sustainability principles. Upon completion of the Olympics, Southeast False Creek residences will be converted to long-term market and social housing. This complete mixed-use community will be developed to encourage walking, cycling and transit use as alternatives to the automobile to link residents with goods, services and workplaces. The community design will minimize environmental impacts associated with energy use, provide water use and storm water management; it will also include green spaces suitable for urban agriculture. Southeast False Creek will eventually contain 6 million sq ft of development and be home to 16,000 people.

A key component of this sustainable community is a district energy system that will provide space heating and domestic hot water to all buildings in the Southeast False Creek and Olympic Village development. The first phase of the system will utilize raw sewage to provide 70 percent of the space heating and domestic hot water requirements of Southeast False Creek and the Olympic Village. This system will utilize raw sewage to provide 70 percent of the space heating and domestic hot water requirements of Southeast False Creek and the Olympic Village. There is also strong potential for the district energy system to be expanded into areas north and east of Southeast False Creek to serve new development that will begin post-2010. While sewage heat recovery will be explored as an option for these areas, other technologies will be looked at as well, including compact bioenergy and biomass combustion or gasification.
‘Neighbourhood Energy Utility’

Vancouver’s city planning philosophy is to create a great city of communities that cares about its people, its environment and the opportunities to live, work and prosper. Thus, the city of Vancouver refers to its district energy system as the ‘Neighbourhood Energy Utility’ (or NEU), a term that reflects its strategy of neighborhood-focused planning.

The first phase of NEU development will use untreated municipal sewage as the main heat source, tapping a renewable, locally available source of energy. It will be the first of its technology in North America, and one of only four such projects in the world. The NEU will also utilize heat from rooftop solar panels located on three Olympic Village buildings.

The primary objective of the NEU is to reduce greenhouse gas emissions while providing a service that is cost-competitive with conventional electricity and natural gas sources of heat and hot water. Secondary objectives include reducing local airshed combustion-sourced pollutants; decreasing dependency on fossil fuels; developing innovative technology that can be replicated elsewhere; lowering electricity demand and developing flexible infrastructure that can adapt to technology advancements; and future-proofing the new neighborhood against energy price fluctuations and supply limitations.

Sewage waste heat will be recovered at the Southeast False Creek Community Energy Centre. The Energy Centre will be designed as an interpretive facility to showcase the innovative use of sustainable technology and is expected to achieve Leadership in Energy and Environmental Design (LEED®) Gold certification.

From the Energy Centre, a network of underground pipes will deliver the heated water to Southeast False Creek buildings. The system, when completed in September 2009 (Table 1), will produce heat at a cost that is competitive with traditional building heat and hot water systems, but in a more sustainable manner: Greenhouse gas emissions will be significantly lower, and the NEU will have the long-term flexibility to adopt new alternative heat sources to keep...

Table 1. Vancouver’s ‘Neighbourhood Energy Utility’ System in Southeast False Creek.

<table>
<thead>
<tr>
<th>Month</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2005</td>
<td>Southeast False Creek Official Development Plan approved with sustainable community design objectives</td>
</tr>
<tr>
<td>June 2005</td>
<td>Feasibility study initiated</td>
</tr>
<tr>
<td>March 2006</td>
<td>Decision made to develop Phase 1 of Neighbourhood Energy Utility</td>
</tr>
<tr>
<td>August 2006</td>
<td>District heating pipe construction begins</td>
</tr>
<tr>
<td>June 2007</td>
<td>Community Energy Centre use of sewage heat recovery design begins</td>
</tr>
<tr>
<td>June 2008</td>
<td>Construction of energy transfer stations begins</td>
</tr>
<tr>
<td>August 2008</td>
<td>Construction of Community Energy Centre begins</td>
</tr>
<tr>
<td>September 2009</td>
<td>Phase 1 development of NEU complete</td>
</tr>
<tr>
<td>November 2009</td>
<td>VANOC takes over Olympic Village buildings to prepare for Olympics</td>
</tr>
<tr>
<td>February 2010</td>
<td>Winter Olympic and Paralympic Games</td>
</tr>
<tr>
<td>March 2010</td>
<td>Permanent residents move into Olympic Village</td>
</tr>
</tbody>
</table>

