



Greenwood Park and Kealy Woods Park Management Plan

city
of north
vancouver

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Acknowledgments

This Plan has been developed with input from key stakeholders, the public, community groups, school groups and City staff.

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Executive Summary

The City of North Vancouver Council and staff have a vision to be the healthiest small city in the world. By acting as leaders in climate action and as stewards of the environment for future generations, we can ensure that our City is healthy, liveable, and vibrant. Healthy urban forest parks are important community assets that contribute to the mental, social, and economic wellbeing of the community. Urban forests provide the opportunity to connect with the natural world and ourselves more deeply. To the end, City staff has been working on a long-term park management plan at Greenwood Park and Kealy Woods Park.

Greenwood and Kealy Woods are located in the upper grand boulevard neighbourhood of the City of North Vancouver. These urban forests span approximately 12.67 hectares with some truly unique qualities. Greenwood Park has mostly level terrain with the exception of the historic rock quarry and bluffs. The Green Necklace portion that extends north into the Greenwood Park was built in 2018, and has attracted many more visitors to Greenwood Park and the neighborhood in general. This presents opportunities in active transportation, healthy lifestyles, and exploration of the urban forest. Kealy Woods is also forested with natural rocky outcrops and steep bluffs. Two public schools are within close vicinity, Queensbury Elementary School and Sutherland High School. Students and teachers regularly visit the parks for outdoor recreation and learning opportunities.

Some of the challenges with both parks include a lack of defined park entry, invasive plant material, safety concerns related to lack of park signage and maps, poor drainage in some areas, trash and graffiti, and unsanctioned activities such as camping and parties. Climate change has affected both parks resulting in a decline of cedar and hemlock trees, wind blown areas, and safety concerns related to wildfire risks. In 2019 City staff and consultant, Diamond Head Consulting worked on an environmental assessment (EA) of Greenwood and Kealy Woods. The purpose of the EA is to help guide the short and long-term decisions. The assessment includes analysis of existing trees, vegetation, wildlife habitat, watercourses, invasive species, and an inventory of trails and other recreational features.

Phase 1 of the public consultation effort included sharing the key findings of EA with the public and also provided preliminary ideas for recreation and environmental enhancement improvements. The public consultation involved a formal open house, 2 workshops with school aged children, a build your own park activity as part of the annual Kids in the Hall event, meetings with stakeholder groups including in person, on the phone, and emails. Staff also worked to develop an online project page and public engagement forum that included an online survey questionnaire. We heard walking and hiking is the most favoured activity. Trash, traffic noise, graffiti and forest fuel loads were some of the top concerns. Overall we heard the preference is to maintain the parks in natural forested states with recreational improvements kept to a minimum and focused on nature centric activities like climbing and mountain biking.

Phase 2 of the public consultation focused on the feedback received. City staff prepared a package of drawings and images that included proposed new trails, potential trail closures and restoration strategies, quarry and bluff habitat restoration, invasive plant management, and improved park entrance designs. Under normal conditions, this information would have been presented to the public via an open house where dialogue and discussion with City staff is afforded. However, due to COVID safety precautions, a video presentation of the package was included on the Let's Talk project page to introduce the assembled information and invite visitors to provide feedback and complete a questionnaire. The public also had the opportunity to highlight locations and provide comments on an interactive trail map, as well as participating in a question and answer forum.

This Plan should be considered both a strategic framework and a working document, with its actions and their prioritization subject to review and revision in response to changing conditions, new information, and

resource availability. Below is the recommended action steps and phasing strategy to carry out improvements at Greenwood and Kealy Woods;

Greenwood Action Plan and Recommendations:

MANAGEMENT AND MONITORING

- 1 Review and implement strategies for removal of trash, graffiti, and unsanctioned structures
- 2 Monitor trails and implement measures where necessary to establish official trails
- 3 Implement the phased invasive species removal plan including park stewards program
- 4 Remove disc golf course including signs and tags posted on trees
- 5 Implement drainage and utility improvements plan
- 6 Continue ongoing urban forest management including hazard tree assessment
- 7 Implement biodiversity strategies such as wildlife trees, habitat logs
- 8 Remove and repair identified hazards
- 9 Review and implement increase of bylaws city staff presence for animal control/dogs off-leash infractions
- 10 Implement strategies for wildfire risk reduction in the 'City wide Community Wildfire Protection Plan'

PLANNING

- 11 Complete the Greenwood and Kealy Woods park and trails plan with GIS and Communications
- 12 Explore opportunities with Ministry of Transportation for a noise barrier wall
- 13 Collaborate with Queensbury elementary school to develop a nature-centric outdoor classroom
- 14 Explore opportunities to reduce width of Ridgeway Avenue and develop rain garden additions

RECREATIONAL IMPROVEMENTS

- 15 Consider nature play opportunities (use natural materials found at parks for outdoor classroom area)
- 16 Collaborate with North Shore Mountain Bike Association for planning and implementation of the multi-use loop trail including community trail build days
- 17 Complete detailed design and implement park entrance improvements including wayfinding and community signage

ENVIRONMENTAL ENHANCEMENTS, PROTECTION, AND PLANTING

- 18 Identify and implement trail closures
- 19 Monitor indicator wild life species for impacts
- 20 Collaborate with Queensbury elementary school, Greenwood Park Forest Stewardship and City Park Stewards community groups for monitoring environmental condition of parks
- 21 Develop management strategy for plant communities listed of special concern

STEWARDSHIP & COMMUNICATIONS

- 22 Encourage community neighborhood watch program with the Block Watch Society of BC
- 23 Encourage and collaborate with community groups for existing and new programming at the parks (walking clubs, kids events, school programs)
- 24 Encourage and collaborate with volunteers for CNV Stream Keepers Program
- 25 Develop educational signage for historic quarry
- 26 Work with City Parks Stewards Coordinator to implement trail maintenance and park clean up events

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1.0 Introduction

1.1 Purpose

The purpose of the Greenwood and Kealy Woods Park Management Plan is to provide a strategic framework and effective implementation plan for the long-term management and enhancement of the environmental and recreational assets of these natural area parks.

