

Kus-kus-sum Land Restoration Phase I: Unpaving Paradise

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DRAFT Final Report



Prepared for: Fish and Wildlife Compensation Program

Prepared by: Jennifer Sutherst and Caitlin Pierzchalski (Comox Valley Project Watershed Society)

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TABLE OF CONTENTS

List of Figures	3
Executive Summary	4
Introduction	6
Site History	7
Background	9
Goals and Objectives:	10
Study Area	10
Methods: Initial Kus-kus-sum Restoration	12
Project Plans and Modelling	12
Project Planting Prescription	13
Concrete Removal	13
Surface and Sub-surface Testing	13
Surface and Sub-surface Material Tests	13
TerraWest Soil Testing	14
GeoScan Infrastructure Location Testing	14
Building Demolition	15
Building Demolition	15
Re-purposing and Recycling	15
Results and Outcomes	16
Project Plans and Modelling	16
Project Planting Prescription	17
Concrete Removal	17
Surface and Sub-surface Testing	18
Surface and Sub-surface Material Tests	18
TerraWest Soil Testing	18
GeoScan Infrastructure Location Testing	18
Building Demolition	19
Building Demolition	19
Re-purposing and Recycling	19
Discussion & Recommendations	19
Acknowledgements	20

References	21
Appendices (Attached Separately)	22

LIST OF FIGURES

Figure 1: Location of the Kus-kus-sum site in relation to the K’ómoks Estuary and adjacent watersheds. Map courtesy NHC, 2020.	6
Figure 2: 1946 Aerial image of Kus-kus-sum site.....	7
Figure 3: Map of Kus-kus-sum site within a Courtenay, BC context. Image from Google Earth, 2021.	11
Figure 4: Panorama of the 440m steel clad retaining wall that separates the current site from Courtenay River.....	12
Figure 5: Updated construction plan for the Kus-kus-sum site. Prepared by NHC, 2020.	16
Figure 6: An example of water distribution on KKS site before and after proposed restoration. Current site is shown on left and proposed site design is shown on right. Prepared by NHC, 2020.....	17

The Kus-kus-sum project is an initiative, being undertaken by the Comox Valley Project Watershed Society (CVPWS) in partnership with the K'ómoks First Nation (KFN) and the City of Courtenay (CoC), that aims to purchase a former industrial sawmill site alongside the Courtenay River within K'ómoks Estuary for the purpose of reverting it back to fish and wildlife habitat for long-term conservation. CVPWS and their project partners successfully negotiated a deal to purchase the property from Interfor Corporation in September 2017 and had until June 30th, 2020 to raise the funds to buy the land. Once the land was acquired the restoration of the property could begin. With this goal in mind CVPWS secured funding from the Fish and Wildlife Compensation Program (FWCP) to begin the restoration of the site in the summer of 2020, as this initiative aligns with the priority action PUN.RLR.HB.16.01 in the FWCP Puntledge River Watershed Action Plan. One of the stipulations of the FWCP funding was that restoration could not begin at the site until the property title had been transferred.

However, the Covid19 worldwide pandemic had a significant impact on the land acquisition phase of the project, including planned fund-raising activities, and the property title did not transfer over to CVPWS until Feb 23rd, 2021 – at which point CVPWS could begin restoration of the site. The initially planned restoration activities for 2020 included the removal of the derelict office building on the site, and the start of the removal of the hard surfacing that covers the site. Although the removal of hard surfacing was scaled back most of the other restoration objectives were met. Completed work during included some preliminary surface and sub-surface testing, followed by a more extensive soil sampling and laboratory analysis to determine if any pre-existing contamination was present. Initial test pits gave supporting evidence that suggested that the restoration plan and budget should be updated to take into account an increased thickness of surface concrete to be removed and variable sub-surface conditions, potentially increasing need for soil amendment. These changes were made, and updated plans and modelling were carried out. Hydraulic models were done to better show likely inundation levels, with tidal flow and freshwater input, with the new proposed design. The last of the standing infrastructure on site, one derelict office building was demolished

during March 15-24th, 2021 and building materials from the building demolition were re-used and recycled wherever possible. Now that initial restoration work has been completed, the project can move forward to complete the restoration of the site by 2023.