Historic Southeast False Creek

Southeast False Creek (SEFC) is located adjacent to downtown Vancouver, across the bay from False Creek North, the high-density residential development that now occupies the former 1986 Olympic Fair site. Beginning in the mid-1800s, this former tidal marsh began attracting heavy industry and was soon the city’s industrial heart. Thousands of people worked in the area’s factories, lumber mills and rail and shipbuilding yards. After World War II, the False Creek industries gradually faded away. While the last industrial coal left in the late 1990s, a legacy of contaminated water and soil and dilapidated structures remained.

As early as 1991, the Vancouver City Council recognized the opportunity presented by SEFC and the need to take a leadership role in protecting this environment. The council directed that SEFC be developed as an energy-efficient community. Further guidance came through the public process that evolved from the development of the South East False Creek Policy Statement in 1999, which identified SEFC as a model for urban sustainable development.

This goal happens to be in keeping with the Vancouver Organizing Committee’s commitment to sustainability in the construction of new facilities and other preparations for the Olympic Games.
Innovative, Integrated Solution

The NEU will be a fully integrated renewable energy solution (Fig. 1) that will deliver two key elements of innovation: (1) the recovery of waste heat from untreated sewage in a municipal pump station and (2) the use of thermal net metering technology that allows for customer-generated thermal energy to be returned to the NEU system and redistributed to the wider neighborhood.

Thermal energy will be captured from raw sewage by the integration of a screening and heat exchange process into a new municipal pump station. Heat recovered from sewage will be used to provide the space heating and domestic hot water to the neighborhood. Similar to a geothermal application, heat pumps will be used to boost temperatures from the warm sewage supply to a higher temperature range useful for space heating and domestic hot water. However, sewage heat recovery will have efficiency and cost advantages when compared to typical geothermal installations, due to the following:

1. In Southeast False Creek, the annual sewage temperature averages 18 degrees Celsius (64.4 F), more than 10 degrees Celsius warmer than the ground temperature. This results in a greater efficiency of the heat pump system. More heat is produced for every unit of electricity required to run the heat pump.
2. The NEU will make use of a direct heat exchange process between the source sewage and the heat pump. In fact, sewage will pass directly through the heat pump evaporator. In contrast, a geothermal application typically relies on an intermediary glycol loop that moves heat between the ground and the heat pump system. Direct heat transfer from the sewage results in greater efficiency due to the avoidance of heat losses associated with secondary loops, plus the avoidance of electricity required to pump the glycol intermediary fluid. In addition, the high capital cost and the need for large open spaces for geothermal ground well fields is avoided through the direct transfer approach.

Sewage Heat Recovery Worldwide

It is important to note that there are a number of sewage heat recovery facilities operating worldwide that recover heat from treated sewage, as opposed to raw sewage in this case. The treated sewage heat technology avoids the need for the removal of sewage solids. However, the challenge that limits the use of such technology is that...
Net Thermal Metering

In the first phase of development, the NEU will receive excess heat generated by solar thermal modules located on the rooftops of three Olympic Village buildings. These modules will supply thermal energy to tenant buildings for space heating, domestic hot water, and in some cases, absorption chilling. Excess heat produced by these solar installations will be distributed to the wider neighborhood, enabling greater utilization of the solar energy.

NEU energy transfer stations, located within customer buildings, will be designed to both supply and receive energy, returning excess customer-generated heat to the NEU distribution pipe system. The NEU Energy Centre will in turn receive and redistribute this heat to the neighborhood. This net metering technology is not limited to solar thermal energy, as it can readily accept heat produced by a variety of existing and future building-scale thermal energy microgeneration technologies.

