Macaulay Point Pump Station
Esquimalt, BC

Esquimalt Bylaw:
55. 2.B.5 - Macaulay Point Pump Station, Upgraded to standards of design, materials and quality of construction consistent with recent Craigflower Pump Station project, with odour mitigation measures to be installed in Macaulay Pump station, and Lang Cove Pump Station, providing for an odour detection level no greater than five (5) odour units measured at the property lines (or fence lines where applicable)

Owner:
Capital Regional District (CRD)

The Design-Build team
Kenaidan Contracting Ltd.
Kerr Wood Leidal Consulting Engineers
Stephane Laroye Architect Inc. | SLA inc.
LADR Landscape Architects

19 March 2018

Landscape Context

Macaulay Point Management Plans
Township of Esquimalt

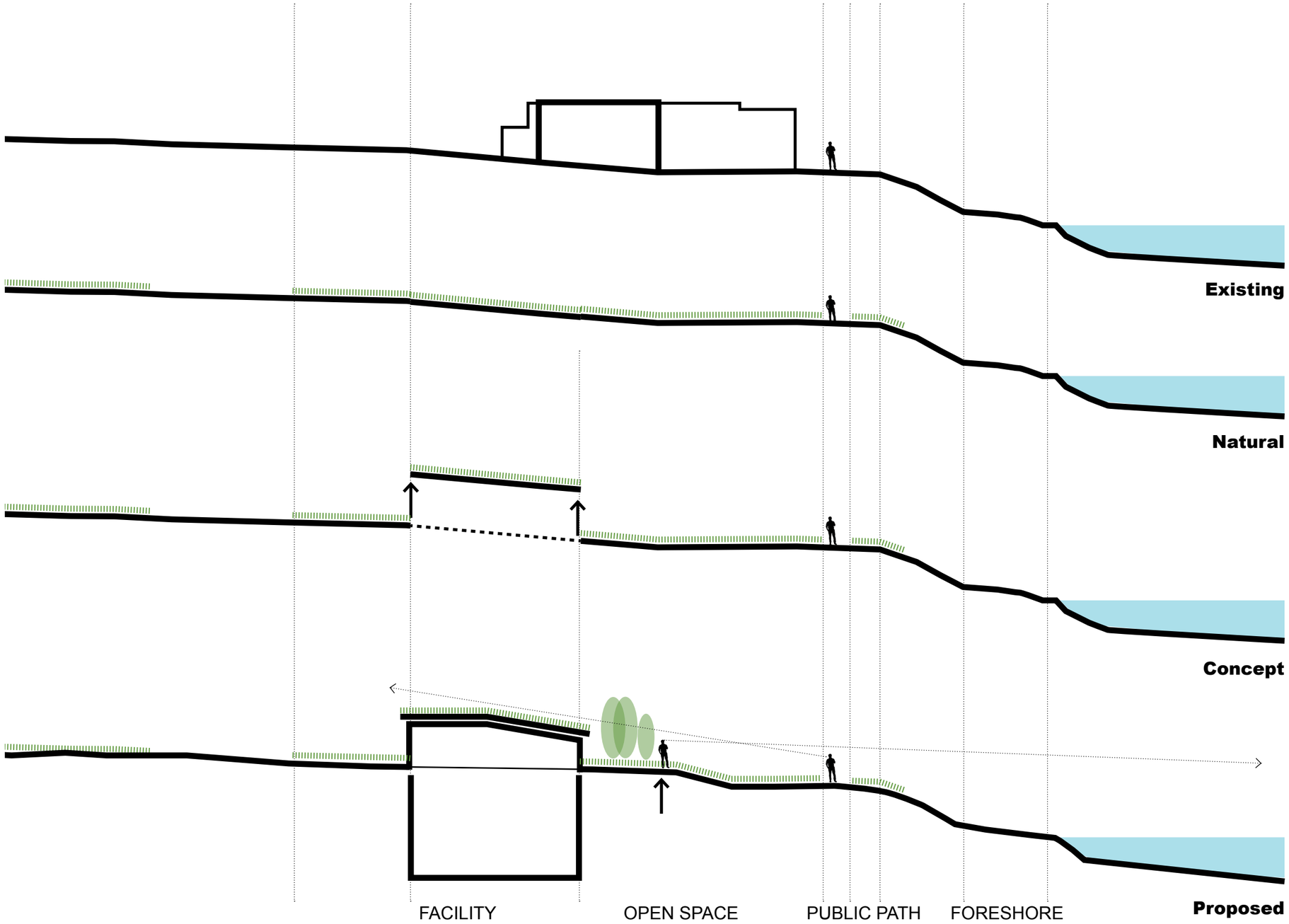
Figure 1. Preliminary management zones suggested for Macaulay Point Park.