In 2016, Comox Valley Project Watershed Society (CVPWS), in partnership with the K'ómoks First Nation (KFN) and the City of Courtenay (CoC), embarked on a mission to acquire and restore a decommissioned sawmill site, formerly referred to as the Field sawmill, and now known as Kus-kus-sum. The Kus-kus-sum site was once a tidally-influenced forested riparian area that provided habitat resources for fish and wildlife at the confluence of the Courtenay River and the K'ómoks Estuary. It is located along the salmonid migration corridor that connects the K'ómoks Estuary to upper watershed spawning habitats in the Puntledge, Morrison and Tsolum Watersheds.



Figure 1: Location of the Kus-kus-sum site in relation to the K'ómoks Estuary and adjacent watersheds. Map courtesy NHC, 2020.

SITE HISTORY

Historical air photos from 1946 and 1951 show that the area was forested and indicate that one or more channels crossed the property and connected to the Dyke Slough (Figure 1). These channels would have provided brackish off-channel habitat for salmonids, a type of habitat that is lacking in the K'ómoks Estuary. Off-channel habitat allows juvenile salmonids to escape high river flows and seal predation, as well as providing holding areas to allow for forage, growth, and acclimatization to increasing salinities before they migrate to the marine environment (Beechie et al. 1994) (Sommer et al. 2001) (Ebersole et al. 2003).



Figure 2: 1946 Aerial image of Kus-kus-sum site

A sawmill was built on the Kus-kus-sum site location in 1949. Over the next 50 years, to facilitate industrial sawmill operations, the area was cleared and paved and a steel-clad concrete retaining wall (which encroaches on the river) was erected along the shoreline. These alterations have removed much of the historical fish and wildlife habitat values of the site. A 1977 governmental report on Comox Harbor stated that the estuary is one of the richest in Canada and that the sawmill operations and associated log booming should be relocated, in part due to impacts to these salmon runs (Burns, 1977). The decline of the once bountiful runs of Chinook salmon is one of the legacy impacts from logging and milling activities (Sommer et al. 2001). At the Kus-kus-sum site, seals utilize the steel wall as well as the Dyke Slough, which is

now a blind channel, to easily trap and prey upon salmonids (both out-migrating juveniles and returning spawners). One study indicated that seals consumed an estimated 36% of endangered Chinook runs in the estuary (Ebersole et al. 2003).

In 2005, sawmill operations at the site were shut down and the land was put up for sale in 2008 by Interfor Corporation. This created an opportunity to reclaim the area, restore it to functioning salt marsh and riparian forest habitat, and protect the site from future development. In 2010, a study done to identify the restoration and protection opportunities for enhancing juvenile salmonid survival classified restoring and conserving the Kus-kus-sum site as a high priority (Tryon, 2011). In addition to the CVPWS, others have suggested that it would be prudent to investigate the extent of saltmarsh historically present in the upper estuary, and that returning a portion of the former estuary floodplains to marsh would improve the productivity of the area for salmonids and other wildlife (Jeffres et al. 2008). There are five species of salmon that use the estuary, including a very depressed population of summer-run Chinook salmon which is considered to be a unique, endangered stock (Richards et al. 1992) (Bellmore et al. 2012). The restored habitat would connect with and support the adjacent conservation areas providing over 25 acres of tidally-influenced wetland for salmonids to access. In addition, the restoration would help attenuate localized flooding issues and help mitigate climate change. The area is of cultural importance to the K'ómoks First Nation, and one of the key aims of the project remains to restore the site through the lens of reconciliation.

The Kus-kus-sum initiative aligns with the priority action PUN.RLR.HB.16.01 in the FWCP Puntledge River Watershed Action Plan, and previous funding from FWCP allowed CVPWS to undertake baseline studies helping us make great advances on the project and to chart a path forward. We have since acquired the land, created a detailed restoration prescription for the site and associated budget, and begun initial restoration activities on the site. This year's FWCP funding supported these initial discovery stages of restoration to inform future work, as well as some of the initial, visible activities on site, including the demolition of the derelict office building. These are important, first few steps of the restoration of KKS that will restore and conserve its' habitat and wildlife values on this site in perpetuity.

