2020 CCE AWARDS

Blakeburn Lagoons Park

Category:
Water Resources

Client/Owner:
City of Port Coquitlam

Component:
Entire Project

Firm Submitting:
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BACKGROUND

Blakeburn Lagoons Park is a newly created nature reserve and public park in Port Coquitlam, BC.

The 11-hectare site was used as a sanitary detention facility until 1978 when it was decommissioned, fenced off, and effectively abandoned.

The site was designated for public park development in 1980. However, environmental assessments over the years revealed levels of cadmium, copper, lead and zinc in the lagoon sludge exceeded Contaminated Sites Regulation standards for urban parks. A previous environmental consulting report suggested capping the complete 11-hectare site. The projected high contamination remediation cost prevented site development from occurring until 2015 when $2.85 million in federal and municipal funding was secured.

The City of Port Coquitlam engaged ISL to undertake design, tender, and construction services for the project. ISL's team comprised of municipal and hydrological engineers, landscape architects, environmental managers and public engagement experts. The goal was to convert the site into a public open space while reducing contamination to levels acceptable for public exposure.

Public safety, ecological restoration, and stormwater management were priorities for the City.

ISL's team integrated the City's goals while building upon them to enhance site hydrology, contamination remediation, and ecological restoration in the creation of constructed wetlands and a new public park.

COMMUNITY ENGAGEMENT

With close proximity between Blakeburns Lagoons and nearby residents, the City of Port Coquitlam wanted to ensure residents were engaged throughout the park development process to ensure community participation in and support for the project.

In May 2016, ISL and the City held the first of two community engagement sessions to hear from the residents what they wanted from the proposed park. Two options were presented: 'A People Park' – with a focus on public amenities and a manicured landscape, and 'Nature's Renewal' – an opportunity to restore the park site to a more natural state.

Public engagement indicated strong support for 'Nature's Renewal', the creation of a public park with an emphasis on ecological enhancements.

In response, the project team proposed converting the settlement lagoons into ecologically rich, bioremediating constructed wetlands.

The second public engagement session was held in February 2017, with the ISL team presenting a park design that remediated the site, created a nature park for the community, introduced wildlife habitat and fit within the project budget.

FINDING OPPORTUNITIES IN CHALLENGING BUDGETS

The complete budget for the project was formed from two cash streams, a federal grant and municipal capital funds. The federal portion of the work was to be spent solely on remediation work while the municipal budget was to be spent on creation of the park itself. All activities in the project scope had to be very clearly allocated to one or the other.

Typically, contaminated materials are excavated and relocated or chemically treated in-situ. These were not options for the Blakeburn project due to budget constraints. To successfully excavate and remove 50,000 tonnes of contaminated materials or chemically remediate site soil would have taken most of the project budget.

This budget challenge created an opportunity to rethink the project and develop onsite measures that would improve hydrology, remediate the site, create a natural park space for residents, and create habitat for wildlife.

Our diverse project team achieved these interconnected goals, tackling each component together while meeting all the City's project goals.

Integration in Design Expertise

ISL's experts in stormwater modelling, municipal engineering, landscape architecture, and environmental management worked together to develop a cohesive, practical, and cost effective approach to successfully delivering the project.

The hydrologist and municipal engineer worked together on practical ways to utilize the existing storm network to provide a new source of stormwater to the site, while maximizing the contamination attenuation benefits of the constructed wetlands.

ISL's integrated team worked together to create solutions that created mutually beneficial outcomes. The collaborative, multi-disciplinary approach was key to the project's success.

Hydrology

The existing lagoons were hydrologically cut off from the surrounding storm network, with only rainwater replenishing them. A source of fresh water was needed to be found to support aquatic biofiltration and bioremediation processes and the creation of a healthy wetlands ecosystem.

ISL completed a 2D model to analyze the neighbourhood stormwater system and determine potential discharge volumes. Evapotranspiration modelling identified how quickly the lagoons would dry out. This model coupled with environmental requirements helped ISL determine the shape, depth and surface area of the wetlands.

There was also an opportunity to look at stormwater runoff in an adjacent neighbourhood that had a history of flooding. The team provided a solution that diverted floodwater to the wetlands during storm events.

The major benefits to the City were to not only help mitigate local flooding, but also provide additional relief to a pump station located on the nearby Pitt River.

TECHNICAL EXCELLENCE AND INNOVATION

Ecological Restoration and Contamination Remediation

The site's two engineered lagoons were remodelled into naturalistic wetlands. They were deepened, reshaped, and regraded to create ecological complexity and diverse wildlife habitats. Wetland construction involved 50,000 m³ of earthworks, with on-site cut-fill balance achieved to minimize costs.