Aspen

Garry Oak

The Macaulay Pump Station site has several notable features:
- adjacent coastal bluff marine habitat and coastal waters where whales, sea otters, sea lions and porpoises are seen
- adjacent a popular trail that links Work Point and the Greater Esquimalt community to Macaulay Point Park, a park on the site of an 1800's fortification and the only Esquimalt park with a management plan
- located on traditional Lekwungen territory and will be working with a Lekwungen representative
- located on the Pacific Flyway, a major north/south flyway that extends 4000 miles from Alaska to Patagonia and is used by millions of migratory birds each spring and fall
- part of the Gateway to Victoria when travelling by boat or plane
- surrounded by DND lands including Search and Rescue and married military personnel housing
- currently bereft of ecological values

Section Concept

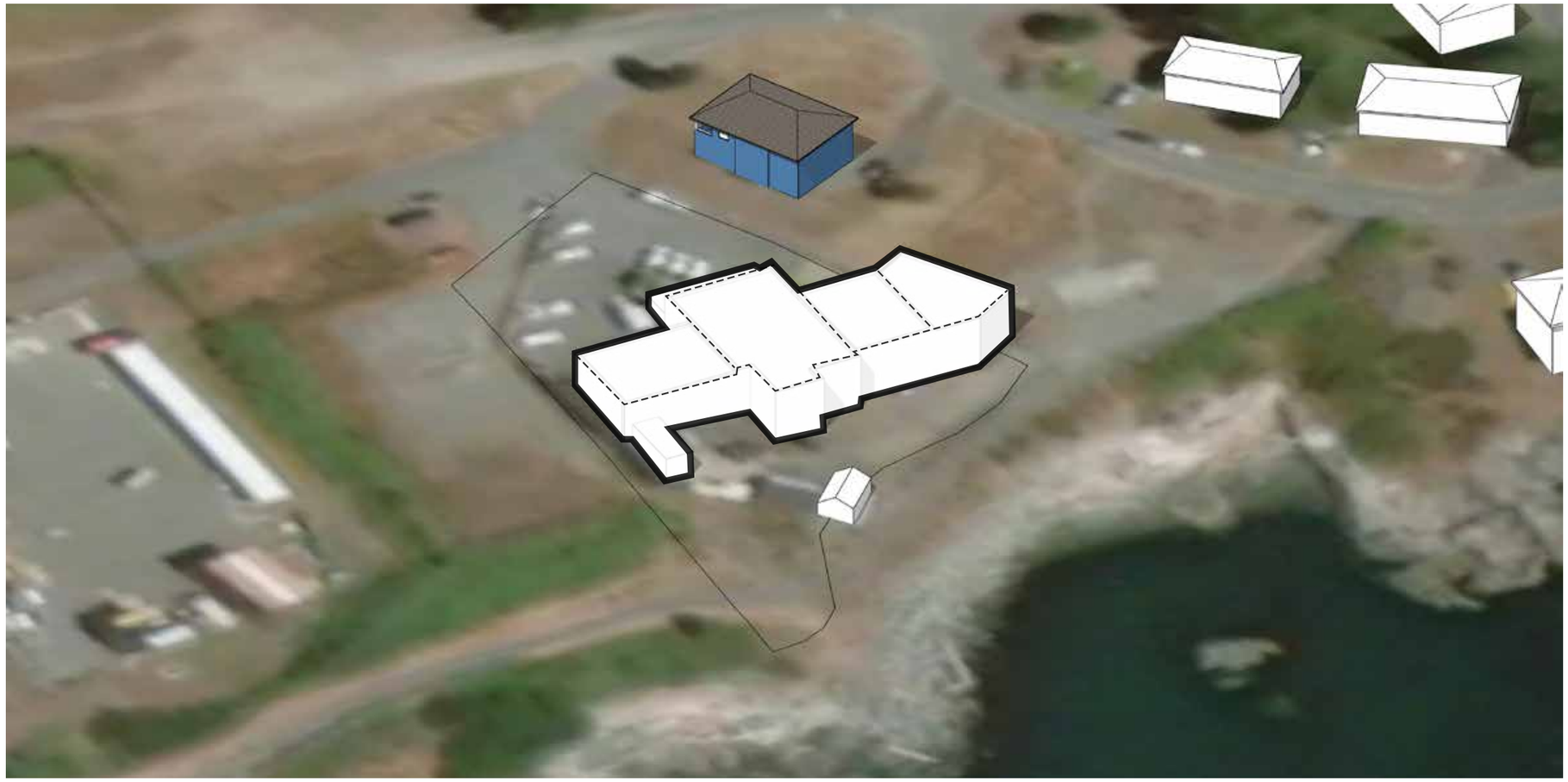


When considering the existing pump station, it clearly ignores its site. If we consider the site in its natural state, one could conceptually raise a piece, landscape and all, and tuck a building below.

This strategy is very much like as seen at Fort Macaulay where the goal was to keep the structures almost invisible from the water and the air.