BACKGROUND

CVPWS secured funding from the Fish and Wildlife Compensation Program (FWCP) to begin the restoration of the site in 2020. The original agreement with Interfor stipulated a deadline by which to raise funds for the purchase of the property of June 30th, 2020. The plan was to start restoration in the summer of 2020, once the property had been secured. Some of the initially planned activities for 2020 included the removal of the derelict office building on the site, and the start of the removal of the hard surfacing that covers the site.

However, the COVID-19 global pandemic had a significant impact on planned activities. The pandemic meant that many of the community fundraising events, which had been planned for the last phase of the campaign, had to be cancelled. As well, CVPWS faced a reduction in capacity as the Manager of Fundraising and Outreach was no longer able to work due to school being cancelled and a lack of childcare resources (daycares were also shut down at that point). The loss of a key staff person meant that the fundraising campaign had less capacity support. As such, the June 30th deadline for fundraising was not met. At this point, Interfor graciously granted CVPWS a fundraising extension to November 30th, 2020.

One of the stipulations of the FWCP grant funding that was received in 2020 was that no restoration work was to begin on the site until the property had been purchased and the title had been transferred, and as such, no restoration works could occur in advance of the land acquisition. By November 30th, CVPWS was successful in raising the remaining funds needed to purchase Kus-kus-sum. After the initial purchase, the three project partners come an agreement on the terms of title transfer for the property. This resulted in a Bare Trust Agreement with CVPWS holding the property in trust for the two partners, KFN and CoC, until their co-ownership and co-management agreements are in place better understand inundation levels with the new proposed design (Appendix A). The Bare Trust Agreement was signed on 23rd of February, 2021 at which point CVPWS could begin restoration (Appendix B).

GOALS AND OBJECTIVES:

The overarching goal of the Kus-kus-sum Land Securement for Puntledge Salmonids project is to acquire and restore the old Field Sawmill Site (Kus-kus-sum) to natural habitat. The objectives for this funding agreement were to support the initial phase of restoration for Kus-kus-sum project. After some delays and stalls with the land acquisition phase of the project, objectives needed to be amended and a change order was put in place to adjust the project and its associated budget. Overall, the goals and deliverables stayed the same, but less hard surfacing was removed than originally anticipated.

Objectives for FWCP Funding 2020/2021:

1. Update project plans and modelling
2. Update planting prescription based on project plan updates
3. Concrete removal
4. Surface and sub-surface testing
 - a. Surface and sub-surface material testing
 - b. TerraWest soil testing
 - c. GeoScan infrastructure location testing
5. Building demolition
 - a. Building demolition
 - b. Re-purposing and recycling of materials

STUDY AREA

Kus-kus-sum is located at 1901 Comox Road in the City of Courtenay, on the east coast of Vancouver Island, British Columbia. It lies along the Courtenay River which branches into the Comox Valley's two main salmon bearing streams, the Puntledge and Tsolum Rivers. The site is situated within the boundary of the K'ómoks Estuary (Figure 3) and the K'ómoks Important Bird

Area. It is within easy walking distance of the Courtenay Riverway Heritage Walk, the Courtenay Marina and Airpark, and is within walking and biking distance of downtown Courtenay. As the property borders Comox Road, which is the main thoroughfare connecting the City of Courtenay and the Town of Comox, it experiences high traffic flow on a daily basis. The site sits alongside the Courtenay River and presently consists of 8.3 acres of paved surface separated from the river by a 440 m steel wall (Figure 4). Cottonwood and alder trees are coming up through the cement, along with some small shrubs and common rushes.



Figure 3: Map of Kus-kus-sum site within a Courtenay, BC context. Image from Google Earth, 2021.

The name Kus-kus-sum was given to the site by the K'ómoks First Nation in honour of an ancient village of the same name that was located in the area. Some the current property may have served as a Sitka Spruce tree burial site for that traditional village (J. Morin, pers. comms., 2016).



Figure 4: Panorama of the 440m steel clad retaining wall that separates the current site from Courtenay River.

METHODS: INITIAL KUS-KUS-SUM RESTORATION

Efforts to start restoration in the summer of 2020 were postponed because CVPWS had yet to obtain title of the Kus-kus-sum site. COVID-19 limited fundraising capacity to raise funds for land acquisition, and the process of agreement between CoC, CVPWS, and KFN on land transfer took some time to get in place. One of the main stipulations for starting restoration was that Project Watershed or its Partners must hold land title. This title transfer took until late February 2021 to negotiate. Once the Bare Trust Agreement was finally in place for March of 2021, initial restoration efforts were able to move forward. Because of the delayed start, a change request was made in March 2021 for the 2020/2021 FWCP funds to adjust the initial scope of work, and in particular the associated budget.