The work of this Plan consisted of the following;

- An environmental assessment and inventory of existing site features
- Public Consultation
- Development of recommendations and action steps
- Development of masterplan including phasing plans and implementation guidelines
- Development of an Official Trails Plan

1.2 Vision

The City of North Vancouver Council and staff have an overall vision to be the healthiest small city in the world. By acting as leaders in climate action and as stewards of the environment for future generations, we can ensure that our city is healthy, liveable, and vibrant.

The vision for Greenwood Park and Kealy Woods is to provide a healthy urban forest park that promotes and encourages recreation, rest and enjoyment of natural areas, all while ensuring environmental protection and enhancement for a biodiverse habitat for wildlife.

1.3 Goals

The goals for Greenwood Park and Kealy Woods as developed by the City of North Vancouver staff are;

- Establish an official trail plan that works to provide a variety of trail experiences for differing user groups
- Restore, protect and enhance sensitive forest areas and habitats
- Provide improved park entrances including maps and signage to encourage use and sense of safety at the parks
- Remove, control and maintain invasive plants to acceptable occurrence levels
- Provide increased recreational opportunities in a healthy urban forest setting
- Develop the park improvements to promote the health, safety and welfare of the public
- Encourage community partnerships for the building and maintenance of the proposed multi-use trail

1.4 Related Policies and Reports

- Greenwood and Kealy Woods Environmental Assessment Report (2019)
- City of North Vancouver Urban Forest Management Plan- Technical Report (January 2007)
- Living City: Climate Action Starts Here
- Official Community Plan (2014-2031)
- Parks Master Plan (2010-2020)

- Parks Bylaws related to dumping
- Parks bylaws for Dogs in City Parks
- Littering and dumping bylaws

2.0 FINDINGS FROM ENVIRONMENTAL ASSESSMENT

Together with Diamond Head Consulting, staff worked to develop an environmental assessment (EA) of Greenwood and Kealy Woods. The assessment included analysis of existing trees, vegetation, wildlife habitat, watercourses, invasive species, and an inventory of trails and other recreational features. The EA findings included the noted the decline of the forest stand including dieback of cedar and hemlock trees, lack of understory vegetation due the dominant single story tree canopy, the location, density and type of invasive plant materials, maps and inventory of environmentally sensitive areas. The EA also provide suggestions for enhancement opportunities at the parks. The study provided a foundation for many of the actions and strategic directions contained within this park management plan.

2.1 Background

Greenwood and Kealy Woods are located in the upper grand boulevard neighbourhood of the City of North Vancouver. These urban forests span approximately 13 hectares with some truly unique qualities.

Greenwood Park

Greenwood Park is 12 hectares of natural forested area along a 0.76 kilometer length of the Trans Canada Highway between Ridgeway Avenue and Lynn Valley Road. The Green Necklace extends north from Grand Boulevard and 19th Street East on the west side of Greenwood Park and then continues to the west along East 23rd Street.

Greenwood Park has relatively large portions that are mostly level terrain with the exception of the historic rock quarry and bluffs. The abandoned quarry contains two flat benches with exposed rock face and naturally occurring rock bluffs located in the southerly section near the Queensbury Avenue park entrance. The quarry operations began in the early 20th century. Most the rock from the quarry was processed to crush rock base for the road network in the City and District of North Vancouver. An exact date could not be uncovered for when the quarry ceased operations but is thought to of closed in the early 1940's. The bluffs provide a rare and rich habitat for birds and mammal species. A series of intermittent natural streams and drainage channels converge in a wetland area toward the north-west section of the park.

There is one formal trail that extends from the termination of Queensbury Avenue through the park towards the north-west where it terminates at an open clearing that was once an old road corridor. There are undefined braided trails that go up, into and around the quarry and bluffs. There is a looping path that extends from the main path towards the east. The trails are used by walkers, hikers, runners and mountain bikers. There is un-formalized/unsanctioned disc golf course. It includes 18 holes with identified tee off locations. Trees are used as targets for each hole. Currently the trees are identified with aluminum tags and many have been recently spray-painted. Rock climbing and bouldering training has occurred in Greenwood Park since the 1940's. Anchors and bolts occur in several locations in the quarry area. Unsanctioned activity including campfires, partying, camp sites, tree house structures, and dumping of garden waste has occurred.

Kealy Woods Park

Kealy Woods is .67 hectares of second growth forest with natural rocky outcrops and steep bluffs. Invasive plant material is prevalent along with dense canopy trees and steep terrain resulting in reduced opportunities for recreation. There is one trail that makes it's way from the north west corner of the park up towards the top of the bluffs, offering opportunities for passive activity such as sun tanning, reading and rest.

Both areas provide recreational opportunities. Community groups and individuals use the parks for geocaching and orienteering, outdoor games such as capture the flag, walking programs, outdoor physical education programs, biking and more. We found out that walking programs organized through the Harry Jerome Community Recreation Centre are very popular. We also heard from a senior citizen who self-organizes a walking club with frequent walks through Greenwood Park and the along the green necklace route.

