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Neighbourhood vs. Individual Property Scale Coastal Protection: A Case Study in Qualicum Beach, British Columbia

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A Case Study in Qualicum Beach, BC

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Special Thanks – Project Contributors

- Stewardship Centre for British Columbia
- Sarah Bonar R.P.Bio, Aquaparian Environmental Consulting Ltd.
- Town of Qualicum Beach
- Mr. Craig Hodge
- Ryan Christie and Parksville Heavy Equipment

Agenda

- Coastal Processes at Qualicum Beach
- Case Study (Property Scale): Qualicum Beach (Higson Crescent)
- Case Study (Community Scale): Qualicum Beach Seacroft/Higson Cr Shoreline Conceptual Design

QB Shorelines

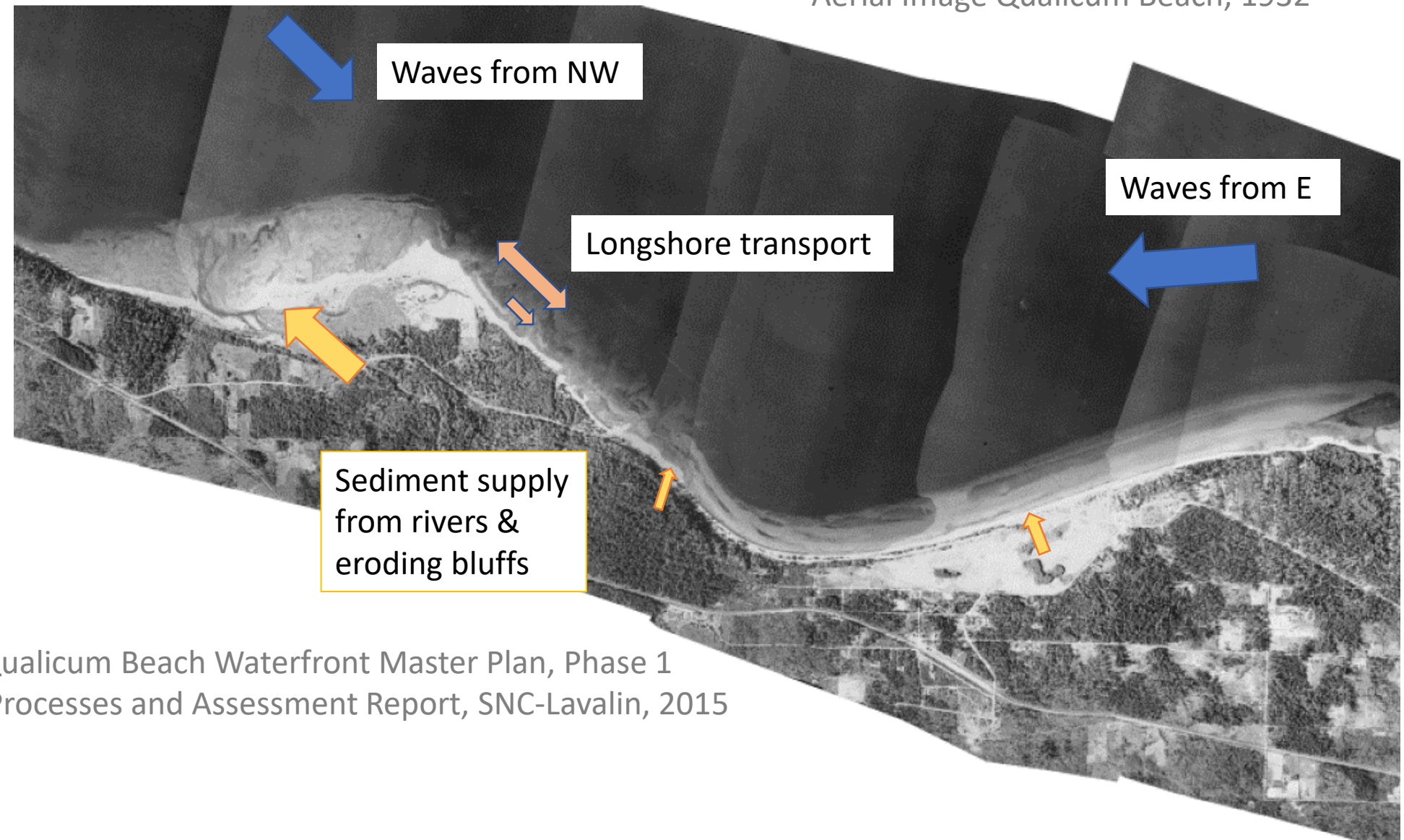
Note the wide upper beach in historic photos.