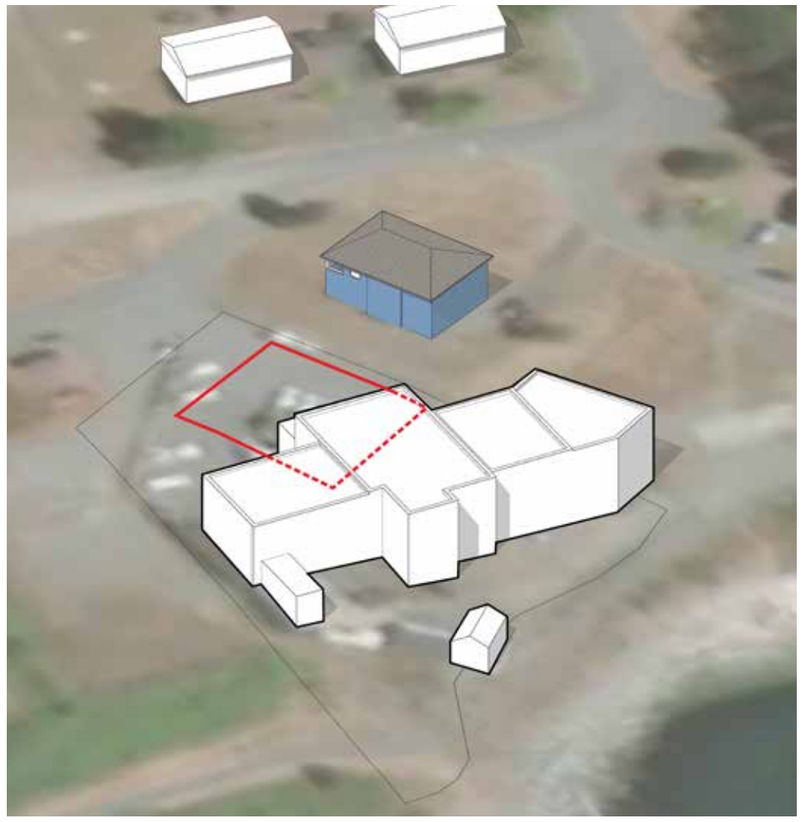
Great effort was made to integrate the new pump station with the natural environment by minimizing projections. Only the minimum projecting above to:
- minimise massing and site profiles
- increase the acoustic performance by locating noise-generating equipment below-grade in acoustically isolated areas
- locate the rooms that require height at the rear with the low rooms on the front, facing the public pathway, which enhances the site profile
- cover the building in a green roof planted with the same sedum found throughout the site
- integrating the building with the surrounding area with planting
- drain the green roof to a rain garden and into the stormwater management system
- reuse excavated material to create a public viewing opportunity

Existing Massing

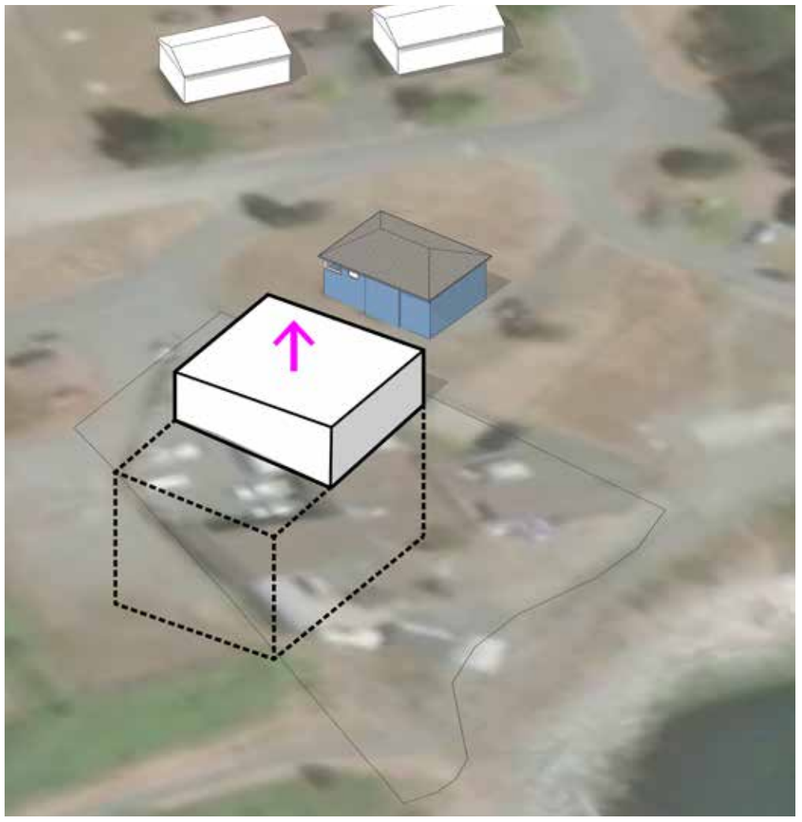


When seen from above, the existing pump station and workyard spans the width of the site and sits close to the public pathway. There are many generations of additions of varying heights, masses and materials, from board-form concrete to a pre-manufactured steel shed.