2.2 Condition of Forest Stand and Understory Vegetation

The natural plant communities that exist in these parks developed naturally after logging of the original old growth forests at the turn of the last century. Since then there have been quarry operations that have caused more recent disturbances as well as natural events including wind throw and mortality from drought and disease.

Many of the older trees in these stands are over 100 years old. In many areas of Greenwood Park, these stands have an even aged single story canopy that is very dense. It restricts sunlight from reaching the forest floor. This, along with human impacts has prevented the establishment of understory plants in some areas.

Disease and wind throw have affected many areas of Greenwood and Kealy woods. Hemlock mistletoe has infected many of the western hemlock resulting in the onset of decay. There are significant areas in Greenwood and Kealy where trees growing with shallow roots have resulted in blown down trees. What is interesting to note is that the blow down areas in both parks are now regenerating with a mix of young tree and shrub species. These young dense stands are dominated by western hemlock but include a mix of other conifer and deciduous species as well. In some areas there has been restoration planting which has enhanced the species diversity.

Drier summers have resulted in drought stress to the trees. Many of the western hemlocks and western red cedars in Kealy Woods and some in Greenwood around the quarry have recently died or are currently showing signs of dieback as a result. These forest health concerns cause risk to park users and adjacent values, including roads, sidewalks, houses, and hydro lines.

Predominant understory vegetation in the conifer areas included sword fern (*Polystichum munitum*), vine maple (*Acer circinatum*), salal (*Gaultheria shallon*) and red huckleberry (*Vaccinium parvifolium*). In areas where stand openings allow light to reach the forest floor the ground cover is denser and includes salmonberry (*Rubus spectabilis*), red-osier dogwood (*Cornus stolonifera*) and hardhack (*Spiraea douglasii*).

2.3 Invasive Plant Species

Found throughout the park but are in highest concentrations around the perimeter of the park areas where human activity has occurred. Common species include Himalayan blackberry (*Rubus armeniacus*), English ivy (*Hedera helix*), English holly (*Ilex aquifolium*), lamium (*Lamium galeobdolon*), scotch broom (*Cytisus scoparius*) and spurge laurel (*Daphne laureola*). There are some remaining small areas of Japanese knotweed (*Fallopia japonica*) that have been identified and are a priority for eradication.

A watercourse/wetland complex exists in the northeastern edge of Greenwood carrying runoff from the Highway #1 and drainage from Tempe Heights Park to the north. There is also a drainage issue with an undefined watercourse that drains southeast of the main quarry toward Queensbury Avenue.

2.4 Wildlife

Greenwood is an important habitat hub as it is disconnected from other large natural areas. It provides a wide range of habitat for wildlife, from streams and wetlands, dry rocky outcrops, dense shrub plant communities, and a diversity of forest types. These natural areas provide protected interior habitat that is valuable as a refuge area for species that are less tolerant of human activity. Bedrock outcrops and the natural bluffs support sensitive plant communities including western red cedar and western hemlock plant communities and are unique within the region and sensitive to human traffic. These include small rock bluffs with cervices and overhangs suitable for bats. The EA report lists the following species that could potentially inhabit the areas in the area;

Common Name	Scientific Name	B.C. Status
Pacific water shrew	<i>Sorex bendirii</i>	Red
Keen's long-eared myotis	<i>Myotis keenii</i>	Blue
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>	Blue
Red-legged frog	<i>Rana aurora</i>	Blue
Olive-sided flycatcher	<i>Contopus cooperi</i>	Blue
Barn swallow	<i>Hirundo rustica</i>	Blue
Western screech-owl, kennicottii subspecies	<i>Megascops kennicottii kennicottii</i>	Blue
Band-tailed pigeon	<i>Patagioenas fasciata</i>	Blue
Trowbridge's shrew	<i>Sorex trowbridgii</i>	Blue

City staff worked with the consultant to develop a monitoring and ecological indicator program to protect and enhance the integrity of these natural areas. Monitoring the success of these measures and keeping track of the condition of the park and allows the City to detect changes and impacts from recreation use as well as climate change. Ecological indicators are used to understand the condition of natural areas and can include physical attributes of natural areas or the presence of certain species. For an ecological indicator to be effective it must be easy to measure and be an attribute that reflects the overall ecological health of an area.

The following are indicators that are recommended to be assessed periodically;

Invasive Plant Species Cover: The presence of invasive species provides an indication of the impacts the urban environment is having on a natural area. Planned mitigation works will reduce the cover of invasive species. Completing an inventory of invasive species every 5 years will provide a good indication of the overall ecological integrity of the parks.

Indicator Wildlife Species: Population health of other species and quality of habitat may be inferred based on management information collected for ecological indicator species. A list of potential indicator species to monitor biodiversity and environmental change in the park is outlined in Table 9. These species are easily monitored and are typical of the habitat found on the north shore. The health of these populations indicate the ecological health of a natural area. Birds are particularly valuable due to ease of observation, responsiveness to change, and abundant research to support their use as indicators. Species to monitor the health of habitat types in the parks are recommended in the table below.