Along new wetland shorelines and on wildlife habitat islands, 3,000m³ of imported soil amender was mixed with lagoon sludge to dilute the contaminants and provide a nutrient-rich plant growing medium. These areas were densely planted with phytoremediation plants to absorb, immobilize and break down heavy metals. Fencing prevents public access to these areas. Accessible park areas were capped with clean imported material to prevent public exposure to underlying soil contaminants. This combined dilution, isolation, capping, and phytoremediation strategy both initiated the park's ecological healing processes and made it safe for public use.

Numerous ecological features were introduced to the park to increase wildlife habitat diversity. These include wetland habitat islands, gravel beaches, ephemeral ponds, tree snags, woody debris piles, bat boxes and edible plants. Vegetative buffers and fencing protect environmentally sensitive areas from public access.

Through the introduction of biological processes and ecological features, the site was converted from a degraded and contaminated landscape into a robust, self-sustaining, and self-healing wetland ecosystem.

Hydrological Enhancements

Hydrological improvements included a new municipal stormwater inlet, a new outlet, and wetland linkage to facilitate water movement across the site. During the summer, municipal stormwater inflow from the surrounding neighbourhood helped maintain wetland water levels.

A hydrodynamic separator was installed at the stormwater inlet to remove contaminants, targeting fine sediments, litter, debris, hydrocarbons, metals and nutrients. This storm control system was the first line of contaminant removal from road drainage.

Downstream from the separator, a pretreatment pond was created to help reduce suspended solids even further. The pretreatment pond was separated from the large water body via a heavily planted berm. The plants were final treatment of the water prior to entering the wetlands.

ENVIRONMENTAL, ECONOMIC AND SOCIAL SUSTAINABILITY

Protecting and Enhancing Natural Habitats

The Blakeburn Lagoons Park project exemplifies how the integration of professional services – project management, civil engineering, landscape architecture, environmental management and construction professionals – working in close collaboration can enhance project outcomes. The cohesive, practical and cost-effective solutions met client, community and environmental goals. Working together, the team delivered:

Soil and water contamination level reduction: Contamination dilution through the introduction of 3000 m^3 of organic soil amender to the site as well as the introduction of terrestrial and aquatic phytoremediation plants to absorb, immobilize and break down contaminants.

Improved hydrology: Wetlands provide stormwater relief for the neighbourhood storm network. The deepened wetlands coupled with shade trees planted at the water's edge, help reduce the water temperatures as well as the frequency and extent of algal blooms; a new municipal stormwater inlet to the wetlands, a new outlet, and linked wetlands generate water movement across the site.

Improved water quality: A hydrodynamic separator prior to the stormwater inlet, a settlement pool at the inlet, and biofiltration planting in emergent and aquatic zones in the wetlands capture suspended solids, roadway runoff contaminants, and on-site water borne contaminants prior to discharge into a natural water course.

Wildlife habitat creation: A naturalized wetland shoreline shape with varying wetland floor and adjacent landscape topography increases diversity and quantity of bird and amphibian wildlife; four wildlife habitat islands in the wetlands, large and coarse woody debris, boulders, gravel beaches, bat boxes, tree snags, and dense and diverse indigenous vegetation for wildlife habitat and food supply.

Invasive plant and wildlife control: Mechanical removal of all invasive plants from the site such as Himalayan Blackberry and their return controlled via dense and robust new indigenous planting as well as on-going park maintenance; invasive bullfrogs controlled via ephemeral ponds that dry out and kill their eggs.

Indigenous plant revegetation: Approximately four hectares of the site is planted with over 100,000 indigenous shrubs and groundcover plants as well as over 1,300 indigenous trees, while two hectares is planted with native grasses. Planting is divided into six biotopes (wet and dry meadow, forest, brush, emergent, and aquatic habitats), and subdivided into 67 micro sites. Plants are installed in varying ages and sizes to increase habitat complexity. Forest and brush areas are planted with a mix of early and late pioneer forest species so the site will eventually return to the Coastal Western Hemlock forest that once existed here.

Economic and Social Benefits of Remediation

The naturalistic landscape of the park benefits more than wildlife. This approach also limits park maintenance costs, increases property values for neighbouring residential properties, and increases the viability of adjacent site development with a resulting increase in the municipal tax base.

With 1.6 km of looped walking trails, Blakeburn Lagoons Park provides passive recreation for the community, improves public sense of wellbeing through exposure to nature, and mitigates site contamination risks to public health. The park has become an educational facility for local schools involving plant installation and wildlife monitoring. It has also become a “hot spot” for Vancouver-area birders. Since opening in spring 2018, over 140 bird species have been sighted there.

Blakeburn Lagoons Park, through the introduction of natural remediation processes, wildlife features, interpretive signage and walking trails, offers an engaging and immersive experience of ecological restoration and renewal.