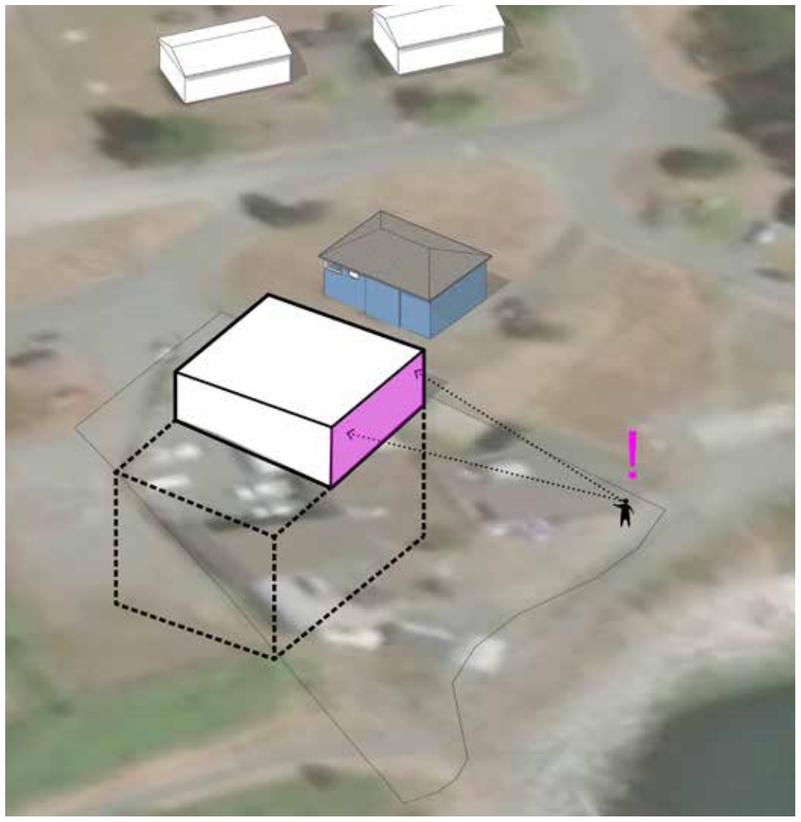
Massing Concept



The selected location within the site for the new pump station is shown in red. This location was choosen for a number of reasons.
1. It is set far back from the path and shore, providing more open space and natural habitat.
2. It allows the existing station to remain operational during the construction and eliminates the need for distruptive temporary solutions
3. It aligns with the adjacent building creating a street edge.

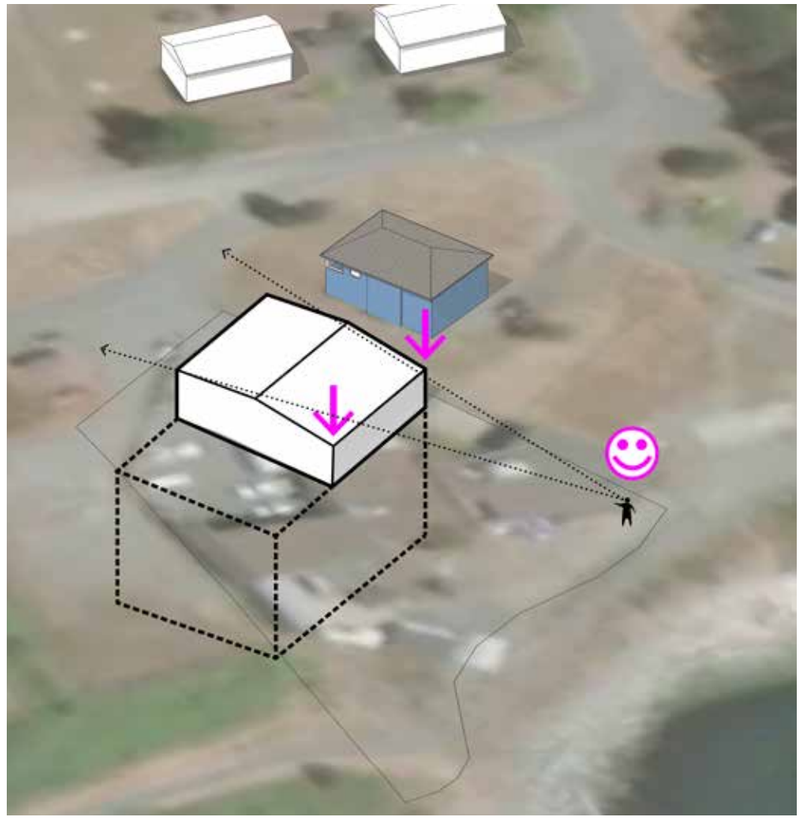


The above-grade equipment requires a clearance height of 6m on the interior. This diagram shows the required footprint extruded to 7m (1m for structure, green roof and services).