Indicator Wildlife Species to Monitor:

Habitat Type	Indicator species	Survey Method
Open Shrub	Spotted Towhee (<i>Pipilo maculatus</i>)	Singing birds
	Anise Swallowtail (<i>Papilio zelicaon Lucas</i>)	Visual survey for adults
Deciduous Forests	Black-throated Gray Warbler (<i>Dendroica nigrescens</i>)	Singing birds
	Swainson's Thrush (<i>Catharus ustulatus</i>)	Singing birds
Coniferous Forests	Brown Creeper (<i>Certhia Americana</i>)	Singing birds
	Barred owl (<i>Strix varia</i>)	Call back surveys
Mixed Forests	Pileated Woodpecker (<i>Dryocopus pileatus</i>)	Evidence of foraging
	Douglas Squirrel (<i>Tamiasciurus douglasii</i>)	Woodlands Investigate methods

2.5 Vegetation Species at Risk

There are plant communities that are rare, endangered, and at risk located within the project site. The below figure is a table listing the species and BC status retrieved from the Conservation Data Centre (CDC).

Scientific Name	Common Name	BEC Unit	BC Status
<i>Thuja plicata</i> / <i>Polystichum munitum</i> Dry Maritime	Western redcedar / sword fern Dry Maritime	CWHdm/05	Blue
<i>Pseudotsuga menziesii</i> - <i>Pinus contorta</i> / <i>Holodiscus discolor</i> / <i>Cladina</i> spp.	Douglas-fir - lodgepole pine / oceanspray / reindeer lichens	CWHdm/02	Yellow
<i>Pseudotsuga menziesii</i> - <i>Tsuga heterophylla</i> / <i>Gaultheria shallon</i> Dry Maritime	Douglas-fir - western hemlock / salal Dry Maritime	CWHdm/03	Blue
<i>Thuja plicata</i> / <i>Tiarella trifoliata</i> Dry Maritime	Western redcedar / three-leaved foamflower Dry Maritime	CWHdm/07	Blue
<i>Tsuga heterophylla</i> / <i>Buckiella undulata</i>	Western hemlock / flat-moss	CWHdm/01	Blue

2.6 Wildfire Risks

In other areas of the parks there has been high fuel-loading on the ground from blow down and many of the mature trees have retained their lower branches. These areas pose a high risk of a ground fire starting and spreading into the crowns of the trees. In general, the greatest risk exists where residents are located up against conifer dominate forest types with no break in the fuels to help slow or defend against a wildfire.

Fuel mitigation in these areas will reduce the wildfire risk to these residents and has the potential to enhance ecosystem function by increasing light to support a wider variety of under-storey plants.

A wildfire protection plan with recommendations and actions steps is currently being developed and in it's final review by City Staff and a Consultant hired to prepare a report.

2.7 Environmental Sensitivity and Value

A map and rating system was developed based on environmental values at Greenwood and Kealy Woods. The values include biodiversity, water/riparian areas, natural area isolation from human presence, and sensitive landscapes. The map assigns sensitivity ratings to areas of the parks from very high to low and should be considered when planning for park amenities and infrastructure improvements.

2.8 Connectivity to Active Transportation Network

Opportunities for connections to community amenities to and from Greenwood and Kealy Woods include the Harry Jerome Community Centre, the Green Necklace loop and Grand Boulevard Park.

During the public consultation, there was strong support for enhancing the trail connection on the east portion of the site at the Sutherland Avenue trail entrance with connections to the active transportation lanes on Lynn Valley Road.

2.9 Conclusions

The above findings informed the overall park management including the trails map and amenities planning. These recommendations were brought forward to the public during the phase 1 and phase 2 consultation stages.

3.0 PUBLIC CONSULTATION

3.1 Phase 1 Consultation

The public consultation for Greenwood and Kealy Woods Park involved a formal open house, 2 workshops with school aged children, a build your own park activity as part of the annual Kids in the Hall event, meetings with stakeholder groups including in person, on the phone, and emails. Staff also worked to develop an online project page and public engagement that included a survey questionnaire.

City staff had the following public consultation goals;

- Communicate key findings from the environmental assessment.
- Communicate the rationale and basis for park improvements and restoration strategies.
- Connect with community members that may not typically engage in public consultation.
- Learn more about the park from a variety of perspectives.
- Consult with stewardship groups and other external stakeholders.
- Integrate online methods of engagement together with an onsite open house.

3.2 What We Heard

Our efforts were focused firstly on establishing how the parks are currently being used. Overall, the most favoured activity at 41% for Greenwood Park and Kealy Woods is walking and hiking. We heard that many people enjoy walking their dogs, berry picking with their children, and mountain biking.

City staff also reached out to community stakeholders such as the North Vancouver Recreation Commission. We found out that walking programs organized through the Harry Jerome Community Recreation Centre are very popular. We also heard from a senior citizen who self-organized a club called the “Golden Agers Hiking Club” with frequent walks through Greenwood Park and the along the green necklace route. Children’s camps as well as students from Queensbury elementary school frequent Greenwood Park for games such as capture the flag, nature observations, and exploration of the forest. Geocaching and orienteering events occur twice a year with the Greater Vancouver Orienteering Society in both parks. They requested much of their exploration occurs in the eastern portion of the park and would like the kids to be able to run freely in these areas. Kealy Woods is less visited, however we heard from that berry picking and sitting on the exposed bluffs to be in the sun on clear days is a favoured activity.

We also asked respondents to share what their main concerns are when they visit the parks. The two most common responses we heard were the condition of the trails and traffic noise. We also heard many comments related to trash, broken glass, drug paraphernalia, and graffiti. During the site tour at Greenwood Park, the Grade 11 students from Sutherland High school spoke passionately about the quarry and the amount of trash and graffiti that has occurred there. The students suggested that the quarry should become a destination with a defined trail, signage, seating and public art. They suggested that the quarry central rock face that is currently covered in graffiti should become a public art mural. They reasoned that if more people come to the quarry because it is a unique cultural place, it will stop getting destroyed. There was also concern for the amount of invasive plant material and windblown trees and resulting forest fuels. Some participants were concerned about the fire department practicing chain saw cutting in the park due to noise and aesthetics.