This technological approach is transferable to any location where a building with thermal microgeneration facilities is connected to a district energy system. With the growing demand for net zero type buildings that produce as much energy as consumed, it is expected that the thermal net metering technology being utilized in Southeast False Creek will be used in other jurisdictions. At the time of this writing, one additional Southeast False Creek land developer was making an inquiry into using this technology to return surplus heat generated from solar thermal collectors (for a swimming pool) to the NEU.

Sewage treatment facilities tend to be far removed from the urban areas that would serve as customers for the heat. The NEU will benefit from the use of raw sewage due to the proximity to the new residential development, and raw sewage tends to be of higher temperature than treated sewage, which experiences temperature losses through the transmission and treatment processes.

Technology vendors have developed in-pipe heat recovery systems to extract heat from raw sewage. The city of Vancouver investigated the potential use of these systems and found them to be unable to extract adequate heat energy from the sewer system, with suboptimal efficiency and high capital cost. In addition, further efficiency losses were predicted based on energy inputs required to pump flow through secondary loops. The capital costs of installing several hundred meters of in-pipe heat exchangers made the option cost-prohibitive for the NEU’s utility-scale heat requirements.

Worldwide, there are three facilities similar to the NEU that extract heat energy on a utility scale using a direct-transfer approach from raw sewage. Two of these facilities are in Oslo, Norway, and one is in Tokyo, Japan. The first Oslo plant was commissioned in 1991 and the second one in 2006. The second facility used a similar design approach to the first, validating the technological model of direct heat transfer from raw sewage. (See the article “Flush With Success: Novel sewage-to-energy system in Oslo” in First Quarter 2007 District Energy magazine.)

In North America, numerous municipal and commercial institutions are currently exploring the implementation of raw-sewage heat recovery systems. Requisite conditions for its implementation include the availability of adequate sewage flow and a district energy system to receive the heat. Neighborhood-scale developments that require the installation of new municipal infrastructure tend to be ideal candidates for the implementation of this technology. It can be integrated at an affordable cost into the new municipal sewage pump stations that are typically required for such developments, and the heat distribution infrastructure can be installed cost-effectively when coordinated with other street and building works.

The primary challenges associated with the implementation of NEU-scale sewage heat recovery systems include:

1. Management of sewage solids and biofilms. The NEU design team will use a pretreatment and cleaning system modeled on the success of similar installations in Norway and Japan.
2. Need for district energy infrastructure to make technology economically feasible. District energy systems are becoming more commonplace in North America. This is because it is virtually impossible to cost-effectively achieve efficiency and greenhouse gas emission targets in neighborhood-scale developments without district energy infrastructure. This has led to greater interest in sewage heat recovery and other renewable sources of energy that could not otherwise be used without a district energy system.

Environmental Impacts

The development of the NEU will benefit air quality resulting in significant reductions in combustion byproduct pollutants, including nitrogen oxides, sulfur oxides, carbon monoxide and particulate matter. This is because the NEU will eliminate the need for individual buildings in Southeast False Creek to have any combustion boiler systems.

In Canada, the backbone of any sustainable community is district energy.

Table 2 tabulates the reduction in emissions that will be realized as the result of establishing the NEU to provide space heating and domestic hot water for buildings in Southeast False Creek. Because there is no universally accepted standard for the calculation of greenhouse gas emissions for electricity consumed in British Columbia, projections have been provided for three different greenhouse gas calculation methodologies.

In the absence of the NEU, each building development in Southeast False Creek would be responsible for its own heating and domestic hot water systems. Traditionally, heating systems are installed by developers and owned and operated by the ultimate building owners. Under the status quo, the majority of heating would be met by electricity and smaller proportion with natural gas. The business as usual (BAU) benchmark for this evaluation of environmental impacts is as follows:

- One hundred percent of commercial and institutional buildings would be heated with natural gas.
- Multi家庭 residential construction, domestic hot water and makeup air...
London 2012: District energy/CCHP the winning choice

In 2012, London will host the Summer Olympic and Paralympic Games, and when it does, the Olympic Park and Stratford City development where the Games take place will be served by trigeneration district heating, district cooling and power. Announced in July, Eleya, a subsidiary of Suez Energy Services, was awarded the contract to build, finance and operate two Energy Centres and the distribution network supplying these venues and the Legacy communities that will develop after 2012. The Energy Centres will include a combined cooling, heating and power plant that will be equipped with biomass boilers using sustainable biomass fuels and natural gas to generate the heat. These technologies will help Britain’s Olympic Delivery Authority achieve a 20 percent reduction in carbon emissions.

