

Project: Passive Solar Greenhouse

Location: 179 Chinook, Kitimat BC

PID: 008102295

Passive Solar Greenhouse Concept:

Passive solar greenhouses are capable of growing plants year-round in northern Canadian climates. The design consists of the fine balancing of a south facing transparent, insulated medium, a northern insulated wall and roof, a series of vents to achieve thermal syphoning, a thermal mass and an insulated foundation. Designed correctly, the passive solar greenhouses can depend solely on solar heat and provide a self-reliance solution in cold, shady climates.

The proposed greenhouse design for this project has been developed by Smart Greenhouses LLC in the mountains of Colorado. Two 30ft long greenhouse designs are currently being assessed. The Liorah model has a 18ft roof span and the Shining Mountain has a 14ft roof span, with a steeper roof to allow for greater snow shed.



Picture A: Example of the Liorah Greenhouse model



Picture B: Example of the interior of the Liorah Greenhouse model (West facing)



Picture C: Example of the interior of the Liorah Greenhouse model (East facing)



Picture D: Example of the Shining Mountain model w Optional Shed



Picture E: Example of the interior of the Shining Mountain model (West facing)

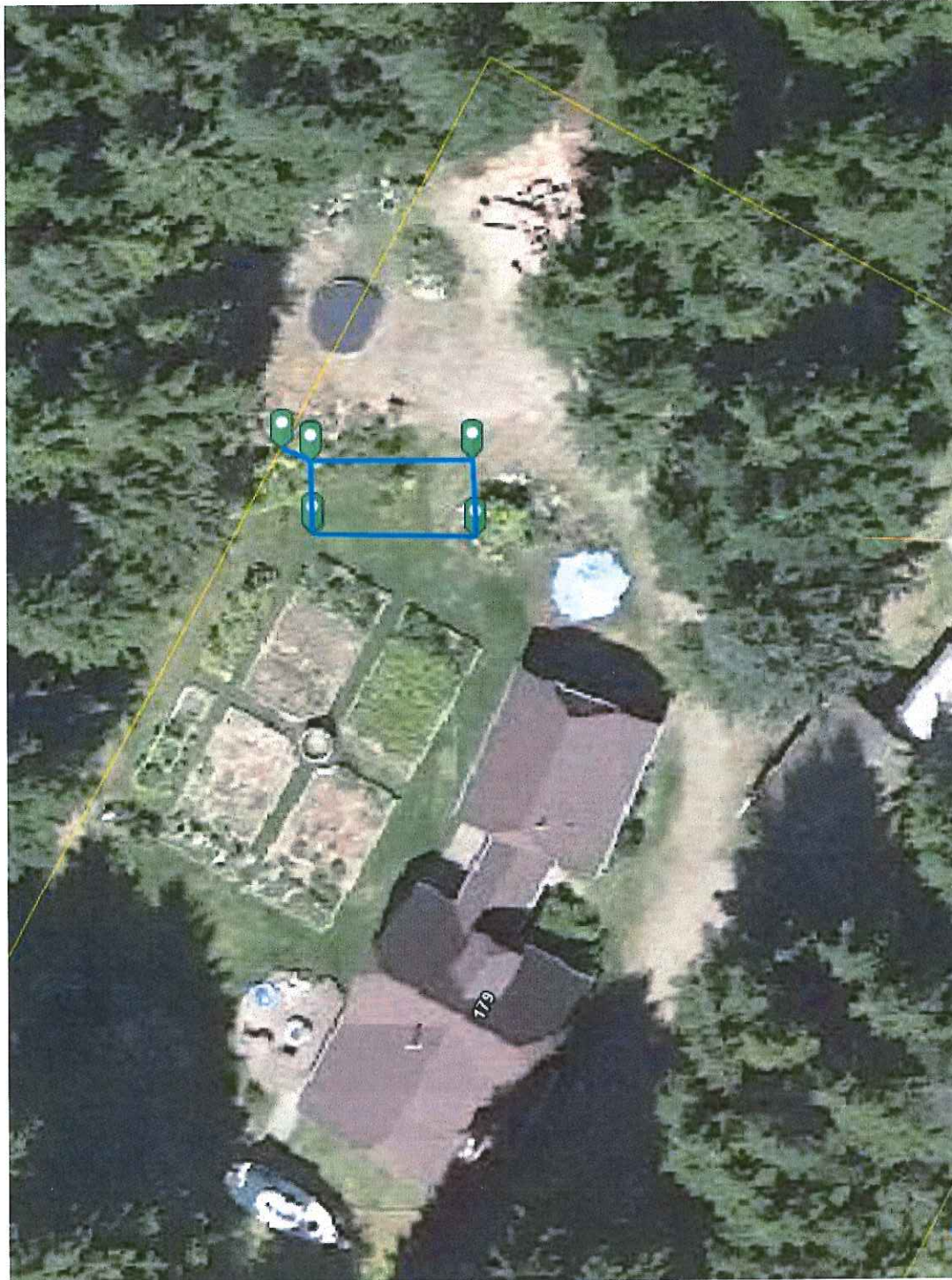
More info:

Yukon Gov: [http://www.emr.gov.yk.ca/agriculture/pdf/Greenhouses for the Northern Climate.pdf](http://www.emr.gov.yk.ca/agriculture/pdf/Greenhouses%20for%20the%20Northern%20Climate.pdf)

Proposed Greenhouses: <https://www.pennandcordsgarden.com/greenhouses.html>

Proposed Location & Conceptual Design:

To maximize solar gain, passive greenhouse glazing must be oriented to face 15° S-SE to 0° S to maximize solar gain. The proposed greenhouse will be oriented 0° S with a 5ft offset from the rear of the property to minimize shade and maximize solar gain.



Picture F: Proposed Location

Surface Water Management:

4" Perimeter drain @ footing cw geofabric wrap & ¾in stone, Draining NE

Foundation:

ICF Strip Footing, 6in x 4ft deep w 6in x 1ft base

Structure:

Std grade lumber where covered

Cedar where uncovered

Painted white

HVAC:

Ground & roof wax activated vents for 15 to 20% of glazing area

East & West doors w screens

Air lock entrance at one door

Emergency exhaust fan (tbd)

Heat:

None initially

Future design provisions/considerations for rocket mass stove

Water or sand/rock drum thermal mass

Glazing:

South orientation: 0°

Angle: Wider (2 angle) exposure to sky globe required to maximize gain in cloudy conditions.

Primary slope: 70 - 75° for winter conditions

Secondary slope: 30° slope for to contrast x while maximizing snow shed

Material: Co Ex Corp, AC Plastics or Polygal triple or quintuple panels

Insulation:

Roof: R30

Walls: R20

Soil Curtain: R20

Glazing: R3.2 or R2.6, depending on polycarbonate thickness (25mm or 16mm)

Foam sealing of structure joints.