Appendix A

WHISTLER DISC GOLF FEASIBILITY STUDY

NOVEMBER 22, 2024.

UPDATED JUNE 16, 2025.

Resort Municipality of Whistler
whistler.ca

WHISTLER

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1. Introduction and Purpose

In response to issues of safety, access, trespass, capacity, unauthorized course building, environmental impact, and user experience, the Resort Municipality of Whistler (RMOW) initiated a Disc Golf Feasibility Study in 2023. The Study's purpose is to:

- Examine the feasibility and means to address the stated issues at the existing Lost Lake Disc Golf site; and
- Explore the feasibility of developing an alternative or second disc golf course elsewhere in the Whistler community that would address the stated issues either in whole or in part.

2. Objectives

Overall, the Project's objectives are to:

- Focus current and future RMOW investment to best address and balance the stated issues; and
- Provide a disc golf experience in Whistler comparable to and compatible with other municipal recreation offerings.

3. Rationale

While disc golf in Whistler has evolved somewhat organically over time and has a much more informal identity when compared to Whistler's otherwise formalized recreational activities, it is an important recreational and social activity for Whistler's residents and guests.

Disc Golf appeals to a wide range of ages, skill levels and physical abilities. With a low-cost barrier to participation, use has been growing steadily since first appearing in municipal policy documents in 2015 (Recreation and Leisure Master Plan). In 2022 over 18,000 users were recorded using an automated trail counter device from May to October. It is worth noting this number may be artificially high due to the placement of the counter near a low use recreation trail.

Figure 1. Lost Lake disc golf course existing sign.

The Lost Lake Disc Golf is unique amongst courses as it possesses a mix of open and forested play, has a wilderness experience appeal, and several holes are truly memorable. Over time issues of safety, access, trespass, capacity, unauthorized course building, environmental impact, wayfinding and decreasing user experience have been identified. These issues require attention through an increased level of formalization, investment, and management from the RMOW.

It is also recognized that disc golf is here to stay, and that efforts to remove or not support disc golf may well result in new concerns and challenges in an even less managed and more impactful condition.

4. Study Methodology

Over the course of the Study the consultants received inputs from the Whistler Disc Golf Club (WDGC) and guidance from municipal staff including the departments of Parks Planning, Resort Operations (parks operations and management), Climate and Environment, and Protective Services (Fire Smart). External consultants were retained by the RMOW to provide technical support to the Feasibility Study. Collectively, consultants, WDGC and RMOW staff are called the Project Team.

The consultants completed an analysis of the existing Lost Lake course and adjacent forested areas, and seven other potential sites elsewhere in the community through the lenses of environment and disc golf. An on-site Environmental Impact Assessment (EIA) for the existing Lost Lake course and adjacent areas being considered for possible course expansion was completed, and a "desktop level" Whistler specific Disc Golf Environmental Suitability and Mitigation Guidelines (DGESMG's) using GIS data sets were developed. Technical documents produced through this effort are linked to this Project Summary and were used to inform the recommendations moving forward. The consultant team included the following:

Dialog Design.

Dialog's role centered around project leadership and communication and to support INdesign Disc Golf Inc. through deliverable development.

Cascade Environmental Resource Group.

Retained by Dialog as part of the consulting team, Cascade led the environmental aspects of the project. Technical documents produced:

- Environmental Assessment for Lost Lake Disc Golf Course,
- Disc Golf Environmental Suitability Guidelines (DGESG),
- Environmental Assessment of Potential Sites,
- Environmental Impact Study: Lost Lake Disc Golf Course, Whistler, BC.
- Analysis of Course Routing Plans for Lost Lake Disc Golf Course in Whistler, B.C,

INdesign Disc Golf Inc.

Retained by Dialog as part of the consulting team, INdesign led the disc golf aspects of the project. Technical documents produced:

- Disc Golf Course Feasibility Report.
- INdesign "Scorecards"; additional course location suitability evaluations.
- Analysis of Course Routing Plans for Lost Lake Disc Golf Course in Whistler, B.C.

Resort Municipality of Whistler.

- Climate & Environment: engaged throughout the project the C&E team attended site meetings, reviewed guiding documents, and provided input from the RMOW's environmental lens.
- Park Operations: manages course maintenance and offered course history, current maintenance practices, observed issues, attended course walkthroughs and offered feedback to course concepts.
- Communications: distributed and collected feedback from course users through online engagement platform, Social Pinpoint.
- Recreation: provided feedback at various project benchmarks, particularly regarding course routing concepts to ensure no disruptions to Lost Lake's Nordic ski operations.

Community Engagement.

Given the intent of this project as a feasibility study only, community engagement was limited to a user focused online survey. QR code survey signs were installed on the Lost Lake Disc Golf Course for the 2024 season. The survey received ~70 responses collecting valuable user perspectives. Detailed survey results can be found at Appendix G. Broader community engagement would be included should this project advance further.

5. Possible Development Scenarios

The technical documents generated three general Possible Development Scenarios (PDS's) that in the opinion of the Project Team largely address the project's objectives.

It is important to note:

- A budget and accompanying funding source for course planning, design and implementation has not been confirmed,
- Only scenarios that are technically feasible are included,
- Each scenario has its own set of pros, cons, constraints and opportunities,
- Each scenario has varying ability to address stated concerns,
- Each scenario represents a varying amount of environmental impact, and that environmental mitigation and protection is necessary for each scenario. This is discussed in more detail in Cascade reports.
- Several scenarios are not located on municipally controlled land. Securing access is beyond the scope of this Feasibility Study, and may ultimately prove to be not possible,
- All scenarios involving the existing Lost Lake course would result in new and rejuvenated disc golf infrastructure including tee boxes, baskets, signage, wayfinding, and support amenities, as well as environmental restoration and protection as outlined in the Cascade reports; and
- Identification of a PDS in this report is not a commitment to advance it.

5.1 The Three Scenarios:

1. Rejuvenate the existing Lost Lake course within existing footprint, reducing the course from 27 holes to 18 holes AND;
    a. Develop a second smaller course near Function Junction; OR
    b. Develop a second larger course in the upper Whistler Interpretive Forest.
2. Reconfigure the existing Lost Lake course and extend to connect with Spruce Grove Park.
3. Expand the existing Lost Lake course and extend to connect with Spruce Grove Park and north of the existing course.

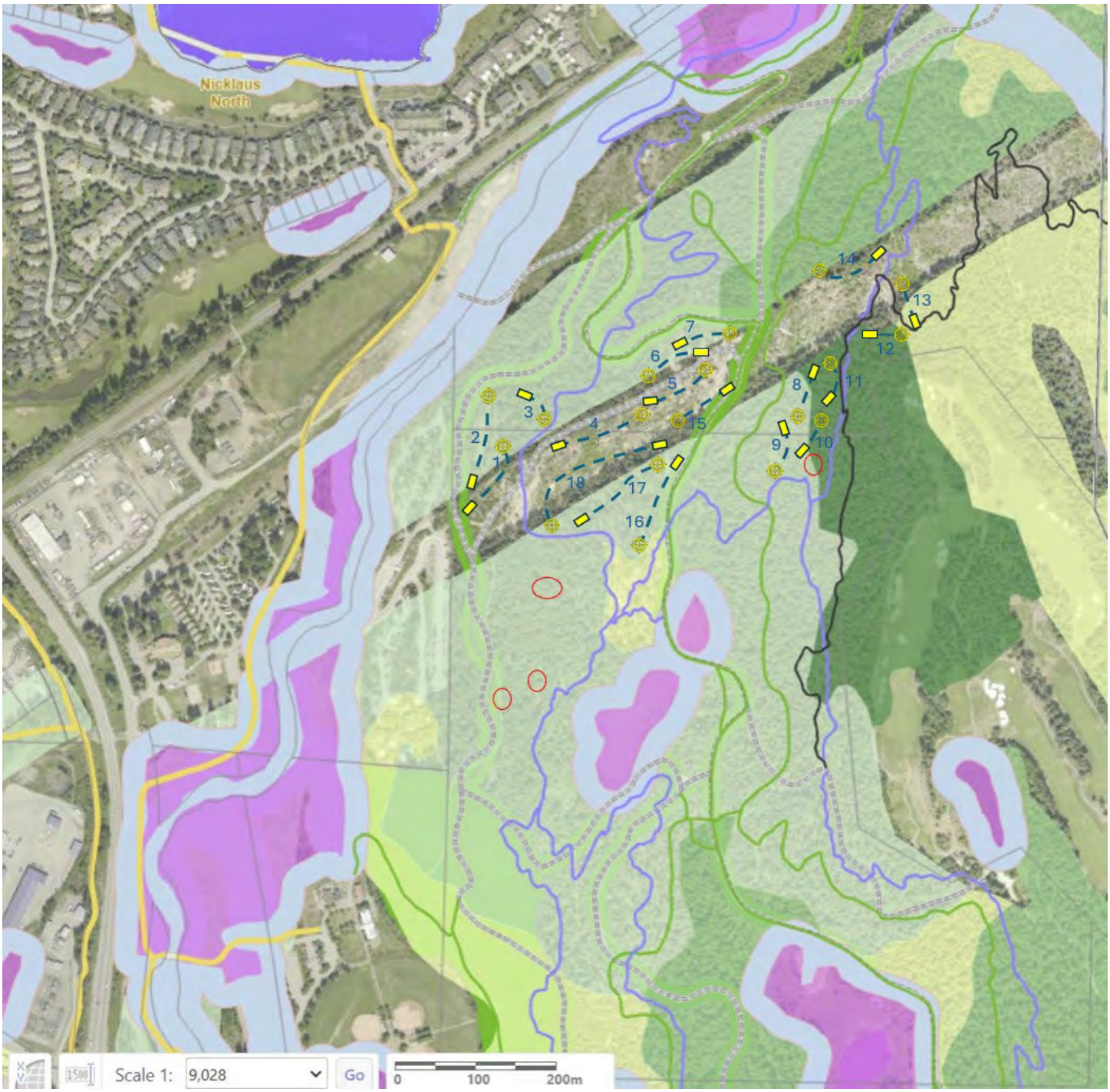
*Appendix F contains further analysis of conceptual routing plans.

5.2 High Level Analysis:

- *Capacity, Safety, Unauthorized Course Expansion.* Scenario 1 requires a second course to address these existing issues. Without expansion the likelihood of further safety concerns and unauthorized course expansion will increase. This is especially crucial if PDS 1 is pursued.
- *Environmental Impact through Lost Lake course expansion.* PDS's 2 and 3 represent new environmental impacts to Lost Lake Park. Informed by Cascade's Environmental Impact Assessment and application of the Environmental Suitability & Mitigation Guidelines, preliminary course routing plans lessen impacts by utilizing recently and future planned wildfire thinned areas and seasonal Nordic Trails where possible.
- *Land Access.* Scenarios 1a and 1b require access to land not controlled by the RMOW. While a process exists to request access, there is no guarantee that access would be granted.
- *Financial Considerations.* All scenarios require an increase in annual operating and maintenance (O&M) costs to provide a disc golf experience comparable to other municipal recreation offerings (current annual O&M costs are approximately $5000/year). Scenarios with expanded and or new courses would require one-time capital funding to construct and would require an increase in annual O&M funding.

Possible Development Scenario 1

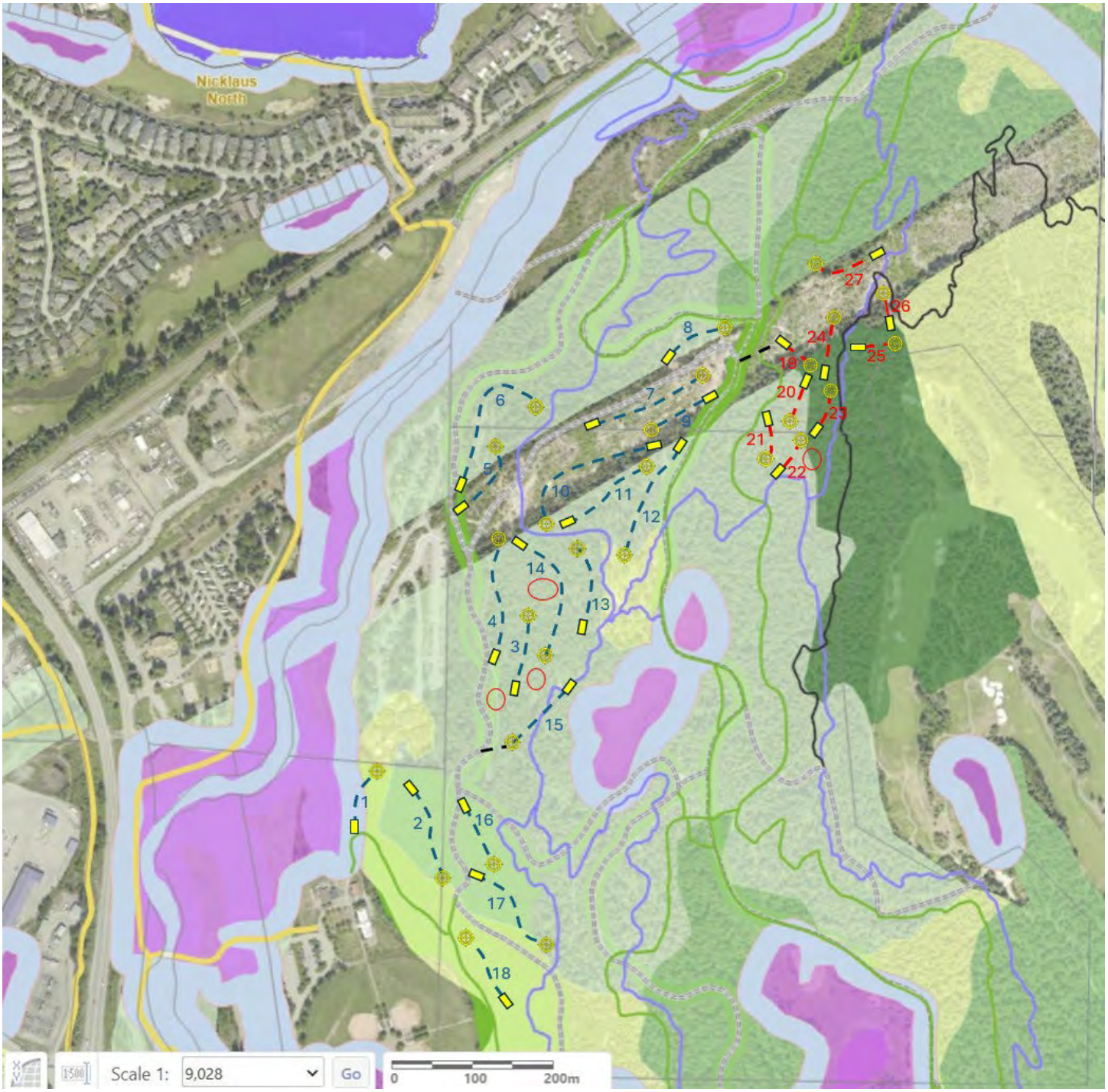
Rejuvenate existing Lost Lake course within existing footprint, reducing 27 to 18 holes.



- Tee Pad
- Basket
- Disc Golf Routing
- Trail (Difficult)
- Trail (Medium)
- Trail (Easy)
- Valley Trail (Paved)
- Nordic Ski Trail / FSR
- Significant Tree (retain)
- Lake
- Wetland
- 30m Riparian Buffer
- Logged Forest (<100 years)
- Unlogged Mature (100-249 years)
- Old Forest (250-399 years)
- Ancient Forest (400+ years)
- Fuel Managed Areas

Possible Development Scenario 2

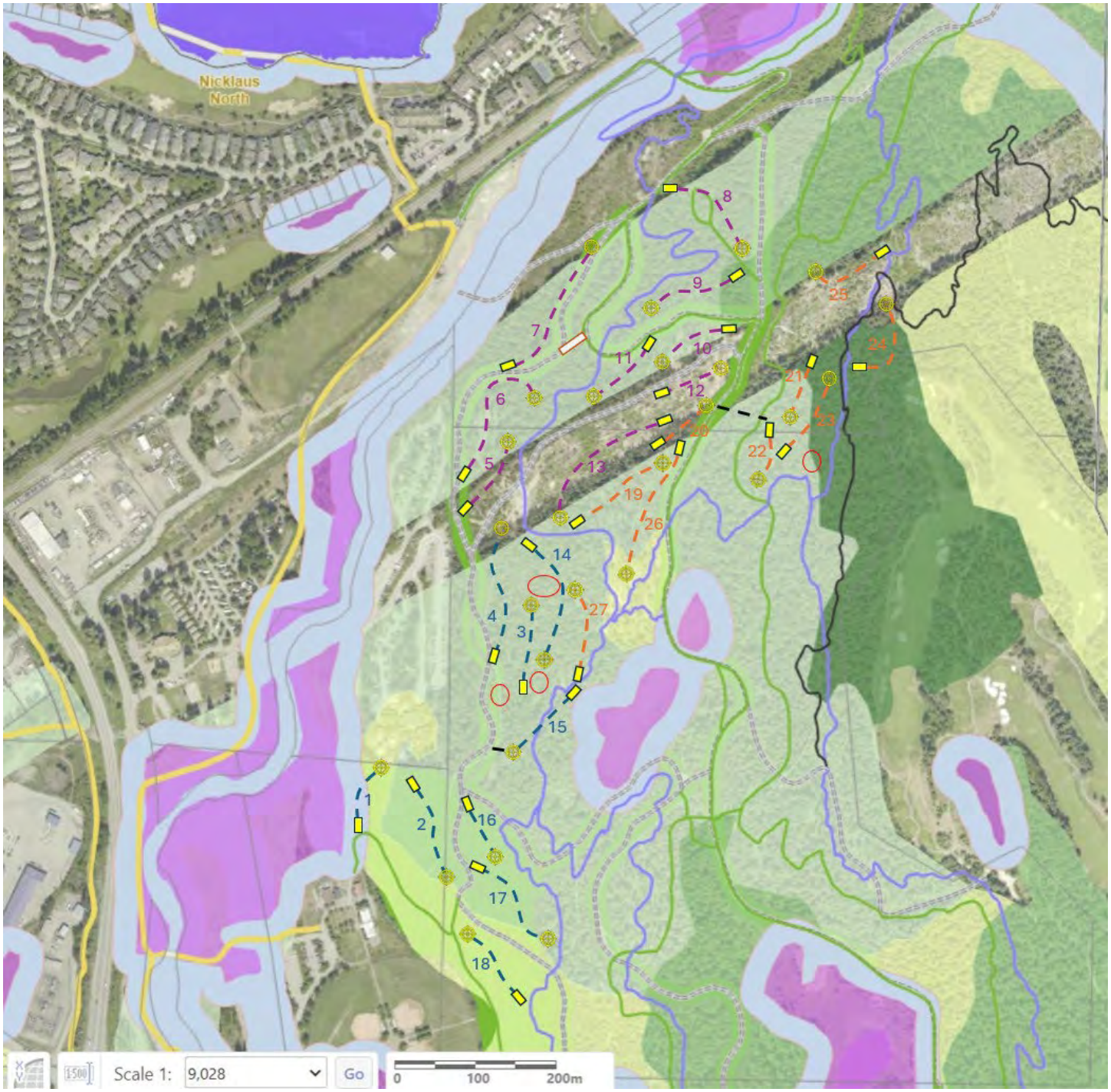
Reconfigure existing Lost Lake course to connect with Spruce Grove Park.



- Tee Pad
- Basket
- Disc Golf (Holes 1-18)
- Disc Golf ("back 9")
- Trail (Difficult)
- Trail (Medium)
- Trail (Easy)
- Valley Trail (Paved)
- Nordic Ski Trail / FSR
- Trail Connection
- Significant Tree (retain)
- Lake
- Wetland
- 30m Riparian Buffer
- Logged Forest (<100 years)
- Unlogged Mature (100-249 years)
- Old Forest (250-399 years)
- Ancient Forest (400+ years)
- Fuel Managed Areas

Possible Development Scenario 3

Expand footprint to connect with Spruce Grove Park & north of the existing course.



- Tee Pad
- Basket
- Disc Golf (Loop 1)
- Disc Golf (Loop 2)
- Disc Golf (Loop 3)
- Trail (Difficult)
- Trail (Medium)
- Trail (Easy)
- Valley Trail (Paved)
- Nordic Ski Trail / FSR
- Trail Connection
- Road Connection
- Significant Tree (retain)
- Lake
- Wetland
- 30m Riparian Buffer
- Logged Forest (<100 years)
- Unlogged Mature (100-249 years)
- Old Forest (250-399 years)
- Ancient Forest (400+ years)
- Fuel Managed Areas

6. Recommendation

Given the foregoing it is recommended that PDS 3 (Reconfigure the existing Lost Lake course and extend to connect with Spruce Grove Park and north of the existing course) be advanced.

This PDS can meet the project's objectives, address stated issues and best balance new course development with environmental protection, mitigation, and restoration. The location is central in the community and accessible by preferred transportation modes (active transportation, transit). Use of existing park facilities at Spruce Grove Park makes best use of existing infrastructure. Focusing on one course minimizes overall annual operation and maintenance costs and minimizes environmental impacts.

PDS 2 is quite viable although the additional space offered by PDS 3 allows for improved course flow and stronger user experiences with limited environmental impacts or cost premiums.

7. Budget

Development of the recommended PDS 3 is estimated to require a budget of ~ $4000,000.00.

This includes:

- Course hardware; tee pads, baskets, wayfinding.
- Supporting infrastructure; no additional needs if using Spruce Grove Park amenities.
- Environmental protection and restoration; fencing/barriers, trails, erosion control.
- Professional services and permitting fees.

8. Future Planning

Looking to the future, it is recommended that a second smaller course near Function Junction be given consideration for longer term development.

A second course would disperse users over a larger area thus reducing wear and capacity issues at the Lost Lake course. Being located on mostly disturbed lands (hydro right of way, former highway right of way) is preferable to using non-disturbed lands. Proximity to Function Junction offers easy access by preferred modes of transportation (active transportation, transit) and may increase activity for some local businesses. Proximity to Whistler's largest existing population of permanent residents and families in Cheakamus Crossing, which is anticipated to increase by a further 500 + units in the years to come would help to create a more complete community, avoid adding transportation pressures to the Highway and reduce demand on the existing Lost Lake course.

Figure 2. Disc golfer enjoys Lost Lake course.

9. Municipal Policy Considerations

The Disc Golf Feasibility Study's recommendation aligns with aspects of the following municipal policy documents including:

- 2023-2026 Strategic Plan
    - Climate Action
        - Progress the Climate Action Big Moves Implementation Plan – see below.
    - Smart Tourism
        - Preserve and protect Whistler's unique culture, natural assets and infrastructure.
            - Values are protected and on-site management conditions improved with strategic reinvestment in Lost Lake Park.
        - Design parks infrastructure, programming and transportation options to encourage dispersion
            - This is applicable to a potential second course as noted in this Summary Document.
- Community Vision and Official Community Plan
    - Many objectives and goals are in support of or in contrast to the recommendations of this Summary Document. That said, balancing recreation with nature is necessary to achieve Whistler's vision of "A place where our community thrives, nature is protected, and guests are inspired."
- Climate Action Big Moves Strategy
    - Move beyond the car
        - Enable more active transportation
            - Active transportation is reinforced by continuing to locate the course in its present location which is accessible by the Valley Trail and Transit.
        - Develop compact and low carbon neighbourhoods
            - By extension to building more complete communities, this is applicable to a potential second course as noted in this Summary Document.
- Recreation and Leisure Master Plan
    - The recommendations of this Summary Document are consistent with the recommended directions of the Council adopted RLMP to manage deterioration, conflict, trespass, high use levels, and consideration for a second course.

10. Next Steps

1. Share the results of the Disc Golf Feasibility Study with the community and respond accordingly.
2. With support, seek and secure funding sources for the Lost Lake course planning, community engagement, design and implementation as per the recommendation of this study

11. Appendix A: Disc Golf Course Feasibility Study.

Prepared by: INdesign Disc Golf Inc.

INnovative by design
INspired by design
INclusive by design

DISC GOLF COURSE FEASIBILITY STUDY.

Prepared for:
Resort Municipality of Whistler.

Prepared by:
INdesign Disc Golf Inc.

April 11, 2024.

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1 EXECUTIVE SUMMARY.

INdesign Disc Golf Inc. in partnership with Dialog Design and Cascade Environmental Resource Group Ltd, has been retained by the Resort Municipality of Whistler (RMOW) to support the development of a master plan for disc golf for Whistler B.C. The two components of the feasibility study are to support the creation of a rejuvenation and possible expansion plan for the existing Lost Lake Disc Golf Course (LLDGC), referred to as Scope A, and to evaluate additional land areas for the potential development of a second course in the Whistler Valley, referred to as Scope B.

INdesign Disc Golf Inc. conducted the disc golf course analysis and Cascade Environmental Resources Group Ltd provided an environmental assessment of the existing course and seven sites identified as potential areas for a new course. Cascade assembled the Disc Golf Environmental Suitability Guidelines (DGESG) which includes sustainability best practices. Dialog Design has provided project communication and provided leadership through the consultation processes.

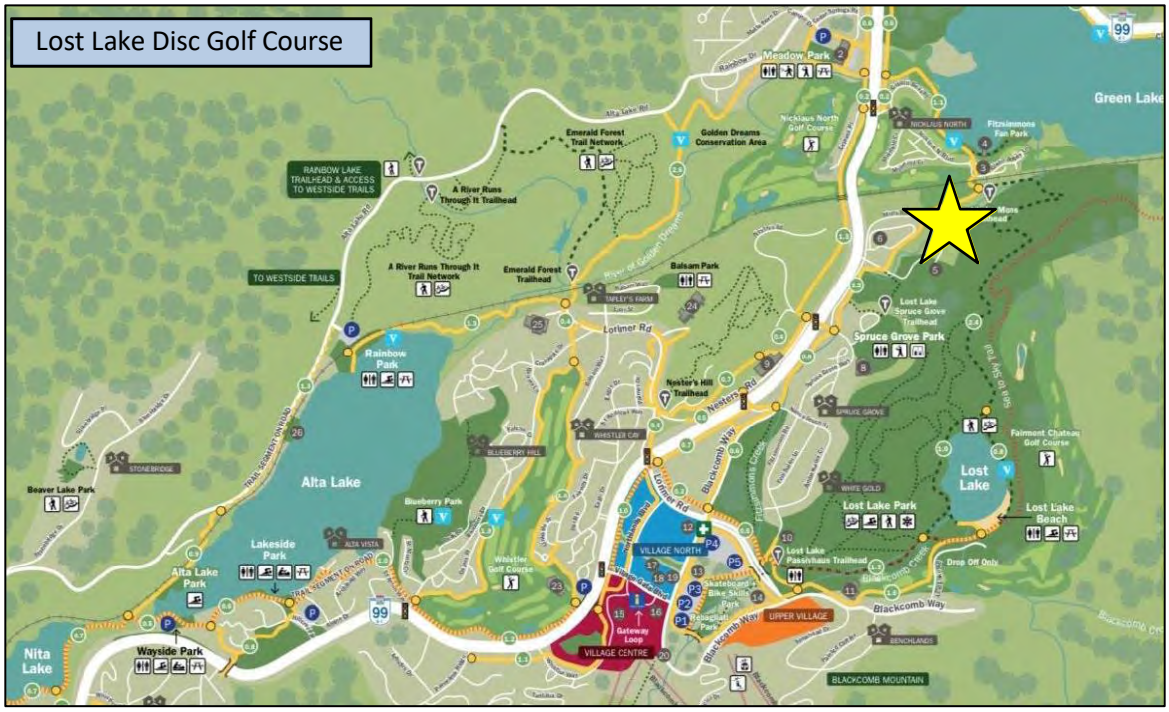
SCOPE A:
An assessment of the current Lost Lake Disc Golf Course was completed with numerous opportunities identified to substantially improve the safety, playability, appearance, and user experience of the current course. Paired with the possibility of accessing additional adjacent land, a wide range of design possibilities are available that would transition the course from its current novice to intermediate skill level to a more advanced skill level while maintaining the overall character of the course. With appropriate design strategies, a rejuvenated course would not only continue to serve new players but would meet the growing demand from players with developing and high skill levels.

SCOPE B:
Scope B required the evaluation of 7 sites identified by the RMOW for a potential second course in the Whistler Valley.

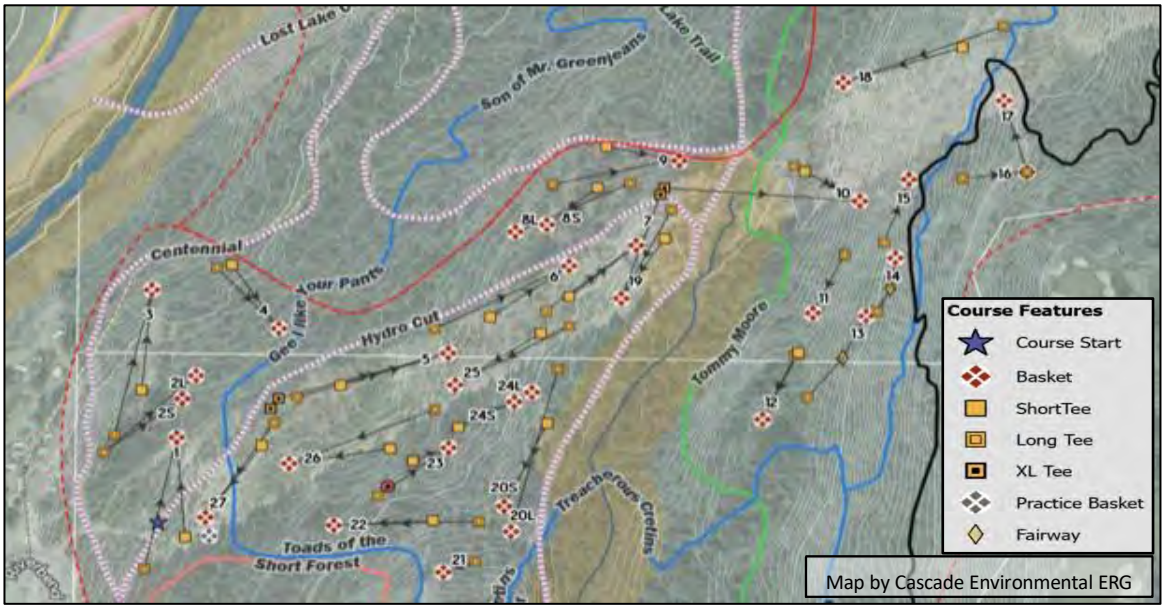
The advancement of any options would require further environmental assessment and consultation with the Lil'wat Nation and the Squamish Nation.

2 SCOPE A: REJUVENATION OF LOST LAKE DISC GOLF COURSE.

2.1 Location of Lost Lake Disc Golf Course.



2.2 Lost Lake Disc Golf Course Map.



2.3 Introduction.

The evaluation of the existing LLDGC consists of a review of the overall condition, infrastructure, design, playability, safety, and the environmental considerations, and sustainable practices leading to a summary of options for the course going forward. Both the RMOW and Whistler Disc Golf Club (WDGC) recognize that the current course needs a comprehensive rejuvenation strategy to address issues that have risen over time related to safety, public access, course design, usability, increasing use, and environmental impacts.

Information used in this report has been gathered from on-site surveys, a detailed inventory of all 27 holes, feedback from the RMOW and the WDGC, online resources, and mapping tools.

A desktop environmental assessment along with the establishment of a Disc Golf Environmental Suitability Guideline (DGESG) document is part of the overall assessment and is provided as a separate report by Cascade Environmental Consulting Ltd.

In conducting this review, the INdesign team completed on-site assessments of each land section, referenced comprehensive mapping resources provided online by the RMOW, and by Cascade Environmental, met with members of the local disc golf club, and participated in regular discussions with the project team from the RMOW. The information assembled through the analysis completed as part of Scope A will lead to a formalized plan for the rejuvenation of the LLDGC and development of operational practices to ensure the long-term sustainability of the course.

2.4 Background.

The Lost Lake Disc Golf Course in Whistler was established in 2001 largely through the efforts of volunteers with assistance provided by RMOW staff in more recent years. The course played host to the Provincial Championships in 2013 where a modified version of the course was used.

The mobile app “Udisc” allows users to view course layouts, track scores and statistics, provide course reviews, and more. In 2023 Udisc provided comprehensive information for over 15,000 courses worldwide. Using the number of app users in a given month or year and information from 2000 days of capturing player numbers manually in 2000, mostly in the US, they calculated that on average, one in five rounds is captured in the Udisc app. However, the length of the course has a significant impact on the ratio as they found the percentage of rounds recorded generally increased as the length of the course increased.

It is hard to accurately account for other factors that might impact the ratio such as resort communities with high volumes of short-term guests, seasonal workers, and the impact of the pandemic during this time frame. Given the background information, it is reasonable to assume that the ratio of rounds recorded in Udisc at Lost Lake is likely less than the average of one in five. Using a ratio of one in five yields a figure of roughly 10,160 rounds were played in 2020, 18,000 rounds played in 2021 and 2022, and 22,150 rounds in 2023. Using 2023 numbers, a ratio of one in six calculates to 26,850 rounds played.

To gain greater insight into the number of course users, the RMOW placed a hidden trail counter at a location on the course where it was felt it would capture a high percentage of those playing the course yet capture few others. During the six-month period between April 29, 2022, and Oct 30, 2022, the counter recorded 18,477 “hits”. While there is far less play on the course during the other six months due to snow cover, the course remains in place and therefore the full year count would be significantly greater than the six-month count. While the counter may have caught some non-disc golfers, it is also likely that with a 27-hole course, that some players will not have played the specific hole where the counter was placed. It is almost certain that when adding in the other six months, the number of players would have been more than 20,000 rounds which is in the range viewed as reasonable from the Udisc stats for the same year as presented in the previous paragraph.

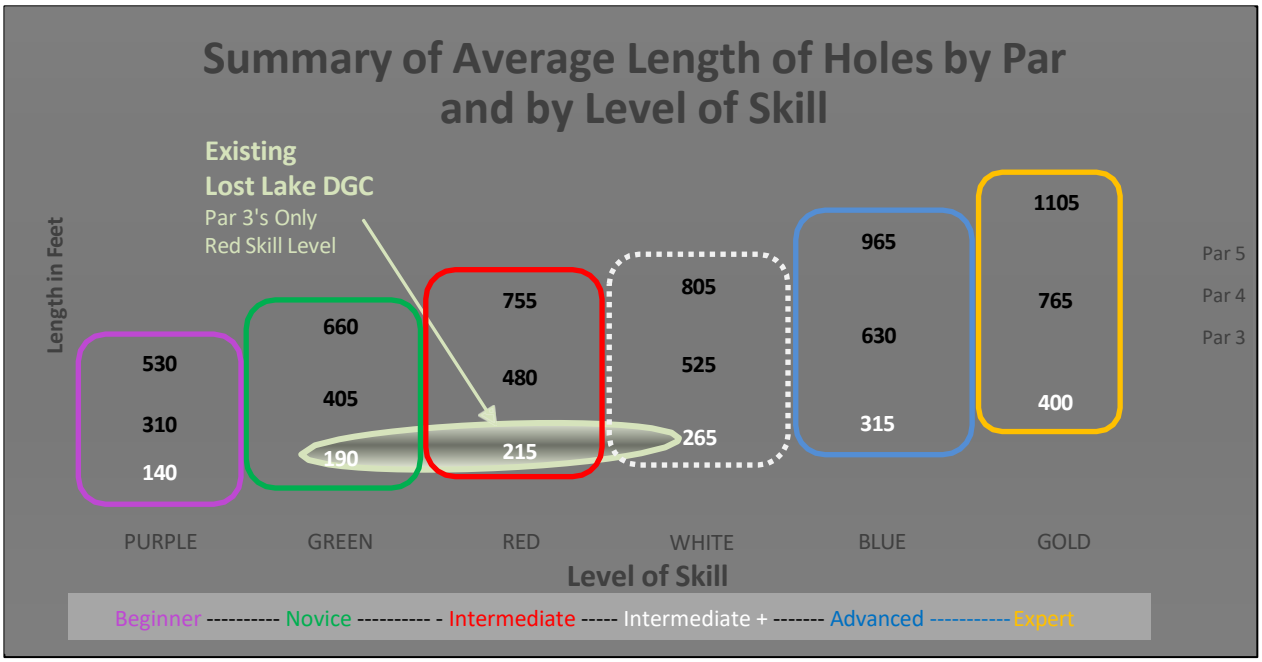
Given the above data, it is reasonable to suggest that in 2023 there was between 22,000 and 25,000 rounds played at the LLDGC which represents a greater than 100% increase since 2020.

The increasing popularity of the sport in Whistler has led to a desire by the RMOW to enhance the disc golfing experience in the community and to improve the ongoing management of disc golf infrastructure, bringing it more in line with other popular recreational activities in the area. The increased participation has also created a need to address challenges related to safety, environmental impact, and ongoing operations.

The Professional Disc Golf Association (PDGA), the governing body for disc golf worldwide, provides guidelines for setting par for specific holes based on skill level (See appendix A). The LLDGC is made up of 27 par 3 holes spread over approximately 18 acres: 11 acres of forested land and 7 acres of BC Hydro transmission power line corridor. The power line corridor is subject to cyclical tree and brush removal as required by BC Hydro’s vegetation management program. When this clearing occurs, it has a dramatic impact on the character and playability of the course, essentially removing features and obstacles important to each affected hole. Trees and other large forms of foliage help define a hole and can provide added challenge by narrowing flight corridors and forcing specific disc flight characteristics.

The average length of the holes at the LLDGC when played from the long teepads is 228 feet which is most closely associated with an intermediate, or red level course, as shown in the summary chart below. When playing from the short teepads the level of challenge is closer to green, with holes averaging 177 feet (54 m) in length and with fairways slightly less treed. A challenging course for advanced level players falls into a mid-white to blue level, while a gold level course provides a test for the highest levels of skill.

Modern courses also incorporate a good number of par 4's and some par 5's into the design to create more challenge, interest and greater variability of play from round to round. When playing par 3 holes the throw to the target is from the same position every time, the teepad. With par 4 and par 5 holes, the approach to the target depends on where the first throw from the teepad landed so it will be different every time, often very different. This introduces variability into each round and maintains interest levels, even for those who play frequently. The chart below is a summarized version of the PDGA guidelines presented in Appendix A and shows roughly where the current Lost Lake course sits relative to the broad spectrum of course levels.



It is important to note that a single course can have multiple layouts to provide a wide range of challenges and allow people of different skill levels to play together. The LLDGC currently incorporates two teepads on many holes, the shorter holes are suitable for novice level players and the longer holes suitable for intermediate. With improvements in equipment and player skill levels rising, many new courses are incorporating two or in some cases three sets of teepads to provide enjoyment and challenge for newer players and for those with high levels of skill. A common scenario that is proving to work well is for two teepads to be installed for each hole, one red level and one blue level.