Sustainable communities need to set a goal of being energy-self-sufficient. The use of a locally available resource (like raw sewage) to provide the majority of the thermal energy to the system is key to achieving this goal. The Southeast False Creek system will be the first in North America to recover waste heat from municipal sewage.

It is also important to note that the Southeast False Creek district energy system is a stable, long-term investment for the city of Vancouver that will reduce greenhouse gas emissions by more than 50 percent. As it has been proven in Europe several times over—and as it will be proven in Vancouver as well—district energy is the link between economic, social and environmental decision.

Chris Baber, P.Eng., represents the city of Vancouver as the project manager for the Southeast False Creek Neighborhood Energy Utility. He has a degree in environmental engineering from the University of British Columbia and is a practicing professional engineer. He may be reached at chris.baber@vancouver.ca.

Richard Damour, P.Eng., MBA, is a vice president with PVE Energy in the company’s Toronto office. He was the team leader for the initial studies that developed the sewage heating concept for Southeast False Creek. A registered professional engineer in the province of Ontario, Damour earned an MBA from the University of Western Ontario. His email address is rdamour@pveenergy.com.

WE NEED THE FACTS TO MAKE THE CASE.

IDEA Carbon Assessment Survey—August 2008

IDEA will be contacting meter systems to collect data on annual fuel use, efficiency and system configurations to assess the impact on the district energy industry of pending greenhouse gas emissions legislation.

Your prompt participation is very important and greatly appreciated. When IDEA calls, please respond. Because we need the facts to make the case.

Questions? Contact Rob Thornton at (508) 366-9339, rob.idea@districtenergy.org.
Innovation
Southeast False Creek
Lauren Woolstencroft
Going for Gold
The Richmond Olympic Oval
World Class Innovation Showcased in Olympic Site

Jean Sorraan

The Southeast False Creek (SEFC) project, which includes the Olympic Village development, will showcase some of BC’s most innovative engineering on one unique site. The development, planned during the early 90s as a model and futuristic community, includes three new areas: a neighborhood energy utility (NEU) that will use renewable energy to generate heat, engineering expertise in the village buildings and surrounding area, and, finally, the transformation of former industrial areas into a stunning pedestrian and bicycle path with a nature island.

"I am told this is the largest residential development in North America," says Rob Leh, Chair of Vancity. Vancity’s Manager of Engineering for Southeast False Creek & Olympic Village, SEFC is the last remaining large tract of undeveloped waterfront land in downtown Vancouver with the site comprising 13 hectares (32 acres) of which 20 hectares (50 acres) is owned by the city. Construction on the city-owned land is currently focused on the seven hectares (17 acres) that will form the housing for the 2010 Olympic and Paralympic Winter Games and a mix of market and non-market housing and commercial space afterward on the SEFC land parcels owned by the
city, there were an additional 30 acres of land held by private developers. When the 80-acre site is built-out, it is estimated a total of 16,000 individuals will live in what is expected to be one of North America’s first LEED neighborhoods, a designation that is underway in pilot studies in Canada.

The engineers within the site—from the self-consuming garbage canoe to the Lesbian way of capturing waste heat from sewage—will create a new vision of how Vancouver residents live and move forward into a world where conserving resources and limiting mankind’s ecological footprint is a primary consideration.