We asked the public to provide their preferences on the proposed pedestrian and trail improvements. The top three selected were;

- 26% suggested formalizing and defining the park entrances
- 23% suggested formalized trails and looping networks
- 17% suggested wayfinding signage

We heard positive feedback for boardwalks and stairs, but most were eager to ensure that this occurred only in the areas most needed to alleviate erosion and compaction concerns. Split rail fencing was proposed as a method to define the formalized trails and close some of the foot trails. Many people had concerns about fencing because of the perceived negative aesthetics and the inability of people to roam freely in the park. It was recognized by many that compaction of soils and trampling of plants is a concern. Some people were interested in seating and picnic areas, though many indicated that this would be too formal and not needed.

When participants at the public open house were asked to rate the potential recreational improvements including nature themed adventure circuits, a kid’s mountain bike/multi use trail, a formalized climbing/bouldering area and nature play elements, the majority opposed the suggestions. The most common preference we heard was that the parks be maintained in a natural wild state. City staff received a detailed letter about the benefits of forest bathing and the importance for children and adults to enjoy ‘just the woods’. However, we were also offered suggestions such as a nature centric outdoor classroom and play space, a public washroom facility including storage for summer programs and outdoor classroom supplies.

The students at both Queensbury and Sutherland indicated that their preferences for recreation are; Adventure circuits at 33%, kids mountain bike/multi-use trail at 24%, climbing and bouldering at 17% and nature themed play elements at 26%.

We also wanted to know what the public opinions and preferences are for environmental enhancements at the parks. We provided several suggestions, all of which can occur over the course of the management and ongoing maintenance at the parks. The top three priorities are the continued invasive removal program, removal of trash, campfires, tenting and unsanctioned structures, and increase of native understory planting.

We also heard from several neighbors on 23rd street state concerns about the drainage at the along the Green Necklace near the intersection of Ridgeway Avenue and 23rd Street. Staff have been aware of this issue and working to provide repairs and solutions. Phase 1 included was recently completed to widen and deepen the swale along the length of the green necklace and modify the grades to direct surface flows toward the wetland area and away from the trail.

3.3 Phase 2 Consultation

Initial public consultation efforts were focused on determining how the community currently use these parks, presenting key findings from the EA, initial trail plans, and preliminary ideas for potential recreation and environmental enhancements. Based on the feedback received, staff prepared a package of drawings and images that included proposed new trails, potential trail closures and restoration strategies, quarry and bluff habitat restoration, invasive plant management, and improved park entrance designs. Under normal conditions, this information would have been presented to the public via an open house where dialogue and discussion with City staff is afforded. However, due to COVID safety precautions, a video presentation of the package was included on the Let’s Talk project page to introduce the assembled information and invite visitors to provide feedback and complete a questionnaire. The public also had the opportunity to highlight locations and provide comments on an interactive trail map, as well as participating in a question and answer forum.

3.4 What We Heard

The process included 523 visitors to the project page on Let’s Talk with 43 also completing questionnaires. Highlights of the feedback received is provided below, and more detailed information is provided on the Let’s Talk project webpage.

Overall, there was a positive response to the proposed park enhancements and trails plan with many people suggesting that they liked the trail layout and suggested uses. One such trail suggestion includes a partnership with the North Shore Mountain Bike Association (NSMBA) to develop a multi-use pedestrian and mountain bike looped trail in the east portion of the park. The partnership would include two community trail building events where volunteers can work the NSMBA to help construct the new trail.

A proposed renovation of the main park trail was also well received. Currently, the main park trail includes 17 stairs which make it difficult for people with strollers or bikes to navigate. The trail plan proposes to re-route a 40 metres section of the trail to reduce the grade and eliminate the need for stairs in that area.

Other common themes we heard are the desire for dog waste bins at trail entrances and the addition of wayfinding signage to help park users navigate the trails. There was great support creating a new formal trail entrance at East 22nd Street and Sutherland Avenue, including a connection to the bike lane and pedestrian

route on Lynn Valley Road. We also heard continued concern about maintaining the natural forest character of the parks.

Many support the planned removal of the unsanctioned disc golf course, although there was strong disappointment from the existing disc golf players who had hoped it would be formalized. City staff recognize that people are looking for a myriad of outdoors activities during the pandemic. However, the environmental assessment showed that the many unsanctioned and braided trails (including those used for the disc golf course) are leading to ecological degradation due to compaction of forest soils, trampling of sensitive understory vegetation, root compaction and tree decline. Disc golf courses in a forest setting tend to affect larger areas, as there is no way for players to follow a designated route. A disc golf course works well in open space (such as nearby Eastview Park) but tends to result in a series of braided trails and vegetation loss in a densely forested setting. There can also be issues with conflicts with other park users, where limited visibility and poor sight lines make throwing discs a safety concern.

As part of the consultation process, staff were also seeking feedback on the proposed trail and site improvements near the quarry and bluffs. The goal is to encourage more positive and appropriate use of the area, reduce soil erosion and compaction in the sensitive sites and make them less of a secluded attractant for fires and vandalism. There was positive feedback to the notion of improving the trail access to the quarry and around the bluffs with boardwalks and stairs. There was concern by many respondents that while these measures are good, they may not help to discourage unwanted activities in the area. Many people also expressed interest in the proposed collaboration with school groups to build an outdoor classroom in the park. This is envisioned as simple elements such as logs and boulders arranged for seating and presentation.