Once CVPWS was officially holding the property in title for Kus-kus-sum, permits for building demolition were obtained, and the restoration could start with the building demolition in March 2021.

PROJECT PLANS AND MODELLING

CVPWS originally retained Northwest Hydraulic Consultants Ltd. (NHC) in 2017 to provide engineering support of Kus-kus-sum restoration project. Phase 1 of the project was completed in 2018 and involved compiling LiDAR, bathymetry, aerial and survey data, developing project concepts and drawings, estimating material quantities, and developing high-level construction cost estimates. 2020's project work (Phase 2 & part of Phase 3) involved further design refinement and project planning support. During this phase, undertaken as a part of this

funding agreement, NHC provided updated conceptual design drawings, and developed a hydraulic model for KKS.

The hydraulic model aims to illustrate possible water levels and inundation extents at KKS for existing and proposed design under a range of riverine flows and coastal water levels. For full methods behind the numerical model, model validation, and hydraulic analysis, please see Appendix A.

PROJECT PLANTING PRESCRIPTION

CVPWS originally retained Carolla Environmental Consulting in 2017 to provide a preliminary restoration prescription for the revegetation of the Kus-kus-sum site. Carolla was once again approached to provide an updated revegetation plan for the site based on the design and modelling work completed by NHC in 2020. Specifically, Carolla was asked to provide guidance on site preparation, planting strategies, invasive species management and monitoring. In addition, Carolla was asked to provide a planting plan for a section of the property to be planted in 2021 with funding from a World Wildlife Fund grant.

CONCRETE REMOVAL

Concrete removal was scheduled to occur during August of 2020, during the appropriate fish window. The work was postponed as it was stipulated to not occur before transfer of title to CVPWS or its Partners. Title transfer was delayed because of lack of funds at original deadline and a lengthy process for establishing Bare Trust Agreement between CVPWS and Partners. This work was postponed to be carried out during the 2021 and 2022 field seasons. However, significant preparatory work for this phase of the project did occur during 2020/21, specifically the test pits dug over the site resulted in the breaking and removal of concrete (see surface and subsurface testing below).

SURFACE AND SUB-SURFACE TESTING

SURFACE AND SUB-SURFACE MATERIAL TESTS

Initial surface and sub-surface testing was done by NHC on 14 different test pits at the Kus-kus-sum site. This testing aimed to collect field information to inform KKS restoration works and planning. These tests aimed to measure the paving type and thickness, and to catalogue to soil profile at specific locations on site.

On July 30th, 2020, CVPWS and NHC staff did a site visit to designate test pit locations and survey test pit elevations. Permission was sought from Interfor, the owner of the property at the time, before this work was conducted. On Aug. 5-7th, 2021, an Kobelco 260 excavator dug with hydraulic ram was used to break up paving and dig 14 test holes. The type and thickness of paving at each test hole was recorded, as were the soil properties and stratigraphy within each test pit. All test pit information was recorded, except for test pit 14 which could not be dug due to time constraints.

TERRAWEST SOIL TESTING

To build upon initial testing done by NHC, further soils testing was done by TerraWest, to determine if any legacy contaminants or further need for soil remediation were needed. Based on NHC's recommendations in their initial surface and subsurface work, further investigations to measure the possible presence of contaminants on site were needed. The TerraWest report (Appendix E) was conducted in March 2021 and sampled nine test pits to a depth of 4.3m below ground surface. Soil samples were analyzed for hydrocarbon parameters, metals, phenols, and volatile organics. For full description of methods, see Appendix E.

GEOSCAN INFRASTRUCTURE LOCATION TESTING

A GeoScan Utility Survey was carried out March 26th, 2021 to locate and mark all existing underground pipes, conduits, and other infrastructure that will have be removed or protected during the next phase of restoration. The survey will inform restoration planning and work on site as we start removal of concrete surface and earth works on site. The full site was surveyed by GeoScan contractors. Utilities, pipes, and infrastructure were located using ground-penetrating radar, EM locator, and duct lodder, and infrastructure was marked with paint on the site surface.