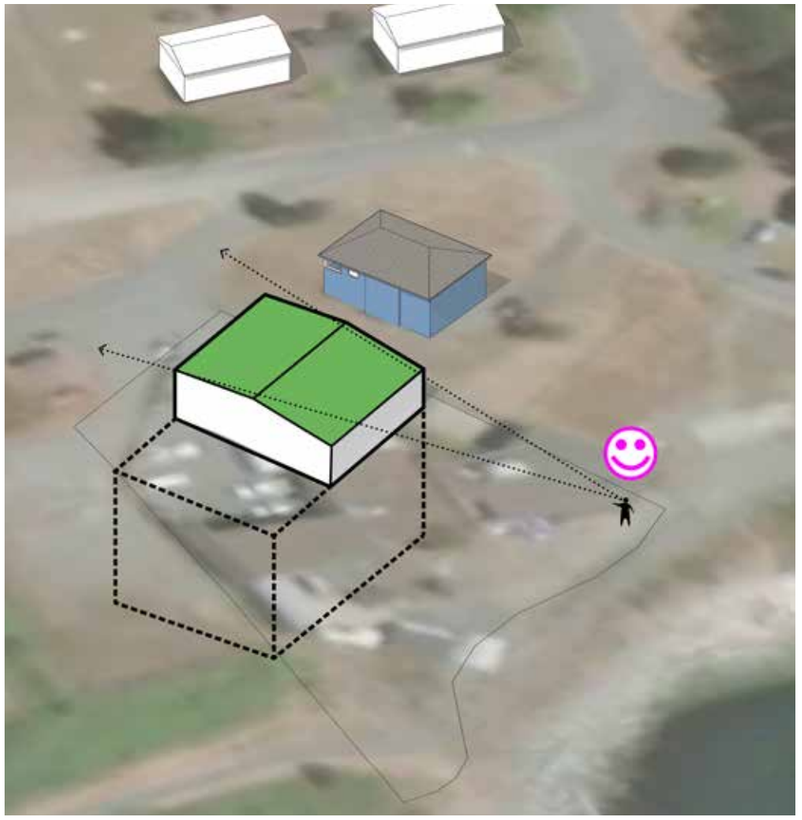


This simple box felt imposing from the path and out of scale.

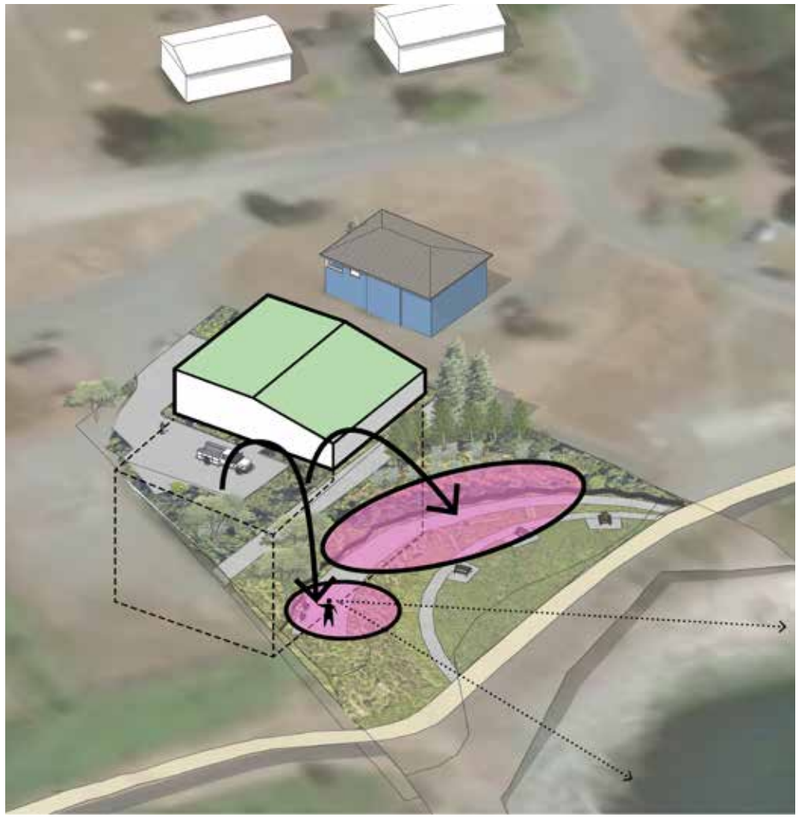
Massing Concept



By working with all the specialists, equipment with lower height clearances were located along the path side of the building. This enabled a large part of the roof to be lowered, providing the oppourtunity to create a sculptural roof and integrate the site profile with the natural environment and waterfront setting.



A green roof provides bird and insect habitat, protects the building envelope from weather and bird droppings, and is pleasent to look at from the path as well as from the air. It also reduces the heat island effect and helps acoustically insulate the building.



The proposed design minimizes the impact to the community and remains focused on sustainability.

In order to reduce truck traffic and waste removal, all excavated material will be relocated on-site and will be used to fill in the old pump station and to create a naturalized elevated pathway which will enable views out to the ocean, where Orcas, whales, sea lions, otters are frequently seen.

Proposed vs Existing Massing

Comparing the proposed and the existing pump stations, it is clear that the station has been moved further back from the public pathway, dramatically increasing the open space; the majority of the facility has been moved below-grade with the above-grade portion kept as small as possible; and, there is a large increase in landscape including the sedum green roof.