From Waste to Warmth

The neighborhood energy utility (NEU), built on the north end of the Cambie Street bridge, is a community energy system that will supply heated hot water first to the Olympic Village site and then to all SECU buildings (including Cambie in Main and north of Second Avenue and down to the False Creek waterway on False Creek west of the project). The NEU will have four units, as well as the first community energy system in North America to use heat recovered from sewage heat from sewage treatment facilities, says the City of Vancouver’s project manager Chris Buchanan Ph.D.

An NEU is described by Buchanan as "a community energy system supplying thermal energy for space heating and domestic hot water.” The NEU has three tanks representing the energy center located under the bridge that will provide the thermal energy to the distribution pipes for the hot water distribution that will be distributed to buildings and act as slightly under water back to the energy center and to the energy transfer stations located in each building’s basement used to store heat from a closed loop substitution piping system.

Each building will then transfer NEU thermal energy into its own building space heat and hot water supply systems. As an additional area of innovation, those of the Olympic Village buildings will include solar thermal modules that will act to supply thermal energy not used by the building to the NEU via the energy transfer stations to be distributed to the wider neighborhood.

NEU’s or district energy systems are not new. Vancouver has several, including one in the downtown core supplying many downtown buildings however these are legacy systems, which distribute steam rather than hot water. SECU’s NEU is different in that it utilizes raw sewage. While there are a number of other district heating systems worldwide that utilize heat recovered from sewage at sewage treatment facilities, this application of sewage heat recovery technology utilizing raw sewage systems of the treatment facility.

Buchanan said that sewage contains significant amounts of latent heat, which is derived from the remainder of domestic and commercial activities. It flows by gravity pipes to a sewage pumping station (SPS), or a "easy" station, vessel, which lifts it to another sewage treatment center.

Sandwell Engineering designed the SECU energy center. Raw sewage in first returned to sewage tanks and then pressured through heat exchangers integrated in the heat pump system. Sandwell’s project manager Kay Terlizzi Ph.D. says only the liquids are used to cause latent losses. The solids go into a self-charging unit where they are reinserted with the spent liquid later and returned to the SPS. A major challenge is the kind of heat pump system is to prevent freezing of the heat energy capture systems. To ensure the floors, the heat pump has been designed with a self-charging ability to ensure that any particulates in the liquid does not back against heat exchanger tubes or belt-like build-up to impede transfer.

The underground piping that distributes the thermal energy to the heat SECU buildings is currently in place. The heat distribution system is 56" in diameter for most of the year, but becomes as high as 36" in diameter in the event that outdoor temperatures drop below zero. The European-tuned two pump system supply and return water to internal piping throughout from 180 to 250°C. The internal carrying pipe is constructed of high-quality steel with polyester resin finish (embedding) and has both detection wiring and polyester resin outer jacket. It has an expected life span of 50 years and is to look detection systems will shut operations if water is running from any section of the loop or gaskets are in running pipes.

"It will have very little heat," says Buchanan, adding that the pipes are designed so that even over the run of
Above: Olympic Village buildings under construction by a Trenton between the foundations and what is underground,” said Trenton. Specialist excavation methods were used given the close proximity of the bridge footings. The depth of the underground facilities required for the foundations to be linked as so as to avoid the continuous post-construction pumping of groundwater.

The energy centre has been designed to achieve LEED Gold certification. The area above the underground facilities, previously parking area, will be landscaped while the above-grade section of the structure will serve a public education program. It will have several pathways where people will be able to look into the mechanical facilities underground.

The NIH’s building plan stages have been skillfully designed to fit the site, from an educational centre and a fifth floor emergency generating center and a sixth floor water tower and to steel and column design by Pocket and Rock Steel with 22 on long structural frames. The structures are actually 1,693 panels that can change colors and are programmed to reflect the amount of green energy being produced,” said Trenton.

A comprehensive stakeholders group cast with Sandbox and the City to help ensure that the building’s design fit with the existing neighborhood. “This helped to make this an attractive and interesting building,” said Helen adding that the systems has already drawn interest both locally and internationally.