BUILDING DEMOLITION

BUILDING DEMOLITION

Once CVPWS was officially holding the title of the land, we were able to move forward with obtaining the CoC building demolition permit. One of the pre-requisites for the demolition permit was a hazardous materials survey. This survey was completed for Project Watershed by Tsolum and Stable Environmental Ltd. (Appendix G), and it confirmed that there were no asbestos containing materials within the office building, however the exterior siding did contain lead contents greater than 90mg/kg. The building demolition was carried out by B & D Containers over from March 15th to 23rd 2021. During the first week dumpsters were delivered to the site and a crew of labourers worked to strip the building of all the drywall and insulation. During the second week a 300t excavator was used to demolish the building, sorting materials by type for re-purposing, recycling, and landfill. A welder came in part way through the demolition to cut out steel I-beams and support posts in the building. CVPWS negotiated having tipping fees waived at the local municipal transfer station to reduce cost. The demolition was supervised by CVPWS staff, Jennifer Sutherst. The demolition was a public showcase of the beginning of the site works at Kus-kus-sum and was recorded with video, photo and drone footage ([Kus Kus Sum Office demolition - YouTube](#)) (R. Ward, 2021).

RE-PURPOSING AND RECYCLING

Recycling and re-use of office building materials was important to CVPWS, so B & D Containers were required to salvage and recycle whatever they could. The process for this included separating all building materials into separate bins by material type and taking these materials to either recycling facilities or municipal landfill as appropriate for material type. As many 2x4s and 2x10s, as possible, were salvaged for re-use and recycling, along with steel I-beams and posts, and several other building materials.

PROJECT PLANS AND MODELLING

Full construction plans and the hydraulic and numerical modelling can be found in Appendix A. To take in account sewage infrastructure not included in previous plan as well as some other parameters, NHC created an updated restoration construction schematic as seen in Figure 5.

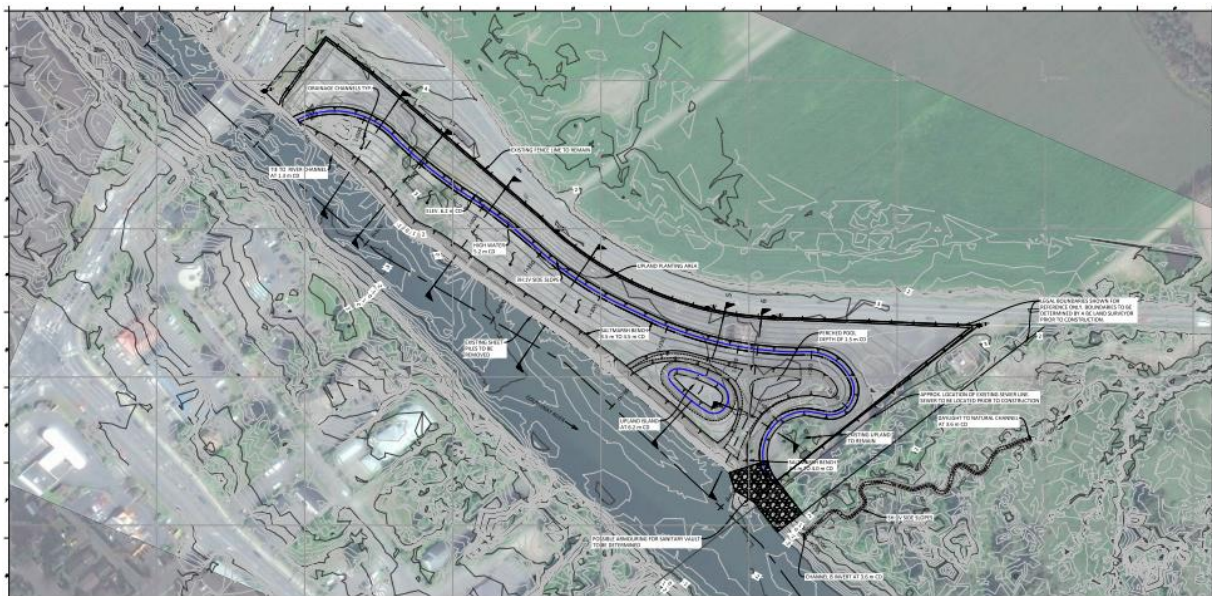


Figure 5: Updated construction plan for the Kus-kus-sum site. Prepared by NHC, 2020.