2.5 Course Strengths.

The LLDGC is recognized for its tight treed fairways, rocky outcroppings, elevation changes, and surrounding beautiful scenery, placing a premium on technical throwing with precision. The course has a forested mountainside character with a unique feel amongst courses in the province. It's overall user experience tracked by Udisc lists the course as the #12 highest rated course in BC. People enjoy their experience on the course even though there are comments related to some of the issues discussed in this evaluation.

The local disc golf community takes great pride in the Lost Lake course. Each year, through the leadership of its society, the WDGC contributes many hours of volunteer labour and funds toward course maintenance and improvements. Additionally, the RMOW supports these efforts with contributing staff hours and $5,000.00 of funding each year for priority modifications to the course. These modifications are generally safety improvements, such as danger tree removal or repairing decaying teepads.

There is some concern within the local disc golf community that a rejuvenation of the LLDGC could potentially change the unique character of the course. Maintaining, and building on, the unique character will be an important guiding principle for the continued planning process and ultimate redesign of the course.

The LLDGC has a broad appeal including those trying disc golf out for the first time; families, young and old, those with lower levels of skill, and highly skilled regulars. For those first learning to play, or who play on an occasional basis, the shorter holes allow for early success that leads to a high level of enjoyment, while the wooded fairways provide a good technical challenge for more experienced players. Players move from hole to hole quite quickly which keeps interest and energy levels high.

Given the terrain and current design, the 27 holes require a good variety of relatively short throws. Some new teepads have been installed more recently to add length to a few holes and new alternate basket locations have been created to increase the overall challenge and variability.

The middle 9 (holes 10-18) is generally considered the tougher of the three loops of 9 holes, and the most physically demanding. Beginners can easily play the first and third set of 9 because holes 9 and 19 are located near each other.

The LLDGC is central to the community with public transportation to Spruce Grove Park, and a variety trails near the course. Spruce Grove Park is considered the designated parking area for the course, however starting at Spruce Grove Park requires a 700 meter moderately uphill walk to get to the start of the course.

2.6 Course Weaknesses.

2.6.1 Design.

The LLDGC is just over 20 years old and reflects the rich history of the sport. Courses developed during this time often consisted entirely of relatively short par 3 holes. With the advancement of skill and equipment modern courses have evolved to include longer holes that include par 4's and occasionally, par 5's. There is still a valuable place for shorter par 3 type courses in disc golf, however, as skills develop, users begin to look for more advanced courses to further challenge themselves and to experience greater variety. When players don't have access to more challenging holes that match their improving skill levels, it is common for some to take it upon themselves to create the challenge they are looking for. This results in creating unauthorized layouts that don't follow the designated routing and maps and can create conflicts with park users, including disc golfers using the approved course layout. This ad hoc approach to creating more challenge with individual holes often overlooks key course design attributes such as the sequencing of length and difficulty of holes and often results in unsafe conditions. Specifically, some of these changes have led to throwing lines that have introduced new significant safety hazards for other disc golfers and trail users.

2.6.2 Maintenance.

The process by which changes to the course occur and how maintenance is conducted appears to lack clarity. The local club members provide some course maintenance and changes, but also provide their suggestions to the RMOW who currently budgets $5,000.00 per year for maintenance and course changes. These requests are prioritized by the RMOW, and work is carried out as funds and time allow. The current process appears to have both parties not always aware of what each other is doing on the course.

From on-site evaluation, it appears the focus of the work is primarily related to improvements to teeing areas, basket locations and signage. As mentioned, the process by which this work is carried out seems to be uncoordinated and lacks an overall long-term comprehensive plan or a standard of quality.

2.6.3 Environment.

It is unclear, due to the lack of observed efforts, if there is a process is in place for routine monitoring and mitigation of environmental impacts such as soil compaction, erosion, tree damage, and loss of vegetation. Varying levels of tree root exposure was observed in several areas, especially on steeper slopes. A lack of designated pathways and inconsistent on-course signage allows players take different routes to get from one place to the next. This "trail braiding" is a result of soil compaction, erosion, and an unnecessary loss of forest vegetation.

Given the nature of flying discs and the variable skill levels, discs do not always follow the intended flight path. As a result, staying on a single designated footpath while playing a hole is not realistic. However, in some situations such as walking from basket to teepad, and walking sections of a fairway, a designated footpath can reduce impact. Experience with other courses has shown that where a designated pathway is implemented, it results in less environmental impact to adjacent areas.

Installing signage (*see 2.6.9*) to educate players about environmentally sensitive areas or species can help reduce negative environmental impacts.

2.6.4 Multiple Layouts.

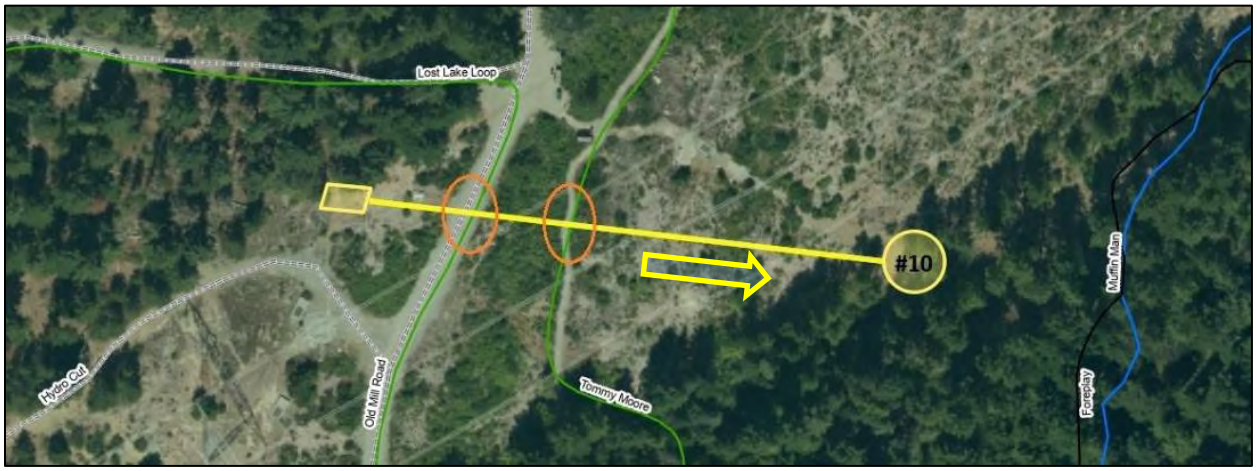
Indicators a course rejuvenation strategy should be considered include, when alternate layouts are being developed on the course, or when new teepad or basket locations are being established in an unauthorized fashion. These changes may be specific to an organized event and considered temporary, but more often they are implemented in response to add variety or challenge. A quick review of Udisc shows several alternate course layouts have been previously used at times at the LLDGC along with new teepads and basket locations that are occasionally added. As mentioned, this can introduce conflicts and safety issues with other players or park users as play is not taking place in a predictable manner.

2.6.5 Safety.

2.6.5.1 Park User Safety.

The Lost Lake Disc Golf course runs adjacent to and occasionally overlaps other park trail systems, most notably the Lost Lake bike trails. With the evident increase of disc golf participation paired with rising rates in other outdoor activities such as walking, hiking and biking, the possibility of conflict in multi-use spaces has risen dramatically. Cyclists can travel through the course area at relatively high speeds which requires focus on the ground ahead. Discs can be thrown at high velocities, be in the air for several seconds, and can have unpredictable flight paths. Because of how much distance can be covered by both bikes and discs in a very short period, the potential conflicts might not be visually apparent or known to either party at the time a disc is released.

Holes that require players to throw directly across roadways or trails have a high level of risk to other trail users being hit by a disc. As an example, hole 10 (see image below) requires a partially sightless throw directly over two well used trails (orange circled areas). Not only is throwing over the trails a significant safety concern, but the distance also requires throwing the disc at a fairly high velocity which can increase the severity of an injury if someone is hit.



Another example is Hole 27 which also requires players to throw across a trail that comes downhill, out of the forest, directly into the flight path of discs.

Clear course signage (*see 2.6.9*) with appropriate messaging such as “Caution: entering course area” or similar, informs other park users of the potential hazards. Offering detour signs for park users to avoid or minimize any disc golf course crossings would also have a significant impact in reducing risks to park users.

2.6.5.2 Disc Golfer Safety.

Holes that involve throwing near teepads, fairways, and baskets from different holes create a risk of other disc golfers being hit by a disc. The image below shows hole 19 where the teeing area requires a throw around the left side of a powerline tower (marked "M" for mandatory) to a basket that is 100 or more feet beyond the tower.

The safety risk exists because the basket for hole 7 is just a few meters to the right of the tower and a poor throw can easily fly directly at and over basket 7 where several players may be completing the hole. In an attempt to discourage people from intentionally throwing around the right of the tower, which would be the easier throw to make for most players, a mandatory flight path, or "mando" is in effect. PDGA rules state that if a disc passes on the wrong side of the mando, in this case the tower, the player is penalized one stroke, and they must throw their next shot from a designated zone. Furthering the issue on hole 19 is that this mandatory rule is not shown on a sign at the teepads, there is no official mando sign approaching the tower, and only a keen and knowledgeable eye would catch the mando indicator on the actual tower (see image on left). Please note that mandos only prevent those who are committed to following the course rules from trying to throw the wrong way around the tower. A player must first be aware of the rule, they must intend on following the rule, and they must execute a throw that doesn't violate the rule. In this specific case, the mandatory rule is only slightly reducing the risk of injury with most of the risk remaining.

Holes should be designed so that discs are thrown directly away from, or at high angles away from, nearby trails, pathways, teepads, baskets, etc. with clear consideration given for throws that result in both intended and unintended flight paths.

Holes should be designed with generous landing areas to keep erratic throws from entering spaces that may have other park users. The most common miss for disc golfers is where the disc ends up further left than intended, therefor it is important to design to minimize potential conflict areas adjacent to common landing zones. Holes 9, 10, 19, 20, 22, 27 all have elements where a miss to the left of the basket could end up on or crossing a trail. The longer the attempted throw, the greater the distance the miss can travel off-line. Throws up, down, and across slopes also have a dramatic effect on how far off-line a disc can travel as can the number of objects that may impede a disc while in flight.

The utmost care should be taken during the course rejuvenation design process to minimize the potential for conflict or injury between disc golfers and parks users and to ensure all parks users are aware of potential risks when entering the disc golf course area.

Signage (*see 2.6.9*) to inform players of potential disc flight risks or identify areas that may require more awareness and precision when throwing or approaching a basket would be helpful in minimizing player-to-player risks.

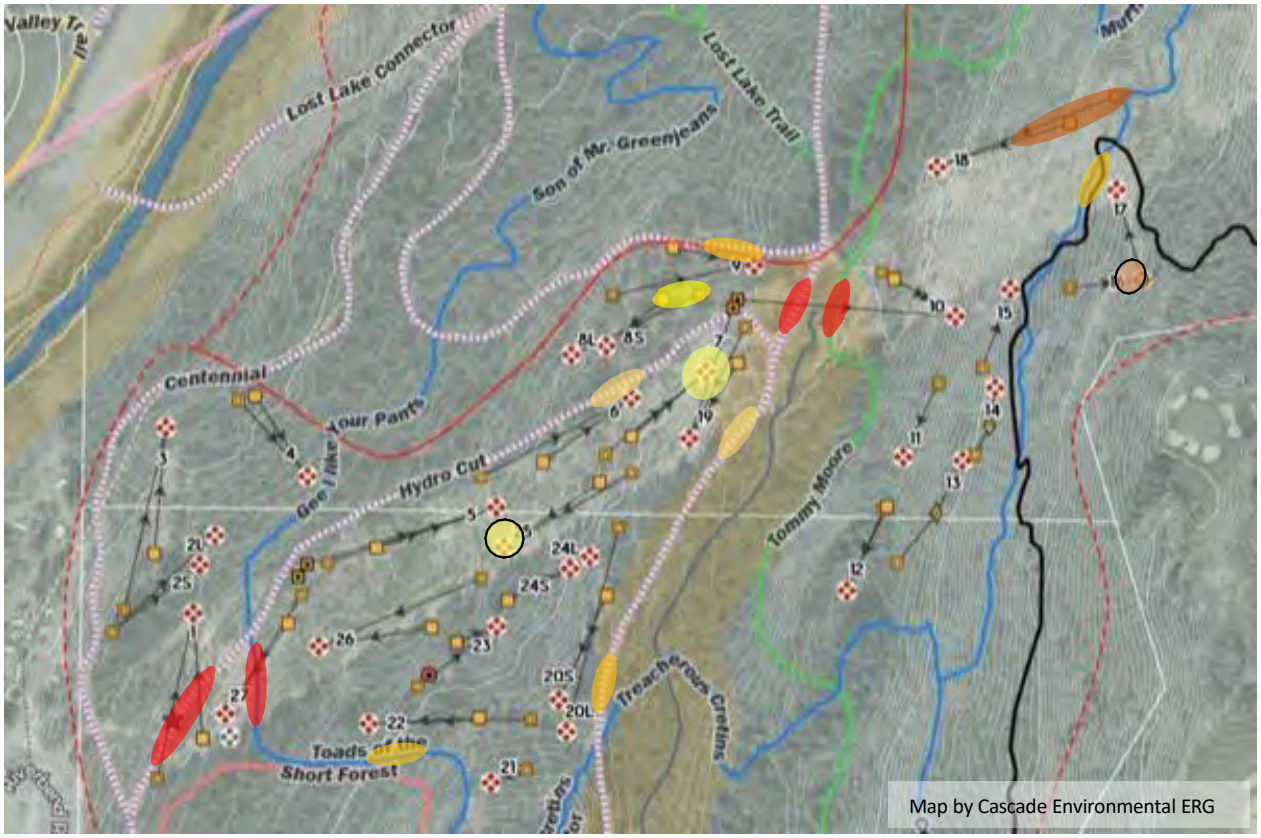
2.6.5.3 Dangerous Terrain.

Holes 16 and 18 have steep drop-offs. A rope anchored into the slope is used by players to make their way down the fairway on hole 18. While this may be the most iconic hole on the course with beautiful views, a substantial elevation drop it is not without significant safety concerns.

Several strategies can be used to reduce the risk of injury while maintaining the valued characteristics such as adjusting the teepad back from the edge, lowering the height of the teepad and establishing a safer pathway down the steep fairway.

Again, the use of signage (*see 2.6.9*) to inform players of any danger can help reduce the chance of harm while navigating difficult course terrain.

2.6.5.4 Summary Map of Safety Risk Areas.



High Risk of Injury to Other Park Users	Moderate Risk of Injury to Other Park Users	Moderate/High Risk of Injury to Other Disc Golfers	Moderate/High Risk of Injury to Self

2.6.6 Parking.

Designated parking for the Lost Lake Disc Golf course is at Spruce Grove Park and requires a 700 meter walk to the first tee. As a result, course users often park in private parking areas near the course that are managed by the adjacent Scandinave spa and the Riverside Campground. Signs in these areas clearly state that parking is for the guests of the spa and campground only, which suggests that disc golfers parking at this location has been problematic. Another popular area of parking is at the north end of the disc golf course below current holes three and four, adjacent to the Nicklaus North Golf Course driving range. Disc golfers using this parking area start their round on hole 4 rather than hole 1.

A combination of a long walk to get to the course start from transit or the designated parking area, parking conflicts and groups starting mid-course and interrupting players mid-round, makes the current start of the course less than ideal and creates a barrier to participation especially for young families and individuals with mobility limitations.

Parking conflicts could be improved through a combination of extending the course closer to Spruce Grove Park, enhanced wayfinding, and an update to the RMOW website that would include more detailed information about the LLGDC such as where to park and how to access the course.

2.6.7 Teepads.

Teepads have been constructed using several different base and top materials and the rubber mats used on most of the teeing surfaces are often too small, not symmetrical and have corners missing. Teepads should have a uniform, level surface, offer good traction in dry and wet conditions and be made of the same materials to reduce tripping.

Teepads should be consistent from one to the next for safety, durability and to provide a professional look. Teepads should be built low to the ground, so a slip or trip does not involve a large drop.



Highlighted earlier, hole 18 is an elevated teepad platform right at the edge of a steep embankment. This is an example where the risk of a serious injury from a fall has been increased. Modifications can be made to maintain the valued benefits of this teepad while significantly reducing the risk of a serious injury. The use of some older teepads has clearly been discontinued with the structures remaining in a deteriorating state rather than being removed from the course.

2.6.8 Targets/Baskets.

Traditionally a course is established using the same basket model from the same manufacturer throughout the course for a consistent and professional look. LLDGC's baskets are of different levels of quality and brands throughout the course; some have coloured bands and some do not.

Some of the baskets are top quality and relatively new. Changing out the remaining baskets would improve overall experience. With longer, forested holes, baskets without colour can be hard to see, especially in low light conditions. Baskets with a colour component improve wayfinding and reduce the uncertainty of where to throw for players unfamiliar with the course.

2.6.9 Signage.

Signage is important. Previously mentioned in course weaknesses; signage plays a valuable role in reducing environmental impacts, contributes to the safety of players and park users, assists in navigating the course and difficult terrain and can alleviate parking conflicts, therefore elevating the overall user experience.

Course signage at LLDGC, when present, is aged, inconsistent, low quality compared to most courses and not the same standard of signage used throughout the RMOW for other recreational activities. The larger course layout kiosks do not accurately represent the course changes that have occurred over time.

Wayfinding signage is inconsistent, not easy to follow, and is a common issue raised in online forums related to the LLDGC. Signs are often different sizes, colour, composition, and not presented with a consistent theme.

Consistency with all signage on the course should be pursued without it being overly intrusive. There are also numerous unauthorized signs, indicators and stickers that have been added over time and have not been removed. Clear wayfinding signage will have a positive impact on those visiting the course, especially those playing for the first time.

Examples of current signage below.


Examples of well executed signage below.


2.6.10 Other.

There are other course conveniences that have been added over time that should be addressed to be consistent with the standards of other amenities in Whistler. Some examples include beverage holders screwed into trees, benches made with snowboards, basket flags, and nets held by rebar placed on steep slopes to prevent discs from rolling downhill. Consistent with other course elements, more natural alternatives can be sourced to provide similar functionality with a higher quality look.

2.7 Course Threats.

2.7.1 Environmental.

The Lost Lake Disc Golf Course was developed over time with little oversight or consideration of environmental impacts. The work done by Cascade Environmental Resource Group as part of this Feasibility Study (desktop environmental analysis, on site Environmental Impact Assessment, development of Disc Golf Environmental Suitability Guidelines "DGESG" tool) may identify areas of the existing course that conflict with environmental values, and the correction of these issues may negatively impact the course in some way.

2.7.2 BC Hydro.

Approximately 1/3 of the LLDGC sits within a BC Hydro transmission powerline corridor and directly underneath powerlines. As a result, trees and shrubs important to the quality of the course are cleared on a cyclical basis as part of BC Hydro's vegetation management. The last clearing by BC Hydro dramatically changed the character of a large portion of the course, much to the disappointment of users.

Changes to the layout of the course should take into consideration the required clearing to minimize the impact on the overall character of the course and specific holes. Discussion with BC Hydro representatives may be effective in developing new vegetation management strategies to help minimize the dramatic effect the clearing process has on the nature of each affected hole.

2.8 Course Opportunities.

2.8.1 Course Design & Layout.

There are numerous strategies that can be utilized to create a safe and more enjoyable experience for the broadening base of people who are playing disc golf.

As stated earlier, the current course reflects a novice to intermediate skill level. With increasing participation rates and improving skill levels, a redesign of the course can continue to provide an enjoyable experience for new or occasional players and respond to the growing need for higher levels of challenge and variability for the growing number of advanced enthusiasts. There are several different approaches that can be taken with the existing LLDGC to respond to the growing need.

2.9 Summary of Potential Approaches.

2.9.1 Reducing the number of Holes.

The LLDGC currently has 27 holes spread over approximately 18 acres and reducing the number of holes from 27 to 18 would provide more land on a per hole basis to improve design, safety, and increase the level of challenge. However, there will also be some loss of available land within the existing course footprint as areas of conflict with other park users needs to be alleviated. Holes can start and finish near trails and players can cross the tails when transitioning from one hole to the next, but holes should never require play directly across or closely alongside trails.

Existing trails and a forest service road place limitations on what is possible. The current course footprint is divided into many smaller parcels, all requiring some level of buffer from adjacent trails. This minimizes the opportunity to create more challenging holes, even with some additional space being available from reducing the number of holes.

Additionally, this option does not address the current access issues, public transportation, parking, and course player capacity would be reduced with 18 holes rather than 27.

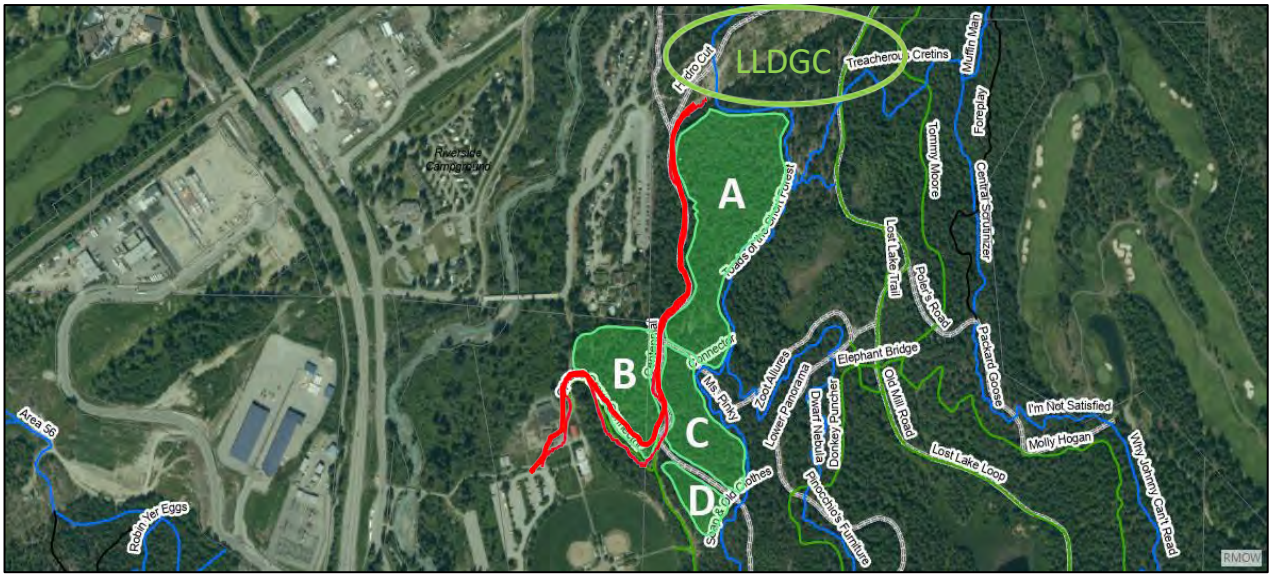
2.9.2 Access Additional Land to Bridge Existing Course to Spruce Grove Park.

One of the considerations brought forward by the RMOW is to incorporate new holes in the area between the current course and Spruce Grove Park. This would reduce the current walking distance from 700 m to 150 m and enhance the overall enjoyment level and appeal of the course. It would also substantially reduce the parking-related issues that exist with the Scandinave Spa and Riverside Campground.

Bringing the start and end of the course close to Spruce Grove Park would improve access to the course and remove a barrier to participate, especially for young families, senior players, and people with mobility limitations preventing access to the course.

Spruce Grove Park is well connected to both transit and the Valley Trail, has substantial parking, and is serviced with municipal washroom facilities, drinking water and trash collection. The map below shows four areas, labelled A, B, C, and D, that are deemed suitable for disc golf holes. The red line represents the current walk from Spruce Grove Park to the start of the course.

Map of Potential additional Land Areas (in green) to Bridge Existing LLDGC to Spruce Grove Park.



Area A will support longer holes including par 4s and possibly par 5s with the remaining areas having sufficient space to provide challenging holes for a wide range of players. Several of the spaces adjacent to these four were evaluated and determined to be not suitable for a variety of reasons.

(Note: with the areas presented in the following section, these images show where new disc golf holes *could* be routed. It should not be interpreted that each of these areas would be used to the full extent of the boundaries drawn.)

2.9.3 Access Additional Space to the North of the Existing Course.

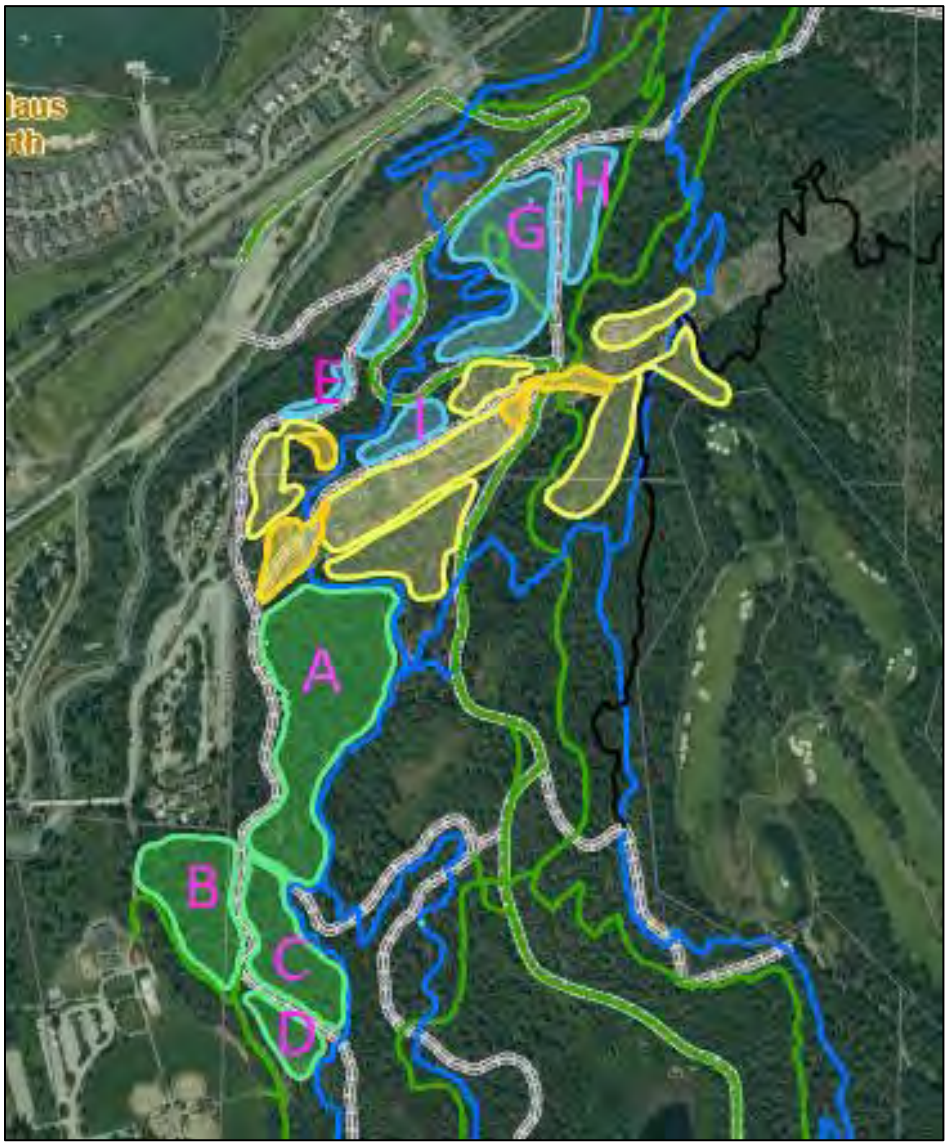
Additional areas to the north of the current course, as indicated in blue in the map below, and identified as areas E, F, G, H, I, and J, provides some exceptional topography for disc golf and incorporating this space would ensure an exceptional and modern disc golf facility. Through this process, the concept of potentially moving the start of the course to this area was explored with parking located across a suspension bridge in a large gravel lot next to the Nicklaus North driving range. This would, require a formal user agreement with Nicklaus North Golf Course. The proximity of industrial operations, more specifically the extraction, storage, processing, and trucking of river gavel, occurs in this area throughout the summer which poses potential risks to the public accessing this area. This use is problematic with public parking and no other parking opportunities exist nearby. There is also a complexity of incorporating future washroom facilities, therefore this option was not explored further. It is noted that many disc golfers park in this area and start their round on the present hole #4.

Map of Additional Land Areas (in blue) North of the Current LLDGC.

2.9.4 Combination of Existing Course Footprint (yellow) + Additional Areas to the North (blue) and South (green) of LLDGC.

The map below shows all three packages of land combined which could represent the maximum reach of the possible expansion. This is not a completed course design, that process will begin once final decisions are made related to available land. Areas within the footprint will only be partially used for the disc golf course rejuvenation.

The yellow areas represent the approximate footprint of the current course with three orange areas identifying the blocks that would be avoided from future use to address existing safety issues. The green and blue areas represent the additional land that could be accessed as part of a new course design.



2.9.5 Environmental Considerations and Course Maintenance.

The desktop environmental assessment and Disc Golf Environmental Suitability Guidelines (DGESG), completed by Cascade Environmental Resource Group Ltd, will inform and guide all future disc golf course development and maintenance activities in Whistler. There are many effective strategies for ensuring the best possible environmental outcomes as they relate to a disc golf course. They include:

- The course design should first seek to eliminate the requirement for players to enter in to identified environmentally or otherwise sensitive areas. This can be accomplished by designing holes in such a way as to effectively eliminate or reduce the chance of discs flying, intentionally or unintentionally, into sensitive areas. The most practical solution is to make sensitive areas "out-of-bounds". A player may retrieve their disc but will bring it back "in-bounds" before continuing play. Another solution is to add a penalty stroke for throwing "out-of-bounds" to discourage players from throwing near these areas.
- The design should minimize the number of times environmentally sensitive areas are crossed and when required, it is done in a way to minimize impacts, such as designated crossings routes whenever possible.
- Dedicated pathways and barriers should be used where possible to reduce trail braiding and allow for healthy vegetation throughout the course.
- Dedicated structural pathways should be considered in strategic areas to reduce compaction and erosion.
- Care should be taken when designing on steep slopes to minimize erosion.
- Protection of tree damage can be minimized in a few ways including designing to reduce the frequency and severity of hits or incorporating tree armor.
- The construction process, and materials used, should reflect practices to minimize the short and long-term environmental impact.
- Educational signs or interpretive panels can remind people of the sensitive environment and to encourage minimizing impacts.

It is recommended a coordinated approach for course changes and ongoing maintenance including environmental impact monitoring and mitigation work. Through discussions with the RMOW and members of the Whistler Disc Golf Club, it is evident that both parties lack communication regarding the maintenance and improvements of the course. It is also apparent that an effective process to mitigate environmental impacts has yet to be established.

As part of the long-term Lost Lake Disc Golf Course rejuvenation strategy, it would be beneficial to establish a formal agreement between the municipality and the local disc golf club that focuses on regular communication and clarifies responsibilities, decision making processes, and funding details. Several clubs in the Province of BC operate with land use agreements with the local municipality which outlines roles, responsibilities, and expectations. A similar arrangement is recommended for the future of the Lost Lake Disc Golf Course.

3 A COURSE FOR THE FUTURE.

Scope A is to support a rejuvenation plan for the existing Lost Lake Disc Golf Course in Whistler. An evaluation of the LLDGC has been completed and we have identified several options for consideration.

Each option will result in a positive change to the overall feel of the course while retaining much of the unique character that is valued by many. Described earlier, quality course elements (teepads, targets, course signage, pathways, etc.) and standardizing these elements throughout the course will provide a professional look and feel and will address many of the less positive feedback.

There are many areas of opportunity to improve the Lost Lake course and address the issues that have risen over time.

Below we present four options starting with the least amount of course change and graduating to the most.

3.1 Improve the quality and safety of the existing 27-hole course.

Advantages:

- Improved safety.
- New course signage that is accurate, clear, consistent, provides all the information for an enjoyable experience.
- All teepads are quality, safe, and consistent.
- Removal of all unsafe teeing structures or those that provide significant safety risk.
- New baskets that are the same brand and model for each hole.
- Incorporate recommendations and best practices as outlined in the DGESG to reduce current environmental impact and identify and implement opportunities for remediation where possible, to restore areas that have been negatively impacted.
- Use the DGESG to establish a systematic maintenance program to minimize environmental issues over time.
- Least costly option

Disadvantages:

- Will not address many of the major safety issues.
- Will not address demands for increased challenge and skill level. Therefore, less likely to reduce ad hoc course changes, as described earlier.
- Proximity of the course to public transportation and parking remains an issue.

3.2 Rejuvenate the existing Lost Lake course within the existing footprint, reducing the course from 27 holes to 18 holes.

Advantages:

- Allows for further improvements to overall course safety.
- All course elements such as signage, teepads and baskets are high quality, as outlined in 3.1.
- Ability to create increased challenge and length of course.
- Allows for more intentional use of the BC Hydro powerline corridor.
- Course can move from a red level course to a white level course.

Disadvantages:

- Usable land: safety issues and environmentally sensitive areas limits what is possible in terms of a course for higher skill levels.
- Course capacity is reduced by nearly 35% while participation rates continue to grow rapidly.
- Course will consist of mostly par 3 holes.
- Proximity of the course to public transportation and parking remains an issue.
- May not be enough of an adjustment for some to consider it better than retaining a 27-hole course.

3.3 Reconfigure the existing 27 hole course and extend to adjacent land to the south connecting to Spruce Grove Park.

Advantages:

- Allows for further improvements to overall course safety.
- All course elements such as signage, teepads, and baskets are high quality, as outlined in 3.2.
- The start/finish area is close to public transportation and designated parking area, making the course much more accessible.
- Wide range of hole variations.
- Good challenge for most players.
- Sufficient land to have some par 4's.
- Sufficient space to incorporate two teepads for most holes.

Two teepads allows for one layout suitable for beginners/novices and a second layout for advanced players. The layouts can be quite different, essentially creating two courses within one. Players within a group can play from different teepads, allowing novice players to play with highly skilled players.

- Much greater variety reduces the need for players to create their own ad hoc layouts.
- Suitable for the types of regional competitions that have occurred in the past.

Disadvantages:

- Due to space limitations, maintaining 27 holes will likely result in a high quality 18 holes with 9 holes (currently holes 10 – 18) remaining as is.
- Course likely limited to some par 4s.
- 18-hole high quality course could be a blue level but the identified loop of 9 remains at a red level.

3.4 Reconfigure the existing 27 hole course using existing footprint and expand to land areas to the north and south, connecting with Spruce Grove.

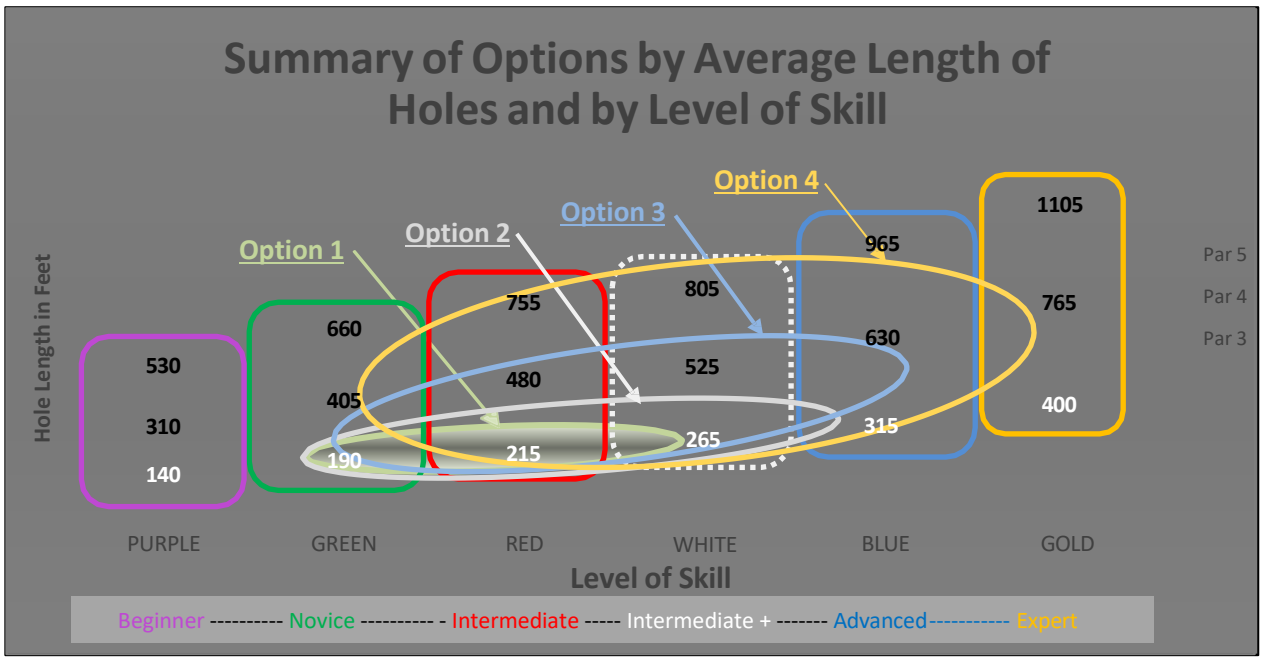
Advantages:

- Everything outlined in 3.3.
- Potential for 27 high quality holes at the blue level with an opportunity to incorporate several holes that could reach up to the gold level of play.
- Par 4's and 5's possible.
- A course that is enjoyable and challenging for the full spectrum of skill levels.
- A course which has potential to be the highest rated in Canada.

Disadvantages:

- Additional costs, but a relatively small increase over Option 3.

3.5 Summary of Options.



4 SCOPE B: POTENTIAL FOR A SECOND COURSE.

Six sites for a potential second disc golf course in Whistler were provided by the RMOW for evaluation, with a seventh location added during the evaluation process.

INdesign conducted the evaluation by viewing maps and satellite images of the properties and site visits to each land parcel. A scorecard, developed by INdesign, was adjusted to reflect specific factors provided by the RMOW and an overall score for most properties was assigned. The objective of this quantitative measure is to capture key features of the land, aesthetics, course design and build factors, accessibility to the community, quality of course, whether it can support the vision of the RMOW, and more.

The detailed scoring is propriety information to INdesign and have been confidentially made available to the RMOW as a separate document.

4.1 Summary of Sites.

The Lower Whistler Interpretive Forest location (Site A) originally scored the second highest, however, existing, and future bike trails run through the middle of the area and almost the full length of the most useable land for a disc golf course. It's location in the community is good, close to transit, and recent forest fire fuel management would have made installation of a course relatively straight forward. The combination of the existing and future bike trails, riparian areas, steep slopes, and an active forest service road, makes this location not a viable option for an 18-hole disc golf course.