Figure 6: View of Shady Rest and Grandview Camp taken from Bluffs - circa 1930.
source: Qualicum Beach Historical and Museum Society

Credit: Qualicum Beach Waterfront Master Plan, Phase 1 Coastal Processes and Assessment Report, SNC-Lavalin, 2015

Coastal Processes

Aerial Image Qualicum Beach, 1932



Credit: Qualicum Beach Waterfront Master Plan, Phase 1
Coastal Processes and Assessment Report, SNC-Lavalin, 2015

Coastal Processes - Erosion

Shoreline circa 1970's. Provided by Bob Weir, Town of Qualicum Beach

Widespread construction of shoreline seawalls and revetments from 1960's to 1990's

Shoreline Protection

- Seawalls have small footprint but vulnerable to overtopping damage
- Can cause significant impacts on beaches
- Loss of integrity from damage can occur suddenly

Alternatives to Seawalls?

To protect against erosion, and reduce flood hazard.

Some examples:

- Beach Nourishments
- Cobble beaches
- Living shorelines (salt marsh, clam beds)
- Rock breakwaters
- Submerged reefs

Green Shores Program

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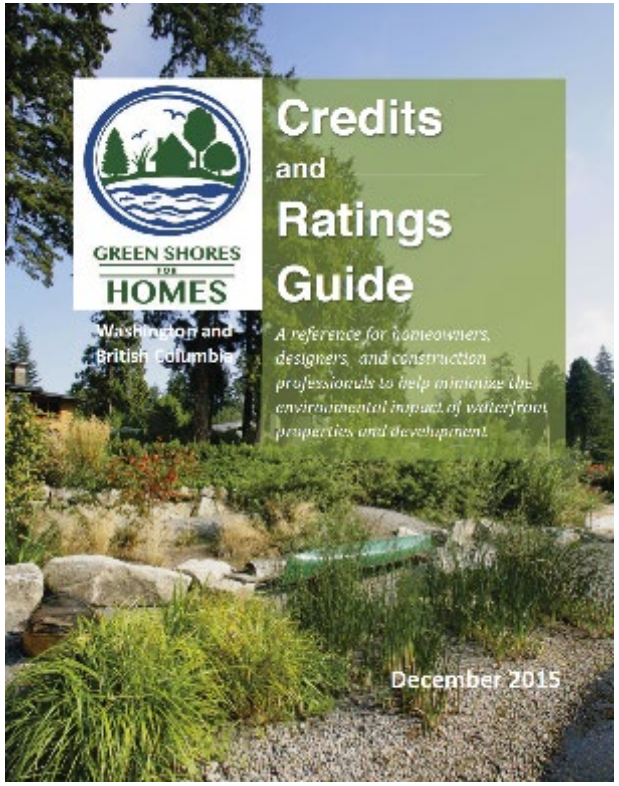
Guiding principles of Green Shores

- Preserve or restore physical processes—the natural actions of water and sediment movement that maintain healthy shorelines.
- Maintain or enhance habitat function and diversity along the shoreline.
- Prevent or reduce pollutants entering the aquatic environment.
- Avoid or reduce cumulative impacts—small individual effects that add up to large impacts on shoreline environments.

Seawalls do not support these principles…



Green Shores Program

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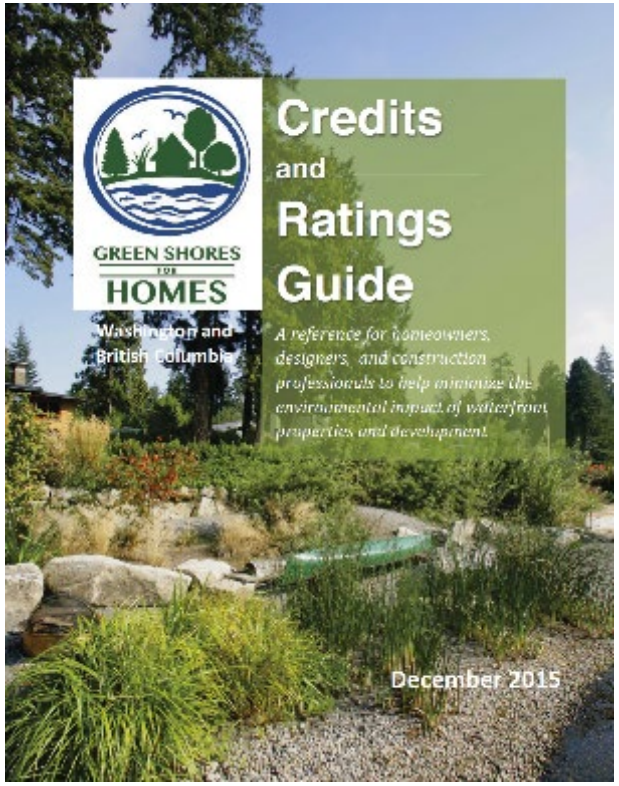
Credit 1.5: Soft Shore Protection or Enhancement