Proposed massing

The proposed massing respects the existing slope of the site, minimizing its scale and its impact on the landscape. It is screened from the public pathway, from the air and from the water. It is an all-wood building, both the structure and its cladding. The facility will no longer be a workyard. There will be no security fencing or gate around the building. Only one antenna will project above the roof.
Mechanical air intake and exhaust have been combined with roof access into a single vertical element.

Concept Rendering

The nearby Fort Macaulay provides a precedent for how to integrate a structure along the coast within a rolling landscape meadow and peeking out from just above.

Fort Macaulay Bunker

Rendering of the proposed open space and the building screening

Building Materials

Sedum Green Roof

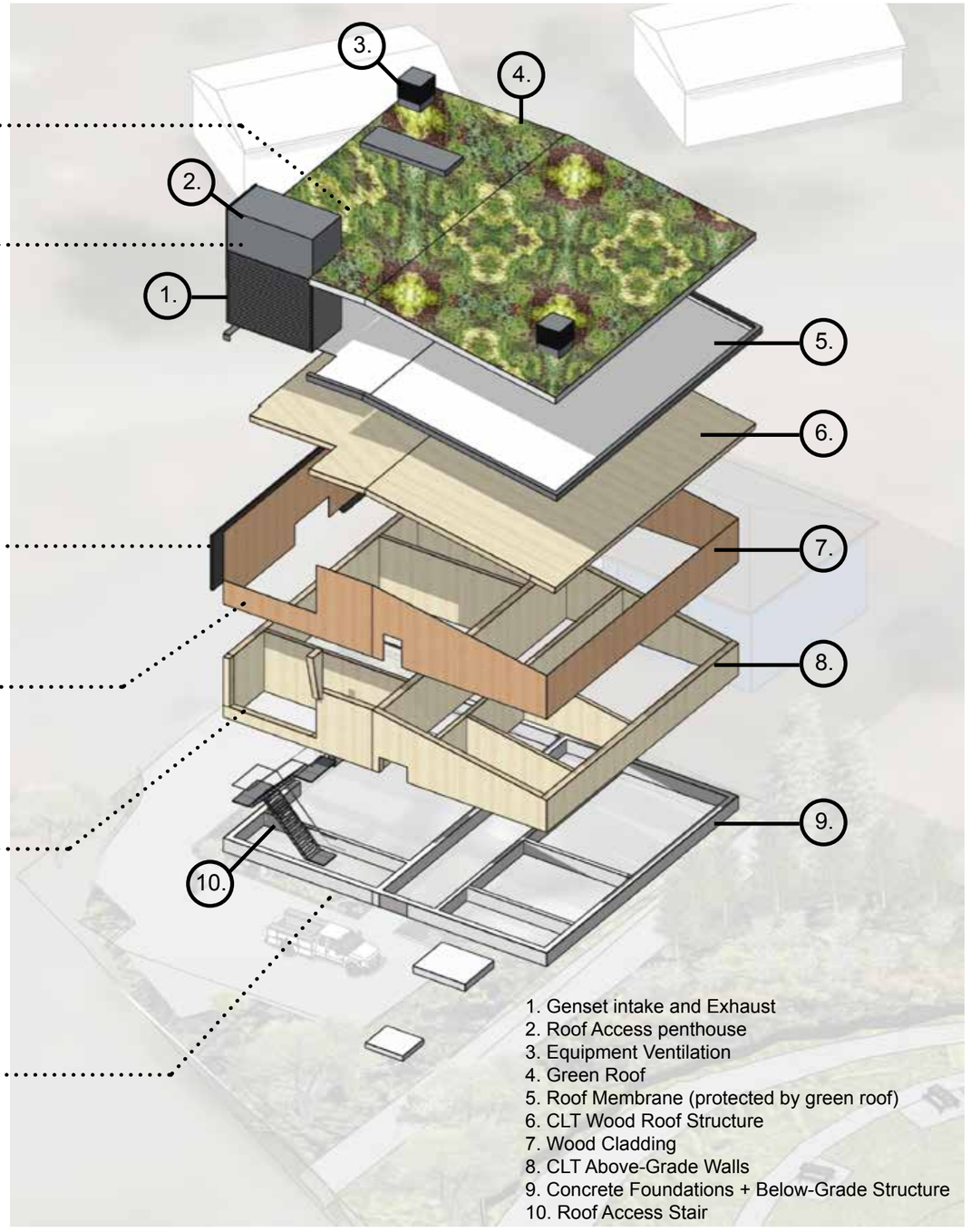
Composite Aluminum Panel

Accoya Shou Sugi Ban Wood Siding

Accoya Natural Wood Siding

CLT Structure

Concrete



1. Genset intake and Exhaust
2. Roof Access penthouse
3. Equipment Ventilation
4. Green Roof
5. Roof Membrane (protected by green roof)
6. CLT Wood Roof Structure
7. Wood Cladding
8. CLT Above-Grade Walls
9. Concrete Foundations + Below-Grade Structure
10. Roof Access Stair

As we considered the exterior materials for a building with such an exposed oceanfront site, many critieria had to be addressed:
- durability
- quality
- maintenance
- weathering
- natural
- sustainable

The proposed green roof provides a natural material when seen from above, such as cruise ships, ferries, float planes and helicopters; it provides protection to the roof membranes from sun and extreme weather as well as gull droppings which are caustic to roofing; it provides additional acoustic dampening; and, provides additional habitat for birds and insects.