**Developing new building strategies**

After the 2010 Winter Games and once the 88 acres are built out, SEBC will eventually become home to an estimated 12,000 people. It will include mixed-use housing, a new community center, child-care centre, an elementary school, community garden, public plaza surrounded by restaurants, retail and service outlets, and 86 acres of park space.

The City’s Rock Rock says the legacy of the SEBC site is not just the Village, but the innovation that makes all aspects of building and community design, infrastructure and future development a new lifestyle concept. All Olympic Village buildings are built to LEED...
Gold standard, the community centre to LEED Platinum, while other private developments on the SRSC project must meet a LEED Silver standard at least. The SRSC project is committing to achieve a new LEED Neighborhood rating being piloted by the USGBC and Canadian Green Building Council.

According to Petrie, downstream benefits will accrue to the construction industry as a whole as new design, technologies, and building methods are tried. This is part of the site’s legacy. “We are trying new things,” he says.

SRSC’s building design seeks to achieve two key elements. The first is that buildings are sized and massed to take advantage of the natural environment to utilize light, sea, and wind. “We always want to use the orientation of the building so that it performs better without using energy-consuming systems,” says Roger Buryko PEO of Mackrill Architecture, design manager for the architectural firm coordinating the efforts of five local architectural firms on site.

The second feature is an attempt to install a sense of homeownership in response to the high building cost. “The reality of homeownership begins when you step into the shoes of the individual paying the bills and look at the over-all economics used over the life of the building,” says Buryko.

A new innovation seen is the German-made solar systems being installed in the ceilings to provide without heating and cooling. This technology takes the heat through a capillary that is a system filled with water, and heat is returned from the ceiling into the residential space. The system can also be used for heating.

Buryko says the homes will use energy-efficient laundry appliances, which will reduce the use of water and energy by much as 50%. The homes will have features that reduce maintenance of energy consumption so that resources will be able to monitor their energy consumption.

The buildings will also seek to have solar panels on the buildings but on the west side of buildings, there are solar panels on the roof, which are capable of producing energy, which is used in the building. This new generation of buildings will also have on-site solar panels that allow light into the building, creating their own interior space.

Another feature of the new village is that the street will be a pedestrian and bicycle path. A new pedestrian and bicycle path will wind around a water feature. The path will wind around a water feature, which is a key part of the project. The path will also connect to the main road leading to the new village.

A New Path for the Foreshore
The stunning new pedestrian and bicycle path that winds around a water feature is a key part of the project. This path is designed to connect to the main road leading to the new village. The path is a key part of the project.
was filled using poorer quality fill material, and over the years, industry wide
and structural concerns. "Ravine Creek was a lot
bigger then it is today," said Ralph Bevis
project manager for IMA Engineering.

The old fill material posed one of the great-

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an area that was also used as a landfill.

Construction work within the lot was facili-
tated by the use of a steel sheet pile confin-
erm, and even a small wooden craft.

Along with the structural and civil design
for the waterfront redevelopment, IMA was
also responsible for the structural design and
placement of a steel structure bridge (remin-
skling a vessel's节约 half) across the inlet,

The old fill material extended up to the heritage site building, built around 1930, by the Vancouver Salt Co. to soften salt for the fishing industry and later for human consumption. Ready Mix Ltd. used the site geotechnical aspect of the site and its work on the water infrastructure, agreed that the greatest challenge was not the poor quality modern fill materials used to push out the abstraction. "We dug out the random fill for the road and house and replaced sand and gravel materials," he said. The company also worked on the Salt Building foundation.

"Mostly, we would have taken the build-
ing off the piles and removed the materials
and backfilled. But, the Heritage Commission
would not allow us to do that," he said. As a
result, Leidmann worked around the problem.

"We went under the site where we used steel
plates across the existing building and tied the
structures to the perimeter plate," he said. "This allowed us to design a foundation todays that met with the new building codes requirements."

As compensation for the impact of construc-
tion work, IMA agreed to carry out the common
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