The Upper Whistler Interpretive Forest area (Site B) located approximately 4.5 km up the Cheakamus Lake Forest Service Road (FSR), has the highest overall rating. There is a large amount of low sloped terrain, and much of this area has been recently fuel managed so design and installation of a new course would be streamlined, and land preparation would be relatively inexpensive. The large amount of land available would allow a disc golf course to safely coexist with the existing biking/hiking trails in the area. The characteristics of the land would support everything up to and including a gold level, championship course. Should the RMOW wish to add a world class course to the area, this is a location. It should be noted that the Forest Service Road is not maintained by the RMOW and the land itself is crown land which introduces the complexity of multiple partners/stakeholders in moving a project.

Two sites, Alta Lake Road (Site C) and Hot Dog Alley (Site D), both along Alta Lake Road, were not rated. These sites were quickly deemed to be unsuitable, primarily due to large portions of severe steep slopes.

A third site, Parkhurst (Site E), was also ruled out because access to the area doesn't currently exist and additional infrastructure investment would be required to be able to proceed at this location. The Parkhurst area is a large parcel of land, and a preliminary evaluation and rating indicates it can support a high quality 18-hole disc golf course. This can be explored more thoroughly as part of a master plan for this area.

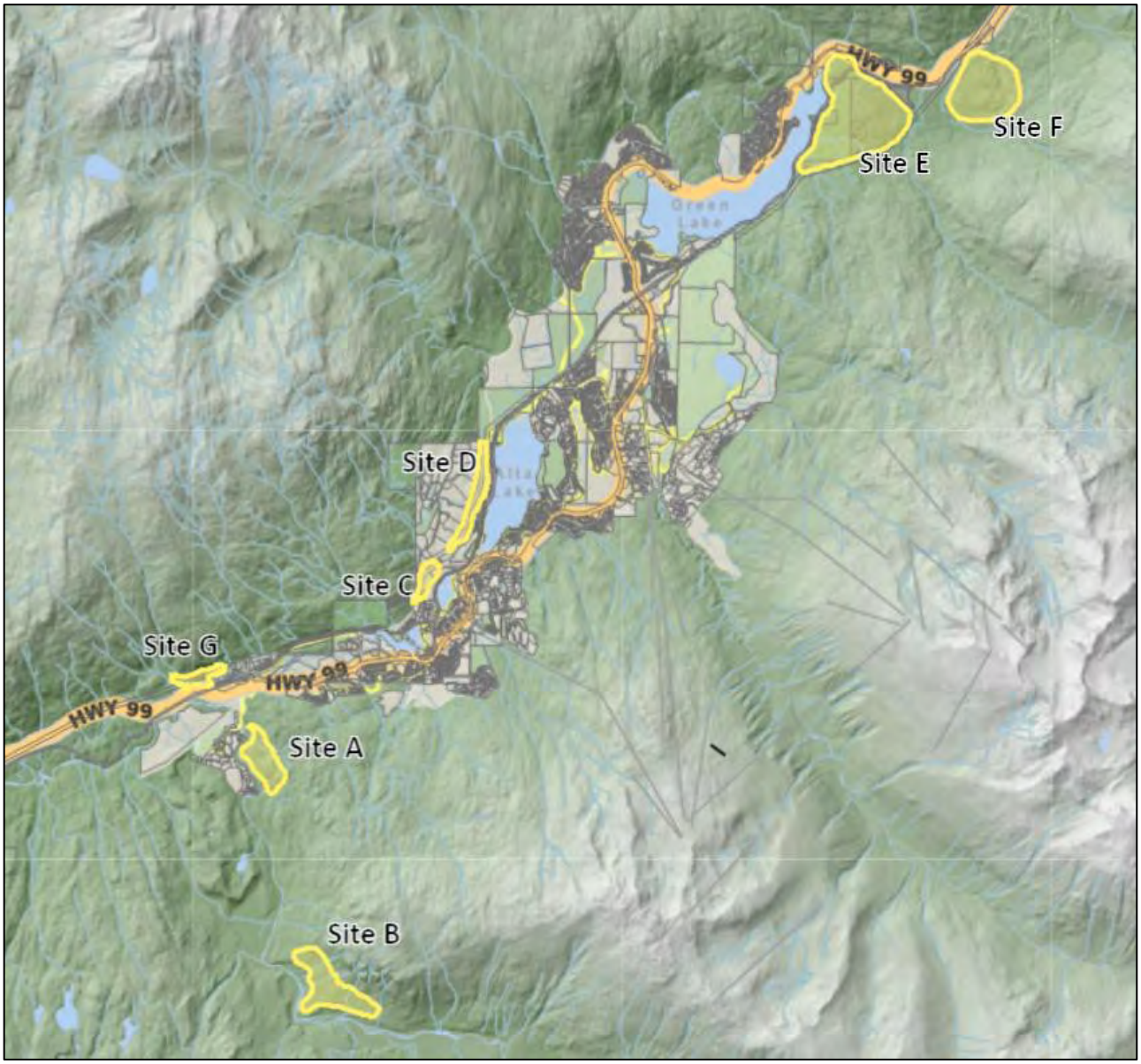
The large Comfortably Numb area (site F) is the most unique. It has many foundational characteristics on which to establish a great course including rocky outcroppings, ample space, elevation changes, amazing views, and more. Like the Parkhurst location, this area is accessed via the Wedge Creek Forest Service Road, approximately 8 km north of Meadow Park Sports Centre. Access to the area is not straight forward and may have similar infrastructure issues as the Parkhurst area. As an example, from Hwy 99, the access road crosses a bridge that appears it would require a significant upgrade if use was substantially increased. The land consists of very lightly disturbed forest and although there are biking trails in the area, they are few. A top-level championship course could be possible here but given the large amount of land available a fair amount of additional surveying would be required to provide a detailed review. This location is rated the second highest for suitability for a quality 18-hole disc golf course and an area worth considering for additional disc golf infrastructure as part of long-term planning for the area.

The final area reviewed was the Function Junction Site (Site G) and it is located along the powerline corridor up and behind the local businesses at the south end of the business area. This land is characterized by multiple terrain and elevation changes. The location can likely support up to a white level, intermediate community course due to limitations presented by steep slopes and riparian areas. The interesting terrain can make for some unique holes and a different experience than what a rejuvenated LLDGC will provide. With the location at the south end of Whistler it can provide an enjoyable and easily accessible recreational activity for the growing community of Cheakamus Crossing.

A desktop environmental assessment has been conducted with respect to each potential site by Cascade Environmental Group Ltd and is provided as a separate document.

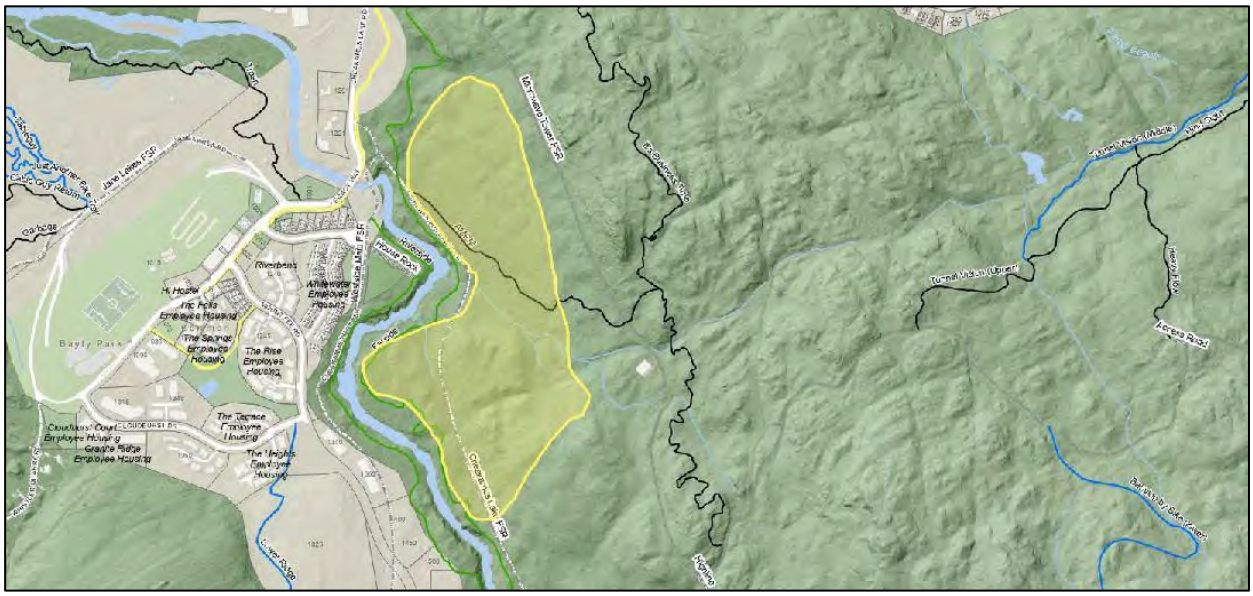
4.2 Potential Course Locations.

Map showing the locations of the seven sites identified by the RMOW.



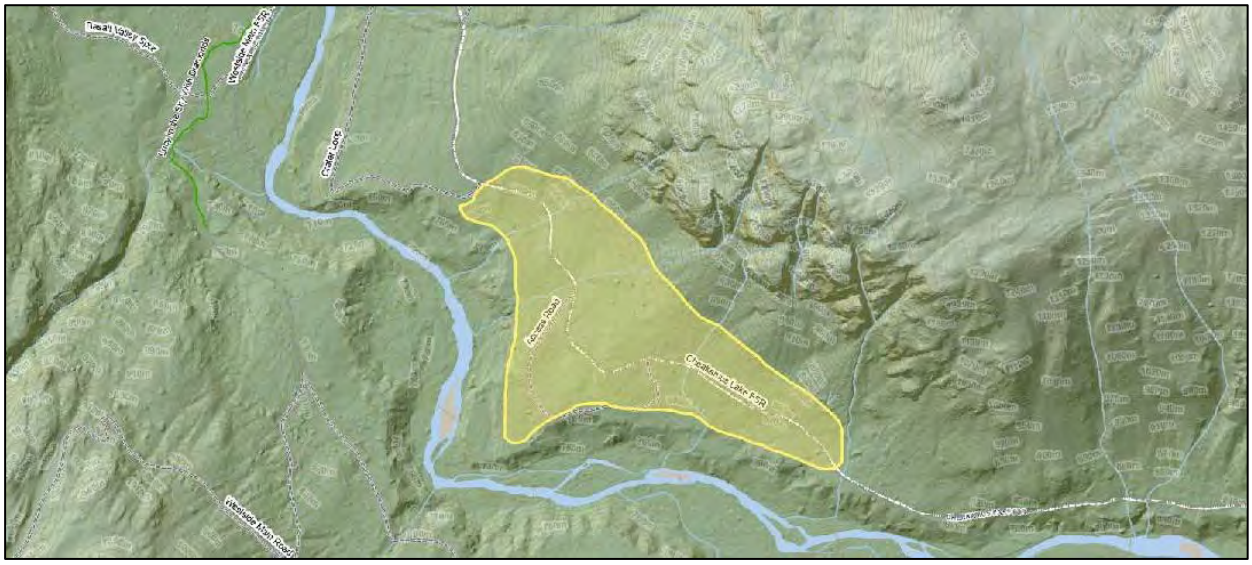
4.3 Evaluation of Potential Course Locations.

Site A: Lower Whistler Interpretative Forest. *Rating: 54/100*



Strengths	Weaknesses
▪ Close to Valley Trail ▪ 600 m to nearest bus stop at Hwy 99 at Function Junction ▪ Good access on Forest Service Road ▪ Interesting landscape, elevation changes, rock outcroppings, forested and recently fuel managed areas, nearby river ▪ Cost to install a new course relatively low due to recent fuel management	▪ Riparian areas, existing and developing bike trails, the FSR, and steep slopes reduce the amount of the land suitable to likely less than 12 acres ▪ Reasonable parking within 300 m but no easy parking areas along FSR due to sloped land on either side ▪ Approved new bike trail will run almost the full length of area and through the middle of the prime DG terrain. ▪ As a result, this is not a property that can support a quality 18-hole disc golf course

Site B: Upper Whistler Interpretive Forest. *Rating: 75/100*



Strengths	Weaknesses
▪ 50 acres + significant additional adjacent areas possible ▪ South end of Whistler corridor ▪ Land fairly level with elevation change ▪ Large recently fuel managed areas ▪ Interesting land features with a mix of forested and recently fuel managed areas ▪ Land at north end has existing corridors for fairways ▪ Undeveloped natural parking areas ▪ Cost to build relatively low due to recent fuel management, low sloped land, and good existing road access ▪ Could support a world-class championship course	▪ Existing bike trails and forest service roads through the middle of property creates some design complexity but manageable ▪ Some riparian areas and steep slopes near river ▪ Challenging Access: 4.5 km up the Forest Service Road from Cheakamus Crossing ▪ No transit or Valley Trail services

Site C: Alta Lake Road. *Rating: Not rated*

Strengths	Weaknesses
▪ Close to existing neighborhoods ▪ Stunning views ▪ Existing parking lot (private?) ▪ Future Valley Trail to adjacent lands	▪ 25 acres with large portions consisting of steep slopes leaving much less land suitable for disc golf ▪ No public transportation access ▪ Creek runs across middle of property ▪ Very complex from a design perspective ▪ Navigation effort high ▪ Course build costs relatively high as equipment access difficult

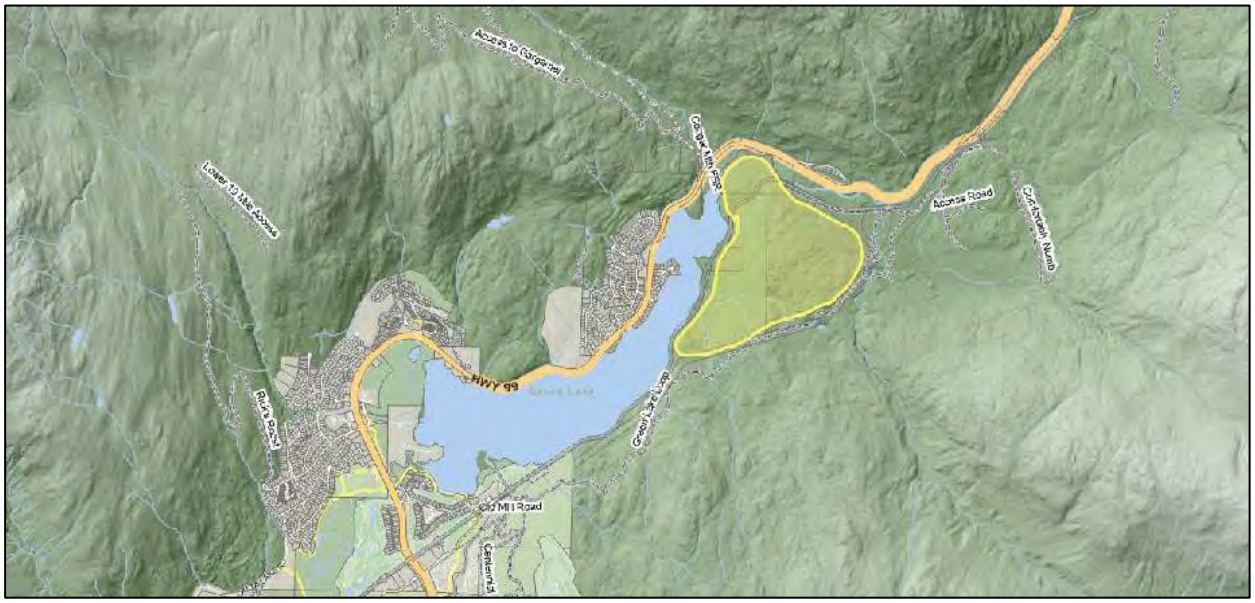
Site was not rated as land deemed not suitable for a quality 18-hole disc golf course.

Site D: Hot Dog Alley. *Rating: Not rated*

Strengths	Weaknesses
▪ 40 + acres in total ▪ Close to Valley Trail ▪ Good vehicle access ▪ Stunning views ▪ Reasonable bike access	▪ Large portion consists of steep slopes ▪ Riparian area runs through property ▪ Existing multi-use trails run down middle for full length ▪ Complex from a design perspective ▪ Navigation effort high ▪ No public transportation and no existing parking ▪ Course build costs relatively high as equipment access difficult ▪ Similar to Alta Lake Property

Site was not rated as land deemed not suitable for a quality 18-hole disc golf course.

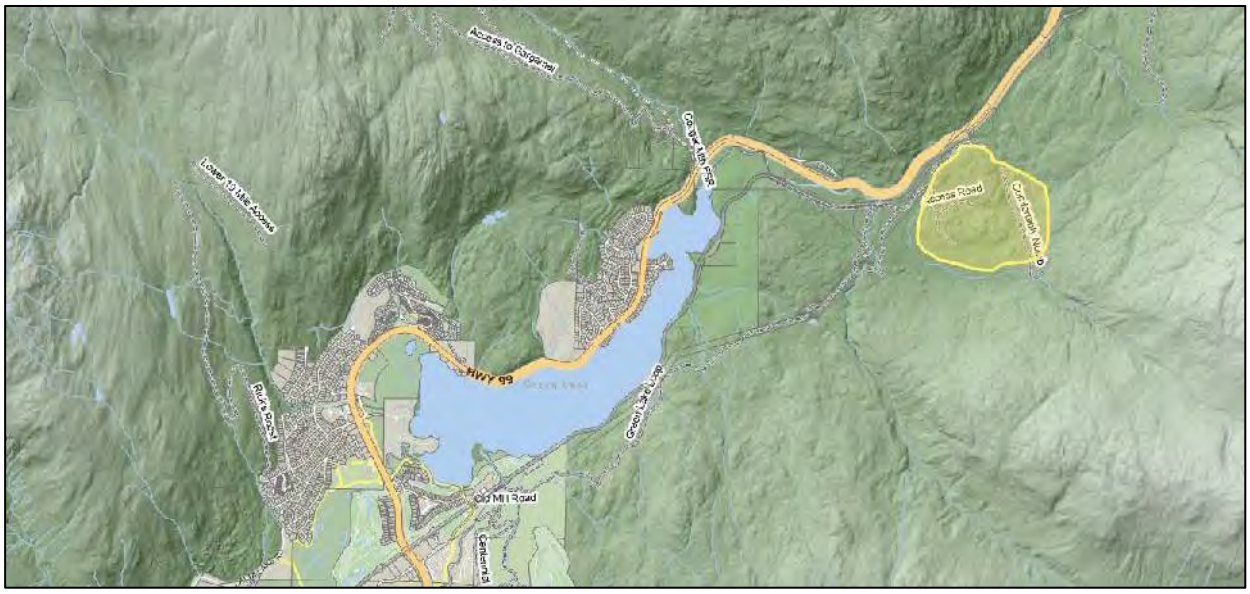
Site E: Parkhurst Area. *Rating: Not rated*



Strengths	Weaknesses
▪ 300 acres + but not all useable ▪ Southwest block of 75 acres appears quite suitable ▪ Forested ▪ Great views ▪ Good features, elevation changes, lake.	▪ Current access to area is about 2.5 km from Hwy 99 and there is a locking gate at about the 800 m mark. ▪ Turn-off from Hwy 99 is 8 km north of Meadow Park Sports Centre ▪ Much of the 300 acres has steep slopes ▪ Most level ground at most remote south end ▪ Some riparian areas (creeks) ▪ Significant infrastructure would be required to make this area viable ▪ No public transit or Valley Trail services

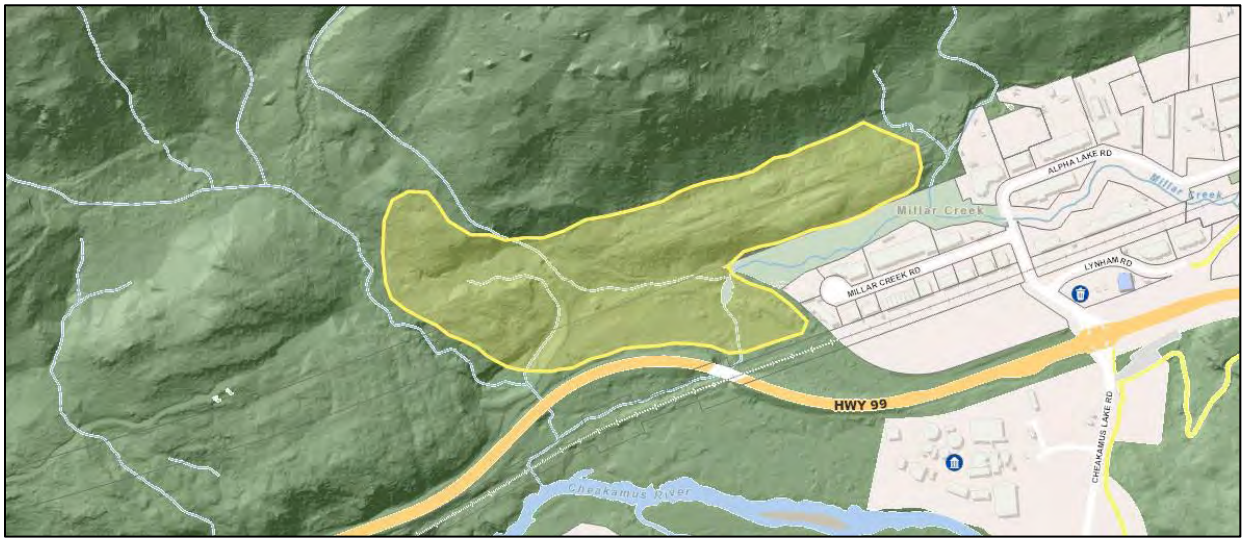
Given the large amount of land and difficult access, a significant amount of infrastructure capital would have to be expended for this to be considered a potential site for a disc golf course. As a result, and following discussion with RMOW representatives, a thorough review and rating was not completed. If access is improved in the future, the preliminary review indicates it is likely that it could support a quality 18-hole disc golf course.

Site F: Comfortably Numb. *Rating: 64/100*



Strengths	Weaknesses
▪ 150 + acres ▪ Minimally disturbed forest ▪ Unique land character, rock outcroppings, mounds, elevation changes ▪ Potential parking ▪ Panoramic views ▪ Very few existing bike or hike trails ▪ No significant riparian areas ▪ Combination of different density forests ▪ Could support a high-quality blue level course ▪ Some fuel management nearby which could be extended as part of the development of a disc golf course	▪ Turn-off from Hwy 99 is 8 km north of Meadow Park Sports Centre ▪ Property accessed at about 700 m from highway turnoff ▪ Likely moderate infrastructure costs related to road/bridge access ▪ Course building costs would be moderate to high due to terrain, forest density, and access ▪ No transit or Valley Trail services

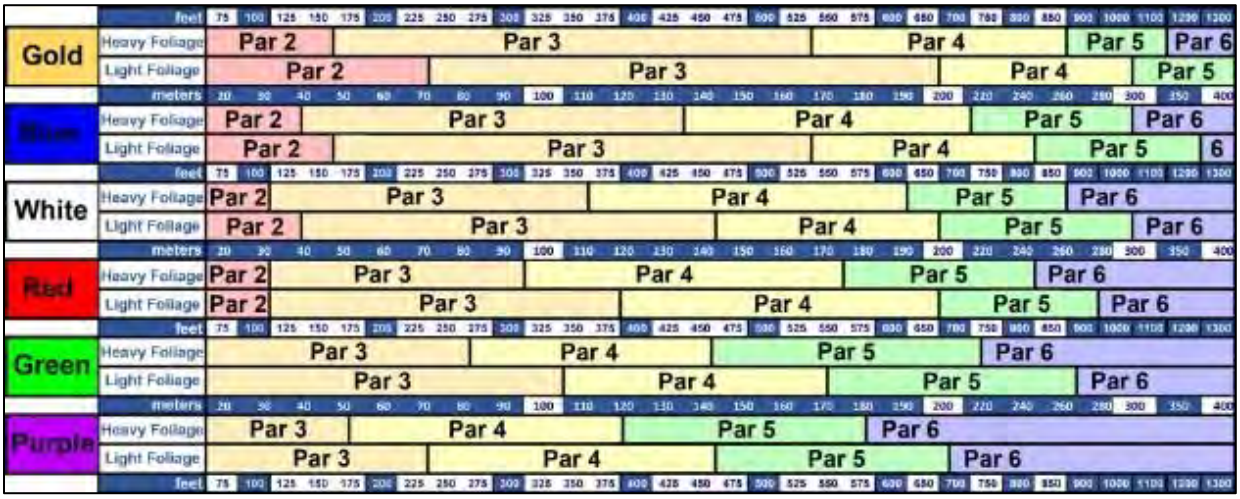
Site G: Function Junction. *Rating: 56/100*



Strengths	Weaknesses
▪ Nice features such as rock outcroppings, mounds, elevation changes ▪ Panoramic views including a waterfall backdrop ▪ Proximity to public transit, Valley Trail and nearby parking ▪ Few existing bike or other trails in area ▪ Combination of forest and open areas ▪ Could support a quality community course up to the white level ▪ Existing Hydro powerline has recently gone through vegetation management ▪ Existing road through middle of area provides good access for course installation, especially one with so much elevation changes and slopes ▪ Very close to Cheakamus Crossing - a relatively high residential growth area in the community	▪ Space is limited to 12 - 15 acres but still suitable for a community level course ▪ Main vehicle parking on the other side of Hwy 99 so crossing the Hwy is required and there is potential for people parking at nearby businesses ▪ Powerline area will undergo periodic vegetation management which changes the nature/challenge of the course. Designing a new course with this in mind is a complicating factor ▪ Elevation changes will make it physically demanding to play, however, that will be offset by it being a relatively short course

5 APPENDICES.

5.1 Appendix A: PDGA Guidelines for Par and Skill Level.



12. Appendix B: Environmental Assessment for Lost Lake Disc Golf Course.

Prepared by: Cascade Environmental Research Group.

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

Environmental Assessment for Lost Lake Disc Golf Course

Prepared for:
Resort Municipality of Whistler

Prepared by:
Cascade Environmental Resource Ltd.

Project No.: 1162-01-03
Date: January 4, 2022

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This document should not be construed to be:

- A Phase 1 - Environmental Site Assessment;
- A Stage 1 – Preliminary Site Investigation (as per the Contaminated Sites Regulations of the Waste Mgt. Act);
- An Environmental Impact Assessment (as per the BC Environmental Assessment Act).

Table of Contents

1 Introduction

1.1 Background

The Resort Municipality of Whistler (RMOW) is conducting a Disc Golf Feasibility study for the rejuvenation and potential extension of the existing Lost Lake Disc Golf Course (LLDGC) and investigation of new areas within the Whistler valley for a potential new disc golf course. Cascade Environmental Resource Group Ltd. (Cascade) working as a sub-consultant for INdesign Disc Course Design (INdesign) and Dialog Design was retained by the RMOW to be part of the consulting team to assess current conditions of the LLDGC, produce a rejuvenation plan (Scope A) and explore opportunities within the valley for a potential second course (scope B). Cascade will be focusing on the environmental assessment components for Scope A and Scope B, assessing existing environmental assessments and providing environmental opportunities and constraints to existing course maintenance and rejuvenation and future sites for the possible second course. This report focuses on Scope A; detailing the assessment of the rejuvenation of the existing LLDGC. Details of the environmental assessment for Scope B are found in an accompanying report (Cascade, 2022a).

The LLDGC was established in 2001. The 27-hole course offers multiple levels of difficulty from forested to open fairways, and a wide range of topography from low-gradient to steep slopes. Interlacing the course are a series of popular mountain biking trails. The LLDGC has grown organically over the decades, funded by community user groups contributions. Disc golf is a free, accessible outdoor recreation activity which is increasing in popularity, resulting in an increase in user numbers and the requirement for a strategic rejuvenation to address emerging issues, including potential environmental impacts.

1.2 Project Area

The existing LLDGC project area is located within the municipal Lost Lake Park boundaries north of Lost Lake in Whistler, BC. The project area for the environmental assessment was defined as the area encompassing the existing 27 holes of the LLDGC (see Lost Lake Existing Map Series). The RMOW identified two areas for a proposed extension from the existing LLDGC to the south and north of the existing LLDGC area, which was also included within the project area of this environmental assessment.

1.3 Methodology

A desktop environmental assessment was completed by Cascade utilizing the Disc Golf Environmental Suitability Guidelines (DGCESG). The DGCESG is a recreational planning tool produced for the project by Cascade which identifies potential Environmentally Sensitive Areas (ESAs) at a landscape level and provides strategic direction for Disc Golf recreation planning to mitigate potential impacts (Cascade, 2022b). Simon Fry, R.P.Bio. B.Sc., Biologist, Nicola Church M.Sc., GIS Specialist and Oliver Chew B.Sc., GIS Technician, conducted the environmental assessment. All personnel have extensive experience in conducting environmental assessments.

2 Existing Environmental Conditions

2.1 Lost Lake Disc Golf Course

2.1.1 Terrestrial Vegetation

The LLDGC consists of a multi-structural forest within the Coastal Western Hemlock Moist Submaritime zone (CWHms) of the BC Biogeoclimatic Ecosystem Classification (BEC). BEC delineates ecological

zones (biogeoclimatic units) by vegetation, soils, and climate. Ecosystems within typical forest sites of the CHWms1 are dominated by western hemlock (*Tsuga heterophylla*), Douglas-fir (*Pseudotsuga menziesii*), western redcedar (*Thuja plicata*) and amabilis fir (*Abies amabilis*). Common understorey species include Alaskan blueberry (*Vaccinium alaskaense*) and a well-developed moss layer featuring step moss (*Hylocomium splendens)*, pipecleaner moss (*Rhytidiopsis robusta)*, and red-stemmed feather moss (*Pleurozium schreberi)*.

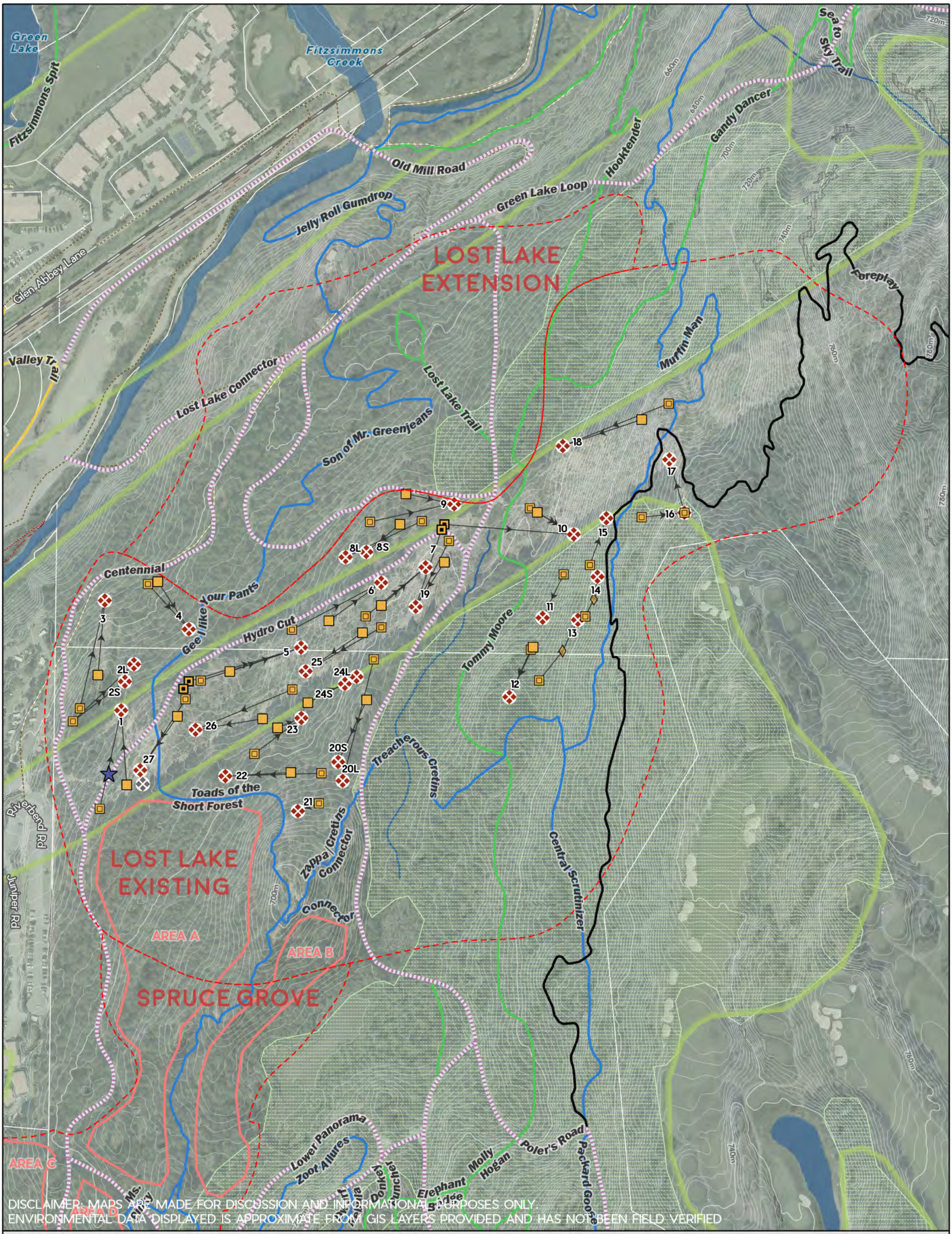
The forest within the subject area is dissected east to west by a hydroelectric power right of way and associated tower and line infrastructure (See Lost Lake Existing Map Series). This right of way is regularly maintained by BC Hydro via mechanical vegetation thinning and the right of way vegetation consists mainly of a low shrub structural stage. The age of the forest north and south of the BC Hydro right of way ranges from mature to old forest structural stage, ranging from approximately 190 years old to more than 300 years old (iMap BC , 2022).

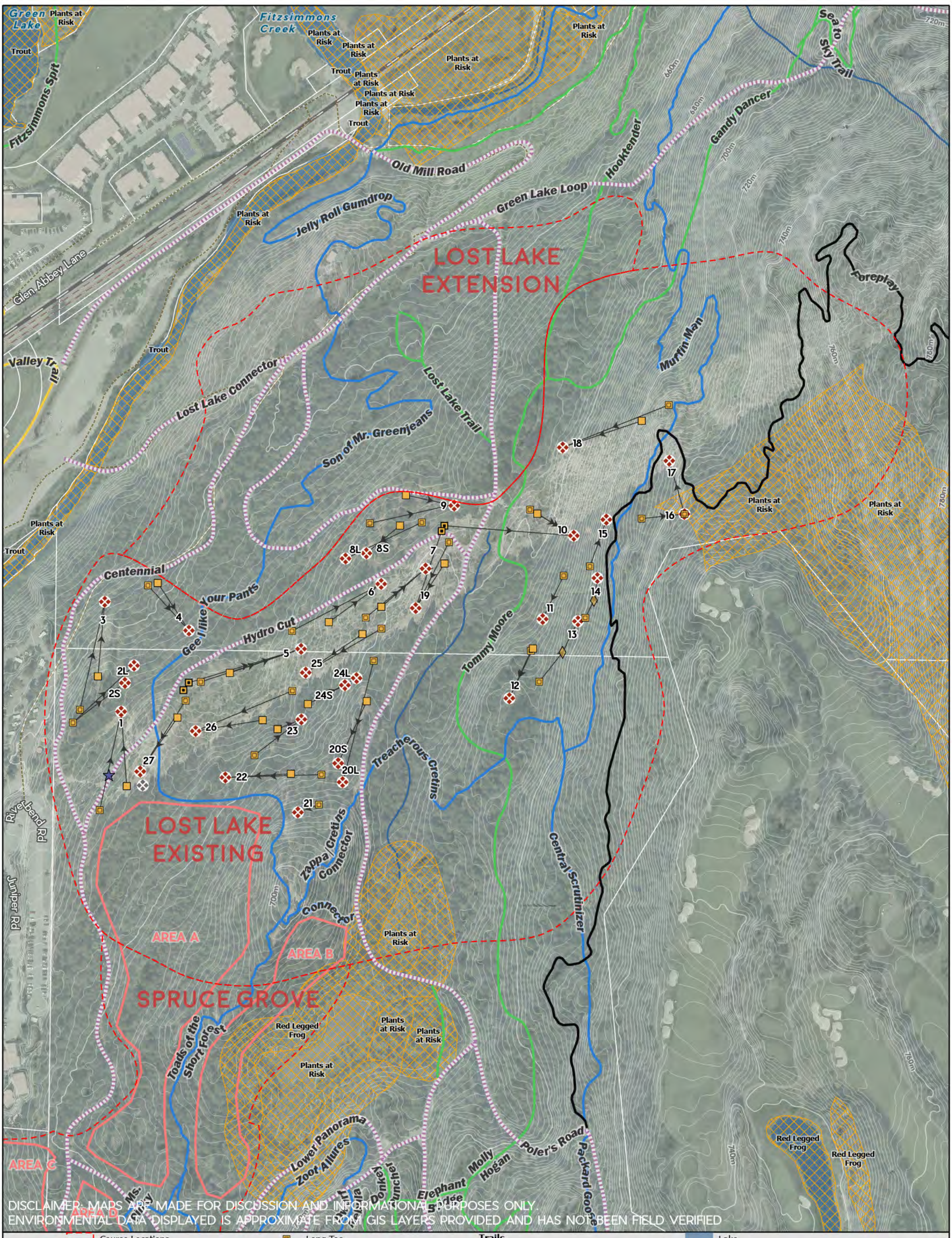
2.1.2 Aquatic and Riparian Habitats

Fitzsimmons Creek is located to the north of the LLDGC and has an associated riparian area from the high water mark of the creek (see Lost Lake Existing Map Series).

A wetland named “Helen’s Corner Wetland” in this report is located to the South of the border of the LLDGC boundaries. A channel outflows and drains North from the wetland along the route of Lost Lake Trail North (formerly Old Mill Road) and flows subsurface at the right of way alignment on the crossing to Hole 10 (see Lost Lake Existing Map Series). The channel is an intermittent channel which was dry during the site visit conducted by Indesign on September 14, 2022.

The RMOW OCP defines a Riparian Ecosystem Protection Area (REPA) as ‘Land within 30 metres of the high water mark of a stream as mapped by the municipality and shown on Schedule J’ of the OCP. REPAs are protected from development due to the potential for high biodiversity and range of habitat features offered by these areas. The REPA setback mapped on Schedule J associated with this channel would be 30 m from each bank. Any proposed works within the REPA setback would have to comply with the associated guidelines (RMOW, 2020).