Updated modelling showed water depths based on tidal inundation and freshwater incursion on the site for current (non-restored) conditions and proposed (restored) conditions (Figure 6).

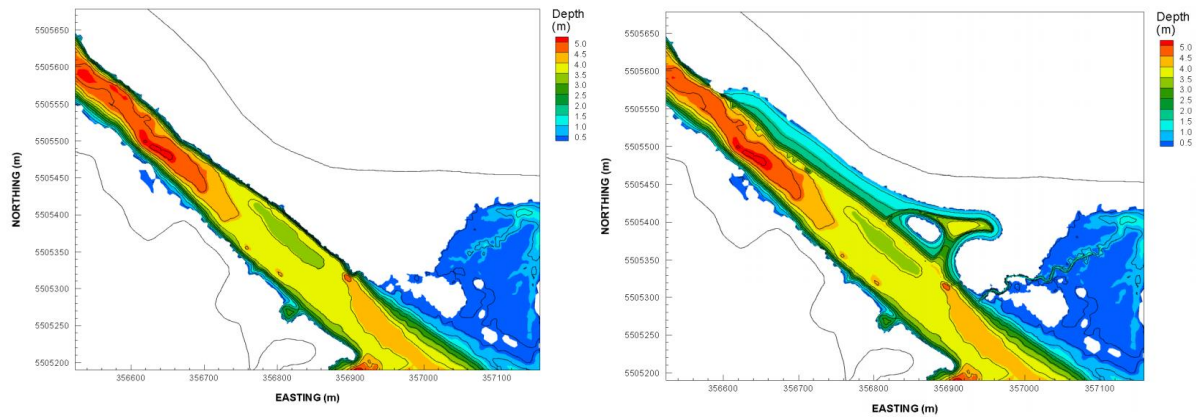


Figure 6: An example of water distribution on KKS site before and after proposed restoration. Current site is shown on left and proposed site design is shown on right. Prepared by NHC, 2020.

PROJECT PLANTING PRESCRIPTION

Carolla Environmental Consulting provided an updated plan for revegetation of the Kus-kus-sum site once the earth works are completed included guidance on site preparation, planting strategy, scheduling and timing, specific plant species, quantities and sizes for each habitat type, invasive species management, and recommendations for monitoring and adaptive management. In addition, a specific planting plan was provided to undertake a small demonstration project in 2021 with funding from the World Wildlife Fund. For the detailed report please refer to Appendix C.

CONCRETE REMOVAL

Concrete removal was not achieved as planned in 2020/2021 because of postponements due to lack of funding for acquisition and longer than planned process for land transfer agreement between the three project partners. This adjustment was captured in a change order for this agreement completed online Mar. 2021. However, the original scope of work did not include the complete removal of all the hard surfacing at the site, but rather starting this process with the removal of some of the concrete. Indeed, this work was started as the test pits that were dug in the summer of 2020 resulted in the breaking and removal of concrete in these areas. Hence, although not as much was achieved as originally planned, the overarching goal to work towards the de-building of the site and returning it to wildlands has gotten off to a good start.

SURFACE AND SUB-SURFACE TESTING

SURFACE AND SUB-SURFACE MATERIAL TESTS

Surface and sub-surface material testing pits dug by NHC found surface type to be concrete of varying thicknesses with a variable composite of rebar within the concrete. The layout of rebar within the surface layer was not consistent across the surface, and concrete thickness also varied across site. Steel I-beams were found to have been driven into the site on the northwest corner of the site where a building once stood. See Appendix D for a full report of surface and sub-surface sampling carried out in August, 2020.

TERRAWEST SOIL TESTING

Based on laboratory results from soil assessment done in March 2021, TerraWest concluded that four of the nine test pits contained contaminants of concern (COCs) exceeded the applicable standards for Industrial land use and six of the nine test pits contained COCs exceeding applicable standards for Reverted Wildlands land use (See Appendix E). These contaminants included Arsenic, Copper, Toluene, and HEPH. All other parameters were reported at concentration less the lowest standards or did not have applicable standards. Overall TerraWest's findings were consistent with a site that has previously been remediate but still has some low-level contaminant concentrations in some areas. If soil is excavated and disposed of from these areas it will require a soil management plan.