To qualify for this credit, construct soft shore protection rather than hard shore protection structures where shoreline erosion control is needed.



At Qualicum Beach, high wave energy and long-shore transport present challenges.

Hence, a hybrid design is required that includes some ‘hard’ elements.

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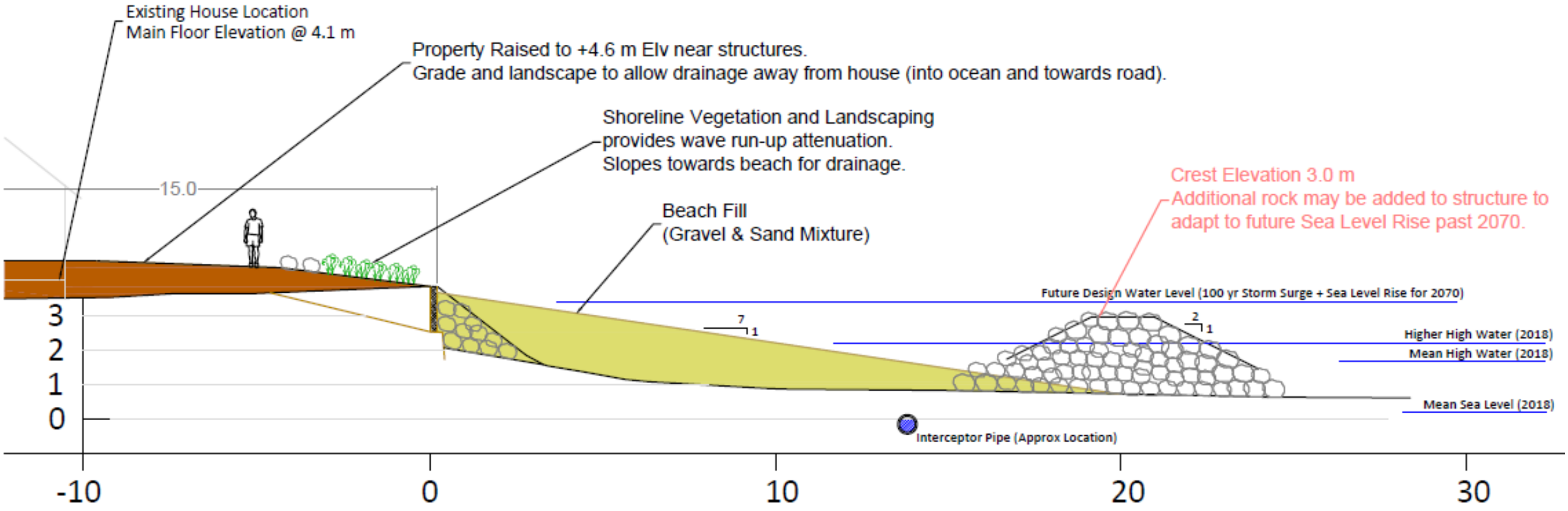
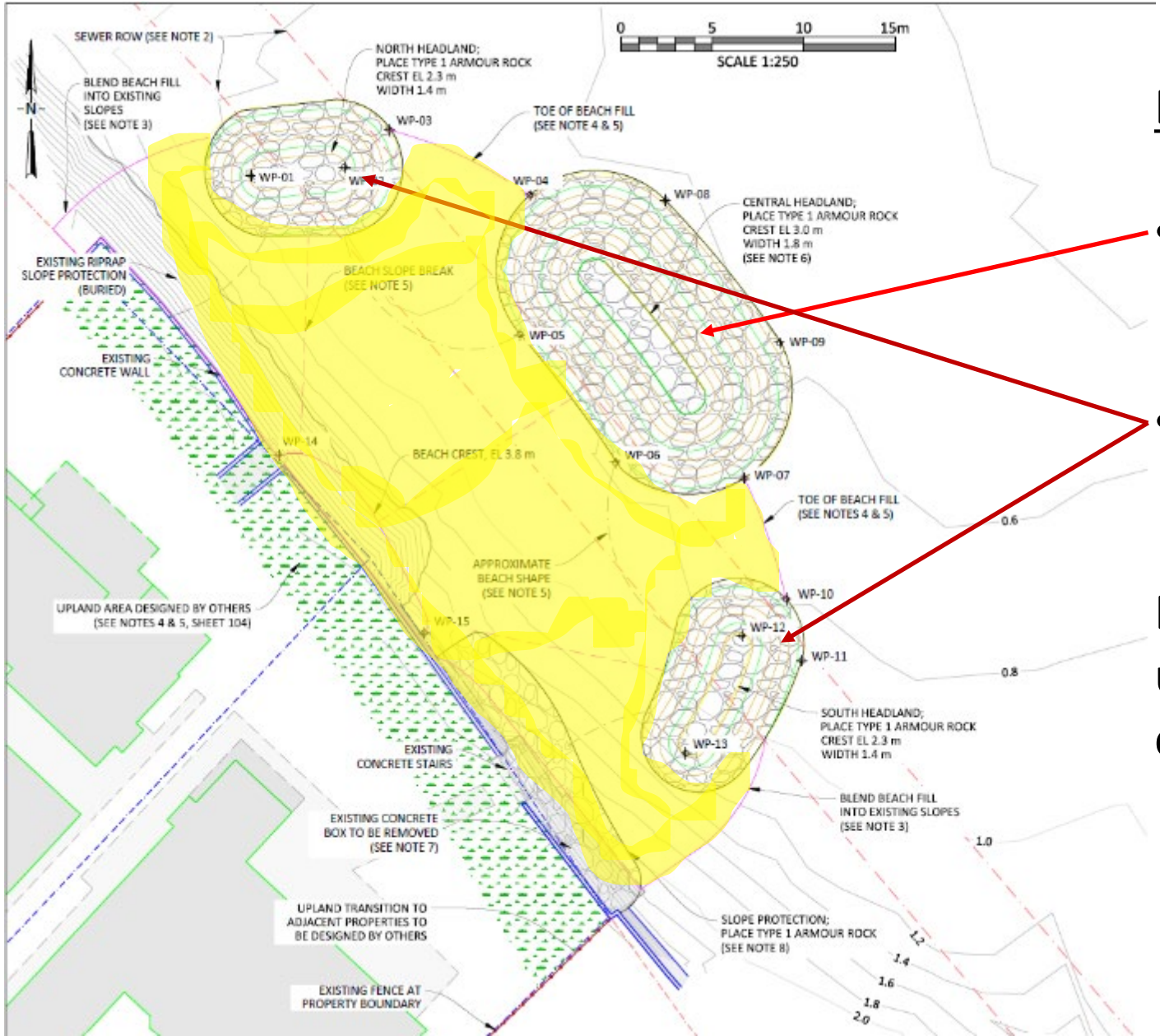
Case Study
Higson Crescent
Qualicum Beach

Pre-Construction Photos (Higson Cr.)

Hybrid Design (Higson Cr.) – Section View



Hybrid Design (Higson Cr.) – Plan View



Elements of the design

- Detached breakwater to dissipate wave energy
- Smaller rock headlands to limit long-shore transport.

Both provide habitat on upper tidal zone, and complexity.

Higson Crescent – Construction (2021)

Higson Crescent – Post Construction (2021)

Higson Crescent – Winter Storms

Photo Credits: Craig Hodge

Higson Crescent – Post Winter Condition

Higson Crescent – Post Winter Condition

<u>Post Construction Monitoring (Spring 2022)</u>

- Overall project worked very well
- Provided better protection than adjacent seawalls.
- Beach profile is dynamic and changes in pocket beach

NW side higher level of erosion than anticipated for 1 year.

Higson Crescent – Post Winter Condition

<u>Post Construction Monitoring (Spring 2022)</u>

Properties on each side of project had accretion of sediment on upper beach.

Good as project is allowing continuation of sediment transport. Project is not isolated from coastal processes.