Green Lake
Fitzsimmons Creek
Fitzsimmons Spit
Old Mill Road
Jelly Roll Gumdrop
Green Lake Loop
Hooktender
Gandy Dancer
Sea to Sky Trail
Glen Abbey Lane
LOST LAKE EXTENSION
Foreplay
Murfin Man
Valley Trail
Lost Lake Connector
Lost Lake Trail
Son of Mr. Greenjeans
Centennial
Gee I like Your Pants
Hydro Cut
Tommy Moore
Treacherous Cretins
Central Scrutinizer
Toads of the Short Forest
Zappa/Cretins Connector
Riverbend Rd
Juniper Rd
LOST LAKE EXISTING
AREA A
AREA B
SPRUCE GROVE
AREA C
AREA D
Ms. Guided
Lower Panorama
Zoot Allures
Jekyll
Donkey Jet
Elephant Ridge
Molly Hogan
Poler's Road
Packard Goose
DISCLAIMER: MAPS ARE MADE FOR DISCUSSION AND INFORMATIONAL PURPOSES ONLY.
ENVIRONMENTAL DATA DISPLAYED IS APPROXIMATE FROM GIS LAYERS PROVIDED AND HAS NOT BEEN FIELD VERIFIED
Course Locations
Course Features
Course Start
Basket
ShortTee
Long Tee
XL Tee
Practice Basket
Fairway
Hole Direction
Old Forest
Tree Preservation Covenant
Unlogged Core Forest
Slope >45 degrees
Municipal Boundary
Lake
Stream
Building Footprints
Cadastre - DataBC
Contour Interval
1m interval
20m interval
Trails
Access
Black Diamond
Blue Square
Green Circle
White Circle
Lost Lake/Spruce Grove Course Areas
GIS Cartographer: Oliver Chew
Date: 2023-01-04
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N
CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD
N
0 50 100 200 300
Meters
Map 1 - Low ESG
Lost Lake Existing
Disc Golf Feasibility Study
Whistler
British Columbia



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ENVIRONMENTAL DATA DISPLAYED IS APPROXIMATE FROM GIS LAYERS PROVIDED AND HAS NOT BEEN FIELD VERIFIED

Course Locations
Lost Lake/Spruce Grove Course Areas
Cadastre - DataBC

Course Features

Course Start
Basket
ShortTee
Long Tee
XL Tee
Practice Basket
Fairway
Species at Risk - Potential Habitat
Hole Direction

Trails

Access
Black Diamond
Blue Square
Green Circle
White Circle
Municipal Boundary

Lake
Stream

Contour Interval

1m interval
20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

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0 50 100 200 300
Meters

Map 2 - Medium ESG
Lost Lake Existing

Disc Golf Feasibility Study
Whistler
British Columbia

Green Lake
Fitzsimmons Creek
Fitzsimmons Spit
Old Mill Road
Jelly Roll Gumdrop
Green Lake Loop
Hooktender
Gandy Dancer
Sea to Sky Trail
Glen Abbey Lane
Valley Trail
Lost Lake Connector
Lost Lake Trail
Son of Mr. Greenjeans
LOST LAKE EXTENSION
Foreplay
Murtin Man
Centennial
Gee I like Your Pants
Hydro Cut
Tommy Moore
Treacherous Cretins
Toads of the Short Forest
Zappa/Cretins Connector
Connector
Central Scrutinizer
LOST LAKE EXISTING
AREA A
AREA B
SPRUCE GROVE
AREA C
AREA D
Ms. Chevy
Lower Panorama
Zoot Allures
Donkey Punch
Elephant Ridge
Molly Hogan
Poler's Road
Packard Goose
Riverbend Rd
Juniper Rd
660m
680m
700m
720m
740m
760m
780m
1
2S
2L
3
4
5
6
7
8S
8L
9
10
11
12
13
14
15
16
17
18
19
20S
20L
21
22
23
24S
24L
25
26
27

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Course Locations
Lost Lake/Spruce Grove Course Areas

Course Features
Course Start
Basket
ShortTee
Long Tee
XL Tee
Practice Basket
Fairway
Hole Direction

Raptor Nest
Sighting
Wetland
Large and Old Cottonwoods
Forested Floodplain
Riparian
Municipal Boundary
Stream
Lake
Cadastre - DataBC

Trails
Access
Black Diamond
Blue Square
Green Circle
White Circle

Contour Interval
1m interval
20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL RESOURCE GROUP LTD

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0 50 100 200 300
Meters

Map 3 - High ESG
Lost Lake Existing

Disc Golf Feasibility Study
Whistler
British Columbia

2.2 Spruce Grove and North Lost Lake Course Potential Extension Area

2.2.1 Terrestrial Vegetation Habitat

The forest within the potential extension areas north and south of the existing course is of mature forest structural stage, in the range of approximately 190 years of age with sections of old forest at more than 300 years old (iMap BC). The BEC classification is CWHms1, with the same expected vegetation type as listed in section 2.1.1.

2.2.2 Aquatic and Riparian Habitat

Fitzsimmons Creek is located adjacent to the North Lost Lake potential extension area. The 30 m REPA setback extends into a small section of the north west boundary (see Lost Lake Extension Map Series). No other drainages or watercourses are mapped in the North Lost Lake Course potential extension area.

Helen's Corner Wetland is located adjacent to the Spruce Grove potential extension area, south of the existing course (See Spruce Grove Map series). Desktop analysis identified no drainages from Helen's Corner Wetland or from other sources within the Spruce Grove potential extension area. The associated 30 m REPA setback is located within the Spruce Grove potential extension area.

LOST LAKE EXISTING

SPRUCE GROVE

AREA A

AREA B

AREA C

AREA D

AREA E

AREA F

Hydro Cut

Juniper Rd

Fitzsimmons Creek

Riverbend Rd

Valley Trail

Kirkpatrick Way

Spruce Grove Connector

Centennial

Ms. Pinky

Roads of the Short Forest

Zappa/Cretins Connector

Connector

Treacherous Cretins

Lost Lake Trail

Zoot Allures

Dwarf Nebula

Elephant Bridge

Elephant Bridge Connector

Old Mill Road

Soap & Old Clothes

Pinocchio's Furniture

Lower Panorama

Donkey Puncher

700m

680m

660m

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ENVIRONMENTAL DATA DISPLAYED IS APPROXIMATE FROM GIS LAYERS PROVIDED AND HAS NOT BEEN FIELD VERIFIED

Course Locations
Lost Lake/Spruce Grove Course Areas

Course Features
Basket
Long Tee
Parking

Hole Direction
Old Forest
Tree Preservation Covenant
Unlogged Core Forest
Slope >45 degrees
Municipal Boundary

Stream
Building Footprints
Cadastre - DataBC

Contour Interval
1m interval
20m interval

Trails
Access
Blue Square
Green Circle
White Circle

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

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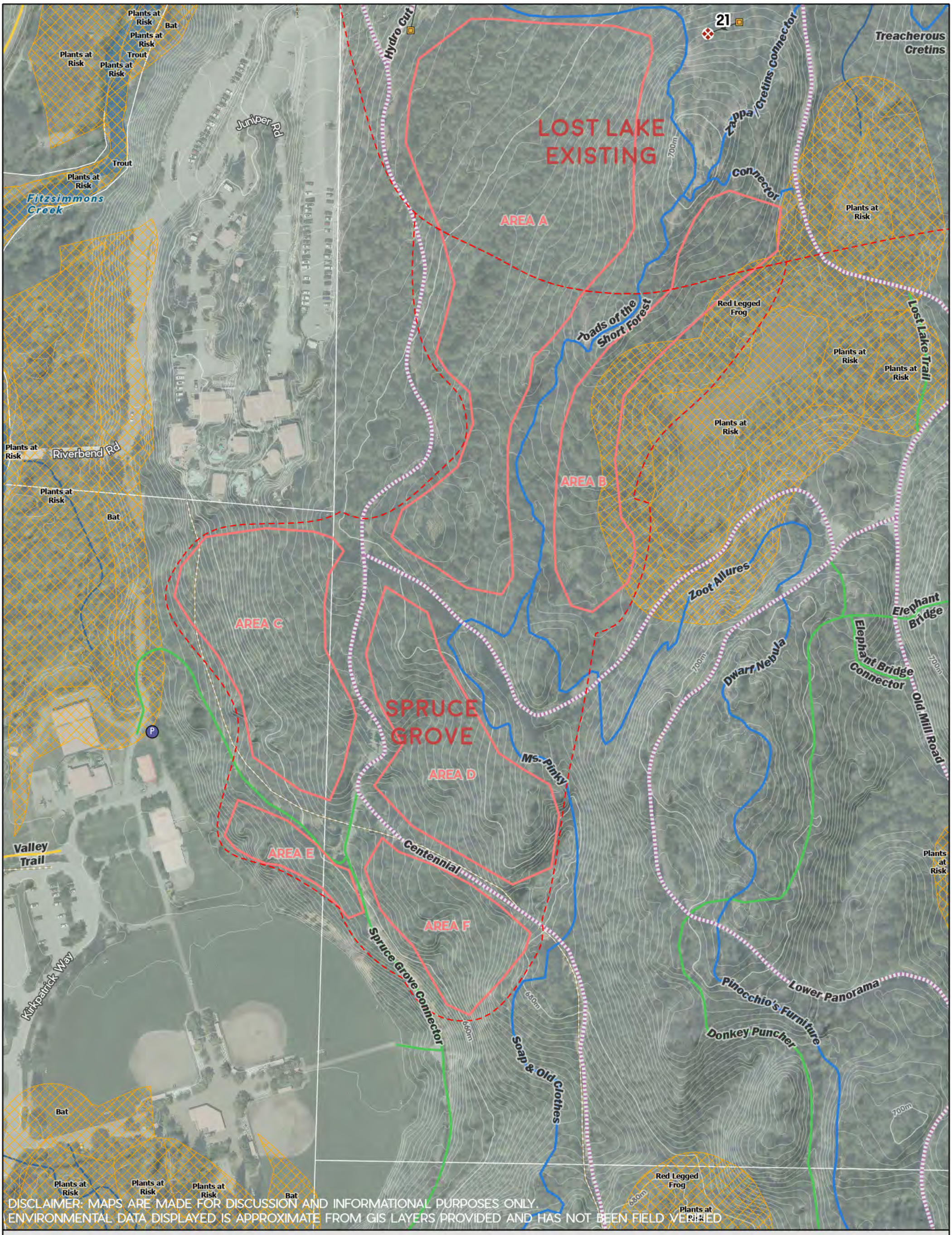
Meters

Map 1 - Low ESG
Spruce Grove

Disc Golf Feasibility Study
Whistler
British Columbia



Course Locations
Lost Lake/Spruce Grove Course Areas
Cadastre - DataBC

Course Features

Basket
Long Tee
Parking
Species at Risk - Potential Habitat
Hole Direction

Trails

Access
Blue Square
Green Circle
White Circle

Municipal Boundary
Stream

Contour Interval

1m interval
20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

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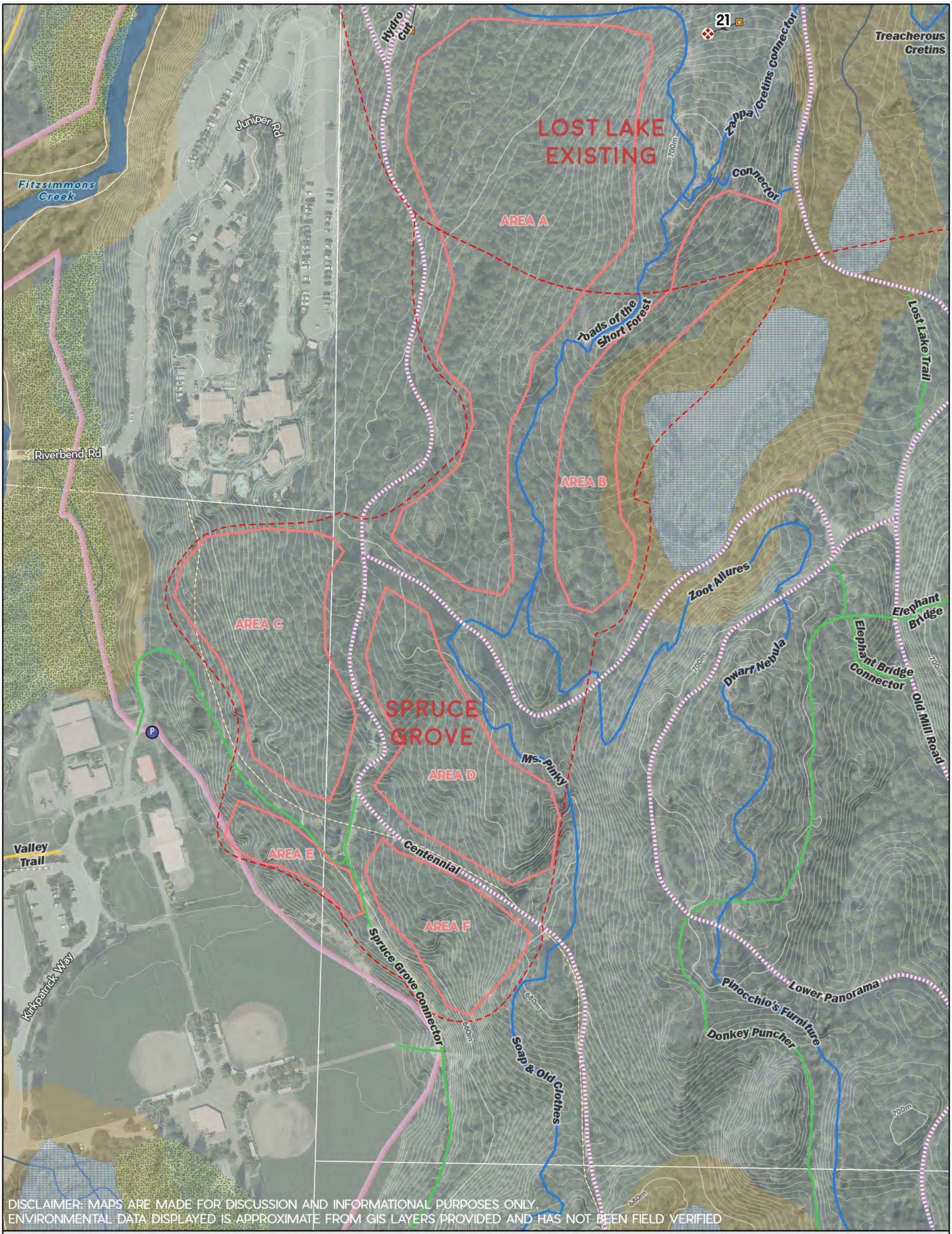
Meters

Map 2 - Medium ESG
Spruce Grove

Disc Golf Feasibility Study
Whistler
British Columbia



Course Locations
Lost Lake/Spruce Grove Course Areas

Course Features

Basket
Long Tee
Parking

Hole Direction
Wetland
Large and Old Cottonwoods
Forested Floodplain
Riparian

Municipal Boundary
Stream
Cadastre - DataBC

Trails

Access
Blue Square
Green Circle
White Circle

Contour Interval

1m interval
20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

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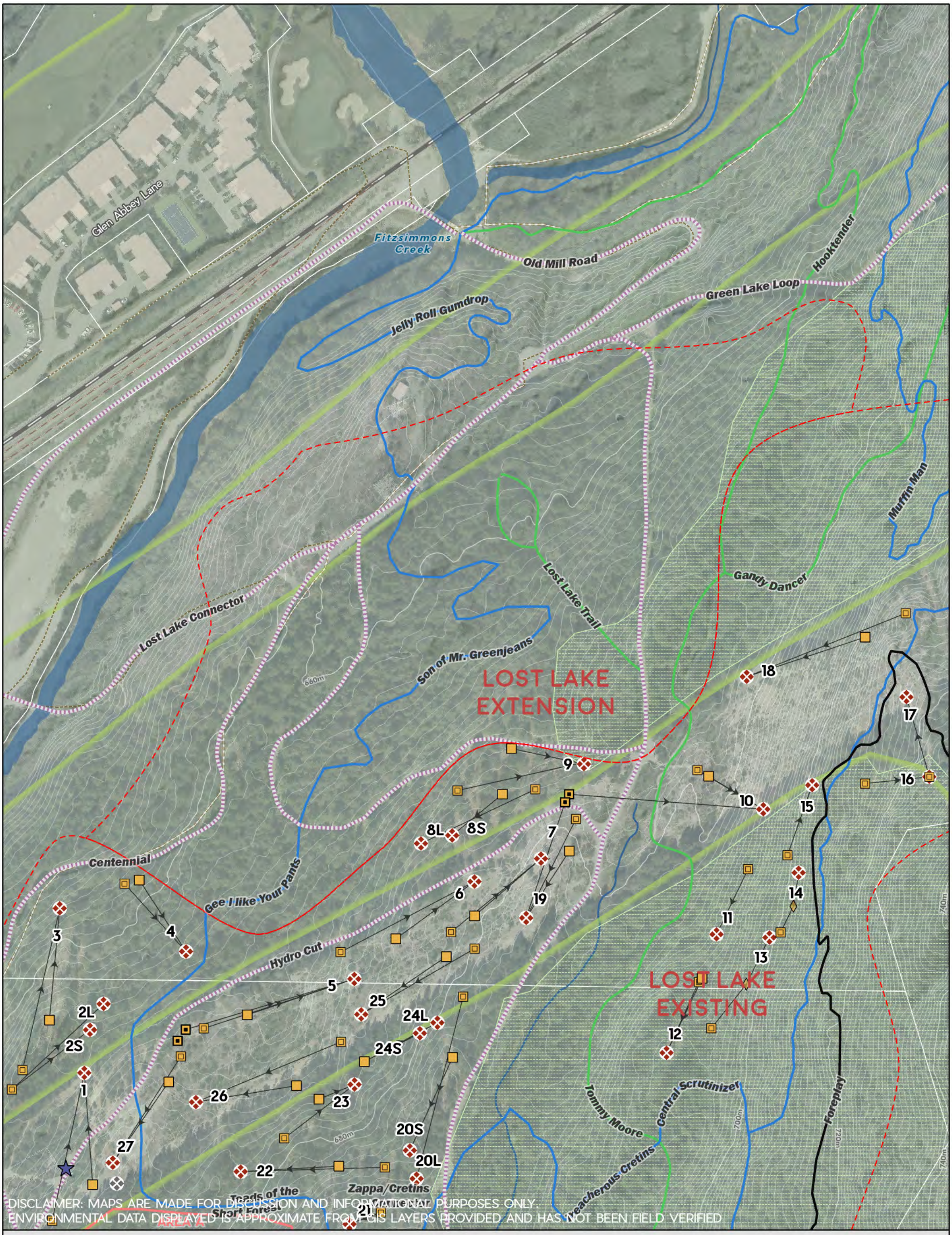
Meters

Map 3 - High ESG
Spruce Grove

Disc Golf Feasibility Study
Whistler
British Columbia



Course Locations

Course Features

- Course Start
- Basket
- ShortTee
- Long Tee
- XL Tee
- Practice Basket
- Fairway
- Hole Direction
- Old Forest
- Unlogged Core Forest
- Slope >45 degrees
- Municipal Boundary
- Lake
- Stream
- Building Footprints
- Cadastre - DataBC

Contour Interval

- 1m interval
- 20m interval

Trails

- Access
- Black Diamond
- Blue Square
- Green Circle
- Lost Lake/Spruce Grove Course Areas

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

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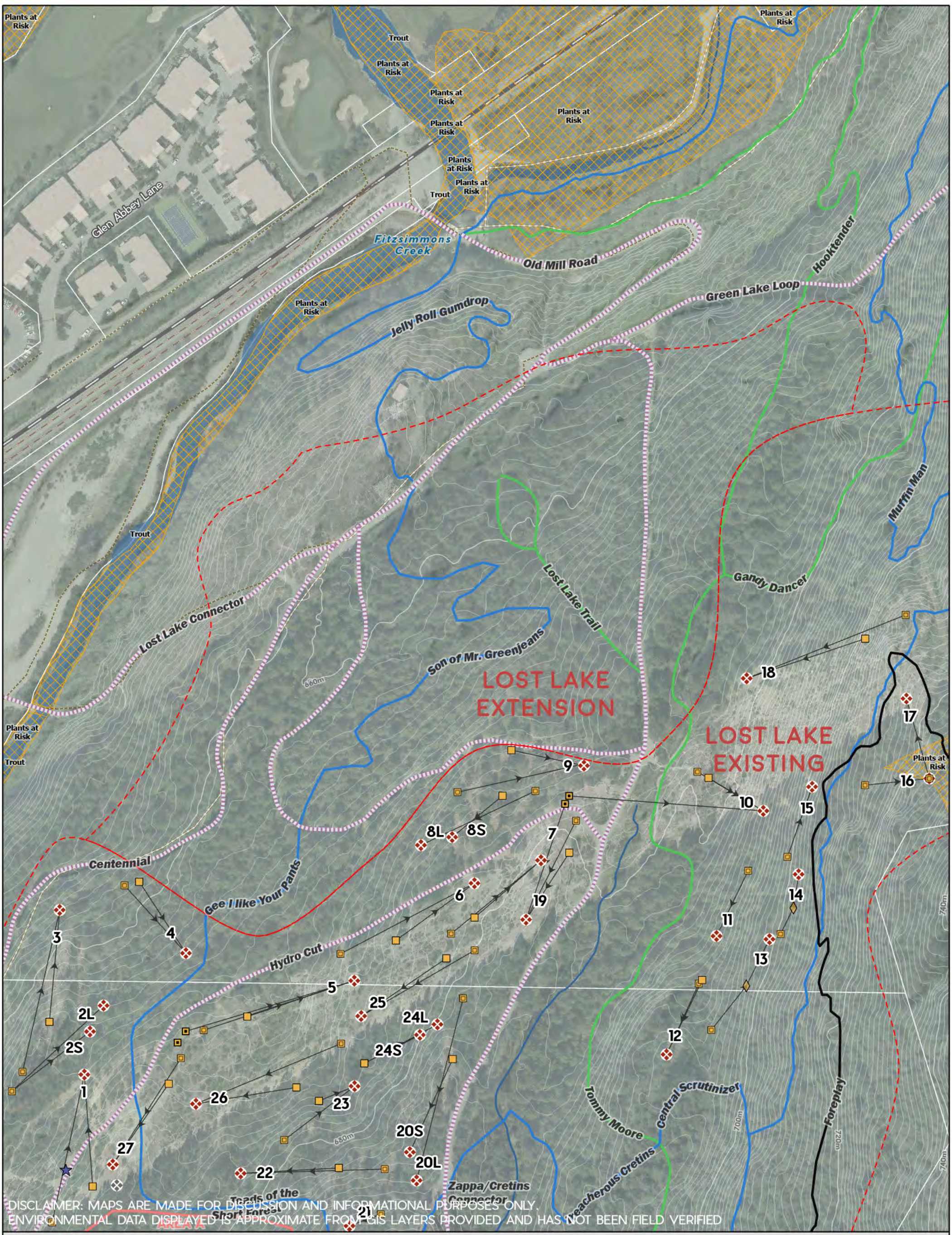
0 50 100 200 300
Meters

Map 1 - Low ESG
Lost Lake Extension

Disc Golf Feasibility Study
Whistler
British Columbia



Course Locations
Lost Lake/Spruce Grove Course Areas
Cadastre - DataBC

Course Features

Course Start
Basket
ShortTee
Long Tee
XL Tee
Practice Basket
Fairway
Species at Risk - Potential Habitat
Hole Direction

Trails

Access
Black Diamond
Blue Square
Green Circle
Municipal Boundary
Lake
Stream

Contour Interval

1m interval
20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

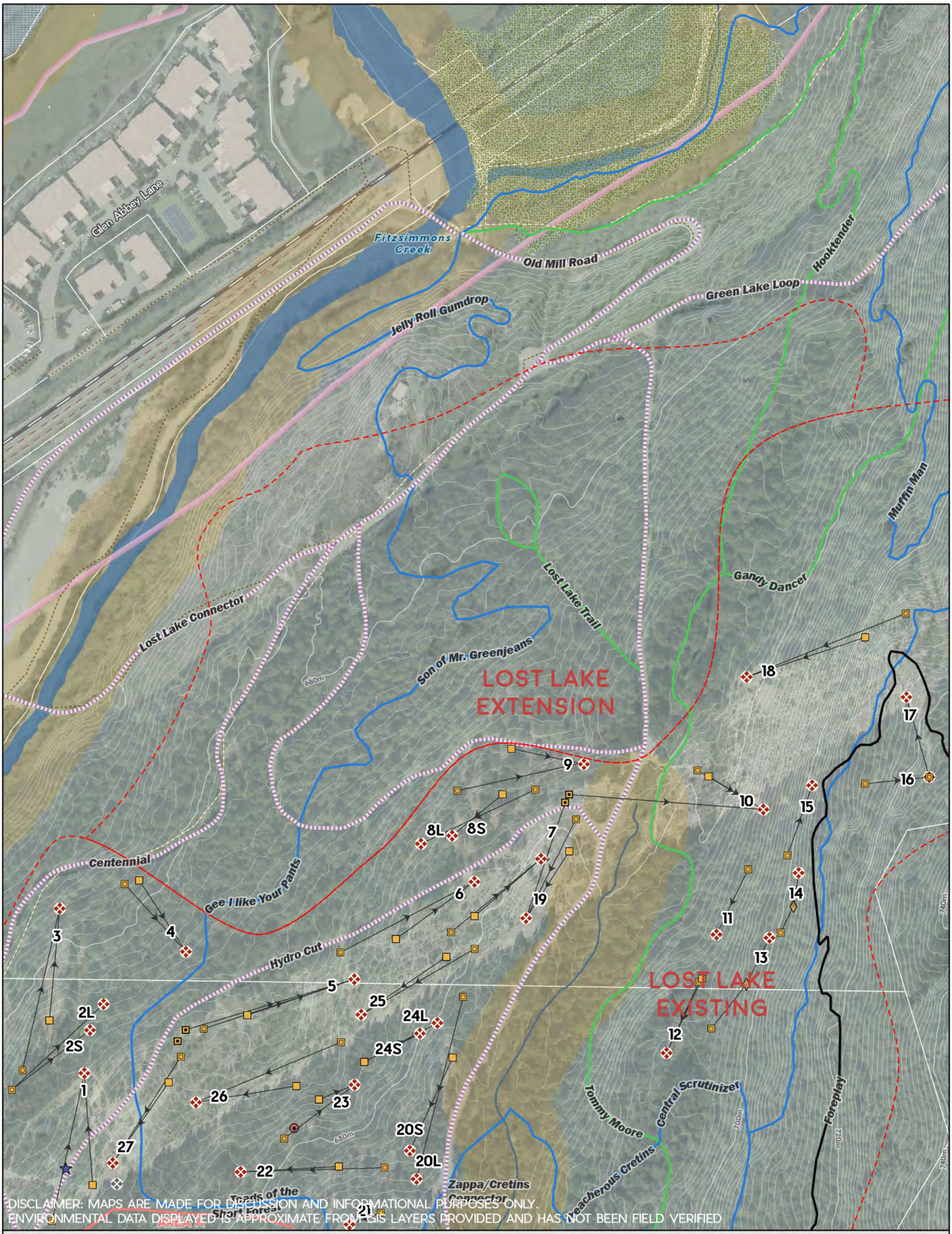
CASCADE ENVIRONMENTAL RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 2 - Medium ESG
Lost Lake Extension

Disc Golf Feasibility Study
Whistler
British Columbia



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ENVIRONMENTAL DATA DISPLAYED IS APPROXIMATE FROM GIS LAYERS PROVIDED AND HAS NOT BEEN FIELD VERIFIED

- Course Locations
- Lost Lake/Spruce Grove Course Areas

Course Features

- Course Start
- Basket
- ShortTee
- Long Tee
- XL Tee
- Practice Basket
- Fairway
- Hole Direction

Raptor Nest

- Sighting
- Wetland
- Large and Old Cottonwoods
- Forested Floodplain
- Riparian
- Municipal Boundary
- Stream
- Lake
- Cadastre - DataBC

Trails

- Access
- Black Diamond
- Blue Square
- Green Circle

Contour Interval

- 1m interval
- 20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 3 - High ESG
Lost Lake Extension

Disc Golf Feasibility Study
Whistler
British Columbia

3 Disc Golf Environmental Suitability Guidelines ESAs

3.1 Lost Lake Disc Golf Course

The ESAs determined by the DCESG for the LLDGC are presented in Table 1 below and presented in the Existing Lost Lake Map Series.

Table 1: ESA areas in the LLDGC determined by the DGESG

ESA Overlap layer	ESA Rating
Riparian Areas	High
Species at Risk Habitat	Medium
Slope Angle	Low
Unlogged Core Forest	Low
Coastal Western Hemlock (CWH) Old Forest	Low

3.1.1 High ESAs

Riparian Areas

A 30 m REPA, as identified in Schedule J of the Whistler OCP, is delineated around the outflow from Helen's Corner Wetland.

3.1.2 Medium ESAs

Species at Risk Habitat

The following habitat types are present in the LLDGC area:

- Old conifer forest
- Young conifer forest
- Riparian forest

The following species at risk from Table 2 of the DGESG (Cascade, 2022b) may use habitat features present on the site:

Amphibians

- Western toad (*Anaxyrus boreas*)

Birds

- Evening grosbeak (*Coccothraustes vespertinus*)
- Band-tailed pigeon (*Patagioenas fasciata*)
- Barn swallow (*Hirundo rustica*)
- Olive-sided fly-catcher (*Contopus cooperi*)

Western toads are yellow listed (secure/least at risk of being lost) by the BC Conservation Data Centre and listed as a species of concern under the federal *Species At Risk Act* (SARA). Western Toads spend 95% of their life in terrestrial habitats, using aquatic environments to breed. Lost Lake is known as a

primary breeding site for western toads. There are three main migration events in the Lost Lake area as adults move to and from Lost Lake for breeding in the spring and toadlets leave the lake in late summer for upland habitat. The toads may move 1 km or more from breeding sites to foraging and hibernation areas, movements up to 7 km from breeding sites were recorded on Vancouver Island (Ministry of Environment, 2014).

Toads hibernate underground in the winter, often in small mammal burrows and coarse woody debris. Recent studies found western toad preferred rotted root wads that provide natural burrows into the earth and protection from the frost line (Wind, 2020).

Evening grosbeak, band-tailed pigeon, barn swallow and olive-sided fly catcher could all potentially use habitat features in the LLDGC area due to available riparian, young and old forest habitat.

3.1.3 Low ESAs

Unlogged Core Forest

Unlogged core forest areas are large swaths of land made of contiguous areas of unlogged forest that provide interior forest habitat that sustains the viability of the plant and animal communities that depend on its stable environmental conditions (RMOW 2020). The areas of old growth forest within the LLDGC outside the hydro right-of-way area may constitute unlogged core forest where they are contiguous with other, larger areas of old growth forest.

CWH Old Forest

CWH old forests are unmanaged lower elevation CWH forests largely greater than 300 years old (RMOW, 2020). The CWH old forest polygons in the southeast area of the LLDGC (encompassing holes 11-17 and to the north of hole 18) are currently not overlapped by any disc golf holes.

3.2 Spruce Grove and North Lost Lake Course Potential Extension Area

The ESAs determined by the DCESG for the potential Spruce Grove and the North Lost Lake potential extension areas are presented in Table 2 and within the Lost Lake Extension and Spruce Grove Map series.

Table 2: ESA overlaps from the Spruce Grove and North Lost Lake Course potential extension using the DGESG tool

ESA Overlap layer	ESA Rating
Riparian Areas	High
Species at Risk Habitat	Medium
Unlogged Core Forest	Low
CWH Old Forest	Low

3.2.1 High ESAs

Riparian Areas

A 30 m REPA, as identified in Schedule J of the OCP, is delineated around Helen's Corner Wetland in the Spruce Grove potential extension area. A 30 m REPA is delineated on Cheakamus River to the north of the North Lost Lake Course potential extension area.

3.2.2 Medium ESAs

Species at Risk Habitat

The following habitat types are present in the Spruce Grove and North Lost Lake Course potential extension area:

- Old conifer forest
- Young conifer forest
- Riparian forest

The following species at risk from Table 2 of the DGESG may use habitat features present on the site:

Amphibians

- Western Toad

Birds

- Evening grosbeak
- Band-tailed pigeon
- Barn Swallow
- Olive-sided fly-catcher

The species at risk habitat was considered to be the same as the LLDCGC.

3.2.3 Low ESAs

Unlogged Core Forest

The areas of old growth forest within the potential extension areas may constitute unlogged core forest where they are contiguous with other, larger areas of old growth forest.

CWH Old Forest

A small section of the CWH Old Forest polygon intersects the eastern boundary of the Spruce Grove potential extension area, and a section of the CWH Old Forest polygon intersects the eastern boundary of the North Lost Lake Course potential extension area.

4 Environmental Constraints and Mitigation Measures

4.1 Existing Lost Lake Disc Golf Course

4.1.1 Riparian Areas ESA

The REPAs within the project area and the ephemeral watercourse outflowing from Helen's Corner Wetland have associated environmental constraints to recreation development and activity.

- Watercourses in BC are protected by the *Water Sustainability Act* (WSA) and any works below the top of bank of a watercourse flowing from a natural source would require appropriate environmental permitting under Section 11 of the WSA. Any crossings of this watercourse would also require a permitting under the WSA.
- The riparian area identified by Schedule J of the Whistler OCP is defined as a Riparian Ecosystem Protection Area (REPA). REPAs are protected from development due to the potential for high biodiversity and range of habitat features offered by these areas. Guidelines from the REPA discourage impacts from any development within the 30 m setback.
- The provincial Riparian Areas Protection Regulation (RAPR) of the *Riparian Areas Protection Regulation* establishes setbacks around watercourses that provide fish habitat and prohibits development within these setbacks. From mapping analysis, the ephemeral watercourse outflowing from Helen's Corner Wetland appears to be isolated from any downgradient fish-bearing watercourses. Additionally, as the RAPR applies only to residential, commercial or industrial development, it is not expected to constrain the proposed municipal recreational development (FLNRORD, 2019).

4.1.1.1 Mitigation Measures

- Any future disc course modification and development should avoid the riparian areas where possible.

4.1.1.2 Opportunities

- Construction of a split rail wooden fence could be considered on the boundary of the old forest area west of hole 12 and along Old Mill Road trail junction to prevent encroachment in the area.

4.1.1.3 Monitoring

- Annual monitoring of the LLDGC should be conducted to identify any signs of impacts or intrusion into riparian areas and to ensure effectiveness and compliance with mitigation measures.

4.1.2 Species at Risk Habitat ESA-Western Toad

The western toad is protected under the provincial *Wildlife Act* from killing, wounding, and taking of individual species, the western toad is also listed as a species of special concern under the Species At Risk Act (SARA). A species that is listed as Endangered, Extirpated or Threatened within Schedule 1 of SARA is legally protected under the Act by certain prohibitions, but a species that is listed with the classification of special concern will not receive protection under the SARA general prohibitions.

As with all species at risk habitat in BC its habitat is only protected by SARA on Federal lands unless it is legally described as critical habitat under special emergency measures of protection on provincial land. The western toad habitat within the project boundaries is not legally protected from development; however, as a known SARA occurrence within the study area, impacts, mitigation measures and management consideration are considered in disc golf course design and maintenance activities.

4.1.2.1 Mitigation Measures

Any disc golf course maintenance and modifications should retain trees, shrubs, logs and stumps as much as possible, which could provide cover or hibernacula for toads and other amphibians (Wind, 2020). If stumps and coarse woody debris are required to be removed from the course during maintenance or modification activities, removal should occur outside of the hibernating time for western toads of November to February (Wind, 2020).

4.1.2.2 Opportunities

- Educational signage could be created at the course entrance describing the life cycle of the western toad and the disc golf course proximity to the known breeding area of Lost Lake. The importance of logs and downed coarse wooded debris could also be described. Signage could encourage users not to disturb downed large coarse wooded debris during recreational activity.

4.1.2.3 Monitoring

- Annual monitoring of the LLDGC should be conducted to identify any signs of impacts or removal to logs and stumps within the course.

4.1.3 Species at Risk Habitat-Evening Grosbeak, Band-tailed Pigeon, Barn Swallow and Olive-sided Flycatcher

The BC *Wildlife Act* Section 34 protects eggs of all birds and nests of certain raptors. The activities involved with disc golf course maintenance and modifications are constrained by Section 34 as below:

A person commits an offence if the person, except as provided by regulation, possesses, takes, injures, molests or destroys

(a) A bird or its egg,

(b) The nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl or,

(c) The nest of a bird not referred to in paragraph (b) when the nest is occupied by a bird or its egg.

If disc course activities and development include tree removal, and are planned within the nesting season on April 1st to August 31st, or if any raptor nests are found on the site, development may be constrained by the *Wildlife Act*. Should tree removal occur within the nesting bird season, a songbird nesting survey should be conducted in the proposed clearing area to avoid contravention of the *Wildlife Act.*

4.1.3.1 Mitigation Measures

- Any disc golf course maintenance or modification on the LLDGC involving tree removal should be completed outside of the bird nesting season of April 1st-September 1st to avoid impacts to nesting birds and potential species at risk birds.
- If tree clearing activities cannot avoid the bird nesting season a Qualified Environmental Professional (QEP) should conduct a bird nest survey to identify any potential active nests in the area that may need protection.
- Any tree clearing involved in disc golf course maintenance or modification at any time of year should include a survey of the trees by a QEP before removal to ensure no raptors nests are present.

4.1.3.2 Monitoring

- Annual monitoring of the LLDGC should be conducted to identify any signs of impacts or unauthorized removal of trees. Actions recommended if impacts are observed include greater communication to recreational users and additional signage.

4.1.4 Unlogged Core Forest and Old Forest ESA

Unlogged Core Forest and Old Forest are considered sensitive habitat under the RMOW Development Permit Area (DPA) for Sensitive Ecosystems. Further field studies are required to be completed by a QEP to inform an Environmental Impact Study as required by the RMOW for any activities planned within the DPA for Sensitive Ecosystems. Since the completion of this environmental assessment, the parks and planning department from the RMOW retained Cascade Environmental to complete further studies in the form of an Environmental Impact Study (EIS) for the areas of potential expansion at Lost Lake. The EIS can be viewed in the project documents. Disc Golf course maintenance and modification activities may be constrained by the DPA requirements and guidelines to preserve and protect these sensitive areas.

4.1.4.1 Mitigation Measures/Opportunities

A section of the LLDGC overlaps a BC Hydro right of way. Mitigation measures to protect forest ecosystem habitats are focused within the CWH Old Forest and Unlogged Core Forest Areas of the course, outside of the disturbed BC Hydro right of way.

Minimizing Tree Impacts

- Old growth trees (over 300 years old) should not be removed for course modification and maintenance.
- Any course maintenance and modification should minimize young tree removal in the Old Forest ESA and Unlogged Core Forest ESA.
- Coarse woody debris should be left in an undisturbed state wherever possible during maintenance and modifications within areas of the Old Forest and unlogged Core Forest ESA.
- Wildlife trees/snags should be retained and avoided in course modification and maintenance to reduce the need for danger tree removal.
- All new signage should be positioned on course posts secured within the ground to prevent any impact to tree health from securing signage to trees.
- If existing signage attached by screws to trees is not adequate and is required to be removed existing screws or nails should be undisturbed to prevent the risk of opening wounds to infection on the tree. Signage material could be removed with tin clips to achieve this mitigation measures.