3.5 Next Steps

Based on the feedback received, the park management plan can now be finalised and have actions prioritized for implementation. Since there was strong support for community outreach, trail building and native plant restoration, the first initiatives will include improvements to the main trail through Greenwood Park, partnering with NSMBA on the new eastern trail loop and additional Park Stewards activities commencing in December 2020. With the recent adoption of the City’s Community Wildfire Protection Plan, staff have also applied for provincial grant funding to complete fuel management prescriptions for Greenwood and Kealy Woods Park. That detailed assessment work is anticipated for the spring of 2021.

4.0 DETAILED STRATEGIES & RECOMMENDATIONS

4.1 Evaluation of Key Action Steps

4.1.1 CNV Staff Presence

Review and implement increase of Parks operations staff presence at parks for removal of trash, graffiti, and unsanctioned structures.

Recommendations:

- Set a meeting with Parks Operations staff to confirm current levels of service. Meet on site to review current issues and develop action plan for care and clean up of the park.

- Implement signage both regulatory and educational for no campfires, dangers of forest fires.

4.1.2 Implement the Invasive Management Plan

Implement recommendations provided by Diamond Head Consulting in their Invasive Management Plan. Collaborate with Natural Areas City Crew and Park Stewardship Coordinator to organize volunteers to assist with removal and native planting restoration sites. The Diamond Head report provides high, medium and low priority areas and also provides recommendations for areas within the park that are suitable for volunteers.

Some of the invasive plant material such as Japanese Knotweed and Holly should be removed by professionals and/or CNV staff.

The Invasive management plan provides recommendations for the monitoring, maintenance and adaptive management of the parks

Recommendations:





In brief, the recommendations are;

- Treatment: date, person in charge, species targets, method, area treated, volume removed, establish photo plots prior to treatment, and cost
- Restoration: date, person in charge, plant species, quantities, spacing, site prep (silt fence, mulch, geo textile, etc.), and cost
- Maintenance: date, person in charge, species targets, method, area treated, volume removed, survival rate, and cost

4.1.3 Implement the Park Plans

The Park and Trail Plan provides a graphic illustration of the park feature upgrades recommended throughout the parks. This includes items such as re-routing the main park trail to remove a section that includes 17 stairs. Upgrades also include locations for stairs, resting sites, signage including education, restoration and wayfinding signs and split rail fencing.

A trail classification map was developed that suggests 4 types of trails at Greenwood and Kealy Woods. The map shows the types of allowed uses on the trails, the surface treatment, slope recommendations, and levels of use current and anticipated. See below table.

LEGEND	NAME	WIDTH	SURFACE	TYPE OF USE	LEVEL OF USE	LONGITUDINAL SLOPE
	Green Necklace	3 meters	Asphalt paved surface	Walking, jogging, cycling, strollers wheelchairs, maintenance vehicles with low level lighting	High	Maximum 8% (1:12)
	Main Park Trail	2-3 meters	Well compacted gravel	Walking, jogging, cycling, maintenance vehicles	High	Maximum 8% (1:12), otherwise 10% (1:10)
	Multi-use Loop Trail	1- 2 meters	Gravel where needed, compacted soil surface, hard surfaced, wood ramps where needed	Walking, jogging, mountain biking	High-moderate	Maximum 8% (1:12) where possible, otherwise 15% (1:7)
	Nature Trail	1-2 meters	Compacted soil surface, boardwalks and stairs where needed	Walking, jogging, hiking. Mountain biking not permitted	Low-moderate	Maximum 20% (1:5), otherwise some difficult sections are 40% (1:2.5)

Staff also worked with the GIS department to import the proposed trails into the GIS database. This includes the trail types as well as the active transportation linkages.

Recommendations:

- Park Planning staff should work with GIS and Communications team to develop a finalized graphic that will be used as part of the wayfinding signage, on staff maps, and on the City website.

4.1.4 Trail Closures & Restoration Strategies

Through the environmental assessment, we found that the number of braided trails in Greenwood Park in particular are leading to ecological degradation including compaction of soils, destruction of sensitive understory vegetation, tree root compaction and habitat loss. As a result, staff developed a trail closure and restoration plan. Site specific restoration was looked at in the quarry area and includes a number of strategies as shown on the maps and diagrams for the removal of the braided trails, and utilizing methods such as the split rail fencing, signage and planting to encourage trail use on the sanctioned trails.

Recommendations:

- Review the trail closure plans and recommendations and provide updates where necessary. Finalize the plans.
- Collaborate with Operations, Natural Areas City Crew to provide resources to build the fencing, and placement of logs
- Collaborate with the Park Stewardship Coordinator to organize volunteers to assist with native planting

4.1.5 Remove Disc Golf Course

Based upon the environmental assessment, the disc golf course is causing a number of issues including compaction of soils, root disturbance to sensitive trees and disruption of forest floor vegetation. It can be harmful to the natural ecology of the area in which it is played. Disc golf has been documented to cause such environmental degradation as greatly increased erosion, soil compaction, significant trampling of undergrowth and loss of vegetative cover, as well as persistent damage to trees, such as the stripping of bark, leaves, and branches and indentations and nicks made by the discs, which can result in tree death.

Recommendations;

- Work with the existing disc golf users in providing awareness and education of the justifications for removing the disc golf course. Work together to come up with solutions for this activity to be played and practiced in other areas on the north shore.