The proposed Accoya wood cladding is a high quality, Cradle-to-Cradle Gold Certified, durable material. To differentiate the front from the rear or the exposed, weathering side of the building, we propose a Shou Sugi Ban finish which is a walnut-coloured charred finish that naturally protects the wood further, as seen in Japanese and Northern Scandinavian architecture.

All metal must be durable due to the exposure to salt spray and we propose a durable composite aluminum panel colour matched with the acoustic louvres.

The concrete base will be clad in concrete-faced rigid insulation which will be fully screened with planting.

Building Structure

To further our drive for sustainability, we propose the use of cross-laminated timber (CLT) panels, made entirely of BC wood, for the entire above-grade structure (clad in wood). CLT is simple to manufacture as it is made of standard size 2x6 lumber that is glued together into flat panels. There are many advantages:

- light weight
- better seismic response
- reduction in the size of footings
- can use beetle-killed wood or sustainably harvested BC wood
- durable and proven
- efficient, assembles like a Lego set
- acoustic benefit
- speed of construction as panels are pre-manufactured (reduced site noise, fewer trucks)
- sequester carbon

By using CLT on this project, we anticipate sequestering 40,000 kgs of CO2

Quality of Design and Construction

LEED
The design of the pump station is consistent with sustainable design practices including applying Leadership in Energy and Environmental Design (LEED) principles and adapting an energy efficient design.

Public space and Security
The design transforms an almost entirely impermeable lot into an environmentally-rich park-like setting with public amenities. There will be no fencing or gate around the building. To discourage vandalism and negative activity, a combination of robust and aesthetic materials including lighting, landscaping and minimising the number of building openings has been incorporated into the design.

Noise Control
A noise control consultant was retained to measure background noise levels at the site and develop stringent criteria. The pump station has been designed and will be constructed such that noise levels will not exceed 35 dBA.

Odour Control
An odour control specialist has designed a comprehensive odour control system to contain and suppress odour by:
- incorporating sophiticated ventilation and scrubbing systems
- maintaining the wet well area of the pump station at negative pressure to draw air into the scrubber
- directing all wet well air through a two-stage system including an activated carbon absorber system prior to discharge

Post-disaster

The Facility has been designated as essential services in the aftermath of a major natural disaster. The Facility will be designed to post disaster design criteria as per the BC Building Code. The Facility will be designed and constructed to remain serviceable after an earthquake, wind storm or tsunami.

Redundancy

The facility has been design with redundancy for critical elements according to the requirements of the BC Provincial Municipal Wastewater Regulation. Redundancy is also provided on critical elements of the odour control system.

Equipment is provided in duplicate and sized to operate with one unit out of service under peak loading conditions. Redundancy is provided in the instrumentation and control systems, sewage pumps and odour control equipment.

Service Life

The CRD requires the Design-Builder to select materials, equipment and technology that are reliable, durable, easy to maintain, and have a proven track and have good product support.

Design, Durability and Maintenance

The design respects the site and surrounding areas, and is aesthetically pleasing, with varying building lines and heights.

The facility complies with zoning bylaws in all respects including building height and setbacks.

All structures have a design life of 75 years.

The facility meets the Township of Esquimalt Sustainable Development Strategic Plan and includes many features defined in the Township of Esquimalt Green Building Checklist.

The Facility incorporates methods to clean and reduce stormwater runoff.

The design aligns with Crime Prevention Through Environmental Design (CPTED) principles.

The design minimises the impact of temporary construction works by coordinating phasing/ staging/siting to maintain the operation of the existing pump station while the new one is under construction.