Minimizing vegetation trampling

- A defined trail should be incorporated between each hole within the Old Forest ESA and Unlogged Core Forest ESA.
- A trail tread should be added to prevent soil compaction (e.g. mulch) and trails should be designed to discourage shortcuts, using landforms or vegetation blocks (Photo 1).
- Wayfinding signage should be updated throughout the course to provide clear direction on trails to prevent trampling of vegetation.

Minimizing Soil Compaction

- Mulch should be added to a depth of 6 inches around areas of high foot traffic, including around tee boxes (Photo 1) and greens (where suitable) to prevent soil compaction in Old Forest and Unlogged Core Forest ESA areas.

- Tree protection zones should be established around old growth trees identified within the course area.
- Tree protection zones should be mulched to a distance of two times the dripline of old growth trees in high use areas of the course e.g. around tee boxes and greens to prevent soil compaction and protect root systems in ESAs.
- Tee boxes should be made from pervious materials (e.g. wood slats or pervious concrete) to prevent soil compaction.
- Impact protection in the form of wooden poles can be used in front of trees, if necessary, on high strike zones e.g. close proximity to the tee if observed on site.

Invasive Species

- Opportunities to provide a boot-cleaning brush stand (Photo 2) should be explored at the entrance of the course, with educational signage to encourage users to clean boots of material before and after using the course to prevent the spread of invasive species.

4.1.4.2 Monitoring

- Annual monitoring of the LLDGC should be conducted to identify any signs of tree removal, vegetation trampling, soil compaction and invasive species, and to ensure effectiveness and compliance with mitigation measures.

4.2 Spruce Grove and North Lost Lake Course Potential Extension Area

4.2.1 Riparian Areas ESA

The riparian area associated with Helen's Corner Wetland and Fitzsimmons Creek has environmental constraints as described previously (Section 4.1.1).

4.2.1.1 Mitigation Measures

- Any future disc course development should avoid these riparian areas where possible.

4.2.1.2 Opportunities

- Construction of a split rail wooden fence along the boundary of Helen's Corner Wetland REPA to protect this area could be incorporated into the course design.

4.2.1.3 Monitoring

- Annual monitoring should be completed of the potential course extension area for signs of impacts or intrusion into riparian areas and to ensure effectiveness and compliance with mitigation measures.

4.2.2 Species at Risk Habitat ESA-Western Toad

Constraints to course development from potential western toad habitat exist as described in Section 4.1.2.

4.2.2.1 Mitigation Measures

- Disc golf course design and construction should retain trees, shrubs, logs and stumps as much as possible, which could provide cover or hibernacula for toads and other amphibians (Wind, 2020).
- If stumps and coarse woody debris are required to be removed from the course during course construction activities, removal should occur outside of the hibernating time for western toads of November to February (Wind, 2020).

4.2.2.2 Opportunities

- Educational signage could be incorporated into course design as described in Section 4.2.2.2.

4.2.2.3 Monitoring

- Annual monitoring should be completed of the potential course extension area for signs of impacts or removal to logs and stumps within the course.

4.2.3 Species at Risk Habitat ESA-Evening Grosbeak, Band-tailed Pigeon, Barn Swallow and Olive-sided Flycatcher

4.2.3.1 Mitigation Measures

- Any disc golf course development involving tree removal should be completed outside of the bird nesting season of April 1st-September 1st to avoid impacts to nesting birds, as described in Section 4.2.3.

- If tree clearing activities cannot avoid the bird nesting season a QEP should conduct a bird nest survey to identify any potential active nests in the area that may need to protection.
- Tree clearing for disc golf course development at any time of year should include a survey of the trees by a QEP before removal to ensure no raptors nests are present.

4.2.4 Unlogged Core Forest and Old Forest ESA

Unlogged Core Forest and Old Forest are considered sensitive habitat under the RMOW DPA for Sensitive Ecosystems. Disc golf course development activities would be constrained by the DPA requirements and guidelines to preserve and protect these sensitive areas. Further field studies are required to be completed by a QEP to inform an Environmental Impact Study as required by the RMOW for any activities planned within the DPA for Sensitive Ecosystems.

4.2.4.1 Mitigation Measures/Opportunities

Fuel management activities recently occurred in the area south of the Zoot Allures trail in the Spruce Grove potential extension area. This area provides an opportunity to develop a course in an existing disturbed area that is less environmentally sensitive.

Minimizing Tree Impacts

- Old growth trees (over 300 years old) should not be removed for course development.
- Course development activities should minimize young and mature tree removal in the CWH Old Forest and Unlogged Core Forest ESA.
- Coarse woody debris should be left in an undisturbed state wherever possible in course design within Unlogged Core Forest and CWH Old Forest ESA.
- Wildlife trees/snags should be retained and avoided in course development to reduce the need for danger tree removal.
- Signage should be positioned on course posts secured within the ground to prevent signage being screwed into trees and impacting tree health.

Minimizing vegetation trampling

- If applicable, defined fairway trails should be considered where hard surfaces are not present e.g. granite rock within the Unlogged Core Forest and CWH Old Forest ESA.
- A trail tread should be added to prevent soil compaction (e.g. mulch) and trails should be designed to discourage shortcuts using landforms or vegetation blocks.
- Wayfinding signage should be installed throughout the course to provide clear direction on trails to prevent trampling of vegetation.

Minimizing Soil Compaction

- Mulching should be incorporated areas of predicted high foot traffic, including around tee boxes and greens (where suitable) to prevent soil compaction in Unlogged Core Forest and CWH Old Forest ESAs.
- Tree protection zones should be established around old growth trees identified within the course area.
- Tree protection zones should be mulched to a distance of two times the dripline of old growth trees in high use areas of the course e.g. around tee boxes and greens to prevent soil compaction and protect root systems.
- Tee boxes should be made from pervious materials (e.g. wood slats or pervious concrete) to prevent soil compaction.

- Impact protection must be used in design on predicted high strike zones of trees e.g. close proximity to the tee.

Invasive Species

- Designs should consider a boot-cleaning brush stand as described in Section 4.1.4.1.

4.2.4.2 Monitoring

- Annual monitoring of the potential extension area course should be conducted to identify any signs of tree removal, vegetation trampling, soil compaction and invasive species, and to ensure effectiveness and compliance with mitigation measures.

Photo 1: Example of mulching and fairway trail in San Francisco Disc Golf Course

Photo 2: Boot brush and educational signage at Brandywine BC Park

5 Recommendations

Lost Lake Disc Golf Course

A summary of environmental recommendations based on the desktop preliminary environmental assessment for the LLDGC is described below. As per INdesign's report for Scope A and B of the project (INdesign, 2022), a formal operational agreement between the municipality and the local disc golf club that focuses on these environmental recommendations for the Lost Lake Course rejuvenation project could assist in mitigation measure implementation.

A colour code has been used in the table to identify;

- Operation Agreement Conditions recommendations
- Short Term Environmental recommendations
- Long Term Environmental recommendations

Table 3: Summary of environmental recommendations for the LLDGC

ESA	Location	Mitigation Measures	Opportunities
High ESAs			
Riparian Area	Outflow of Helen's Corner Wetland-see maps	Avoid riparian area in future disc golf course modifications and maintenance. Only connecting trails should be considered through riparian areas.	Construction of split rail fence for protection of riparian area.
Medium ESAs			
Western toad potential species at risk habitat	General forested area within the course	Retain trees, shrubs logs and stumps during maintenance and modification.	Educational signage installation.
Evening Grosbeak, Band-tailed pigeon, Barn Swallow and Olive-	General forested area within the course	Conduct any tree felling or vegetation removal required for course maintenance outside of bird	-

ESA	Location	Mitigation Measures	Opportunities
sided flycatcher potential species at risk habitat		nesting window of April 1st to August 31st.	
Low ESAs			
Unlogged Core Forest and Old Forest ESA	Holes within Unlogged Core Forest and Old Forest ESA outside of the hydro right of way	**Minimizing tree impacts:**	
		Minimize removal of mature and young trees in ESA areas.	
		Avoid removal of old growth trees..	
		Coarse woody debris should be left in an undisturbed state.	
		Wildlife trees/snags should be retained and avoided in course modification maintenance.	
		Signage should be installed without impact to trees on the course.	All new signage should be positioned on course posts secured within the ground to prevent any impact to tree health from securing to trees.
			If existing signage is to be removed existing screws or nails should be undisturbed to prevent the risk of opening wounds to infection on the tree.
		Minimizing vegetation trampling:	

ESA	Location	Mitigation Measures	Opportunities
		Defined trails should be incorporated between each hole.	Defined trails with appropriate tread and delineation features can be added in connecting trails.
		Incorporate clear wayfinding signage.	Wayfinding signage should be updated throughout the course to provide clear direction on trails to prevent trampling of vegetation.
		Establish designated fairway trails.	Incorporation of fairway trails where applicable if not on hardened surface e.g. rock.
		Minimizing soil compaction.	
		Minimize soil compaction in high trafficked areas.	Mulch around applicable tee boxes and applicable greens.
			Tee boxes should be updated to be uniform and made from impervious material e.g. wood or concrete.
		Protect significant tree rooting systems.	Mulch two times the dripline distance from the truck of applicable significant trees.
		Protect trees from disc throw impacts.	Identify any trees on the course that have any damage that may need protection in the form of post structures.

ESA	Location	Mitigation Measures	Opportunities
		Minimize invasive species introduction.	Boot-cleaning brush stand at the entrance of the course with educational signage should be explored.

Spruce Grove and Lost Lake Course Potential Extension Area

Table 4: Summary of environmental recommendations for the Spruce Grove and North Lost Lake Course potential extension areas

ESA	Location	Mitigation Measures	Opportunities
High ESAs			
Riparian Area	Riparian Area of "Helen's Corner Wetland" and Fitzsimmons s Creek.	Avoid riparian area in future disc golf course design. Connecting trails between holes in riparian areas may be considered with appropriate design.	Construction of split rail fence for protection of riparian area if course adjacent to area.
Medium ESAs			
Western toad potential species at risk habitat	General forested area within the course	Trees, shrubs, logs and stumps should be retained during course design, construction and future maintenance.	Educational signage installation.
Evening Grosbeak, Band-tailed pigeon, Barn Swallow and Olive-sided flycatcher potential species at risk habitat	General forested area within the course	Tree or vegetation clearing during course construction or maintenance should be conducted outside of bird	

ESA	Location	Mitigation Measures	Opportunities
		nesting window of April 1st to August 31st.	
Low ESAs			
Unlogged Core Forest and Old Forest ESA	Holes within Core Forest ESA	**Minimizing tree impacts:**	
		Minimize tree removal of mature and young trees in ESAs.	
		Avoid removal of old growth trees in ESAs.	
		Coarse woody debris should be left in an undisturbed state.	
		Wildlife trees/snags should be retained and avoided in course development.	
		Signage should be installed without impacting trees on the course.	All new signage should be positioned on course posts secured within the ground to prevent any impact to tree health.
		Minimizing vegetation trampling:	
		Defined trails should be incorporated between each hole.	Defined trails with appropriate tread and delineation features

ESA	Location	Mitigation Measures	Opportunities
			will be required in potential course extension design.
		Incorporate clear wayfinding signage.	Wayfinding signage is required in design throughout the potential course extension to provide clear direction on trails.
		Establish designated fairway trails where applicable.	Incorporation of fairway trails where applicable if not on hardened surface e.g. rock in potential course extension design.
		Minimizing soil compaction:	
		Minimize soil compaction in high trafficked areas.	Mulch around applicable tee boxes and applicable greens where required in potential course extension design.
			Tee boxes must be designed to be to be uniform and made from impervious material e.g. wood slats or pervious concrete.
		Protect root systems of significant trees.	Identify significant trees in course design that may require mulching two times the distance of the dripline from the tree trunk.

ESA	Location	Mitigation Measures	Opportunities
		Protect trees from disc throw impacts.	Identify any trees on course that may receive damage from discs and provide protection in in potential course extension design where necessary.
		Minimize invasive species introduction.	Potential course extension design could include a boot-cleaning brush stand at the entrance of the course with educational signage.

6 References

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7 Appendices

Appendix A: Analyis of species at risk ranked by possability to use habitat fetaures available within the LLDGC and Spruce Grove and North Lost Lake Potential Course Extension Area.

Wildlife Class	Species	BC Status	Habitat Preferences and occurrences in the RMOW	ESG habitat layer	Habitat Possibility
Amphibian	Coastal tailed frog *Ascaphus truei*	Yellow	Mountainside creeks >6 ºC water temperatures, mainly between 700 and 122 m, especially rounded cobbles confirmed presence in 15 RMOW creeks	Coastal tailed frog habitat layer	Unlikely- intermittent steam on site do not support conditions
Amphibian	Western toad *Anaxyrus boreas*	Yellow	Various upland habitats around ponds, lakes, reservoirs, and slow-moving rivers and streams. Known continuous breeding site is Lost Lake.	Watercourse lines, Lost Lake	**Possible**- upland habitat from known breeding site at Lost Lake
Amphibian	Northern red-legged frog *Rana aurora*	Blue	Lakes and small ponds in warm sites at the south end of the RMOW, especially Brandywine; also confirmed on n. side of Callaghan Road on Calcheck FSR.	Northern red-legged frog habitat layer	Unlikely- northern red legged frog not believed to be at subject site elevation
Bird	Common Nighthawk *Chordeiles minor*	yellow	Mountains and plains in open coniferous forest, savanna, grassland, and towns. Nesting occurs on the ground on a bare site in an open area.	Unlogged Core Forest, Tree Preservation Covenants, OGMA's, CCF-EBM's	Unlikely- only open area is within the hydro-right of way which is heavily disturbed
Bird	Evening Grosbeak *Coccothraustes vespertinus*	yellow	Coniferous (primarily spruce and fir) and mixed coniferous- decidouous woodland, second growth, and occasionally parks; in migration and winter in a variety of forest and woodland habitats, and around human habitation.	Unlogged Core Forest, Tree Preservation Covenants, OGMA's, CCF-EBM's	**Possible**- forest habitat type present
Bird	Band-tailed pigeon *Patagioenas fasciata*	Blue	Seen in CWH and MH forest , riparian and urban areas. Can breed in urban and edges and forest	Riparian layer	**Possible**- forest habitat type present
Bird	Barn swallow *Hirundo rustica*	yellow	Wetlands, grassy areas, riparian, urban areas. Historical nesting at float plane wharf	Wetland layer Riparian layer Green Lake float plane	**Possible**- foraging habitat as riparian and areas and lakes nearby.

Bird	Black swift *Cypseloides niger*	Blue	Alpine CWH and MH forests nests in cliff/steep bluffs known nests in Brandywine Canyon and potentially Soo Bluffs	n/a	Unlikely
Bird	Great blue heron *Ardea herodias ssp. fannini*	Blue	Foraging mainly in valley bottom lakes, wetlands and riparian areas. No known breeding sites nearby.	Wetlands Lakes Streams Heron habitat layer	Unlikely-watercourse on site not connected to fish bearing waters
Bird	Green heron *Butorides virescens*	Blue	Rivers and streams, wetlands, riparian adjacent to shrub or small tree cover.	Wetlands Stream alignment Heron habitat layer	Unlikely-watercourse on site not connected to fish bearing waters
Bird	Northern goshawk *Accipiter gentilis ssp. laingi*	Red	Alpine, CWH and MH forest and wetlands. Nest sites in old growth montane forest at Wedge Creek and Whistler.	Wetlands CWH Old forest	Unlikely-Old Forest does not provide the openings large enough
Bird	Olive-sided fly-catcher *Contopus cooperi*	yellow	CWH and MH forests, riparian habitats breeding requires snags adjacent to openings/wetlands.	Riparian wetlands	**Possible-** riparian forest habitat on site
Fish	Bull trout *Salvelinus confluentus pop. 28*	Blue	Green Lake, Fitzsimmons Creek	Green Lake Fitzsimmons Creek watercourse alignments	Unlikely
Mammal	Grizzly bear Ursus arctos	Blue	Callaghan Brandywine and Sproatt areas. Non-forested or partially forested sites with a wide range of foraging opportunities and choice of habitats.	Grizzly bear class 1 and Class 2 habitat forage polygons	Unlikely
Mammal	Mountain goat *Oreamnos americanus*	Blue	Historically breeding and habitat use, possible use on Sproatt winter range.	Mountain goat ungulate winter range polygons	Unlikely
Mammal	Wolverine *Gulo gulo luscus*	Blue	Potential breeding and habitat use specifically Brandywine, Callaghan, Fitzsimmons and Cheakamus River.	n/a-home ranges are so large habitat features difficult to delineate	Unlikely
Mammal	Little Brown Myotis *Myotis lucifugus*	Yellow	Summer roosts are in buildings and other man-made structures, tree cavities, rock crevices, caves and under the bark of trees. Uses underground habitat	Bat habitat layer	Unlikely

			such as caves for hibernacula		
Plants	Whitebark pine *Pinus albicaulis*	Blue	Common on warm aspect sites near treeline	Whitebark pine known species at risk occurrences	Unlikely- elevation too low.

13. Appendix C: Environmental Assessments for Potential Alternate Sites.

Prepared by: Cascade Environmental Research Group.

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

Environmental Assessment of Potential Sites

Prepared for:
Resort Municipality of Whistler

Prepared by:
Cascade Environmental Resource Ltd.

Project No.: 1162-01-03
Date: November 21, 2022

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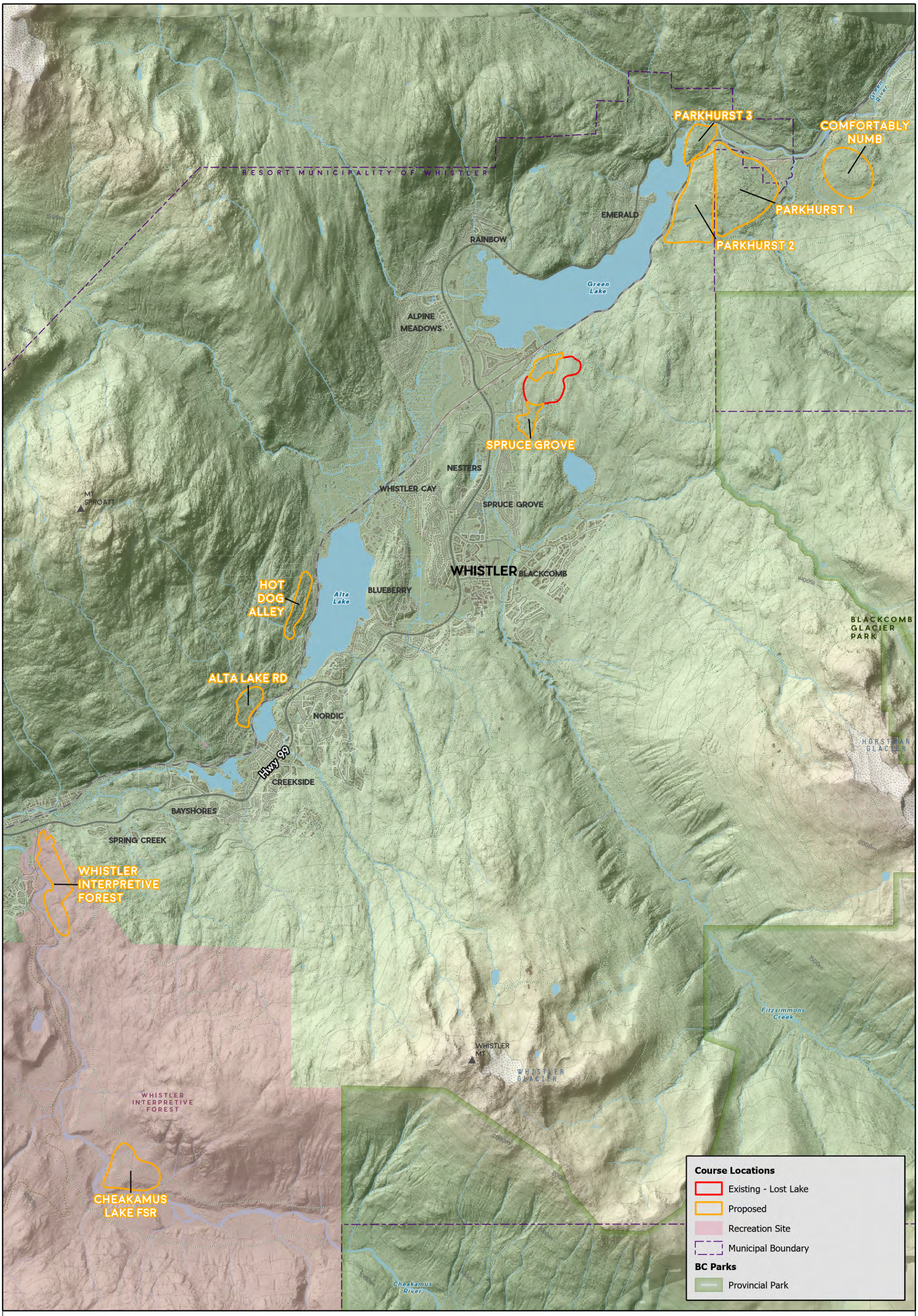
This document should not be construed to be:

- A Phase 1 - Environmental Site Assessment;
- A Stage 1 – Preliminary Site Investigation (as per the Contaminated Sites Regulations of the Waste Mgt. Act);
- An Environmental Impact Assessment (as per the BC Environmental Assessment Act).

Table of Contents

1 Scope B Potential Second Course Assessment

Scope B of the RMOW disc golf feasibility study focuses on identifying potential areas within the Whistler valley suitable for a new disc golf course. Cascade utilized the Disc Golf Course Environmental Sensitivity Guidelines (DGCESG), as produced in Scope A, to assess six identified potential sites (Cascade, 2022). Each potential site was assessed and results, opportunities and constraints are detailed below. Where applicable, important known land use overlaps as determined by Crown land management resources are included. Maps of the six proposed areas are included in this document to display the existing high, medium and low DGCESG Environmental Sensitivity Area (ESA) overlaps.



GIS Cartographer: Oliver Chew
Date: *2023-01-05*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL RESOURCE GROUP LTD

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Kilometers

Overview Map

Disc Golf Feasibility Study
Whistler
British Columbia

1.1 Site A - Whistler Interpretive Forest

Table 1: Results of DGCESG Assessment for Site A

ESA Overlap layer	ESA Rating
Riparian Areas	High
Species at Risk Habitat	Medium
Unlogged Core Forest	Low
Coastal Western Hemlock (CWH) Old Forest	Low
Slopes above 45 degrees	Low

1.1.1 Constraints

- Riparian areas of Cheakamus River and mapped creek that intersects the area will should be avoided in disc golf course design where possible.
- Mitigation measures will be required for design and construction based on species at risk habitat. Further species at risk studies would be required in course development.
- Mitigation measures to protect forest ecosystem habitat will need to be implemented in forest ESA areas.

1.1.2 Opportunities

- Fuel management within the area has provided an area less environmentally sensitive to develop a course due to existing disturbance.

1.1.3 Other Land Use Considerations

Sea to Sky Land and Resource management Plan (SS LRMP)

Cultural Management Area - Legal

The Whistler Interpretative Forest proposed area overlaps the Upper Cheakamus First Nation Cultural Management Area (BC Govt, 2008) (Figure 1).

Land use objectives:

- Conserve the integrity of the First Nations cultural and heritage resources, including cultural sites.
- Ensure that economic development activities are undertaken in a manner that is sensitive to First Nations' social, ceremonial and cultural uses (BC Govt, 2008).

Detailed collaboration would likely be required with the Squamish Nation in this area.

Cultural Place - Legal

The northern area of Whistler Interpretative Forest proposed is adjacent to the Upper Cheakamus River Síiyamín ta Skwxwú7mesh (cultural) site of the Squamish Nation (BC Govt, 2008) (Figure 2).

Objectives:

- No new Crown land tenures will be allocated within the Síiyamin ta Skwxwú7mesh (cultural sites) or Úxwumixw (village sites).
- To preserve and maintain resources that provide opportunities for social, ceremonial and cultural uses by First Nations.
- To protect and maintain the integrity of the First Nations cultural and heritage resources, including sacred sites.
- To limit commercial backcountry recreation use (BC Govt, 2008).

Crown Land Reserves

A *Land Act* Section 17 Conditional Crown Land Reserve exists in accordance with the SS LRMP Cultural Management area boundaries (BC Govt, 1996).

- A section 17 Conditional Crown Land Reserve withdraws the disposition of Crown land except for designated and compatible land use.
- Detailed collaboration would likely be required with provincial government and Squamish Nation in this area.

Trails

- The planned Flashback 3 bike trail overlaps the area.
- The Riverside and Interpretive Forest Loop trail overlap the northern area.
- The bike trail AMPM intersects the northern area.

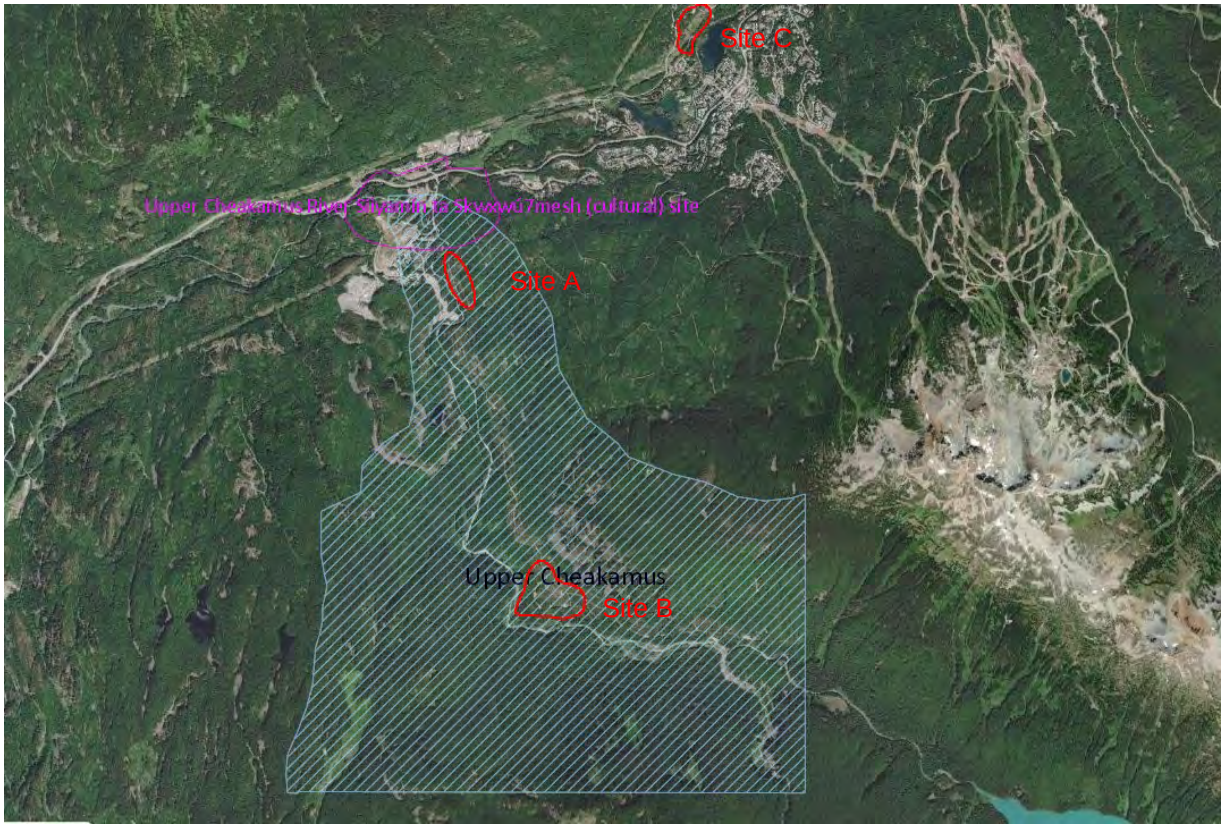
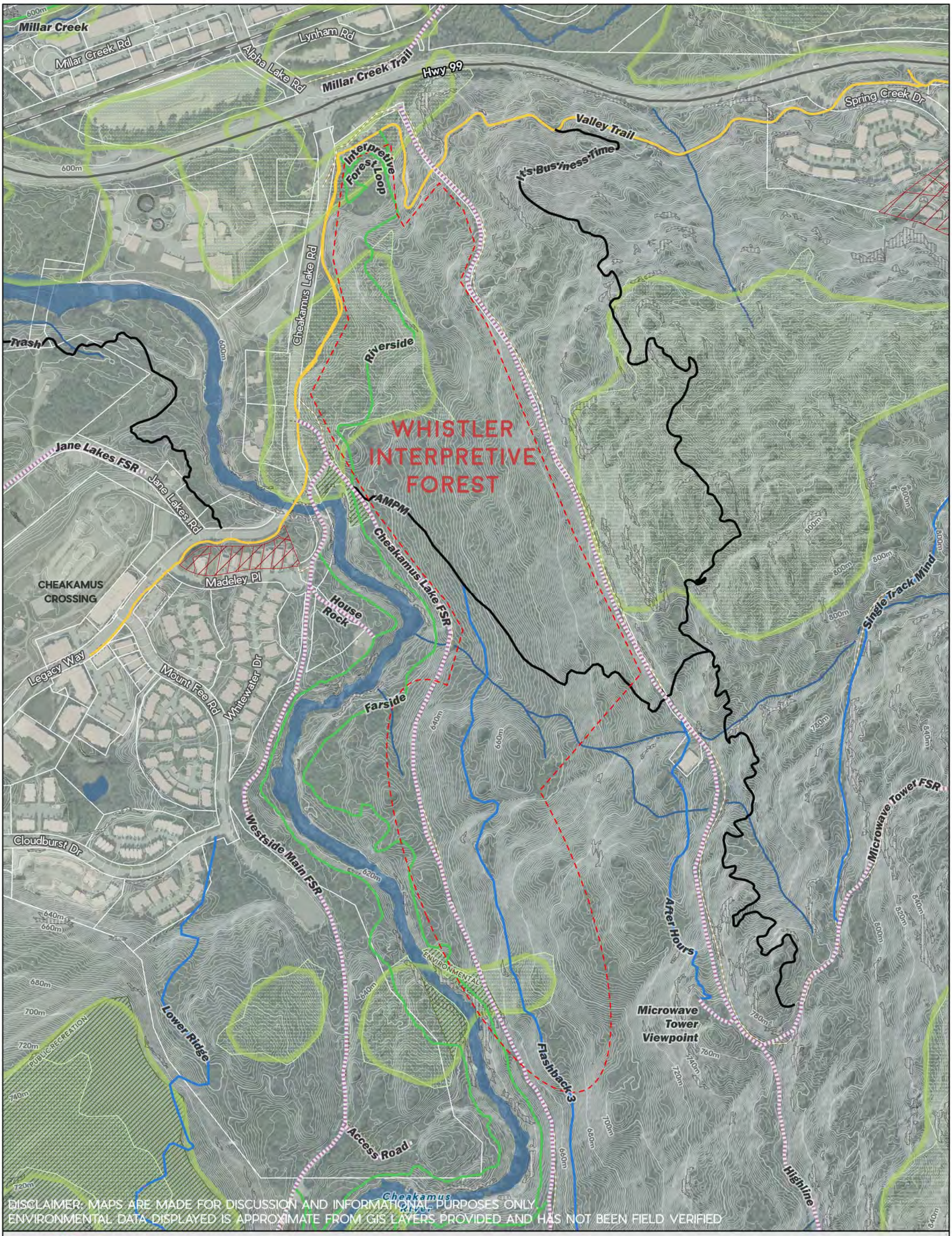


Figure 1: Sea to Sky LRMP Upper Cheakamus River Síiyamín ta Skwxwú7mesh (cultural) site of the Squamish Nation Cultural Site (pink line) and Upper Cheakamus First Nation Cultural Management (blue hash) Area overlapping proposed Disc Golf Areas A, B and C.



GIS Cartographer: Oliver Chew
Date: *2023-01-05*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL RESOURCE GROUP LTD

Map 1 - Low ESG
Whistler Interpretive Forest

Disc Golf Feasibility Study
Whistler
British Columbia

WHISTLER INTERPRETIVE FOREST

DISCLAIMER: MAPS ARE MADE FOR DISCUSSION AND INFORMATIONAL PURPOSES ONLY.
ENVIRONMENTAL DATA DISPLAYED IS APPROXIMATE FROM GIS LAYERS PROVIDED AND HAS NOT BEEN FIELD VERIFIED

- Course Locations
- Cadastre - DataBC
- Species at Risk - Potential Habitat

Trails

- Access
- Black Diamond
- Blue Square
- Green Circle
- White Circle
- Municipal Boundary
- Lake
- Stream

Contour Interval

- 1m interval
- 20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-05*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 2 - Medium ESG
Whistler Interpretive Forest

Disc Golf Feasibility Study
Whistler
British Columbia

Millar Creek
Millar Creek Rd
Lynham Rd
Alpha Lake Rd
Millar Creek Trail
Hwy 99
Spring Creek Dr
Valley Trail
It's Business Time
Interpretive Forest Loop
Cheakamus Lake Rd
Riverside
Trash
Jane Lakes FSR
Jane Lakes Rd
WHISTLER INTERPRETIVE FOREST
AMPM
Cheakamus Lake FSR
CHEAKAMUS CROSSING
Madeley Pl
House Rock
Single Track Mind
Legacy Way
Mount Fee Rd
Whitewater Dr
Farside
Microwave Tower FSR
Cloudburst Dr
Westside Main FSR
After Hours
Lower Ridge
Flashback 3
Microwave Tower Viewpoint
Access Road
Highline
Cheakamus River
600m
620m
640m
660m
680m
700m
720m
740m
760m
780m
800m
820m
840m

DISCLAIMER: MAPS ARE MADE FOR DISCUSSION AND INFORMATIONAL PURPOSES ONLY.
ENVIRONMENTAL DATA DISPLAYED IS APPROXIMATE FROM GIS LAYERS PROVIDED AND HAS NOT BEEN FIELD VERIFIED

- Course Locations
- Wetland
- Large and Old Cottonwoods
- Forested Floodplain
- Riparian
- Municipal Boundary
- Stream
- Lake
- Cadastre - DataBC

Trails

- Access
- Black Diamond
- Blue Square
- Green Circle
- White Circle

Contour Interval

- 1m interval
- 20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-05*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 3 - High ESG
Whistler Interpretive Forest

Disc Golf Feasibility Study
Whistler
British Columbia

1.2 Site B - Cheakamus Lake FSR

Table 2: Results of DGCESG Assessment for Site B

ESA Overlap layer	ESA Rating
Riparian Areas	High
Species at Risk Habitat	Medium
Slopes above 45 degrees	Low
Unlogged Core Forest	Low
CWH Old Forest	Low
Whistler Community Forest (WCF) Ecosystem-Based Management (EBM) Reserve Environmental	Low

1.2.1 Constraints

- Riparian areas of Cheakamus River and two tributaries should be avoided in disc golf course design where possible. Connecting trails between holes in riparian areas may be considered with appropriate design.
- Mitigation measures will be required in design and construction based on species at risk habitat. Further species at risk studies would be required in course development.
- CWH Old Forest and Unlogged Core Forest is located in the southern section of Site B. Mitigation measures may be required if development is planned in these ESAs, including no cutting of old (over 300 years) trees.
- Steeper terrain over 45 degrees occurs in the south of the area.
- A Whistler Community Forest (WCF) Ecosystem-Based Management (EBM) reserve area exists designated for environmental protection on the southern border. This area is located in the riparian area of Cheakamus River and would likely be avoided. Collaboration with the WCF would be anticipated if developing a course in this area.

1.2.2 Opportunities

- The fuel management area north of the Forest Service Road (FSR) provides an opportunity to develop a course in an existing disturbed area that is less environmentally sensitive.
- Remnant lay down areas from previous logging operations provide cleared sections within the area with less environmental sensitivity.
- The majority of the area from satellite imagery analysis is either young or mature forest and outside of the majority of Old Forest and Unlogged Forest ESAs.

1.2.3 Other Land Use Considerations

Sea to Sky Land and Resource Management Plan

Cultural Management Area - Legal

The Whistler Interpretative Forest proposed area overlaps the Upper Cheakamus First Nation Cultural Management Area (BC Govt, 2008) (Figure 1).

Land Use objectives:

- Conserve the integrity of the First Nations cultural and heritage resources, including cultural sites.
- Ensure that economic development activities are undertaken in a manner that is sensitive to First Nations' social, ceremonial and cultural uses (BC Govt, 2008).

Detailed collaboration would likely be required with the Squamish Nation with disc gold course development in this area.

Crown Land Reserves

A Section 17 Conditional Crown Land Reserve exists in accordance with the S2S LRMP Cultural Management area boundaries.

- A section 17 Conditional Crown Land Reserve withdraws the disposition of Crown land except for designated and compatible land use. The area is designated for cultural management.
- Detailed collaboration would likely be required with the provincial government and Squamish Nation in this area.

Trails

- The Far Out 3 trail intersects the area.
- The Far Out Traverse trail intersects the area.
- The planned Flashback 1 trail intersects the area.

- Course Locations
- Old Forest
- Old Growth Management Area
- Unlogged Core Forest
- Cheakamus Community Forest Ecosystem-Based Management Reserve
- Slope >45 degrees
- Municipal Boundary
- Stream

Contour Interval

- 1m interval
- 20m interval

Trails

- Access
- Blue Square

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 1 - Low ESG
Cheakamus Lake FSR

Disc Golf Feasibility Study
Whistler
British Columbia

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Course Locations

Trails

Access

Blue Square

Municipal Boundary

Stream

Contour Interval

1m interval

20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 2 - Medium ESG
Cheakamus Lake FSR

Disc Golf Feasibility Study
Whistler
British Columbia

Course Locations
Large and Old Cottonwoods
Riparian
Municipal Boundary

Stream

Trails
Access
Blue Square

Contour Interval
1m interval
20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 3 - High ESG
Cheakamus Lake FSR

Disc Golf Feasibility Study
Whistler
British Columbia

1.3 Site C - Alta Lake Road

Table 3: Results of DGCESG Assessment for Site C

ESA Overlap layer	ESA Rating
Riparian Areas	High
Species at Risk Habitat	Medium
Slopes above 45 degrees	Low
Unlogged Core Forest	Low

1.3.1 Constraints

- Millar Creek watercourse, with its associated riparian areas, flows through the middle of this site, with the Nita Lake riparian area to the west. These riparian areas should be avoided in course design.
- Potential coastal tailed frog (*Ascaphus truei*) species at risk habitat in Millar Creek should be protected.
- Further species at risk studies would be required in course development.
- Small amount of steeper terrain over 45 degrees in the area.
- Unlogged Core Forest occurs either side of the BC Hydro right of way. Mitigation measures should be implemented if course development is planned in these ESAs, including no cutting of old trees.

1.3.2 Opportunities

- The BC Hydro right of way provides a low sensitivity area for development.