Bad for homeowner if too much sediment is lost…

Important to monitor and adjust to achieve balance between retention and dynamic processes

Scale Problems

- Coastal processes of erosion, sediment transport, and deposition occur on larger scale

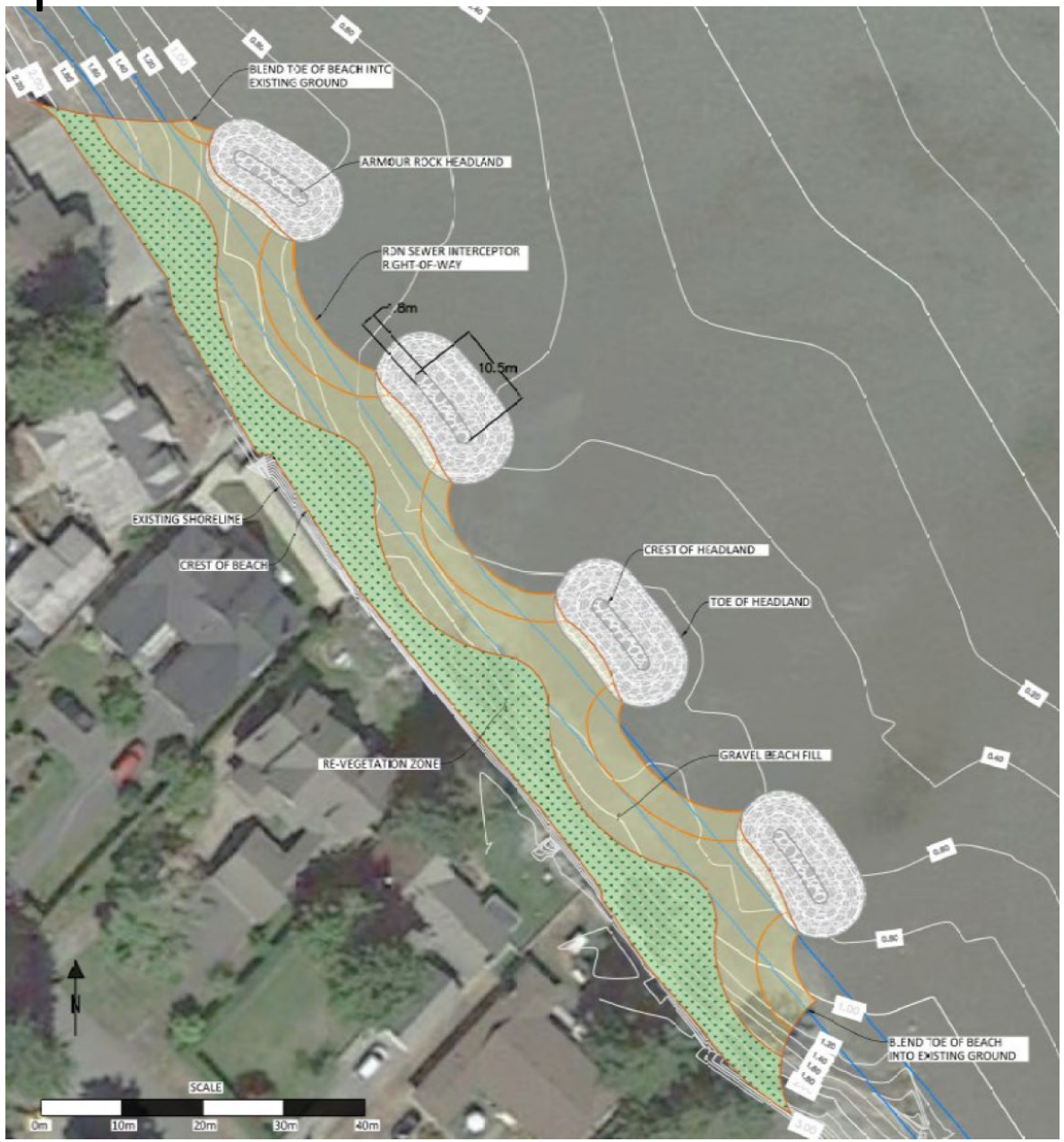
- Small projects on property scale are more sensitive to boundary effects

Case Study
Concept Design
Seacroft-Higson

Neighbourhood Scale Concept

- Larger volume of nourishment
- Reduced volume of rock armour per unit length
- Reduces ‘edge’ effects per size of project