Sustainability

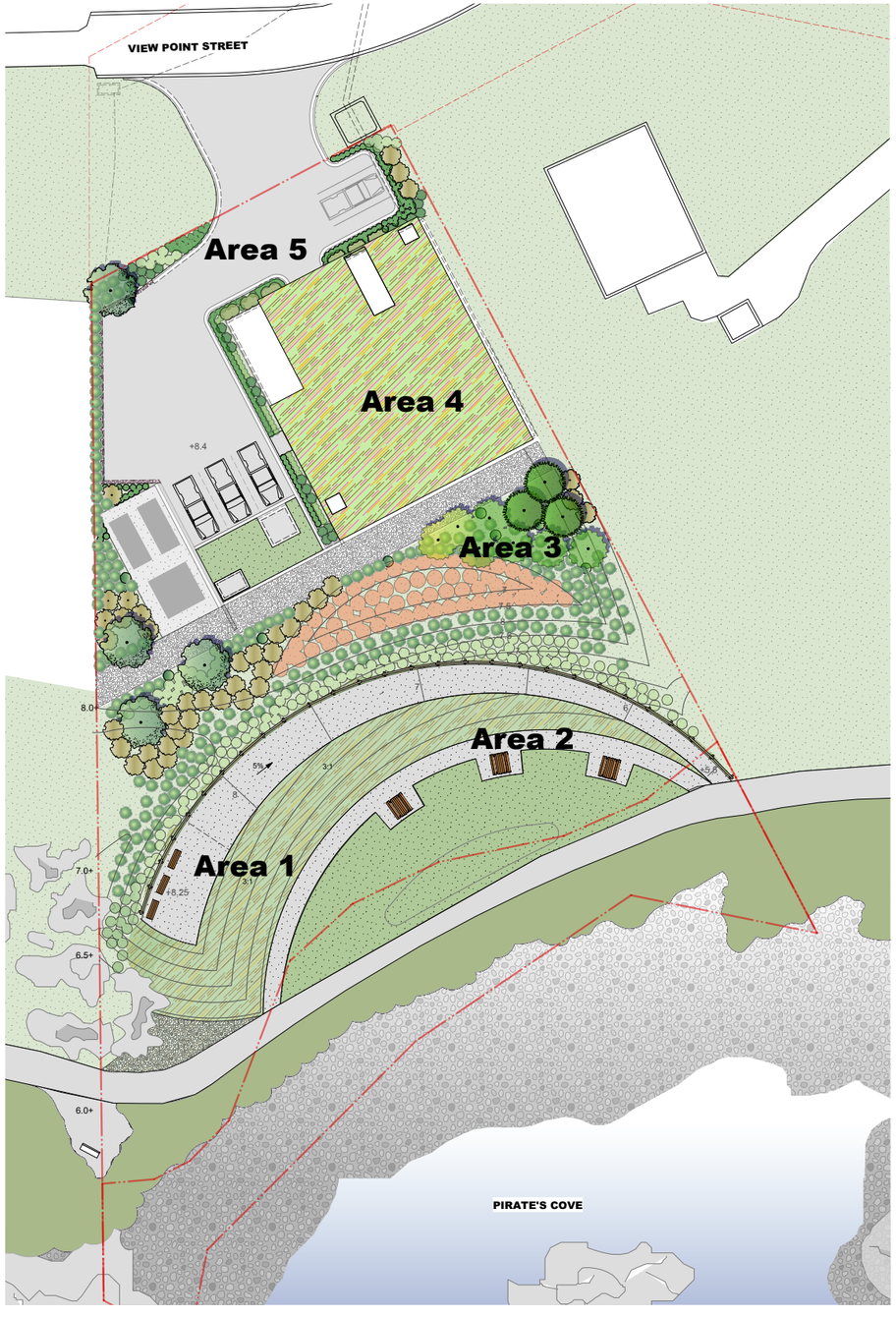
View along public pathway facing west

View along View Point Street facing southeast

Sustainable features include:
- use durable materials
- use an all BC wood above-grade structure which will sequester 40,000 kgs of CO2
- provide a green roof
- rainwater run-off control on-site by means of a bio-swale and rain garden
- erosion and sediment control plans implemented during construction
- increase bio-diversity and habitat on-site
- eliminate fatal bird attraction
- support Macaulay Point Natural Areas Management recommendations
- reduce waste and also truck traffic to minimize the impact to the community
- provide insulation for high acoustic performance with a thermal benefit
- eliminate light pollution by avoiding flood lighting and using only a single motion-activated light above the entry door
- significantly increase the amount of open space

View from the southwest

Landscape Design Objectives



1 **Landscape Concept Plan**

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Vision: Establish an ecologically intelligent landscape that integrates the pump station with the waterfront setting and provides an amenity to the neighbourhood.

Goals:
1) Support relevant Macaulay Point Park Management Plan goals
2) Create the foundation for a self sustaining (potentially novel) ecosystem; include biological diversity and opportunities for bird and wildlife habitat
3) Create a drought-tolerant landscape, that allows for anticipated climate change, succession and park maintenance budgets
4) Create an attractive, welcoming, safe environment for residents

Area 1: Viewing Platform
Area 2: Picnic / Open Space
Area 3: Habitat Restoration/Rain Garden
Area 4: Green Roof
Area 5: Service Entry and Yard

Existing Macaulay Pump Station

Summary

The design approach is based on improving the visual impact of the station and the public's experience with the site while creating a park amenity for the community to enjoy

The design maximises vegetation opportunities and landscape functionality: it transforms an almost entirely impermeable lot into an environmentally-rich park-like setting with public amenities

Rather than upgrading the existing pump station the CRD is $35 million investing in a new pump station

The new station has standards of design, materials and quality of construction that are consistent with the recent Craigflower Pump Station project, and considerate of the station's oceanfront setting

View along public pathway facing west