4.1.6 Drainage and Utility Improvements Plan

An overall site analysis including existing drainage review was conducted in late 2019 and early 2020 locations throughout the site where the drainage is inadequate due to flows, grading and/or utility pipe lines are inadequate. Of particular concern is the drainage in the south-west corner of Greenwood Park adjacent Ridgeway Avenue and 23rd Street. Increased flows from the drainage ditch collecting water from the Green Necklace has surcharged the utility system, causing a back up in water collection. The City Engineering staff in collaboration with Parks Planning worked to develop a drainage and utility improvements plan in the attached plan. A cost estimate for these improvements was prepared by Park Planning staff. The improvements will occur in phases.

Recommendations:

- Work with City Engineering during 2020/2021 to develop detailed design and RFP for improvements to drainage and wetland area in the spring of 2021.

4.1.7 Urban Forest Management

The Environmental Assessment report includes an iTree Eco Assessment report. It estimated 7,988 trees with a tree cover of 58.3 percent. The three most common species are Western Hemlock (35.4 percent), Vine maple (31.8 percent), and Western Red Cedar (16.0 percent).

The City of North Vancouver Arboricultural team should continue their ongoing urban forest management program including hazard tree assessment, removals where required, continued monitoring of diseased and dying hemlock and cedar trees. Retain existing cedar trees where possible for habitat/wildlife tree biodiversity enhancements.

The community wildfire protection plan will also influence the urban forest at these two parks through the recommendations for forest fuel loads.

Wildlife Indicator species as identified in section 2.4 of this report should be monitored periodically.

Recommendations:

- CNV Operations and Arboricultural staff should work with consultants to develop the biodiversity measures.
- The community wildfire protection plan action steps should be reviewed for on the ground strategies for implementing improvements of the forest at Greenwood and Kealy.
- CNV staff to develop monitoring program for wildlife indicator species.

Plant Species Adaptation to Climate Change

As climate change progresses, plant species adapted to climate may help to mitigate impacts. The BC government notes on it’s website that “species diversification may help to buffer the negative impacts of climate change and make forest more resilient when faced with extreme weather events caused by climate change.”

Recommendations:

- When implementing planting plans on site, utilize the proposed plant list provided by Diamond Head Consulting. See Table below. Diamond Head Consulting prepared a polygon map identifying soil types, tree stand and understory vegetation species found within each of the polygon areas. Staff can review the EA report to gather more detailed information to develop restoration planting lists based in part on the existing vegetation.

Recommended Plant List for use on Restoration Sites:

Scientific Name	Common Name	Rich wetter sites	Moderate drier sites	Comments
Trees				
<i>Alnus rubra</i>	Red alder	X	X	Nitrogen fixing and suitable for poor soils. Shade int
<i>Betula papyrifera</i>	Paper birch	X	X	
<i>Thuja plicata</i>	Western redcedar	X	X	
<i>Abies grandis</i>	Grand fir	X		Climate adaptation species
<i>Acer macrophyllum</i>	Bigleaf maple	X		
<i>Picea stichensis</i>	Sitka spruce	X		
<i>Populus balsamifera</i>	Black cottonwood	X		Shade intollerant
<i>Prunus emarginata</i>	Bitter cherry	X		
<i>Tsuga heterophylla</i>	Western hemlock	X		
<i>Arbutus menziesii</i>	Arbutus		X	Climate adaptation species. Plant on open rocky site
<i>Pseudotsuga menziesii</i>	Douglas-fir		X	Shade intollerant
Shrubs				
<i>Acer circinatum</i>	Vine maple	X	X	
<i>Oemleria cerasiformis</i>	Indian plum	X	X	
<i>Ribes sanguineum</i>	Red-flowering currant	X	X	
<i>Cornus stolonifera</i>	Red-osier dogwood	X		Plant in clusters
<i>Crataegus douglasii</i>	Black hawthorn	X		
<i>Lonicera involucrata</i>	Black twinberry	X		
<i>Physocarpus capitatus</i>	Pacific ninebark	X		
<i>Ribes bracteosum</i>	Stink currant	X		
<i>Rubus spectabilis</i>	Salmonberry	X		
<i>Rubus parviflorus</i>	Thimbleberry	X		
<i>Salix Sp</i>	Willow (Pacific, Scouler, Sitka)	X		
<i>Sambucus racemosa</i>	Red elderberry	X		
<i>Spiraea douglasii</i>	Hardhack	X		Plant in clusters
<i>Amelanchier alnifolia</i>	Saskatoon		X	Climate adaptation species
<i>Corylus cornuta</i>	Beaked hazelnut		X	
<i>Gaultheria shallon</i>	Salal		X	Plant in clusters
<i>Holodiscus discolor</i>	Oceanspray		X	Climate adaptation species
<i>Mahonia nervosa</i>	Dull Oregon-grape		X	
<i>Rosa gymnocarpa</i>	Baldhip Rose		X	
<i>Rosa nutkana</i>	Nootka rose		X	
<i>Symphocarpus albus</i>	Snowberry		X	
<i>Vaccinium parvifolium</i>	Red Huckleberry		X	Plant in organic substrates
<i>Rubus ursinus</i>	Trailing Blackberry	X	X	
Herbs				
<i>Athyrium filix-femina</i>	Lady Fern	X		
<i>Blechnum spicant</i>	Deer Fern	X	X	
<i>Dryopteris expansa</i>	Spiny Wood Fern		X	
<i>Polystichum munitum</i>	Sword Fern	X	X	

4.2 Site Feature Opportunities

4.2.1 Noise Barrier Wall

Explore opportunities with Ministry of Transportation to implement a noise barrier wall along length of property line adjacent to Trans Canada Highway. Many of the comments we heard from the public during phase 1 of the public consultation included concern about the noise levels from the TransCanada Highway. Now more than ever, our parks and natural systems are a top priority service for the physical, mental and emotional wellbeing of our communities. Because of this, it's an exciting time for us to think about our parks and how we can ensure they are protected and provide enjoyment. CNV will explore opportunities with the Ministry of Transportation to find out if there are or could be plans for installation of a noise barrier wall between the highway and the park.