Conceptual sketch of neighbourhood scale project (credit Jessica Wilson)



Neighbourhood Scale Concept

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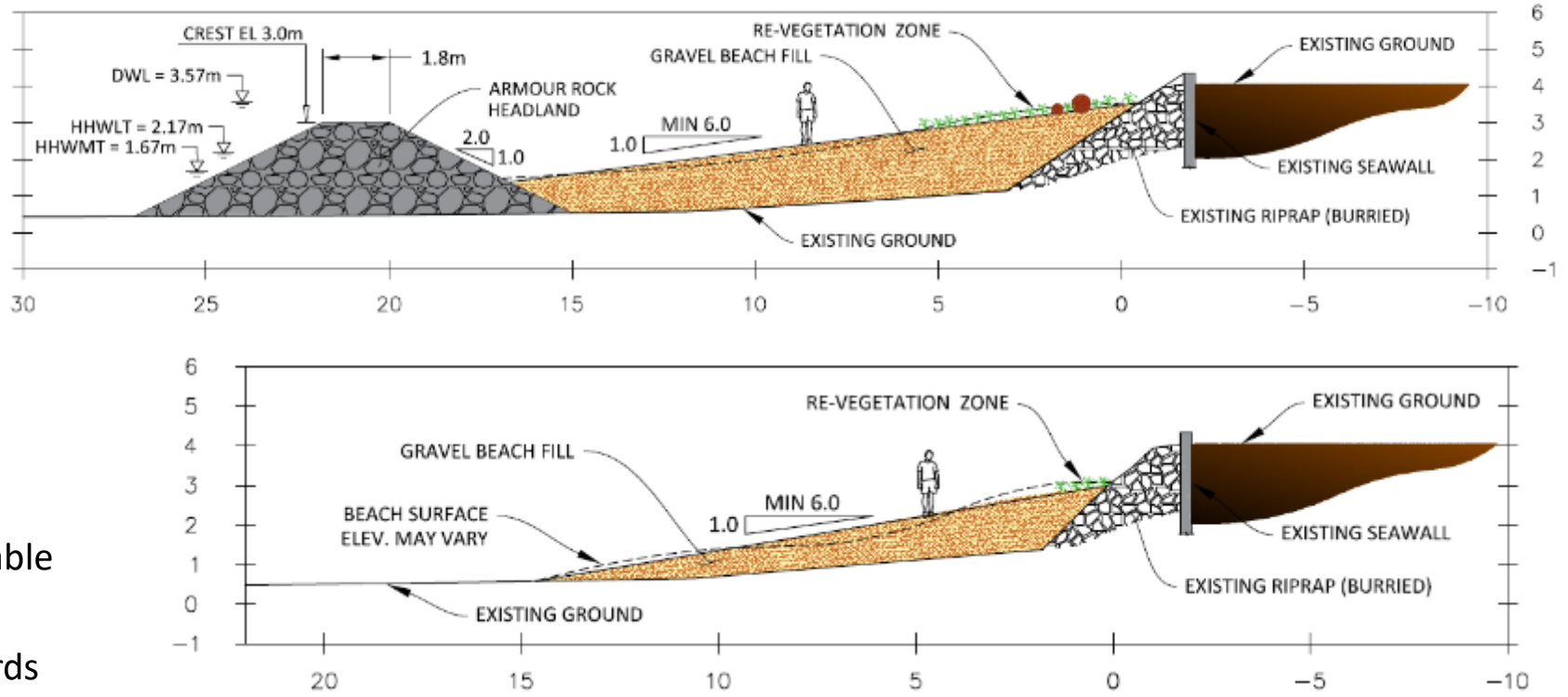
Green Shores Compatibility:

- Restores a more natural beach profile
- Restores ecological functions
- Enhances shoreline habitat
- Avoids cumulative impacts & easily expandable
- Increases resiliency to sea level rise
- Protects properties from coastal flood hazards



Section views of beach – headland system for Neighbourhood Scale at Qualicum Beach.
Top = beach cusp behind rock headland
Bottom = open beach between headlands

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Closing thoughts

- Boundary effects are more pronounced at property scale project.
  - Greater care needed in design
  - Balance of sediment retention (control) and allowing coastal processes
- Community (neighbourhood) scale projects are more in-line with coastal process scale.
  - Can achieve better economies of scale.
  - More opportunities for a variety of design approaches