1.3.3 Other Land Use Considerations

- No other land management overlaps from provincial land use plans or trails occur in this area.
- No other land uses from provincial commercial recreation crown tenures or crown reserves occur in this area.

- Course Locations
- Old Forest
- Tree Preservation Covenant
- Unlogged Core Forest
- Slope >45 degrees
- Municipal Boundary
- Lake
- Stream
- Building Footprints
- Cadastre - DataBC

Contour Interval

- 1m interval
- 20m interval

Trails

- Blue Square
- Double Black Diamond
- White Circle

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 1 - Low ESG
Alta Lake Rd

Disc Golf Feasibility Study
Whistler
British Columbia

Course Locations
Cadastre - DataBC
Species at Risk - Potential Habitat

Trails

Blue Square
Double Black Diamond
White Circle
Municipal Boundary
Lake
Stream

Contour Interval

1m interval
20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 2 - Medium ESG
Alta Lake Rd

Disc Golf Feasibility Study
Whistler
British Columbia

Course Locations

Raptor Nest

Sighting inc Non-Visual IDs

Riparian

Municipal Boundary

Stream

Lake

Cadastre - DataBC

Trails

Blue Square

Double Black Diamond

White Circle

Contour Interval

1m interval

20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 3 - High ESG
Alta Lake Rd

Disc Golf Feasibility Study
Whistler
British Columbia

1.4 Site D - Hot Dog Alley

Table 4: Results of DGCESG Assessment for Site D

ESA Overlap layer	ESA Rating
Riparian Areas	High
Species at Risk Habitat	Medium
Slopes above 45 degrees	Low

1.4.1 Constraints

- Scotia Creek watercourse and associated riparian area located on the west side of the area along with Alta Lake riparian area will be required to be avoided in course design.
- Potential tailed frog species at risk habitat in Scotia Creek should be protected.
- Further species at risk studies would be required in course development.
- Frequent areas of steep terrain over 45 degrees occur within this area.

1.4.2 Opportunities

- BC Hydro right of way provides a low environmental sensitivity zone to develop a disc golf course.

1.4.3 Other Land Use Considerations

Other Land Uses

- No other land uses from provincial land use plans, commercial recreation crown tenures, or crown reserves occur within this area.

Trails

- Hot Dog Alley bike trail intersects the area.
- Danimal North intersects the northern area as it meets Hot Dog Alley trail.

Course Locations
Old Forest
Unlogged Core Forest
Slope >45 degrees

Municipal Boundary
Lake
Stream
Building Footprints

Cadastre - DataBC

Contour Interval
1m interval
20m interval

Trails
Access
Black Diamond
Blue Square
White Circle

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 1 - Low ESG
Hot Dog Alley

Disc Golf Feasibility Study
Whistler
British Columbia

Course Locations
Cadastre - DataBC
Species at Risk - Potential Habitat

Trails

Access
Black Diamond
Blue Square
White Circle
Municipal Boundary
Lake
Stream

Contour Interval

1m interval
20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 2 - Medium ESG
Hot Dog Alley

Disc Golf Feasibility Study
Whistler
British Columbia

Beaver Pass
Danimal Access
Stonebridge Dr
Danimal North
Scotia Creek
Scotia Creek Climb
Hot Dog Alley
Hydro 4x Road
Alta Lake Rd
Valley Trail
Old Mill Lane
Scotia Creek
HOT DOG ALLEY
Alta Lake
840m
820m
800m
780m
760m
740m
720m
700m
680m
660m

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ENVIRONMENTAL DATA DISPLAYED IS APPROXIMATE FROM GIS LAYERS PROVIDED AND HAS NOT BEEN FIELD VERIFIED

- Course Locations
- Wetland
- Riparian
- Municipal Boundary
- Stream
- Lake
- Cadastre - DataBC

Trails

- Access
- Black Diamond
- Blue Square
- White Circle

Contour Interval

- 1m interval
- 20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 3 - High ESG
Hot Dog Alley

Disc Golf Feasibility Study
Whistler
British Columbia

1.5 Site E - Parkhurst Area

Table 5: Results of DGCESG Assessment for Site E

ESA Overlap layer	ESA Rating
Riparian Areas	High
Species at Risk Habitat - red-legged frog (*Rana aurora*)	Medium
Species at Risk Habitat - great blue heron (*Ardea herodias – fannini ssp*)	Medium
Species at Risk Habitat - coastal tailed frog	Medium
Slopes above 45 degrees	Low
Old forest	Low
Unlogged core forest	Low

1.5.1 Constraints

- Riparian areas of Green Lake should be avoided in Parkhurst Area 2 and 3.
- Riparian areas of Green River should be avoided in Parkhurst Area 3.
- Wetland and associated riparian areas located south of Parkhurst Area 3 should be avoided.
- Five mapped tributaries to Green Lake and wetland within Parkhurst Area 2 should be avoided.
- Bull trout (*Salvelinus confluentus*) species at risk habitat within Green Lake to be considered in design to prevent impacts.
- Potential red-legged frog habitat within the wetland south of Parkhurst Area 2 to be protected by mitigation measures and management in course design.
- Potential coastal tailed frog habitat in tributaries to Green Lake to be protected by mitigation measures and management in course design.
- Potential blue heron (*fannini* subspecies) habitat within fish bearing shallow areas of Green Lake and outflow to Green River to be protected by mitigation measures and management in course design.
- Rocky woodland area within Parkhurst Area 1 identified as an area that could contain plant species at risk.
- Further species at risk studies would be required in course development.
- Steeper terrain over 45 degrees in the area.
- Unlogged Core Forest occurs in the majority of Parkhurst Area 2 and 3. Mitigation measures should be implemented if development is planned in these ESAs, including no cutting of old trees.
- Old forest occurs in the north section of Parkhurst Area 2. Mitigation measures be implemented if development is planned in these ESA,s including no cutting of old trees.

1.5.2 Opportunities

- Lands in Parkhurst have recently been acquired by the RMOW for possible park use.

1.5.3 Other Land Use Considerations

Sea to Sky LRMP

Cultural Place - Legal

Green Lake North Síiyamín ta Skwxwú7mesh (cultural) site

The eastern section of Parkhurst 1 area overlaps the Green Lake North Síiyamín ta Skwxwú7mesh (cultural) site as designated by the Squamish Nation the Sea to Sky LRMP (BC Govt, 2008) (Figure 2). Any disc golf course development in this area would require detailed collaboration with the Squamish Nation.

Objectives:

- No new Crown land tenures will be allocated within the Síiyamin ta Skwxwú7mesh (cultural sites) or Úxwumixw (village sites).
- To preserve and maintain resources that provide opportunities for social, ceremonial and cultural uses by First Nations.
- To protect and maintain the integrity of the First Nations cultural and heritage resources, including sacred sites.
- To limit commercial backcountry recreation use (BC Govt, 2008).

Crown Land Reserves

A Section 17 Conditional Crown Land Reserve exists in accordance with the S2S LRMP Cultural Site boundaries.

- A section 17 Conditional Crown Land Reserve withdraws the disposition of Crown land except for designated and compatible land use.
- Detailed collaboration would likely be required with the Squamish Nation and Provincial government within this area.

Trails

- Parkhurst Area 1 has an extensive motorized trials bike trail network mapped on Trailforks named “Playground”. Overlapping uses would require consideration in this area.
- Parkhurst trail loop also exists in Parkhurst Area 2 and 3.

PARKHURST 3

PARKHURST 2

PARKHURST 1

MUNICIPALITY OF WHISTLER

RESORT

Parkhurst

Heliport Rd

Hwy 99

Green River

Kill Me Thrill Me

Access Road

Parkhurst Tower Access

Sea to Sky Trail

Young Lust

Green Lake Loop

Ferry Zone Access

ENVIRONMENTAL / PUBLIC RECREATION

660m 680m 700m 720m 740m 760m 780m 800m

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- Course Locations
- Old Forest
- Old Growth Management Area
- Unlogged Core Forest
- Cheakamus Community Forest Ecosystem-Based Management Reserve
- Slope >45 degrees
- Municipal Boundary
- Stream
- Building Footprints
- Cadastre - DataBC

Contour Interval

- 1m interval
- 20m interval

Trails

- Access
- Black Diamond
- Blue Square
- Green Circle

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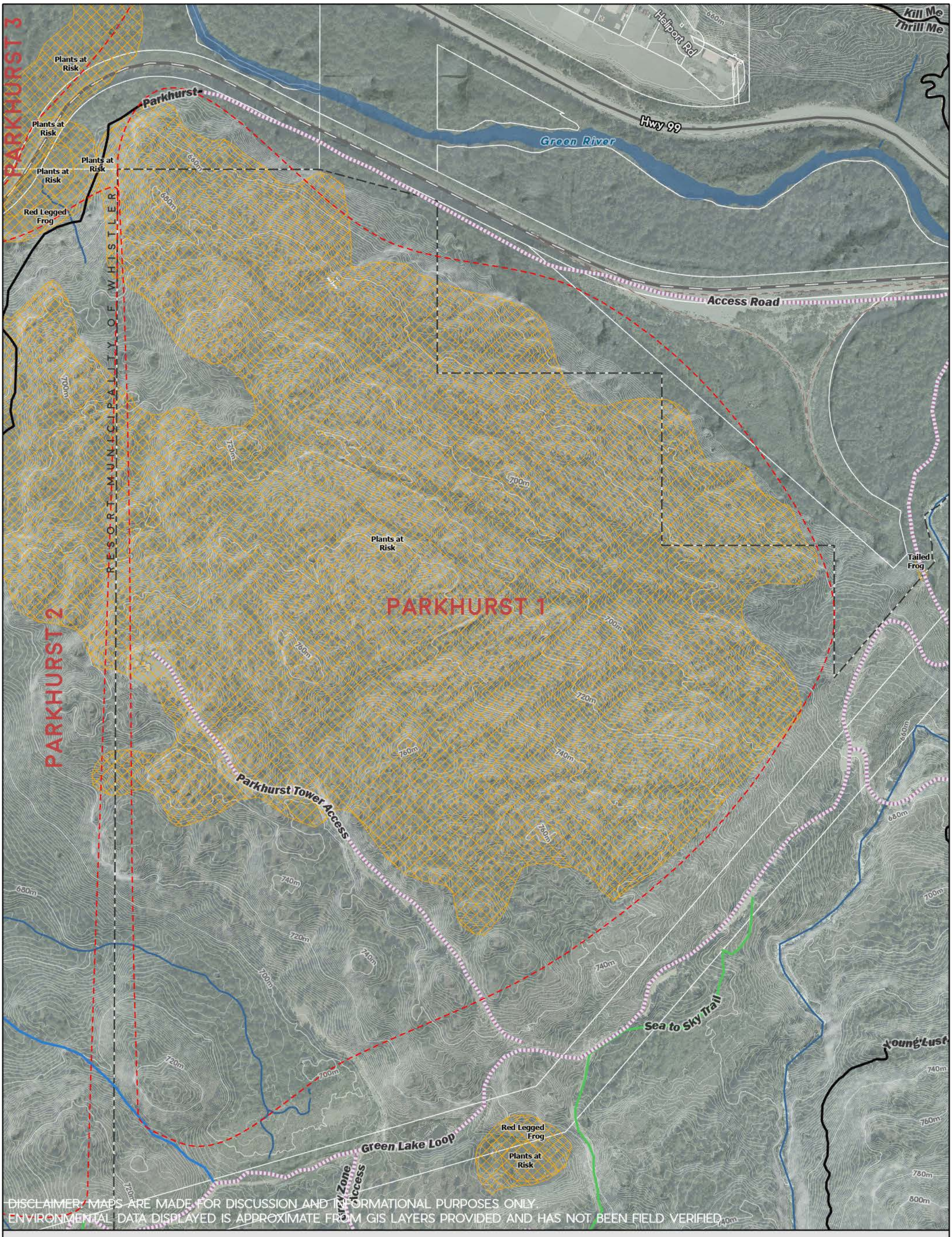
CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 1 - Low ESG
Parkhurst 1

Disc Golf Feasibility Study
Whistler
British Columbia



Course Locations
Cadastre - DataBC
Species at Risk - Potential Habitat

Trails

Access

Black Diamond
Blue Square
Green Circle
Municipal Boundary
Stream

Contour Interval

1m interval
20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
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CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 2 - Medium ESG
Parkhurst 1

Disc Golf Feasibility Study
Whistler
British Columbia

PARKHURST 3

PARKHURST 2

PARKHURST 1

RESORT MUNICIPALITY OF WHISTLER

Parkhurst

Hwy 99

Green River

Heliport Rd

Kill Me Thrill Me

Access Road

Parkhurst Tower Access

Wedge Creek

Sea to Sky Trail

Young Lust

Green Lake Loop

Gravity Zone Access

640m 660m 680m 700m 720m 740m 760m 780m 800m

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Course Locations

Raptor Nest

Sighting

Wetland

Large and Old Cottonwoods

Riparian

Municipal Boundary

Stream

Cadastre - DataBC

Trails

Access

Black Diamond

Blue Square

Green Circle

Contour Interval

1m interval

20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 3 - High ESG
Parkhurst 1

Disc Golf Feasibility Study
Whistler
British Columbia

PARKHURST 3

PARKHURST 1

PARKHURST 2

Green Lake

Hwy 99

Lakeshore Dr

Parkhurst

Access Road

Green River

RESORT MUNICIPALITY OF WHISTLER

Parkhurst Tower Access

Green Lake Loop

Sea to Sky Trail

Jeff's Trail

740m 720m 700m 680m 660m 690m

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ENVIRONMENTAL DATA DISPLAYED IS APPROXIMATE FROM GIS LAYERS PROVIDED AND HAS NOT BEEN FIELD VERIFIED

- Course Locations
- Old Forest
- Unlogged Core Forest
- Slope >45 degrees
- Municipal Boundary
- Lake
- Stream
- Building Footprints
- Cadastre - DataBC

Contour Interval

- 1m interval
- 20m interval

Trails

- Access
- Black Diamond
- Blue Square
- Green Circle

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 1 - Low ESG
Parkhurst 2

Disc Golf Feasibility Study
Whistler
British Columbia

PARKHURST 3

PARKHURST 1

PARKHURST 2

Parkhurst

Access Road

Green River

Hwy 99

Heron

Heron

Plants at Risk

Red Legged Frog

Trout

Green Lake

Lakeshore Dr

Tailed Frog

Parkhurst Tower Access

Green Lake Loop

Sea to Sky Trail

Jeff's Trail

RESORT MUNICIPALITY OF WHISTLER

720m

740m

700m

680m

660m

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ENVIRONMENTAL DATA DISPLAYED IS APPROXIMATE FROM GIS LAYERS PROVIDED AND HAS NOT BEEN FIELD VERIFIED

- Course Locations
- Cadastre - DataBC
- Species at Risk - Potential Habitat

Trails

- Access
- Black Diamond
- Blue Square
- Green Circle
- Municipal Boundary
- Lake
- Stream

Contour Interval

- 1m interval
- 20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 2 - Medium ESG
Parkhurst 2

Disc Golf Feasibility Study
Whistler
British Columbia

Course Locations
Wetland
Riparian
Municipal Boundary
Stream

Lake
Cadastre - DataBC

Trails
Access
Black Diamond

Blue Square
Green Circle

Contour Interval
1m interval
20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 3 - High ESG
Parkhurst 2

Disc Golf Feasibility Study
Whistler
British Columbia

Course Locations
Old Forest
Unlogged Core Forest
Slope >45 degrees
Municipal Boundary

Lake
Stream
Building Footprints
Cadastre - DataBC

Contour Interval
1m interval
20m interval

Trails
Black Diamond

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 1 - Low ESG
Parkhurst 3

Disc Golf Feasibility Study
Whistler
British Columbia

Green River
Hwy 99
Kill Me Thrill Me
Plants at Risk
660m
PARKHURST 3
Heron
Trout
Green Lake
Parkhurst
Red Legged Frog
RESORT MUNICIPALITY OF WHISTLER
PARKHURST 1
PARKHURST 2
680m
700m

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ENVIRONMENTAL DATA DISPLAYED IS APPROXIMATE FROM GIS LAYERS PROVIDED AND HAS NOT BEEN FIELD VERIFIED

- Course Locations
- Cadastre - DataBC
- Species at Risk - Potential Habitat

Trails
- Black Diamond
- Municipal Boundary
- Lake
- Stream

Contour Interval
- 1m interval
- 20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 2 - Medium ESG
Parkhurst 3

Disc Golf Feasibility Study
Whistler
British Columbia

Course Locations

Raptor Nest

Sighting

Wetland

Riparian

Municipal Boundary

Stream

Lake

Cadastre - DataBC

Trails

Black Diamond

Contour Interval

1m interval

20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 3 - High ESG
Parkhurst 3

Disc Golf Feasibility Study
Whistler
British Columbia

1.6 Site F - Comfortably Numb

Table 6: Results of DGCESG Assessment for Site F

ESA Overlap layer	ESA Rating
Riparian Areas	High
Wetland	High
Slopes above 45 degrees	Low
Whistler Community Forest (WCF) Ecosystem-Based Management (EBM) Reserve- Public Recreation	Low

1.6.1 Constraints

- Impacts to the riparian areas of Rethel Creek adjacent to the south and west boundary should be avoided.
- Impact to the central small wetland and associated riparian area should be avoided.
- Steep areas with slopes above 45 degrees occur within the area and will require mitigation measures in course design to prevent erosion and sedimentation issues.
- As area is outside of RMOW boundaries and data for forest ecosystems is unavailable e.g., unlogged core forest and old forest. Further studies are required to delineate these areas.
- A WCF EBM reserve area exists designated for public recreation on the northern border of this site. Collaboration with the WCF would be anticipated if developing a course in this area.
- Further species at risk studies would be required in course development.

1.6.2 Opportunities

- Surrounding existing FSR allows good access to the area resulting in less potential tree removal to provide access for course development.

1.6.3 Other Land Use Considerations

Sea to Sky LRMP

Cultural Place - Legal

Green Lake North Síiyamín ta Skwxwú7mesh (cultural) site

The Comfortably Numb area is entirely overlapped by the Green Lake North Síiyamín ta Skwxwú7mesh (cultural) site as designated by the Squamish Nation and the Sea to Sky LRMP (BC iMap, 2022) (Figure 2). Any disc golf course development in this area would require detailed collaboration with the Squamish Nation.

Objectives:

- No new Crown land tenures will be allocated within the Síiyamin ta Skwxwú7mesh (cultural sites) or Úxwumixw (village sites).
- To preserve and maintain resources that provide opportunities for social, ceremonial and cultural uses by First Nations.
- To protect and maintain the integrity of the First Nations cultural and heritage resources, including sacred sites.
- To limit commercial backcountry recreation use (BC Govt, 2008).

Cultural Place - Legal

Lil'wat Nation - Green Lake Spirited Ground Area

The southwest area of Comfortably Numb on the slope of the FSR overlaps a cultural place area designated by the Lil'wat Nation as a Spirited Ground Area in the Sea to Sky LRMP (Figure 2). Lil'wat Nation A7x7ūlḿecw (Spirited Ground) Areas represent important spiritual, cultural and food gathering areas (BC Govt, 2008).

Objectives:

- To maintain resources that provide opportunities for social, ceremonial and cultural uses by First Nations.
- To maintain natural and aesthetic conditions that are conducive to spiritual and cultural uses.
- To provide for the continuation of cultural activities and traditional renewable resource harvesting activities.
- To enable other compatible uses, as appropriate to the zoning and management direction for each area (BC Govt, 2008).

Crown Land Reserves

A Section 17 Conditional Crown Land Reserve exists in accordance with the SS LRMP Squamish Nation Cultural Site boundaries.

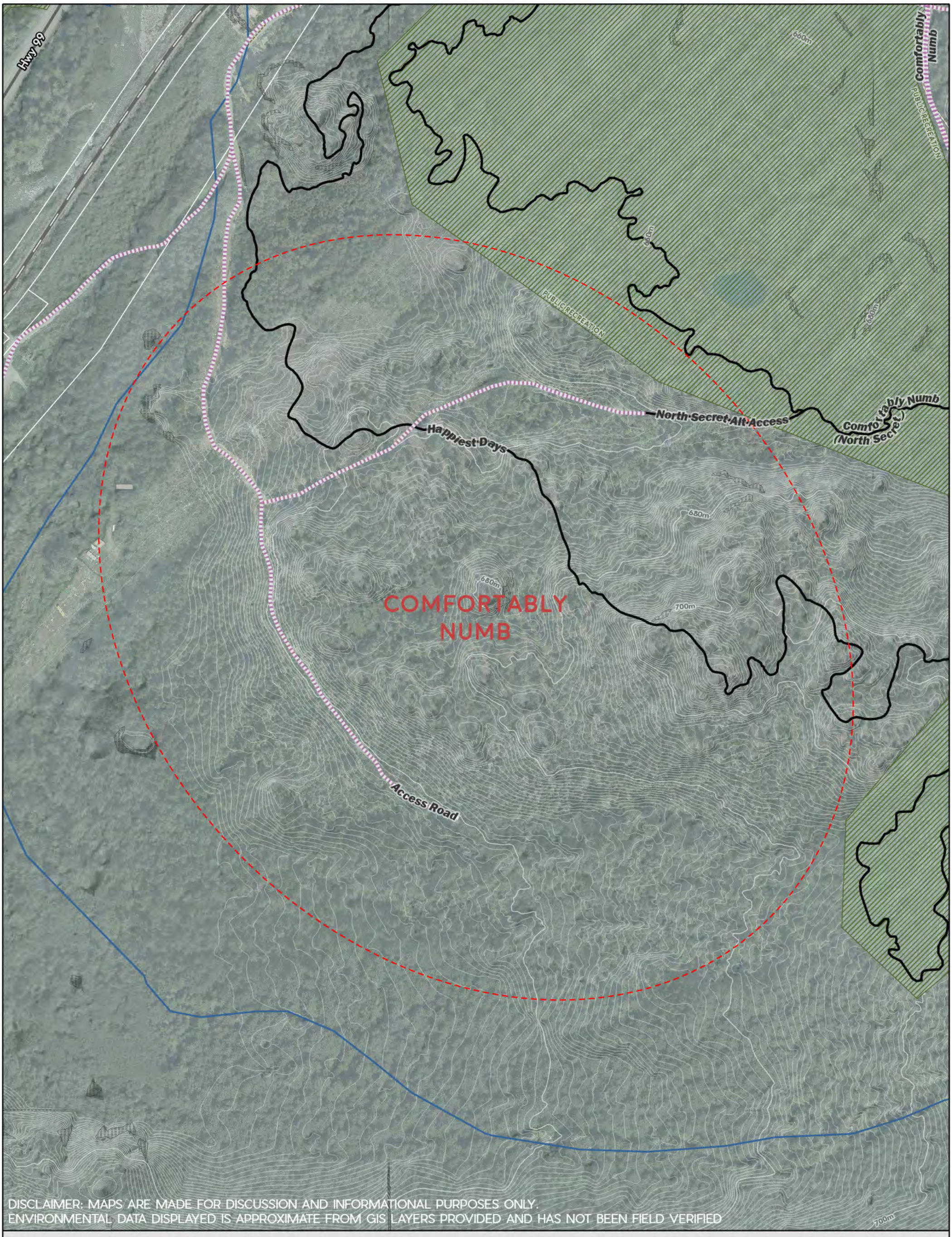
- A Section 17 Conditional Crown Land Reserve withdraws the disposition of Crown land except for designated and compatible land use.
- Detailed collaboration would likely be required with the Squamish Nation, Lil'wat Nation and provincial government within this area.

Commercial Recreation

Whistler Paintball Crown Land tenure

Whistler Paintball have a Crown Land licence of occupation (Land File# 2408709) tenure and paintball playing fields in the area beneath the BC Hydro lines and low lying slopes. Overlapping use for a disc golf course may be restricted in this area.

Figure 2: Sea to Sky LRMP Cultural Sites Green Lake North Síiyamín ta Skwxwú7mesh (cultural) site and Lil'wat Nation- Green Lake Spirited Ground Area overlapping proposed Disc Golf Areas E and F.



Course Locations

Cheakamus Community Forest Ecosystem-Based Management Reserve

Slope >45 degrees

Lake

Stream

Building Footprints

Cadastre - DataBC

Contour Interval

1m interval

20m interval

Trails

Access

Black Diamond

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300

Meters

Map 1 - Low ESG
Comfortably Numb

Disc Golf Feasibility Study
Whistler
British Columbia

Tailed Frog
Hwy 99
660m
Comfortably Numb
Comfortably Numb (Wedge North Main line FSR)
680m
680m
North Secret Alt Access
Happiest Days
Comfortably Numb (North Secret)
680m
680m
700m
COMFORTABLY NUMB
Access Road
700m

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Course Locations
Cadastre - DataBC
Species at Risk - Potential Habitat

Trails
Access
Black Diamond
Lake

Stream

Contour Interval
1m interval
20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 2 - Medium ESG
Comfortably Numb

Disc Golf Feasibility Study
Whistler
British Columbia

Hwy 99

Comfortably Numb

Comfortably Numb (Wedge North Main line FSR)

660m

680m

North Secret Alt Access

Happiest Days

Comfortably Numb (North Secret)

COMFORTABLY NUMB

680m

700m

Access Road

Rethel Creek

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ENVIRONMENTAL DATA DISPLAYED IS APPROXIMATE FROM GIS LAYERS PROVIDED AND HAS NOT BEEN FIELD VERIFIED

700m

Course Locations
Wetland
Riparian
Stream

Lake
Cadastre - DataBC

Trails
Access

Black Diamond

Contour Interval
1m interval
20m interval

GIS Cartographer: Oliver Chew
Date: *2023-01-04*
CERG File #: 1162-01-01
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300
Meters

Map 3 - High ESG
Comfortably Numb

Disc Golf Feasibility Study
Whistler
British Columbia

1.7 Site G – Function Junction

Table 7: Results of DGCESG Assessment for Site A

ESA Overlap layer	ESA Rating
Riparian Areas	High
Large and Old Cottonwoods	High
Species at Risk Habitat	Medium
Unlogged Core Forest	Low
Coastal Western Hemlock (CWH) Old Forest	Low
Slopes above 45 degrees	Low

1.7.1 Constraints

Riparian areas of Miller Creek and tributaries from the steep slopes that intersects the area should be avoided in disc golf course design where possible.

Mitigation measures will be required for design and construction based on species at risk habitat. Species-at-risk occurrences could include plants and wildlife in around talus slopes. Further species at risk studies would be required in course development.

Mitigation measures to protect forest ecosystem habitat will need to be implemented in forest ESA areas.

The area has a large area of steep slopes above 45 degrees.

1.7.2 Opportunities

The hydro right of way area within the area has provided an area less environmentally sensitive to develop a course due to existing disturbance.

1.7.3 Other Land Use Considerations

- High and moderately high-rated grizzly bear (*Ursus arctos)* forage habitat polygons have been identified northwest and east of the area on the upper reaches of the slope. The habitat polygons have been described in the study; *Grizzly Bear Habitat Mapping* around the *Mount Sproatt/ Rainbow Mountain Trail Network and Implications for Trail Management* (MacHutchon, 2020). Course design should consider these polygons to prevent disturbance and discourage human use in the area.
- Talus slopes located in the area are usually designated as sensitive areas due to the habitat they provide and should be avoided from course design.

Trails

- The Rainbow Sproatt Flank Trail intersects the area.

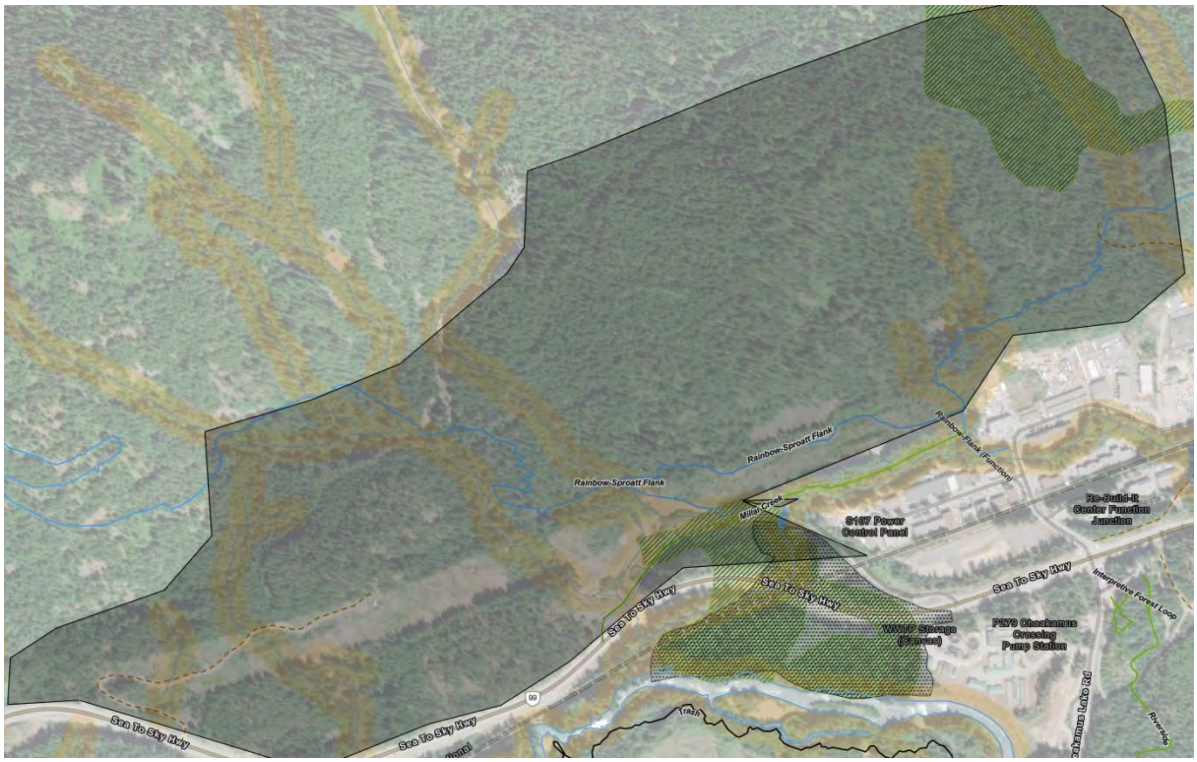

Figure 3: High ESA's including riparian areas in orange and large and old Cottonwood areas in green.

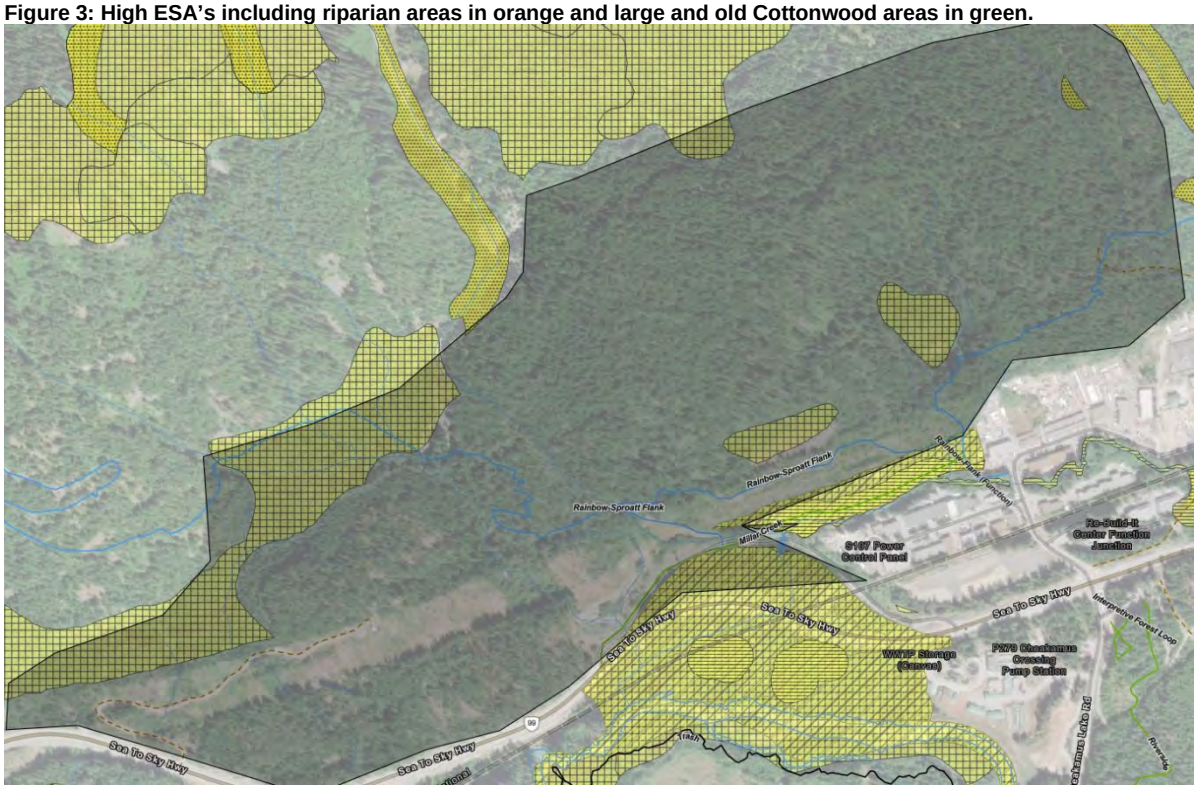

Figure 4: Medium ESA's including potential species at risk habitat.

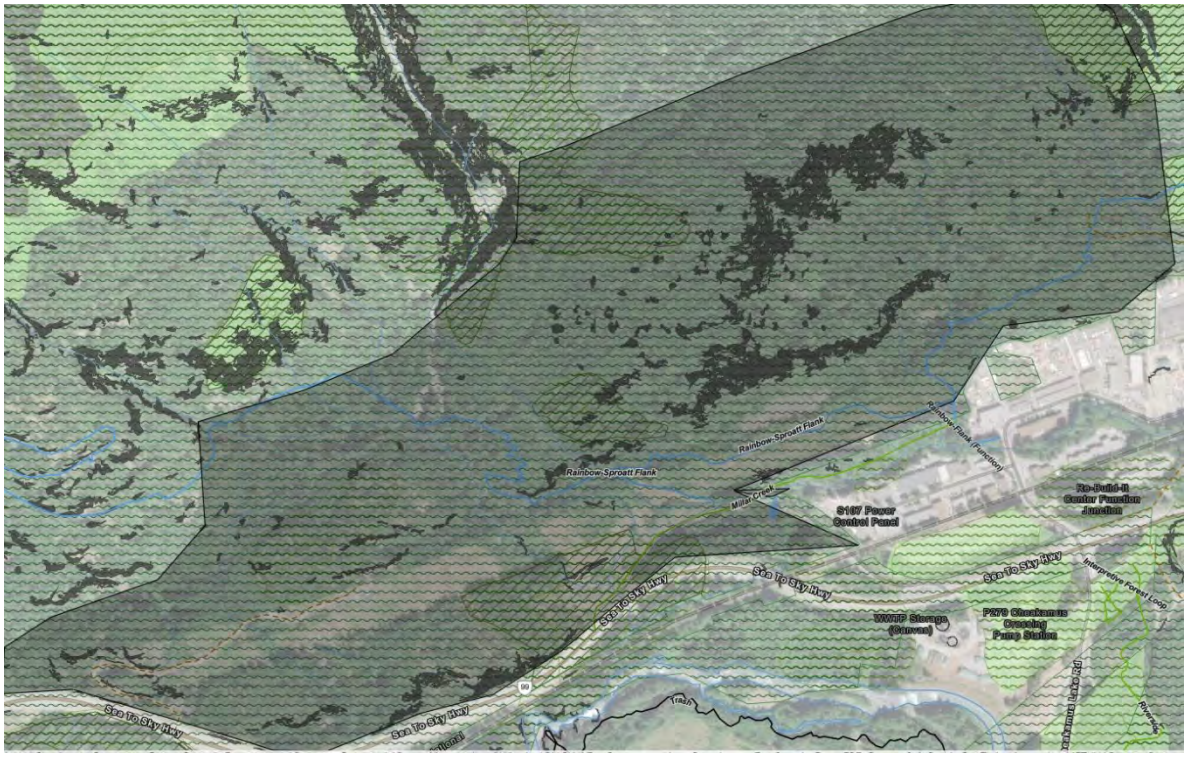

Figure 5: Low ESA's including steep slopes >45 degrees in black, unlogged core forest in green hash and CWH Old Forest in light green.

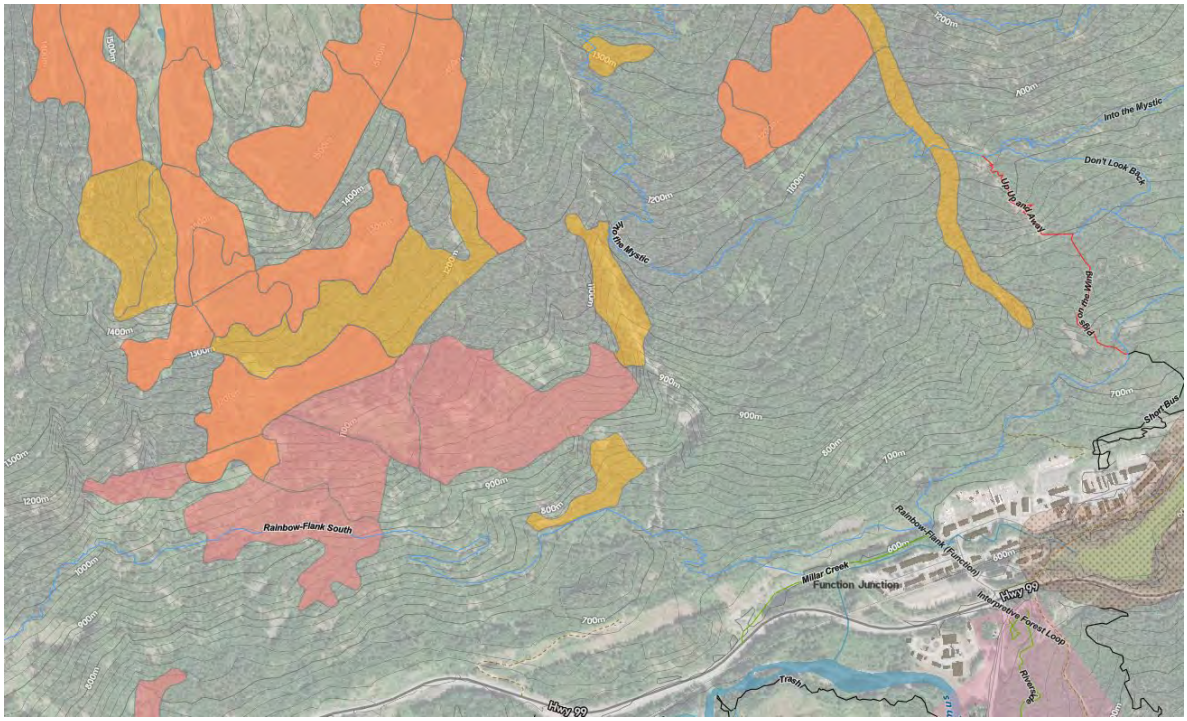

Figure 6: High and moderately high rated grizzly bear forage habitat on the upper slopes of the area.