GEOSCAN INFRASTRUCTURE LOCATION TESTING

GeoScan surveys conducted on March 26th, 2021 located several different utilities and pipes (see Appendix F). Electrical and communication lines to the site were all overhead and have since been disconnected. Water lines were located on site at varied depths between 0.8m and 1.2m. Some of these lines are suspected to be Asbestos Concrete. Storm and sanitary lines were also found between 0.3 and 2.8m depths. One known sewage line to a neighbouring pump station was also located and mapped.

BUILDING DEMOLITION

BUILDING DEMOLITION

The building demolition was successful, and fully-finished within between March 15th and 24th. Building materials were salvaged to reduce waste creation through the demolition. Cleanup of the demolition site was finished at the end of day March 24th and almost no trace of the building is left on site.

RE-PURPOSING AND RECYCLING

Recycled materials included 2x4 and 2x10 lumbers from the building, steel beams and posts, wiring and metals, and a small sink. All other materials were sorted into separate containers and brought to the municipal transfer station for proper disposal.

DISCUSSION & RECOMMENDATIONS

The findings from the original NHC test pits (Appendix A) and TerraWest testing (Appendix E) will have implications for cost of restoration as well as the need for ongoing environmental monitoring on site throughout construction. Findings from GeoScan testing (Appendix F) have provided a strong case for necessary updates to the original restoration construction plan, as well as the need for careful planning for the removal and protection of previously unknown infrastructure. The level of uncertainty of sub-surface type and infrastructure was accounted for in a revised project budget and so values for soil amendment and removal were raised to accommodate need for additional, better quality soil to be brought in, as well as cost associated with bringing poor or contaminated soils off-site for proper disposal. For certain excavation, soil may need to be excavated and disposed of at an approved contaminated soil facility and confirmatory delineation of these soils will need to be done by a qualified professional during excavation – therefore it is recommended that a Soil Management Plan be prepared to help provide guidance for this part of the project. This information will inform the work and planning going forward this summer as we start concrete removal and earth works on the site.

The new design and hydrodynamic model will support future funding efforts for the restoration of KKS.

The demolition of the building at the KKS site brought in a lot of excitement and attention from the wider Courtenay and Comox communities. Several news articles¹⁻² were created to celebrate the occasion and for the community, it represented the start of the long-anticipated restoration of the KKS.

Further agreements beyond the Bare Trust Agreement are still be negotiated between Partners, mainly a Co-Ownership and Co-Management Agreement between K'ómoks First Nation and the City of Courtenay. These agreements will delineate CVPWS as the restoration manager and will also hold implications for long-term monitoring and maintenance of the site. These agreements will further support our relationship with our two Partners who have been paramount in the securing of land and the beginnings of restoration.

ACKNOWLEDGEMENTS

Comox Valley Project Watershed Society would like to acknowledge the financial support of funders, including the generous and ongoing support of FWCP (<https://projectwatershed.ca/about-us/funders-partners/friends-of-kus-kus-sum/>). We would also like to acknowledge the hard work, commitment of all of our board members: Pat Sloan, Bill Heidrick, Brian Storey, Kathy Haigh, Dan Bowen, Don Castleden, Alisha Drinkwater and Bill Heath. A special thank goes out to all of our volunteers who have given their time and energy to support this endeavour, and our CVPWS staff who continue to work hard to make this project a reality.

¹ [Courtenay Kus-Kus-Sum project moving ahead at full steam - My Comox Valley Now](#)

² [Kus-kus-sum, formerly Field's Sawmill Demolition - Tide Change](#)

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Appendix A – Northwest Hydraulics Consulting Ltd.’s Updated Restoration Plan and Hydraulic Modelling

Appendix B – Bare Trust Agreement for 1901 Comox Road

Appendix C – Planting Prescription for the Restoration of the Kus-kus-sum, Comox Valley, 2021

Appendix D – Northwest Hydraulics Consulting Ltd.’s Surface and Sub-surface Test Report

Appendix E – TerraWest Soil Assessment Report

Appendix F – GeoScan Utility Locate Summary

Appendix G - Tsolum and Tstable Environmental Ltd. Hazardous Materials Survey