4.2.2 Public Art Opportunities

Work with Recreation Culture Commission for potential public art opportunities. The recreation and culture commission provides funding and resources for implementing public art on the north shore. Potential themes included references to the quarry with potential for placements at park entrances and the quarry. At the public open house #1, the respondents were not in favour of implementing public art at these parks. City staff should consider possible collaboration with youth and school groups.

4.2.3 Outdoor Classroom

Collaborate with Queensbury Elementary school to develop a nature-centric outdoor classroom. A location for the outdoor classroom has been provided on the trails master plan along with design ideas for it. The solutions for the outdoor classroom should be simple such as boulder and logs placed for seating.

4.3 Recreational Improvements

4.3.1 Multi-use Bike Trail

An impact assessment report was prepared by Diamond Head Consulting of proposed multi use bike trail to inform trail layout and trail building methods. Their report showed that with the proper controls, minimal impact is anticipated. Work with Diamond Head Consulting to monitor and provide input on impacts and control measures. Collaborate with North Shore Mountain Bike Association for planning and implementation of the multi-use bike trail including community build days. Work with them to provide community build events and ongoing approach to maintenance and care of the trail. Involve the community where possible for user ownership through volunteer trail events (as described below).

4.4 Partnerships & Collaboration

4.4.1 Park Stewards Program

The Parks Stewards Program for the City of North Vancouver could include trail maintenance and clean up events at the parks. For the past several years, the forest stewardship group has been focused on invasive management and new native plant installations in collaboration with a non profit society called Evergreen. This was in part to fulfill that society's goals and initiatives for increasing the urban forest density. While this

aspect is still very important, there does appear to be interest and potential to diversify what the forest stewardship group can do. In 2020, the program was taken over exclusively by the City of North Vancouver.

4.4.2 North Shore Mountain Bike Association

The North Shore Mountain Bike Association has a program called the ‘Trail Adoption Plan’ (TAP). This program allows companies and public individuals to become ‘trail adopters’ by providing either labour or funding to support the trail development. The public is invited to join on build events by working along side experienced trail builders. The trail is then monitored for minor maintenance (ie clearing garbage) by the trail adopters. The City benefits from the volunteer labour and the community group benefits from the profile they receive and potential outreach opportunities.

Volunteer trail maintenance or trail building events can be organized by Staff for community and/or corporate participants. These events bring together resources (i.e. staff/contractor expertise, equipment, large group of volunteers, etc.) over a short period of time (i.e. half a day, a weekend) in order to complete a more complicated project such as a trail build.

4.4.3 Public Schools

Queensbury Elementary and Sutherland High School teachers, staff, and students regularly visit the parks for both educational, recreational and personal enjoyment. Classroom students attend Greenwood for nature learning, geocaching, physical education, park clean up and games. During the consultation phase, they expressed interest and concern for the existing environmental issues and a desire to collaborate on the design of an outdoor nature classroom, continued clean up, and awareness building for the revegetation efforts.

Recommendations:

- Work with the City of North Vancouver staff including the Parks Stewardship Coordinator to look at ways to include forest clean up events including safe removal of litter, trash and graffiti
- Collaborate with North Shore Mountain Bike Association for planning and implementation of the multi-use bike trail including community build days
- Collaborate with the schools to design and program the outdoor classroom
- Work with the schools to support clean up events

4.5 Visitor Recreational Experience

4.5.1 Park Entrance Improvements

Design and implement park entrance improvements and trail entryway features including community kiosks, seating, garbage and recycling, maps, rules and park guidelines. The detailed design of the park improvements will require a combination of park planning staff and engineering for the street/sidewalk/letdown/utility upgrade designs. Conceptual plans were developed as part of the consultation efforts.

4.5.2 Signage and Wayfinding

Signage is a crucial aspect of a trail system as it provides a base level of information that reassures new and novice users, explicitly lists the rules and etiquette, underpins risk management, can add to the enjoyment of the walk or ride and enhances the understanding of the environment. Sensitivity to placement including number of signs and placement of them is very important at these parks in order to maintain the natural character of the site.

4.5.3 Trailhead Signage

Trailhead signs at the major access points to orient users, communicate and teach trail etiquette, and provide cautionary information about safety concerns and hazards - ensuring that trail users understand and assume risks associated with their activities along the trails. The signs should warn of major dangers (e.g. steep drop offs, etc), postings regarding maintenance, and details outlining that users are responsible for their own safety and use the trails at their own risk.

4.5.4 Interpretive Signage

Interpretive signage could be used in key areas of the parks to provide information on the natural and cultural history of the area. This could occur either at the park entrances or sensitively placed at key viewpoints.

4.5.5 Trail Closure Strategies

Site specific strategies such as fencing, planting barriers, split rail fencing, and education signage to not only close trails but also to promote the official trails.

6.0 CONCLUSION

As is stated throughout this management plan, the recommendations and action plan is a working strategic framework, with its actions and their prioritization subject to review and revision in response to changing conditions, new information, and resource availability.