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14. Appendix D: Disc Golf Environmental Suitability Guidelines.

Prepared by: Cascade Environmental Research Group.

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

Disc Golf Environmental Suitability Guidelines

Prepared for:
Resort Municipality of Whistler

Prepared by:
Cascade Environmental Resource Ltd.

Project No.: 1162-01-03
Date: October 11, 2022

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Table of Contents

1 Introduction

1.1 Intent of Guidelines

The Disc Golf Environmental Suitability Guidelines (DGESG) tool has been produced to identify the complex environmental conditions and habitats present within the Whistler area for recommendations in maintenance and proposed development of disc golf course activities. The DGESG utilises current best practice, guidelines and policies from a municipal and provincial governance level. As per the Resort Municipality of Whistler's (RMOW) Official Community Plan (OCP) the natural environment is considered one of the community's greatest assets. Protecting the environment while accommodating tourism, housing, recreation and infrastructure development, is a priority for the community (RMOW 2019).

The ESG is informed by the protection of sensitive ecosystems development permit areas from the RMOW OCP and relevant provincial sensitive ecosystem areas. It provides a planning tool to map existing and proposed disc golf course management and development against these environmentally sensitive areas (ESA).

The intent of this DGESG tool is to allow for recreational planners to research existing and proposed disc golf course management and development against environmental sensitive areas (ESA). The DGESG is designed to be used as a higher-level trail planning tool which highlights areas of environmental sensitivity within proposed or existing disc golf course areas.

ESA's were categorized into high, medium and low potential sensitivity specific to disc gold course activities and development with strategies to avoid within the high rated areas (Table 1). Recreational planners can upload disc golf areas onto the ESG's GIS tool and identify overlapping ESA's. The sensitivity rating of the overlapping ESA's will determine if the disc golf course or activities will be required to be adjusted to avoid ESA or commit to mitigation measures in course management, design and construction to protect these areas.

1.2 Methodology

Cascade Environmental Resource Group Ltd. (Cascade) GIS staff utilized the following environmental GIS layers within the DGESG mapping tool for disc golf recreational planning consideration as defined by the project description.

RMOW Data Layers

- Protection of sensitive ecosystems development permit area and priority habitat listed below
    - Species at risk habitat
    - Ecosystems at Risk
    - Raptor's nesting sites
    - Unlogged core forest
    - Large and old cottonwoods
    - CWH forest
    - Forested floodplain
- Protection of riparian ecosystems development permit area-Schedule J OCP areas
- Wetlands
- Tree preservation covenants
- The emerging municipal Priority Habitat Management Strategy
- Cheakamus Community Forest (CCF) Ecosystem-Based Management (EBM) reserves

Provincial Data Layers

- Ungulate Winter Range (UWR) and other identified wildlife habitat areas
- Old-growth management areas (OGMA)
- Hydrography and topography
- Confirmed occurrences of species at risk
- Community Watershed Areas

2 Use of the ESG Tool

The DGESG tool is too be utilized by a combination of this document with the accompanying online GIS mapping system designed with the previous ESA layers. Recreation planners can utilize the DGESG tool to analyze proposed Disc Golf development or existing maintenance against mapped ESA's with the online map and cross-reference ESA areas and mitigation measures within this document.

The ESA defined within the ESG tool has been categorized into a rating system based on the impact potential of disc gold course development and maintenance activities on these areas. Sensitive Environmental Areas have been ranked as high, medium or low.

The ranking of ESA is described below in Table 1. The rankings were determined by provincial best practices for environmental protection including the develop with care document, species at risk recovery plans and municipal management plans including the Twenty--One Mile Creek Watershed: Source Water Protection Plan

The steps below describe the process of using the DGESG tool:

1) A digital geospatial file of the Disc Golf area will be uploaded or defined directly on the GIS DGESG tool Map.
2) ESA-'s that overlap the Disc Golf Area alignment will be listed and categorized by their ESG Sensitivity Ranking.
3) The Disc Golf area can then be adjusted or realigned if appropriate based on the results of the DGESG tool to avoid certain ESA areas and the results of the ESA areas produced.
4) Planning Strategies will be cross-referenced against each ESG sensitivity rating in Table 1.
5) Commitments from the proponent of the disc golf course development or existing maintenance should be based on the relevant mitigation measures listed in Section 3

Table 1: Sensitivity Ratings for ESA's and Corresponding Planning Strategies

ESG Sensitivity rating	ESG Environmental Sensitivity Area	Guidelines
High ESA- Greatest potential impact from recreation Disc Golf course n development Activities	• Wetlands • Riparian areas • Species at risk confirmed occurrences • Raptor nest occurrences • Forested floodplain areas • Community watershed protecting drinking water supply • Large and old cottonwoods	• Avoid disc golf course development wherever possible
Medium ESA- potential environmental impacts if appropriate studies and careful recreational planning and mitigation measures are not implemented in these areas	• Species at risk potential habitat* • Community watershed protecting other uses	• Proposed Disc Golf development must commit to additional studies were required if overlapping with certain ESA's. • Commitments to mitigation measures and trail design for each user must be adhered to during trail authorizations * ESA areas with asterisks will require QEP verification, other field verifications can be conducted by trail construction professionals
Low ESA- Trail planning and mitigation measures can minimize the impact of trail construction and recreation activities on this feature	• Topography- slope angle over 45º • Sensitive Forested Areas (Old Forest, Unlogged Core forest, Tree preservation covenants, OGMA's, CCF EBM's) • UWR	• Commitments to mitigation measures for each user must be adhered to during trail au

3 Mitigation Measures

ESAs that have been identified with the ESG mapping tool that overlap proposed trail alignments or existing trail maintenance activities will be cross-referenced to associated mitigation measures for the protection of these areas. Details of relevant commitments by the proponent can then be detailed in the planning of Disc Golf Courses or maintenance.

A description is provided for each ESA on it is ecological importance, potential impacts, relevant mitigation measures and suggested monitoring components.

3.1.1 Wetlands

Wetlands are considered a high ESA area within the DGESG because:

- Wetlands are susceptible to damage from recreational activities.
- Wetland habitat areas have been reduced within BC and Whistler specifically from development activities.
- Wetlands host a wide range of habitats for plants and wildlife including species at risk.

Disc Golf course development must avoid activities below the top of the bank of wetlands and immediate riparian areas

Potential Impacts

Wetlands are areas where soils are water-saturated for a sufficient length of time such that excess water and resulting low soil oxygen levels are determinants in soils and vegetation development (MacKenzie 2004). Wetlands can include ecosystem sites permanently flooded by shallow water or forested sites with wet soils (Mackenzie, 2004). Recreation activities in and around wetlands can lead to trampling of vegetation and impact wetland wildlife species (WSP, 2009).

Planning Mitigation Measures

- Wetland and associated riparian areas must be avoided in disc golf course design.

Maintenance

- Maintenance should be conducted in line with planning mitigation measures

General Recommendations

The wetland mapping was provided by GIS interpretation and will require a detailed field verification to analyze wetland boundaries. The ESG spatial data is used as a guide to aid disc golf recreation planning.

3.1.2 Riparian Areas

Riparian areas include the riparian areas listed in Schedule J of the RMOW OCP. Riparian areas are the areas bordering on streams, lakes, and wetlands that link water to land. The blend of streambed, water, trees, shrubs and grasses directly influences and provides fish habitat and are also important areas for terrestrial species. Riparian ecosystems also provide a natural setting and visual assets of great significance to the municipality. For all these reasons, riparian ecosystems warrant protection from development. A 30 m setback from the highwater mark of watercourses are defined as per municipal the Riparian Ecosystem Protection Area (REPA)

Potential Impacts

- Loss of riparian vegetation can reduce the quality of fish habitat (shade, nutrient inputs: leaf fall and insect drop)

- Trampling of stream/lake banks causes erosion, decreases water quality, and harms fish
- Soil compaction and vegetation removal will encourage the introduction of invasive plants

Mitigation Measures

- Avoid riparian areas in disc golf course design
- If a connecting trails are planned between holes that must cross a riparian area and watercourse the trail design should cross the riparian area at a right angle to minimize impacts.
- If disc golf course and holes are adjacent to riparian areas wooden fencing should be constructed on riparian boundaries with appropriate signage to delineate, educate and restrict recreational user access to the area.
- Riparian areas should be designed as penalty areas in disc golf design to prevent recreational users playing discs within these areas.
- Disc golf course design should design course and hole alignment to reduce the likelihood of wayward discs entering these riparian areas.

Planning And Trail Modifications

- If trail connections between holes are required ensure trail layout is not parallel to stream.
- If a trail connection between holes must cross a riparian area it must cross at right angles to streams. Bridge crossings over watercourses should follow Requirements and Best Management Practices for Making Changes In and About a Stream in BC regulated by the provincial *Water Sustainability Act.* Reduced risk timing windows for fish and fish habitat should be incorporated based on species presence. An environmental monitor should be used to monitor any works required to for changes in and about a stream.
- Measures must be implemented to reduce trail corridors at grade level to prevent stopping at bridges before and after. e.g. logs before and after bridge crossings
- If a connecting trail between holes must cross a riparian area fencing should be considered on the trail corridor to prevent recreational encroachment.

Monitoring

Factors to monitor if Disc Golf Courses are adjacent to riparian areas.

- Loss of riparian vegetation
- Increased soil exposure
- Evidence of bank erosion and downstream siltation (cloudy sediment-laden water)
- Signs of concentrated run off and accumulated debris

Monitor by:

- Annual maintenance inspections

Maintenance

- Maintenance should be conducted in line with mitigation measures.

General Recommendations

The ESA spatial data is used as a guide to aid disc golf development and maintenance activities and commitment to mitigation measures for riparian and the forested floodplain areas should be adhered if observed during in field development if not previously recognized.

There are exemptions for trail designs that may be used as connecting trails between holes from permits under Schedule J riparian areas as described below (RMOW, 2019)

"(g) Construction of trails for non-motorized use consistent with the Whistler Trail Standards, provided they are located further than 10 metres from the high water mark of a stream, do not exceed 1.0 metre in

width, are constructed of pervious natural material with no concrete, asphalt or pavers and no creosoted or otherwise treated wood, and require no removal of vegetation."

3.1.3 Confirmed Species at Risk Confirmed Occurrences

The B.C. Conservation Data Centre (CDC) maps known element occurrences of red and blue listed species at risk. The DGESG displays these listed occurrences for analysis for disc golf design and activities within the associated mapping tool.

Potential Impacts

The development of a disc golf course and associated activities could disturb required habitat features during development or directly disturb an individual species causing physiological stress during the development of the course or associated disc golf activities.

Mitigation Measures

- Disc golf course design must avoid known element occurrences of species at risk and given a protective buffer dependent on the species. The provincial Develop with Care document (MOE, 2014) has a table of buffers for particular species dependent on activity.
- If a species of risk cannot be avoided in disc golf course design a Qualified Environmental Professional (QEP) must be contacted to provide a study of the proposed area and provide applicable mitigation measures to that species if applicable.

Planning and Disc Golf Course Modification Measures

- Disc golf course facilities, holes and connecting trails should be routed or modified to avoid known species at risk occurrences.

Monitoring

- If disc golf activities are conducted near a known species at risk occurrence the land manager maintaining the course should know of its location and monitoring should be considered to ensure that adjacent disc golf activities are not causing disturbance or impact.

Monitor by

- Regular inspections during routine maintenance

Maintenance

- Maintenance should be conducted in line with mitigation measures.

3.1.4 Raptor Nest Sites

Raptors occur in nearly all terrestrial habitats of British Columbia. They are recognized as an integral part of B.C.'s ecosystems and are legally protected.

Potential Impacts

In British Columbia, conflicts between habitat requirements of raptors and urban and rural developments have been frequent because the valleys and shorelines that are ideal for settlement are also important raptor habitat.

Mitigation Measures

- Known raptor nest occurrences must be avoided by disc golf course development and maintenance activities.

- New disc course development must include a raptors survey conducted by a QEP to identify any potential raptors nests that may be located in the proposed area.
- If a raptors nest is found within a proposed disc golf course area appropriate protective buffer must be applied in design to avoid these areas as per Table 6 in the *Guidelines for Raptor Conservation during Urban and Rural Land Development in British Columbia* (2013).

Monitoring

Factors to monitor if disc golf courses are adjacent to protective raptors nest buffers and known occurrences.

- Continued use of raptors nest during adjacent disc golf activities.

Monitor by:

- Annual inspections by the land manager who maintains the disc golf course.

3.1.5 Forested Floodplain

Forested floodplain is a non-wetland ecosystem that occurs on regularly flooded riparian sites usually on the floodplains of rivers (MacKenzie, 2004). A flood ecosystem can be low, medium or high bench sites based on topography and landscape position. Flood ecosystems are usually inundated during the spring freshet with low bench experience longer (20-40 days) and more powerful flooding than middle benches (<25 days) (MacKenzie, 2004). Sites can be deeply flooded during the first few weeks of the growing season but are situated well above normal summer flows.

Flood ecosystems are intensively used by many wildlife species. They are lush habitats with structural elements not found in adjacent uplands. These ecosystems are usually red and blue listed ecological communities as they have been highly modified by flood control structures (e.g. dykes) in valley community settings (MacKenzie, 2004).

Potential Impacts

- Disturbance of environment by recreation disc golf users during flooding and trenching or disturbance of vegetation.

Mitigation Measures

- Avoid disc golf course design and maintenance in designated forested floodplain areas.

Planning and course Modifications

- Route connecting trails or disc golf holes away from floodplain areas.

Monitoring

- If disc golf course activities exists adjacent to forested floodplain areas they should be monitored for flooding during spring freshets.

Monitor by:

- Annual maintenance inspections of disc golf course land manager during freshet

Maintenance

- Use seasonal area closure signs if flooding occurs on course.

3.1.6 Community Watersheds-Drinking Source

Community watersheds play an important part in protecting water quality for communities and private water users that rely on surface water sources. A community watershed is defined under the *Forest & Range Practices Act* (FRPA) as all or part of the drainage area that is upslope of the lowest point from which water is diverted for human consumption by a licensed waterworks. Community watersheds must also be designated under the Government Actions Regulation.

There a seven Community Watersheds designated within the RTS boundary. Two of these are designated for drinking water sources including Twentyone Mile (Rainbow and Sproatt Mountains) and Brew (Brandywine) watersheds. The other five watersheds are used for other sources and discussed in the medium ESA's in Section 3.2.1.

- Twentyone Mile (Rainbow and Sproatt Mountains)
- Brew (Brandywine)

With regard to the 21 Mile watershed, this area supplies between 45-55% of Whistler's drinking water supply. While this water is treated prior to public distribution the existing treatment system does not include filtration. The cost to add filtration to the treatment system was projected to cost between $20 to $50M in 2015 dollars. Recreational use and more specifically human and animal waste represents a real risk to the watershed. For these reasons it is critical that the RMOW closely control, restrict and monitor recreational use within the watershed in order to protect the public and taxpayers. (21 Mile Source Water Protection Plan, RMOW, 2015)

The Brew Creek Community Watershed is listed as the primary water source for the Brew Creek Lodge.

Potential Impacts

- Potential impacts from recreational trails to community watersheds are associated with potential bank erosion and siltation of watercourses and pollution of water quality from human and animal waste from recreation activities.
- Increased wildfire risk through public use which could contribute to a major turbidity event in the watershed and possible slope failures affecting source of water supply (RMOW, 2015).

Mitigation Measures

- Disc golf course design must avoid community watersheds which provide a primary drinking source

Monitoring

- If disc golf courses are designed adjacent to watershed boundaries recreation use should be monitored beyond the boundary for any intrusion.

Monitoring by

- Annual maintenance inspections of disc golf course by land manager.

Maintenance

- Maintenance should be conducted in line with mitigation measures.

3.1.7 Large and Old Cottonwoods

Large and old cottonwoods indicate the presence of riparian habitats and provide habitat for associated species (RMOW 2019). Black cottonwoods are ecologically significant as they are fast-growing riparian species that seed and restore riparian waterways on sand and gravel bars and floodplains (Nature Conservancy Canada, 2022). Large and Old cottonwoods provide standing snags and are prone to heart rot making them excellent cavity habitat for wildlife including the western screech owl and other plant species at risk (Nature Conservancy Canada, 2022). Recreation Disc Golf planning and activities should consider these important habitat factors in design and activities.

Potential Impacts

- Removal of large cottonwood trees for disc golf course deign
- Removal of cottonwood tree's adjacent to disc golf courses due to the susceptibility to rot and the tree's being classified as a danger tree once the course is in use. Cottonwood provides excellent cavity habit and wildlife trees but can become a hazard to recreation users.

Mitigation Measures

- Disc Golf course design must avoid old and large cottonwood areas in course design.

3.2 Medium Ranked ESA

Medium ESA's have the potential to mitigate most potential environmental impacts if appropriate studies are completed in conjunction with careful recreation planning.

3.2.1 Community Watersheds-Other Uses

Other community watershed areas in the Whistler Valley designated for uses other than providing drinking water sources are listed below. These watershed areas are currently used for firefighting but have a potential to be reactivated for periods of drought or as required for potential growth.

- Blackcomb Creek
- Whistler Creek
- Alpha Creek
- Agnew Creek
- Rideau Creek

Potential Impacts

- Potential impacts from recreational use to community watersheds are associated with potential bank erosion and siltation of watercourses and pollution of water quality from recreation activities including potential human waste within the area. As these community watersheds are currently used for firefighting recreational impacts are not as high-risk as the drinking source use.
- Increased wildfire risk through public use which could contribute to a major turbidity event in the watershed and possible slope failures affecting source of water supply (RMOW, 2015).

Mitigation Measures

- Disc golf course design should identify and protect watercourses in these community watershed areas from recreational impacts. If riparian mitigation measures are followed as per section 3.1.2 including buffers, minimizing connecting trails and crossings in riparian area impacts will be mitigated.
- Washroom facilities must be appropriately placed away from watercourses in these community watersheds.

Monitoring

- If disc golf courses are designed within community watershed boundaries for non-drinking water designated use watercourses should be monitored for;
    - Increased erosion on banks of watercourses from recreational use.
    - Signs of pollutants entering watercourses.

Monitoring by

- Annual maintenance inspections of disc golf course by land manager

Maintenance

- Maintenance should be conducted in line with mitigation measures.

3.2.2 Species at Risk Habitat

Species at risk habitat designation in the Whistler area is a detailed habitat evaluation outside of the scope of this report as species and habitat preferences can vary between season and the various ecosystems. This report utilizes the RMOW species and ecosystems at risk document for confirmed species at risk within the RMOW and designated locations and known observed locations for consideration in trail use planning. The RMOW confirmed wildlife species at risk is based on the most recent work completed by the Whistler Biodiversity Project and results form the annual Bioblitz which was last complied in 2020 (Brett 2020). The DGESG has focused on the larger keystone species including amphibians, birds, fish and mammals (Table 2)

Plant and invertebrate species at risk also have confirmed occurrences within the RMOW but are difficult to delineate habitat characteristics at a landscape planning level. As a detailed plant species at risk mapping was not conducted for this report, land managers should retain a QEP to research confirmed plant species at risk as per the appendix table and confirm if the proposed area could provide habitat and be potentially impacted. Whitebark pine has been included in Table 2 as it is a species that is easily identifiable and has known recorded occurrences

Step by Step Methodology for researching confirmed species at risk habitat

Species at risk searches should be conducted at a site level for proposed disc golf course development or expansion and maintenance activities. Land managers developing the course should retain a QEP to analyze which individuals are possibly using the habitat from the species at risk search criteria listed below.

The proposed Disc Golf activity and course development analysis produced from the DGESG mapping tool can be utilized to determine what habitat characteristics are within the proposed Disc Golf course area and which species at risk in Table 2 could potentially use this habitat based on its preferences.

A step-by-step process to search potential species at risk habitat within the trail alignment area is described below:

1) List the different habitat types that overlap with the proposed disc golf activity alignment

2) Compare listed habitat types and ESA layers to confirmed species at risk wildlife species in Table 2 and make a list of potential species that could be impacted by the Disc Golf activities.

3) Compare types of habitat listed to confirmed and possible species of plant and wildlife in Appendix A and make list of species that could be impacted.

Table 2: Confirmed Wildlife species within the RMOW

Wildlife Class	Species	BC Status	Habitat Preferences and occurrences in the RMOW	ESG habitat layer
Amphibian	Coastal tailed frog *Ascaphus truei*	Yellow	Mountainside creeks >6 ºC water temperatures, mainly between 700 and 122 m, especially rounded cobbles confirmed presence in 15 RMOW creeks	Coastal tailed frog habitat layer
Amphibian	Western toad *Anaxyrus boreas*	Yellow	Various upland habitats around ponds, lakes, reservoirs, and slow-moving rivers and streams. Known continuous breeding site is Lost Lake.	Watercourse lines, Lost Lake
Amphibian	Northern red-legged frog *Rana aurora*	Blue	Lakes and small ponds in warm sites at the south end of the RMOW, especially Brandywine; also confirmed on n. side of Callaghan Road on Calcheck FSR.	Northern red- legged frog habitat layer
Bird	Common Nighthawk *Chordeiles minor*	yellow	Mountains and plains in open coniferous forest, savanna, grassland, and towns. Nesting occurs on the ground on a bare site in an open area.	Unlogged Core Forest, Tree Preservation Covenants, OGMA's, CCF-EBM's
Bird	Evening Grosbeak *Coccothraustes vespertinus*	yellow	Coniferous (primarily spruce and fir) and mixed coniferous-decidouous woodland, second growth, and occasionally parks; in migration and winter in a variety of forest and woodland habitats, and around human habitation.	Unlogged Core Forest, Tree Preservation Covenants, OGMA's, CCF-EBM's
Bird	Band-tailed pigeon *Patagioenas fasciata*	Blue	Seen in CWH and MH forest , riparian and urban areas. Can breed in urban and edges and forest	Riparian layer
Bird	Barn swallow *Hirundo rustica*	Blue	Wetlands, grassy areas, riparian, urban areas. Historical nesting at float plane wharf	Wetland layer Riparian layer Green Lake float plane
Bird	Black swift *Cypseloides niger*	Blue	Alpine CWH and MH forests nests in cliff/steep bluffs known nests in Brandywine Canyon and potentially Soo Bluffs	n/a
Bird	Great blue heron *Ardea herodias ssp. fannini*	Blue	Foraging mainly in valley bottom lakes, wetlands and riparian areas. No known breeding sites nearby.	Wetlands Lakes Streams Heron habitat layer

Bird	Green heron *Butorides virescens*	Blue	Rivers and streams, wetlands, riparian adjacent to shrub or small tree cover.	Wetlands Stream alignment Heron habitat layer
Bird	Northern goshawk *Accipiter gentilis ssp. laingi*	Red	Alpine, CWH and MH forest and wetlands. Nest sites in old growth montane forest at Wedge Creek and Whistler.	Wetlands CWH Old forest
Bird	Olive-sided fly-catcher *Contopus cooperi*	Blue	CWH and MH forests, riparian habitats breeding requires snags adjacent to openings/wetlands.	Riparian wetlands
Fish	Bull trout *Salvelinus confluentus pop. 28*	Blue	Green Lake, Fitzsimmons Creek	Green Lake Fitzsimmons Creek watercourse alignments
Mammal	Grizzly bear Ursus arctos	Blue	Callaghan Brandywine and Sproatt areas. Non-forested or partially forested sites with a wide range of foraging opportunities and choice of habitats.	Grizzly bear class 1 and Class 2 habitat forage polygons
Mammal	Mountain goat *Oreamnos americanus*	Blue	Historically breeding and habitat use, possible use on Sproatt winter range.	Mountain goat ungulate winter range polygons
Mammal	Wolverine *Gulo gulo luscus*	Blue	Potential breeding and habitat use specifically Brandywine, Callaghan, Fitzsimmons and Cheakamus River.	n/a-home ranges are so large habitat features difficult to delineate
Mammal	Little Brown Myotis *Myotis lucifugus*	Yellow	Summer roosts are in buildings and other man-made structures, tree cavities, rock crevices, caves and under the bark of trees. Uses underground habitat such as caves for hibernacula	Bat habitat layer
Plants	Whitebark pine *Pinus albicaulis*	Blue	Common on warm aspect sites near treeline	Whitebark pine known species at risk occurrences

Brett, 2020

Potential Impacts

- Disturbance of species at risk habitat leading to a reduction in habitat quality.

Mitigation Measures

- Follow the DGESG Guidelines of a Species at Risk Search to identify possible species at risk habitat.
- Create mitigation measures for species at risk potentially utilizing habitat within the proposed trail alignment through trail design and construction. A QEP or suitable specialist are expected to analyze potential impacts and provide recommendations on these features.

Planning And Trail Modifications

- Reduced risk timing windows should be incorporated for disc golf course development or maintenance in areas identified to contain possible wildlife species at risk and general wildlife species.
    - Migratory bird species reduced risk timing window is usually outside of their breeding and nesting period of April 1st to September 1st. Activities including vegetation clearing for sic golf course development outside of the reduced risk window would need rationale and appropriate mitigation measures including bird nest surveys conducted by QEPs.
    - Amphibians, reptiles, fish, and mammals also have specific reduced risk timing windows that should be considered for trail construction in their potential habitat. If activities cannot be performed in these reduced-risk timing windows justification and mitigation measures will be required.

Monitoring

- Record wildlife encounters, actions taken, and responses of animals during recreation use.

Monitor by:

- Record of public comments.

Maintenance

- Maintenance should be conducted in line with mitigation measures.

3.3 Low Ranked ESA

The ESG tool ranks ESA's as low, as recreation planning mitigation measures can minimize recreation activity impacts on this feature.

3.3.1 Topography and Slope Angle

The ESG has considered steep slope angles disc golf course development as above 45%.

Potential Impacts

- Recreational activities on steep ground can change drainage patterns and cause erosion
- Erosion will remove organic material from soil and expose roots damaging native vegetation
- Erosion causing sedimentation of streams will decrease water quality and harm fish and fish habitat

Mitigation Measures

- Disc golf course design should implement course and trail connections to utilize methods that will mitigate steep sections of the course to reduce erosion potential.

Planning And Trail Modifications

- Connecting trials on fairways or between holes on steep gradients should follow the following trail guidelines:
    - The half rule – the gradient of a hillside or sideslope trail should be half of the fall line gradient.
    - Grade Reversals – frequent grade reversals are necessary on sloping trails to limit the slope length of the trail, and thereby shed water at shorter intervals.
    - Outslope – outslope trails on steeper terrain to shed water off the tread. An alternative is to provide insloping trails with frequent grade reversals and culvert the water across the trail to the downslope side.
    - Large rocks and stones can be placed in steep decent areas to minimize trail erosion.
    - Stairs can be constructed in sustained steep areas to prevent erosion.

Monitoring

Monitor course and connecting trail conditions for:

- Erosion of trail bed
- Scoured ruts
- Deposition of soil and debris at switchbacks or change in slope
- Sediment-laden water below erosion sites
- Loose stones and gravel left on trail
- Signs of slumps and tension fractures in trail surface

Monitor by:

- Annual maintenance inspections by land manger

Maintenance

- Maintenance should be conducted to ensure continued compliance with the planning and modification mitigation measures.

General Recommendations

The ESA spatial data is used as a guide to aid trails planning**,** commitment to mitigation measures for slope angle over 45º areas should be adhered to during trail construction if observed.

3.3.2 Sensitive Forested Areas (Unlogged Core Forest, Tree Preservation Covenants, OGMA's, CCF-EBM's)

Relevant sensitive forest ESA's have been grouped under one heading as the ESA layers all aim to protect certain forest ecosystems.

Unlogged Core Forest Habitat

Unlogged core forest areas are large swaths of land made of contiguous areas of unlogged forest that provide interior forest habitat that sustains the viability of the plant and animal communities that depend on its stable environmental conditions (RMOW 2019).

CWH Old Forest

CWH forests are unmanaged lower elevation CWH forests largely greater than 300 years old (RMOW, 2019).

OGMA's

Old Growth Management Areas are provincially protected old-growth forests protected from harvesting operations in BC.

Tree Preservation Covenants

The RMOW tree preservation covenants are covenants secured under section 219 of the *Land Title Act* on land title parcels. These covenants typically establish tree preservation zones within properties, where trees and vegetation cannot be removed to accommodate development. Also, they often include replanting guides to rehabilitate areas disturbed by natural hazards or permitted development (RMOW 2022).

CCF -Ecosystem-based management reserves

An Ecosystem-Based Management (EBM) Reserve is a designated voluntary area of protection designated by the CCF to protect forests from harvesting practices for ecological, cultural or recreation reasons (CCF, 2015). Trail activities or proposals in these areas will not have the same degree of impact on these designated environmental areas as harvesting activities. However, protection of these designated ecosystems should be considered within trail planning and appropriate planning and mitigation measures applied. EBM's are designated either for environmental or recreational designations. The DGESG focuses on the environmental EBM's. However, recreation EBM's should be consider for impacts on existing recreation values during trail planning.

Disc golf course development activities must consider the forested ecosystem within these areas and follow the mitigation measures provided.

Potential Impacts

- Removal of trees for disc golf course development
- Trampling of forest understory vegetation from disc golf activities
- Habitat fragmentation
- Soil compaction
- Invasive species introduction from recreation activities

Mitigation Measures

- Minimize the removal of trees with careful course design planning and routing
- Coarse wooded debris should be left in an undisturbed state wherever possible in course design
- Wildlife trees/snags should be retained and avoided in course design to reduce the need for danger tree removal once the course is constructed.
- Mulch should be added to a depth of 6 inches around high foot trafficked areas including tee boxes and greens to prevent soil compaction.
- Tree protection zones should be mulched 2x the dripline in high use areas of the course e.g. around tee and green to protect soil compaction and root protection.
- Tees should be made form pervious materials e.g. wood or concrete to prevent soil compaction
- Impact protection in the form of wooden poles can be used in front of tress if necessary, on high strike zones e.g. close proximity to the tee.

Planning and Modifications

- Define trails on fairways to discourage trail braiding on the forest floor. Consider mulching the trail tread to prevent soil compaction.
- Define trails between the holes to prevent trail braiding of the understory of the forest. Employ appropriate drainage and erosion considerations in connecting trail design as listed above in section 3.2.3. Consider gravel or mulching the connecting trails to prevent soil compaction.
- Avoid trail connection routing between holes that encourages users to take shortcuts where an easier route or interesting. Use landforms or vegetation to block potential shortcut routes.
- Trail width standards should be reduced in these areas wherever possible to reduce tread impact within the forested area.

- Provide clear wayfinding signage throughout the course to prevent trampling of vegetation
- Provide a boot-cleaning brush stand at the entrance of the course to encourage users to clean boots of material before and after using the course to prevent invasive species spread.
- Provide educational environmental signage at the course describing appropriate course rules including
    - staying on designated trails
    - identification of environmental sensitive areas e.g. riparian areas
    - importance of cleaning boots before course use to prevent potential spread of invasive species.

Monitoring

- Annual monitoring to ensure compliance with mitigation.

Maintenance

- Maintenance should be conducted in line with planning and trail modifications mitigation measures.

3.3.3 Ungulate Winter Range Habitat

One UWR for mule deer is located north of Green Lake by the entrance to Cougar Mountain which could be used potentially for a disc golf course. There are currently no provincial restrictions for this species regarding recreational use.

Ungulate winter range habitat provides important winter habitat requirements to ungulates that are not adapted to deep snow. Winter is the most critical period for mountain goats, primarily due to nutritional stress as a result of reduced food availability. Ungulate winter range typically consists of south and southwest aspect slopes which experience more sun and less snow accumulation than north-facing slopes. Winter diets tend to shift to greater conifer browse and litterfall including lichen and branches. (MOE 2010).

Other UWR for mountain goat in the Whistler Valley are located in alpine areas likely not suitable for disc golf course development and activities and have not been considered for the DGESG.

As disc golf is seasonal in use and rarely played with snow on the ground this ESA has been categorized as low.

Potential Impacts

- Disturbance of vegetation in summer months by disc golf activities and course development that could provide snow intercept for UWR habitat values in the winter.

Mitigation Measures

- If a disc golf course design is considered in a UWR mitigation measures to retain forest ecosystem features should be implemented as per Section 3.3.1.

3.4 General Recommendations

General recommendations are presented here as best practice.

3.4.1 In Field ESA Observations

The DGESG tool is designed to guide Disc Golf recreation planning, however avoiding spatial data locations on the map does not guarantee avoiding ESAs. High, Medium and Low ESA's may still be

observed during on ground assessment/ course development. Commitment to mitigation measures for each ESA must be adhered to during disc golf recreation development and maintenance if observed. If this is a high-level ESA (e.g. Wetland) a QEP or suitable specialist are expected to analyze potential impacts and provide recommendations on these features.

3.4.2 Management actions

The preventative maintenance and management actions should be triggered by monitoring indicators, allowing for a staged approach to ensure management measures are taken for each ESA. This is outside of the scope of the ESG but is recommended for consideration as part of the management plan.

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Appendices

Appendix A: Confimred Species at Risk Plants and Invertabrates within the RMOW

Wildlife Class	Species	BC Status
Lichen	spiny witch's hair *Alectoria imshaugii*	Blue
Lichen	alpine redhead Nodobryoria subdivergens	Blue
Lichen	electric rocktripe Umbilicaria decussata	Blue
Moss	Olympic brachydontium moss *Brachydontium olympicum*	Red
Moss	Holzinger's brachythecium moss *Brachythecium holzingeri*	Blue
Moss	tall-clustered thread-moss *Bryum pallescens*	Blue
Moss	grimmia moss *Grimmia caespiticia*	Blue
Moss	Donn's grimmia *Grimmia donniana*	Blue
Moss	black grimmia *Grimmia incurva*	Blue
Moss	Nevada homalothecium moss *Homalothecium nevadense*	Blue
Moss	alpine hygrohypnum moss *Hygrohypnum alpinum*	Blue
Moss	Cardot's pohlia moss *Pohlia cardotii*	Blue
Moss	pseudoleskea moss *Pseudoleskea radicosa var. pallida*	Blue
Moss	pygmy racomitrium moss	Blue

	Racomitrium pygmaeum	
Moss	thickpoint grimmia *Schistidium crassipilum*	Blue
Moss	tripterocladium moss *Tripterocladium leucocladulum*	Blue
Liverwort	Haplomitrium hookeri	Blue
Liverwort	Jungermannia atrovirens	Blue
Liverwort	Nardia breidleri	Blue
Liverwort	Nardia compressa	Blue
Liverwort	Nardia geoscyphus	Blue
Liverwort	Scapania curta var. curta	Blue
Liverwort	Scapania obscura	Blue
Liverwort	Scapania scandica var. scandica	Blue
Liverwort	Solenostoma confertissimum	Red
Bee	Fernald's Cuckoo Bumblebee *Bombus flavidus*	Blue
Butterfly	Western Pine Elfin, sheltonensis ssp. *Callophrys eryphon ssp. sheltonensis*	Blue
Butterfly	Dun Skipper *Euphyes vestris*	Blue
Butterfly	Clodius Parnassian, pseudogallatinus ssp. *Parnassius clodius ssp. pseudogallatinus*	Blue

15. Appendix E: Environmental Impact Study – Lost Lake Disc Golf Course.

Prepared by: Cascade Environmental Research Group.

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

Environmental Impact Study

Lost Lake Disc Golf Course, Whistler, BC

Prepared for:
Resort Municipality of Whistler

Prepared by:
Cascade Environmental Resource Group Ltd.

Project Number: 013-18-06
Date: November 8, 2024

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This Document should not be construed to be:

- A Phase 1 - Environmental Site Assessment
- A Stage 1 – Preliminary Site Investigation (as per the Contaminated Sites Regulations of the Waste Mgt. Act)
- An Environmental Impact Assessment

Table of Contents

1. Introduction

The Resort Municipality of Whistler (RMOW) conducted a Disc Golf Feasibility study for the rejuvenation and extension of the existing Lost Lake Disc Golf Course (LLDGC) in 2022. Cascade Environmental Resource Group Ltd. (Cascade), working as a sub-consultant for INdesign Disc Course Design (INdesign) and Dialog Design, was retained by the RMOW to work with the consulting team to assess current conditions of the LLDGC and provide a rejuvenation plan with possible expansion areas. An initial desktop environmental assessment was conducted by Cascade as part of the feasibility study and completed in January 2023. After the initial desktop environmental assessment, the RMOW requested that Cascade conduct an Environmental Impact Study (EIS) for the existing course and proposed expansion areas of the LLDGC identified during the disc golf feasibility study.

The Whistler Land Use Procedures and Fees Bylaw states that “If development is proposed to occur within 30 meters of the high water mark of a stream in the Protection of Riparian Ecosystems Development Permit Area or the Protection of Sensitive Ecosystems Development Permit Area under the Official Community Plan, a Qualified Environmental Professional (QEP) must submit an environmental impact study in relation to the development consistent with the assessment methods of the Riparian Areas Protection Regulation” (RMOW, 2022). As the LLDGC is located within a Riparian Ecosystem Protection Area (REPA) and Sensitive Ecosystem Protection Area (SEPA) as delineated by Schedule J and Schedule K (respectively) of the Whistler OCP, Cascade Environmental Resource Group Ltd. (Cascade) was retained to conduct a preliminary riparian assessment as per the BC provincial Riparian Areas Protection Regulation and address the REPA and SEPA requirements for enhancement and expansion activities of the LLDGC within this Environmental Impact Study (EIS).

The purpose of an EIS is to assist RMOW staff in the evaluation of the project's environmental impacts. This report reviews and assesses the biophysical conditions, ecosystem integrity, habitat potential, species present (plant and animal), and aquatic features on or adjacent to the subject site. It includes a discussion of the environmental regulatory framework that may affect development activities and provides alternatives for mitigation or resolution where necessary. Potential constraints are identified and recommendations are provided to inform and facilitate the environmental review and approval process.

This report is based on RMOW Ecosystem Mapping, prior environmental reports relevant to the site and site investigations conducted on October 13, November 8, 10, 16 and 17, 2023. The assessment was conducted by Simon Fry, B.Sc., R.P.Bio., Thea Warren, B.Sc. R.P.Bio and Hannah Grant, B.Sc. Mapping support was provided Nicola Church, B.A., M.Sc. (G.I.S.), and Oliver Chew, B.Sc., Adv. Dip. All project team members have extensive experience in conducting environmental inventories, reviews and assessments.

The existing LLDGC is located within the municipal Lost Lake Park boundaries north of Lost Lake in Whistler, BC. The subject area for the EIS was defined as the area encompassing the existing 27 holes of the LLDGC and proposed expansion hole alignments (Map 1). The disc golf feasibility study identified two areas for a proposed extension from the existing LLDGC to the south and north of the existing LLDGC area, which was also included within the project area. A routing plan was provided for assessment which proposed new alignments of the existing 27 holes.

The existing LLDGC and proposed expansion course overlap two legal land parcels as detailed below:(RMOW 2024).

Northern land parcel:

PID:003-178-897

Zoning Bylaw: RSE1 (Residential Single Estate One)

Southern land parcel:

PID: 015-863-743

Zoning Bylaw: LP1 (Leisure Park One)

- Subject Area
- Hole Direction
- Lost Lake Park
- Right Of Way
- Cadastre - DataBC
- Railway - Main
- Railway - Connecting

Contour Interval

- 1m interval
- 20m interval

Trails

- Access
- Black Diamond
- Blue Square
- Double Black Diamond
- Green Circle
- Hiking
- Mountaineering
- White Circle

Course Features

- Course Start
- Basket
- Practice Basket
- Short Tee
- Long Tee
- XL Tee
- Parking

Fitzsimmons Spit
Old Mill Road
Hooktender
Green Lake Loop
Jelly Roll Gumdrop
Glen Abbey Lane
Mutfin Man
Gandy Dancer
Lost Lake Trail
Son of Mr. Greenjeans
Lost Lake Connector
Foreplay
Centennial
Gee I like Your Pants
Hydro Cut
Mons Rd
Juniper Rd
Riverbend Rd
Toads of the Short Forest
Zappa/Cretins Connector
Treacherous Cretins
Tommy Moore
Central Scrutinizer
Zoot Allures
Connector
Elephant Bridge
Elephant Bridge Connector
Dwarf Nebula
Packard Goose
I'm Not Satisfie
Molly Hogan
Poler's Road
Ms. Pinky
Spruce Grove
Kirkpatrick Way
Spruce Grove Fields
LOST LAKE PARK
Spruce Grove Connector
Soap & Old Clothes
Pinocchio's Furniture
Lower Panorama
Donkey Puncher
Blackcomb Way
Lost Lake Loop

GIS Cartographer: Oliver Chew
Date: *2024-05-15*
CERG File #: 013-18-06
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

Spruce Grove Fields

0 50 100 200 300 400
Meters

Map 1 - Project Area

Lost Lake Disc Golf Course EIS
Whistler
British Columbia

2. Existing Environmental Conditions

2.1. Physical Environment

2.1.1. Climate

The LLDGC subject area lies within the Eastern Pacific Ranges Ecosection within the Coast Mountains Ecoprovince in southern British Columbia (Demarchi, 1996). This Ecosection is comprised of a rugged inland area that has a transitional climate, falling between the rain shadowed Southern Interior Ecoprovince to the east, and the high rainfall associated with the Southern Pacific Ranges Ecosection to the west (Demarchi, 1996). The climate is principally influenced by frontal systems moving in from the Pacific Ocean and over the Coast Mountains to the Interior (Green and Klinka 1994). This transitional climate is characteristically moist and cool in the winter. The climate is also associated with heavy snowfall at higher elevations (Green and Klinka, 1994). Summers are relatively cool, although hot dry spells are frequent. The meteorological records from the Whistler weather station record an average annual total precipitation of 1228 mm. The heaviest precipitation occurs in the month of November (192.1 mm average), while July is the driest month (44.7 mm average). Precipitation as snow can occur from October until May. The mean annual temperature is 6.7°C, with the highest mean monthly temperature occurring in August (16.5°C mean daily average; 24.0 mean daily maximum) and the lowest mean monthly temperature occurring in December (-2.8°C mean daily average; -5.4 mean daily minimum) (Environment Canada, 2024).

2.1.2. Geology

The LLDGC subject area is located within the Southern Coast Mountains, underlain by granitic rock of the Coast Plutonic Complex. This complex is characterized by gneisses and granitoid rocks with pendants and septae of metavolcanic and metamorphosed rocks. These reflect a complex history of volcanic activity, magmatic intrusion and uplift (Monger and Journeay, 1994). Rocky granite outcrops were observed throughout the subject area.

2.1.3.Geomorphology

The Whistler Valley was formed during Pleistocene epoch glaciations and subsequent glacial-fluvial action and mass-wasting in the form of rock and debris flow released by frost heaving, erosion, and seismic activity. The resulting features of the terrain consist of glacial till, glycogenic colluvial soils overlying morainal materials or bedrock.

The surficial character of the moderately sloping areas on the property is best described as thin gravely and stony colluvium deposits over bedrock, with a thin organic litter layer. Because of the dominance of bedrock, the topography is slightly hummocky, consisting of gently to moderately sloped terrain.

2.1.4.Hydrology

The LLDGC subject area is located on the lower slopes of Blackcomb Mountain, in close proximity to the valley floor and south of Green Lake. Surface water drains from the slopes of the subject area and eventually enters Fitzsimmon Creek which then connects to Green Lake on the valley floor below. Two watercourse complexes are indicated within the subject area on the RMOW GIS WebMap, including Fitzsimmons Creek and a Wetland complex draining north and west (RMOW, 2024). Surface flow and watercourses on the subject site are discussed in Section 2.5 – Aquatic Environment. No ground water wells are located in the subject area parcels (iMapBC, 2024).

2.2. Terrestrial Environment

2.2.1. Soils

The general soil type for the Coast Mountain and Islands physiographic region is of the Podzolic Order, residing in the Humo-Ferric Great Group. These soils overlay igneous intrusive rock which is resistant to weathering, thus retarding soil development. Over time however, physical and chemical weathering has produced a coarse textured acidic soil (Luttmerding, 1971).

The soils on and around the subject area are mostly composed of Orthic Humo-Ferric Podzols. These shallow soils are characterized by a thin layer of forest litter, and a stony, gravelly colluvium or glacial till over bedrock. The soils are moderately to well drained and typically found on strongly sloping and moderately rolling topography (Luttmerding, 1971).

2.2.2.Vegetation

During the site surveys conducted on October 13, November 08, 10 and 17, 2023, it was determined that the LLDGC and subject area consists of forested vegetation intersected by multiple trails and the holes of the disc golf course. The existing native vegetation consists of young (Structural Stage 5) and mature (Structural Stage 6) coniferous forest vegetation associations. Signs of previous harvesting disturbance within the subject area from observations of remnant stumps and resource roads indicate the last disturbance factor in the forest regeneration was anthropogenic rather than natural. A description of structural stages is provided in Table 1. Vegetation identified in the subject area is listed in

Table **2**.

Table 1: Vegetation Age Class Descriptions

Structural Stage Code	- Interpretation
1 Sparse/Bryoid	- Community is in initial stages of primary and secondary development - Bryophytes and lichens often dominant - Times since disturbance typically <20 years but may be 50-100 + years in areas with little or no soil - Shrub and herb cover <20 % of total area - Tree cover < 10 % of total area
2a/b/c/d Herb	- Early successional stage or edaphic herb community - 2a forb dominated - 2b graminoid dominated, including grasses, sedges, reeds and rushes - 2c aquatic plant dominated, but not 2b plants - 2d dwarf shrub dominated, low growing woody shrubs
3a/b Shrub	- Shrub dominated communities maintained by environmental conditions or disturbance - 3a low shrub < 2 metres tall - 3b tall shrub < 10 metres tall - Tree cover <10 %
4 Pole/Sapling	- Densely stocked trees - Self-thinning not yet evident - Time since disturbance usually < 40 years
5 Young Forest	- Stocking density persists - Self-thinning not yet evident - Time since disturbance usually 40-80 years
6 Mature Forest	- Trees established after the last disturbance have matured - The second cycle of shade-tolerant trees may have become established - Time since disturbance generally 80–250 years

Structural Stage Code	- Interpretation
7 Old Forest	- Structurally complex stands composed mainly of shade-tolerant and regenerating tree species - Snags and coarse woody debris in all stages of decomposition typical - Time since disturbance >250 years
Modifiers: B – Broadleaf C – Coniferous M – Mixed	- Broadleaf stands composed of > 75 % broadleaf tree cover - Coniferous stands composed of > 75 % coniferous tree cover - Mixed stands neither coniferous nor broadleaf compose > 75 % of the total tree cover

Table 2: Vegetation identified within the subject site.

Common Name	Scientific Name
Trees	
western redcedar	*Thuja plicata*
western hemlock	*Tsuga heterophylla*
Douglas-fir	*Pseudotsuga menziesii*
lodgepole pine	*Pinus contorta*
western yew	*Taxus brevifolia*
indian plum	*Oemleria cerasiformis*
Shrubs	
Saskatoon berry	*Amelanchier alnifolia*
prince's pine	*Chimaphila menziesii*
vaccinum sp.	*Vaccinum sp.*
baldhip rose	*Rosa gymnocarpa*
falsebox	*Pachistima myrsinites*
kinnickinick	*Arctostaphylos uva-ursi*
Forbs	
twinflower	*Linnaea borealis*
rattlesnake-plantain	*Goodyera oblongifolia*
wild strawberry	*Fragaria virginiana*

crevice alumroot	*Heuchera micrantha*
white hawkweed	*Hieracium albiflorum*
Mosses and lichen	
pipecleaner moss	*Rhytidiopsis robusta*
step moss	*Hylocomium splendens*
false-polytrichum	*Timmia austriaca*
coastal reindeer	*Cladina portentosa*

Biogeoclimatic Zone Classification (CWHms1)

The subject area is part of the Coastal Western Hemlock (CWH) Moist Submaritime (ms) Southern (1) – CWHms1 – Variant (Green & Klinka 1994). The CWH zone occurs in submaritime areas of the Coast Mountains at elevations ranging from approximately 650 to 1,350 meters. Within the ms1 subzone and variant, a number of different site series exist. The site series classification represents subtle changes in microclimate, soil conditions and associated vegetation. The different site series are further classified into provincial Terrestrial Ecosystem Mapping (TEM) Units based on the structural stage of the vegetation and the terrain of the site. It should be noted that insufficient information was available for compliance with provincial TEM standards. To differentiate between the two, TEM codes are used to refer to Cascade delineated Terrestrial Ecosystems (TE).

The RMOW has produced corresponding Whistler Ecosystem Mapping units. The pre-typed Whistler Ecosystem Mapping polygons identified on the Whistler GIS WebMap were used for preliminary field mapping, which was verified during site assessments and adjusted as necessary.

Terrestrial Ecosystem and Whistler Ecosystem Mapping

During the field work conducted on October 13, November 08, 10 and 17, 2023, the pre-typed RMOW mapping codes ascribed to the polygon areas were verified with observed vegetation and soil attributes. Six TE polygons were identified within the LLDGC subject area as displayed on Map 2.

Polygon 1 - 5DKj5mC / 5AMj5mC

Polygon 1 - TEM Code DF –Site Series 03 (FdHw- Falsebox)

POLYGON 1 TEM CODE DERIVATION					
Decile	Gentle slope-less than 35%			Multistoried; all crown classes well represented	
5	**DF**	**j**	**5**	**m**	**C**
50% of the polygon is Site Series DF	FdHw – Falsebox		Young Forest		Coniferous

Polygon 1 - TEM Code AM –Site Series 01 (HwBa-Stepmoss)

POLYGON 1 TEM CODE DERIVATION					
Decile	Gentle slope-less than 35%			Multistoried; all crown classes well represented	
5	**AM**	**j**	**5**	**m**	**C**
50% of the polygon is Site Series AM	HwBa-Stepmoss		Young Forest		Coniferous

Polygon #1 is located on a gentle slope within the proposed disc golf holes #6 and #7 area. The slope has a gentle gradient at 18% and has a northwest aspect. Forest structural stage is a young forest at 40-80 years old, determined from a tree core conducted on a representative Douglas-fir tree. The tree cored measured 32.4 cm diameter at breast height (DBH) and was 49 years old.

Soils were observed to be composed of a coarse loamy sand with a coarse fragment percentage of 20-30%. A Mor humus form was observed with an Ae layer present; all soil features indicated a soil with poorer nutrient value and dry, well drained soils. The slope position and soil conditions gave a resulting Soil Nutrient Regime (SNR) of B-C (poor-average) with a Soil Moisture Regime (SMR) of 4 (fresh).

Vegetation observed within the plot included a tree canopy composition dominated by Douglas-fir with lesser amounts western redcedar and lodgepole pine (Photo 1). The shrub layer was moderate and covered 40% of the plot, containing western yew, falsebox, baldhip rose, twinflower and prince's pine. The herb layer was sparse at 7% coverage and was composed of rattlesnake-plantain and wild strawberry. The moss layer was also sparse at 15% coverage in the plot and consisted of step moss and pipecleaner moss. The canopy height was estimated at 25 m and other trees measured for DBH included a western redcedar at 22 cm DBH, lodgepole pine at 27.5 cm DBH and western yew at 4 cm DBH. The polygon was designated as site series 01 and 03 due to vegetation associated with 03 site series and soil conditions more related to site series 01.

Polygon 1 was also found to occur on the west-facing slope in the area of the existing holes #13, #14, #15, #16 and #17 and proposed holes #20, #21 and #22. This polygon was confirmed during a visual inspection and modified in TE decile coverage from the pre-typed Whistler ecosystem mapping code due to the steeper slopes producing an 03 site series.

Photo 1: Vegetation association within Polygon1. November 10, 2023.

Polygon 2 - 8AMj6mC/2DFj6mC

Polygon 2 - TEM Code AM –Site Series 01 (HwBa-Stepmoss)

POLYGON 2 TEM CODE DERIVATION					
Decile	Gentle slope-less than 35%			Multistoried; all crown classes well represented	
8	**AM**	**j**	**6**	**m**	**C**
80% of the polygon is Site Series AM	HwBa-Stepmoss		Mature Forest		Coniferous

POLYGON 2 TEM CODE DERIVATION					
Decile	Gentle slope-less than 35%			Multistoried; all crown classes well represented	
2	**DF**	**j**	**6**	**m**	**C**
20% of the polygon is Site Series DF	FdHw – Falsebox		Mature Forest		Coniferous

Polygon 2 is similar to Polygon 1 TE vegetation structure, with a gentle slope and northwestern aspect. However, during a visual inspection of the polygon the TE code was showing a much more similar vegetation association to that of the pre-typed Whistler ecosystem mapping, with a higher decile of 01 site series vegetation with greater presence of western hemlock in the canopy. The stand height and forest structure were also visually observed to differ from Polygon 1 and a tree core sample was conducted on a Douglas-fir tree with a 51.5 cm DBH (Photo 2). The core sample was determined to be 206 years old, confirming the forest structure as mature. Polygon 2 makes up the majority of the LLDGC subject area and is the forest type proposed for most of the proposed expansion holes, including #2, #3, #4, #8, #9, #10, #11, #14, #15, #16, #17 and #26 and #27.

Photo 2: Vegetation association within Polygon 2 and Douglas-fir tree cored in foreground. November 10, 2023.

Polygon 3 – 6DFj6mC/4DKj6mC

Polygon 3 - TEM Code DF – Site Series 03 (FdHw- Falsebox)

POLYGON 3 TEM CODE DERIVATION					
Decile	Gentle slope-less than 35%			Multistoried; all crown classes well represented	
6	**DF**	**j**	**6**	**m**	**C**
60% of the polygon is Site Series DF	FdHw – Falsebox		Mature Forest		Coniferous

Polygon 3 - TEM Code DK –Site Series 02 (FdPl- Kinnikinnick)

POLYGON 3 TEM CODE DERIVATION					
Decile	Gentle slope-less than 35%			Multistoried; all crown classes well represented	
4	**DK**	**j**	**6**	**m**	**C**
40% of the polygon is Site Series DK	FdPl-Kinnikinnick		Mature Forest		Coniferous

Polygon #3 is located on gentle slopes and rock outcrops within existing holes #8 and #9 and the area of proposed hole #12. The slope has a gentle gradient at 20% and has a northwest aspect. Forest structural stage is estimated to be mature forest at 80-250 years old. The slope position and soil conditions gave a resulting Soil Nutrient Regime (SNR) of A (very poor) with a Soil Moisture Regime (SMR) of 1 (very dry).

Vegetation observed within the plot included a tree canopy composition dominated by lodgepole pine with lesser amounts of Douglas-fir and western redcedar (Photo 3). The shrub layer was low and covered 15% of the plot, containing falsebox, vaccinium sp., baldhip rose, Saskatoon berry, kinnikinnick, prince's pine and Indian plum. The herb layer was also sparse at 3% coverage and was composed of hawkweed, crevice alumroot and rattlesnake plantain. The moss and lichen layer was extensive throughout the bedrock outcrop area at 80% coverage in the plot and consisted of false-polytrichum and coastal reindeer lichen. The canopy height was estimated at 15 m and other trees measured for DBH included a western redcedar at 22.5 cm DBH, lodgepole pine at 15.2 cm DBH and Doulas fir at 12.5 cm DBH.

The polygon was designated as site series 02 and 03 with appropriate deciles as per the pre-typed Whistler ecosystem mapping. Vegetation surrounding the rocky outcrop where the plot was taken was observed to be an 03 site series, whereas the rocky outcrop itself was site series 02. The polygon was extended from the pre-typed Whistler ecosystem mapping boundary to include the area around the existing hole 3 and proposed hole #5 as a visual plot conducted in the area confirmed the same conditions.

Photo 3: View of vegetation and rocky outcrop within Polygon 3. November 10, 2023.

Polygon 4 10Am6mC

Polygon 4 - TEM Code AM –Site Series 01 (HwBa-Stepmoss)

POLYGON 4 TEM CODE DERIVATION				
Decile			Multistoried; all crown classes well represented	
10	**AM**	**6**	**m**	**C**
100% of the polygon is Site Series AM	HwBa-Stepmoss	Mature Forest		Coniferous

Polygon 4 was verified by a visual plot and confirmed to be as per the pre-typed Whistler ecosystem mapping code for this area. The site series differed from Polygon 1 as the terrain was located on a flatter bench and there were no 03 site series associated with drier soils and steeper terrain. The existing hole #12 is located in this polygon.

Polygon 5 10DK6mC

Polygon 5 - TEM Code DK –Site Series 02 (FdPl- Kinnikinnick)

POLYGON 5 TEM CODE DERIVATION				
Decile			Multistoried; all crown classes well represented	
10	**DK**	**6**	**m**	**C**
100% of the polygon is Site Series DK	FdPl-Kinnikinnick	Mature Forest		Coniferous

Polygon 5 was verified by a visual plot and confirmed to be as per the pre-typed Whistler ecosystem mapping code for this area. The terrain was viewed to be entirely composed of bedrock outcrop producing the 02 site series with very dry shallow soils and dominated by lodgepole pine (Photo 4). Existing holes #20 and #21 are located within this polygon.

Photo 4: Typical vegetation in Polygon 5 with extensive bedrock outcrop. November 10, 2023.

Polygon 6 6Am5C/4DF5C

Polygon 6 - TEM Code AM –Site Series 01 (HwBa-Stepmoss)

POLYGON 6 TEM CODE DERIVATION					
Decile				Multistoried; all crown classes well represented	
6	**AM**		**5**	**m**	**C**
60% of the polygon is Site Series AM	HwBa-Stepmoss		Young Forest		Coniferous

Polygon 6 - TEM Code DF –Site Series 03 (FdHw- Falsebox)

POLYGON 6 TEM CODE DERIVATION					
Decile	Gentle slope-less than 35%			Multistoried; all crown classes well represented	
4	**DF**	**j**	**5**	**m**	**C**
40% of the polygon is Site Series DF	FdHw – Falsebox		Young Forest		Coniferous

Polygon 6 was verified by a visual plot and confirmed to contain the same sites series as the pre-typed Whistler ecosystem mapping code for this area. The polygon was confirmed to be a young forest from the height of the tree stands and had a higher decile of 03 sites series than the pre-typed Whistler ecosystem mapping due to the drier conditions observed and steeper terrain in areas producing lodgepole pine stands (Photo 5). Proposed hole alignments for hole #1 and #18 are located within Polygon 6. Polygon 6 is located on a western aspect slope above Spruce Grove Park. Wildfire fuel management had occurred within the understory throughout and this polygon was observed to be the most recent forest stand to be harvested.

Photo 5: Typical vegetation in Polygon 6 displaying a young forest structure and fuel-treated understory. November 10, 2023.

Polygon 7 10UR

Polygon 7 was verified as UR - Urban and included the hydro line right of way that has been regularly cleared of vegetation for maintenance of the hydro lines and is classified as an anthropogenic land classification as confirmed by the pre-typed Whistler ecosystem mapping code.

Rare and Endangered Plant Species

In BC, there are two governing bodies involved with the ranking of species and/or ecological communities at risk. At the national level, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) provides advice pertaining to the *Species at Risk Act* (SARA), and at the provincial level, the Conservation Data Centre (CDC) manages the BC Status List.

The Canadian government created SARA in 2002 to complement the Accord for the Protection of Species at Risk (a national effort to identify and protect threatened and endangered wildlife and their associated habitats across the country). COSEWIC is the scientific body responsible for assigning the status of species at risk under SARA. This system uses the following terminology:

- Extinct (XX)
- Extirpated (XT)
- Endangered (E)
- Threatened (T)
- Special concern (SC)
- Not at risk (NAR)
- Data deficient (DD)

A species that is listed as Endangered, Extirpated or Threatened is included on the legal list under Schedule 1 of SARA and is legally protected under SARA with federal measures to protect and recover these species in effect.

The BC CDC designates provincial red or blue list status to animal and plant species, and ecological communities of concerns (BC MOE, 2024). The red list includes indigenous species or subspecies considered to be endangered or threatened. Endangered species are facing imminent extirpation / extinction, whereas threatened groups or species are likely to become endangered if limiting factors are not reversed. The blue list includes taxa considered to be vulnerable because of characteristics that make them particularly sensitive to human activities or natural events. Although blue listed species are at risk, they are not considered endangered or threatened. Yellow listed species are all others not included on the red or blue lists and may include species which are declining, increasing, common, or uncommon. Table 3, Table 4 and Table 9 below include the CDC listed (i.e. rare and threatened) species that have the potential to occur on the subject site; species designated as SARA Schedule 1 are also noted. Potentially occurring species are based on broad habitat preferences delineated by forest district and biogeoclimatic zone, and refined by habitat type available in the subject site. Forest and anthropogenic terrain were selected as habitat type to identify potential listed species for the purposes of this report.

Potential occurrences are then designated as unlikely or possible based upon species specific habitat requirements and an on-site assessment of those habitats. Note that a comprehensive evaluation of the study area for each species was not possible due to time constraints, seasonal migration patterns, and the transient nature of some species.

The CDC iMap (BC Gov, 2024b) does not list any rare and endangered plant species on the subject area. A list of potentially occurring plant species at risk for the area containing the subject site is provided below in Table 3. However, none of these species has the potential to occur on site due to specific habitat requirements.

Table 3: Plant species at risk potentially occurring on the site

Common Name *Scientific name*	**Status**		**Habitat Requirements**	**Potential Occurrence**
	BC List	**SARA Status**		
Tall bugbane *Actaea elata var. elata*	Red	Endangered	Moist forests in the lower montane zone; rare in extreme SW BC, known only from the Cultus Lake-Chilliwack River area.	**Unlikely-** closest record in the lower mainland*.
Vancouver Island beggarticks *Bidens amplissima*	Blue	Special Concern	moist edges of marshes, in bogs, along stream and river banks, in pond edges and in ditches. Known occurrences in Whistler.	**Unlikely** – never documented in the RMOW*.
Roell's brotherella *Brotherella roellii*	Red	Endangered	Occurs only on hardwoods and rotten logs in remnant second-growth stands within urban areas near Fraser River and Howe Sound.	**Unlikely** – not found near Whistler*.
Slender spike-rush *Eleocharis nitida*	Blue		Peaty or sandy places; wet soil and shallow water.	**Unlikely** - no suitable habitat on subject area. No close occurrence records to RMOW*.
Banded cord-moss *Entosthodon fascicularis*	Blue	Special Concern	Extremely local on periodically humid or damp earth of terraces of exposed outcrop knobs in open stand of Arbutus menziesii and Quercus garryana on southern and eastern Vancouver Island. On soil to 700m.	**Unlikely** - no suitable habitat on subject area.
Poor pocket moss *Fissidens pauperculus*	Red	Endangered	Bare, moist soil banks, often growing with Fissidens bryoides.	**Unlikely-** closest record in the lower mainland.

Common Name *Scientific name*	**Status**		**Habitat Requirements**	**Potential Occurrence**
	BC List	**SARA Status**		
Leafy miterwort *Mitellastra caulescens*	Blue		Wet to moist meadows and woodlands in the lowland and montane zones; rare on S Vancouver Island and the lower Fraser Valley.	**Unlikely** – Closest Record S Van Island and Fraser Valley*
Whitebark pine *Pinus albicaulis*	Blue	Endangered	Montane forests and on thin, rocky, cold soils at or near timberline at an elevation of 1300-3700 m in the sub-alpine to alpine zones.	**Unlikely**- subject site at elevation of 640
Lance-leaved figwort *Scrophularia lanceolata*	Blue		Moist to mesic roadsides, clearings, thickets and forest edges in the lowland and montane zones.	**Unlikely-** Closest record in the lower mainland.

All references from CDC BC ecosystems explorer (BC MOE, 2024) except *references from Brett 2022.

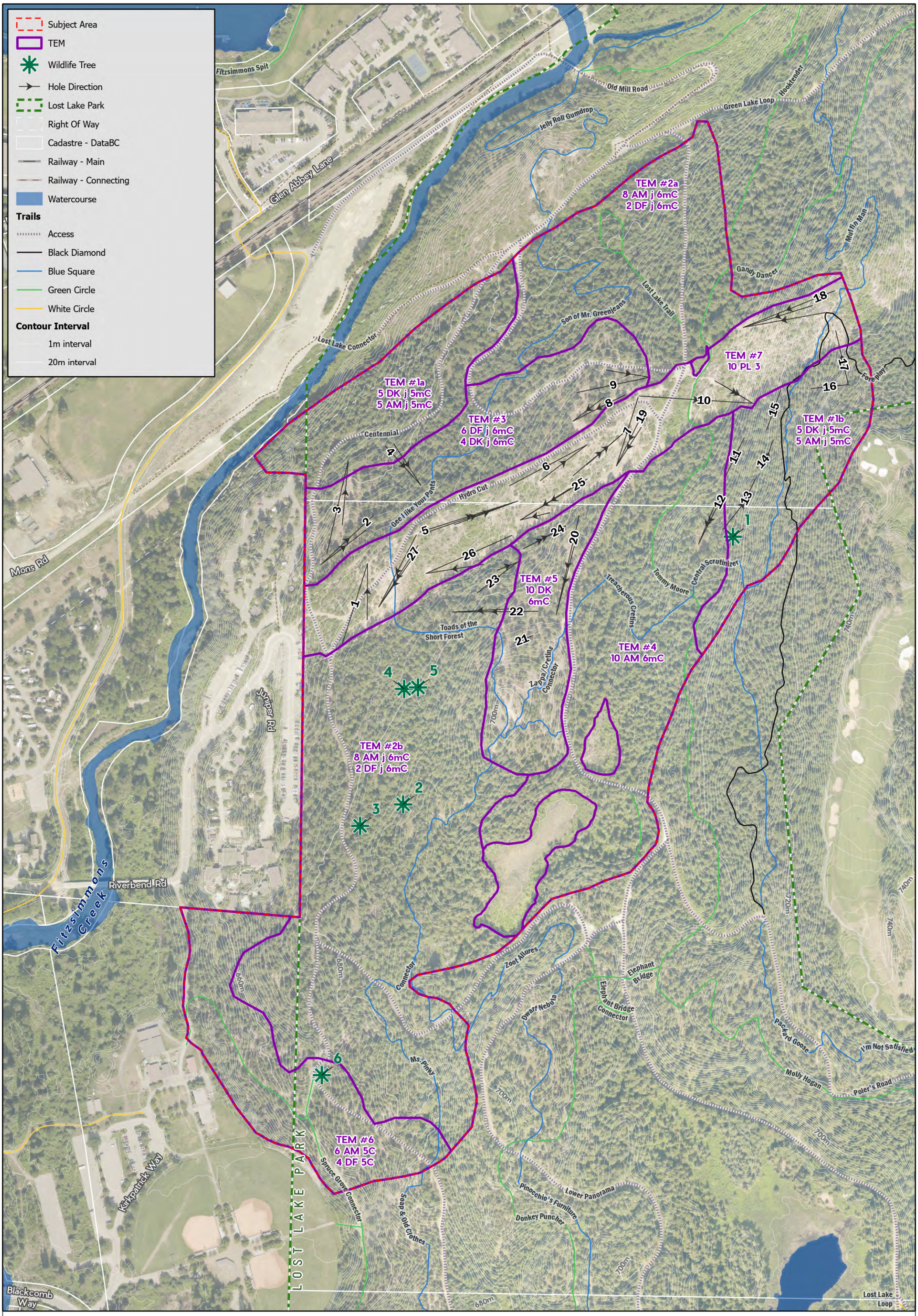
Rare and Endangered Ecological Communities

The term "ecological" is a direct reference to the integration of biological components with non-biological features such as soil, landforms, climate and disturbance factors. The term "community" reflects the interactions of living organisms (plants, animals, fungi, bacteria, etc.), and the relationships that exists between the living and non-living components of the community. Currently, the most common ecological communities that are known in BC are based on the Vegetation Classification component of the Ministry of Forests and Range Biogeoclimatic Ecosystem Classification, which focuses on the terrestrial plant associations of BC's native plants.

Large tracts of undisturbed plant communities are considered ecologically more important than disturbed/fragmented or second growth communities. Vegetation on the subject lands consists of forest in a mature and young structural stage previously disturbed by anthropogenic harvesting. The LLDGC ecological communities are adjacent development including golf courses, campgrounds and the residential neighbourhood of Spruce Grove. Three blue listed ecological communities exist within the subject area (Map 2) and are described in Table 4.

Table 4: Rare and endangered ecological communities occurring on the subject site.

Site Series Name **Common Name** *Scientific name*	**TEM Code**	**Status** **BC List**	**BCG Zone**	**Polygons**	**Structural stage**
Douglas-fir - western hemlock / falsebox *Pseudotsuga menziesii - Tsuga heterophylla / Paxistima myrsinites*	DF	Blue	CWHms1/03	1	5
				2	6
				3	6
				6	5
Douglas-fir - lodgepole pine / kinnikinnick *Pseudotsuga menziesii - Pinus contorta / Arctostaphylos uva-ursi*	DK	Blue	CWHms1/02	3	6
				5	6
Western hemlock - amablis fir / step moss *Tsuga heterophylla - abies amabilis / Hylocomium splendens*	AM	Blue	CWHms1/01	1	5
				2	6
				4	6
				6	5



GIS Cartographer: Oliver Chew
Date: *2024-04-16*
CERG File #: 013-18-06
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

N

0 50 100 200 300 400
Meters

Map 2 - Existing Vegetation

Lost Lake Disc Golf Course EIS
Whistler
British Columbia

2.3. Wildlife and Wildlife Habitats

Observations of wildlife signs were recorded as part of the ecological surveys conducted on the LLDGC subject area on October 10, November 8, 10 and 17, 2023. The LLDGC subject area contains potential wildlife habitat due to the presence of:

- Mature forest
- Available forage (e.g. berries)
- Coarse woody debris
- Wildlife trees
- Riparian area

2.3.1. Mammals

The Coastal Western Hemlock (CWH) zone is a common home for black-tailed deer which could use the site for foraging. Black-tailed deer scat was observed during the field survey. Other mammals that are commonly found in the CWH and potentially use the site include black bear (*Ursus americanus*), deer mouse (*Peromyscus maniculatus*), snowshoe hare (*Lepus americanus*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), pika (*Ochotona princeps*) and yellow-pine chipmunk (*Tamias amoenus*).

2.3.2. Birds

The CWH ecosystem surrounding the Whistler area is considered to have the greatest diversity and abundance of habitat elements in British Columbia. This habitat diversity results in a broad diversity of bird species. The riparian areas and mature forest of the LLDGC could provide habitat for a number of avian species, and raptors could potentially inhabit the site as the mature forest provides perching and potential nesting sites in close proximity to Green Lake for hunting prey. A nest survey was not undertaken as part of this report, but raptor nests were not observed during the field visits.

2.3.3. Amphibians and Reptiles

A comprehensive survey for amphibians and reptiles (herpetiles) was not conducted as part of this report; however, no amphibians or reptiles were observed during the site visits. Amphibians typically found in the CWH biogeoclimatic zone include Northern Pacific treefrog (*Hyla regilla*), northwestern salamander (*Ambystoma gracile*), western toad (*Anaxyrus boreas*), rough-skinned newt (*Taricha granulose*) and long-toed salamander (*Ambystoma macrodactylum*). Lost Lake is a known breeding site for the western toad and this species is described in Section 2.3.4 of the report.

Garter snakes (*Thamnophis* spp.) and alligator lizards (*Elgaria coerulea*) are reptiles commonly found in the region and may use the subject lands for foraging.

2.3.4. Rare and Endangered Wildlife Species

A search was conducted for potentially occurring wildlife species at-risk through the BC Conservation Data Centre based on the site's biogeoclimatic zone and the habitat available on and around the LLDGC subject area. Potentially occurring wildlife species are provided in Table 9 which is displayed within Appendix A.

2.4. Valued Ecosystem Components

2.4.1.Wildlife Trees

Wildlife trees include significant standing snags, veteran trees, and trees with broken tops, holes or cavities. These trees are important for various reasons such as perching, foraging, and nesting sites for birds and mammals. Sporadic wildlife trees were observed in the LLDGC subject area and have been recorded in Table 5 and general locations are found on Map 2 (Photo 6).

Table 5: Wildlife Tree's identified within the LLDGC Subject Area

Wildlife Tree #	Location
1-Snag	South of tee box for existing hole #13
2-Snag	Adjacent to proposed hole #14 alignment
3-Snag	Adjacent to proposed hole #3 alignment
4-Douglas-fir with snapped top that will develop into wildlife tree.	Adjacent to proposed hole #14 alignment
5-Significant Douglas-fir at 82.5 cm DBH	Adjacent to proposed hole #14 alignment
6-Snag	Adjacent to Centennial trail and south of proposed hole #17

Photo 6: Wildlife Tree #2 adjacent to proposed hole #14. May 3, 2018.

2.4.2. Coarse Woody Debris

Coarse Woody Debris (CWD) on the forest floor is an indicator of potential species richness in forested areas. Microhabitats, decay and nutrient cycling provide a range of life-cycle opportunities for smaller ground-dwelling wildlife (e.g. squirrels, shrews, and voles) and vegetation. CWD was observed within the subject site within various stages of decomposition (Photo 7).

Photo 7: CWD observed in Polygon 2b and proposed Hole #14. November 8, 2023.

2.4.3.Wildlife Movement Corridors

Wildlife tend to use routes with particular features when moving across the landscape to forage for food, disperse, find mates, or locate breeding sites. These features can include such things as cover, shade, vegetation, water or surface characteristics. Scale is also a significant factor in determining the suitability of a landscape; larger animals with home ranges covering hundreds of kilometres have far different

movement corridor requirements than some reptiles, whose corridor requirements are measured in metres.

The riparian corridor of Helen's Corner Wetland and associated outflow could provide a small-scale wildlife corridor within the LLDGC area. Lost Lake is a known breeding site for the western toad and the amphibian could use the surrounding forest to move between breeding areas and foraging areas (see section 3.3.4 for more details).

The LLDGC subject area is unsuitable for large landscape wildlife movement due to the development in the valley bottom from Highway 99, Spruce Grove and Nicklaus North residential areas. To the south, residential areas of Blackcomb Mountain resort also constrain larger scale wildlife movement. The lower slopes of Blackcomb Mountain northeast of the LLDGC subject area are less constrained with development for wildlife movement except for the Fairmont Chateau Golf Course area.

2.4.4. Rock slopes

Rock slopes provide specialized habitat for many species; however, no rock slopes were observed on the subject area.

2.4.5. Sensitive Ecosystem Protection Area

The RMOW Official Community Plan (OCP) defines Sensitive Ecosystem Protection Areas (SEPAs) as land which may contain species at risk habitat; ecosystems at risk; raptor's nesting sites; core forest habitat; CWH forest; cottonwoods; and forested floodplain (RMOW, 2019). Schedule K of the OCP identifies the LLGGC subject area as a SEPA.

The following SEPA habitat is located on the LLDGC subject area:

- Potential Species at Risk Habitat
- Ecosystems at Risk
- Potential raptors nesting sites

CWH forest, as defined in the OCP, was not identified within the subject area as forest stands were determined to be mature stands up to 200 years old from core samples taken. CWH forests are defined as "Unmanaged lower elevation CWH forests largely greater than 300 years old" in the OCP (RMOW, 2019). The OCP CWH definition would meet the old forest structural stand definition, and does not include mature forest or other structural stages.

Core forest is defined as "Contiguous areas of unlogged forest that provide interior forest habitat that sustains the viability of the plant and animal communities that depend on its stable environmental conditions" (RMOW, 2019). As the LLDGC is young and mature forest that has been previously harvested, this SEPA habitat is not present. Also, the forest in the LLDGC is impacted by edge effects from the adjacent development of golf courses, trails, campgrounds, Scandinave Spa buildings and residential development.

The provincial iMapBC online mapping tool identifies a proposed potential future critical habitat area for spotted owl on and around the LLDGC subject area (BC Gov, 2024a). Northern spotted owl is listed by COSEWIC as Endangered in BC and numbers have declined due to fragmentation and destruction of old-growth coniferous forest in BC. The recovery strategy for the spotted owl states that the objective for the habitat areas is to conserve and restore populations of spotted owl (Gov. Canada, 2019). Proposed critical habitat polygons include potential future critical habitat. The proposed potential future critical

habitat polygons were generally delineated for nesting, roosting, and foraging habitat within coniferous forest stands older than 100 years with dominant trees taller than 19 m, which are found below elevations of 1370 to 1500 m (Gov. of Canada, 2019). The approved spatial critical habitat has yet to be defined; however, these large spatial areas are designated to potentially provide a large tract of lands within BC to support the recovery of the spotted owl.

Mature trees should be retained wherever possible in and around the LLDGC to support future critical habitat programs. However, as no critical habitat polygons are yet approved and no orders exist for the protection of this critical habitat on non-federal land, no legal constraints result from the proposed spotted owl critical habitat polygons.

Three blue-listed ecosystems at risk occur within the young and mature forest on the subject site. However, no raptor's nests were observed during the site visits, and no core forest, CWH forest, cottonwoods or forested floodplains, as defined by the Whistler OCP, occur on the subject site.

2.5. Aquatic Environment

Aquatic features that exist on and around the subject area include Fitzsimmons Creek located north of the existing LLDGC, a wetland complex with associated intermittent channels named "Helen's Corner Wetland" in this report, and Spruce Grove Wetland (Map 3).

Fitzsimmons Creek

Fitzsimmons Creek is a turbid, fast flowing, glacier-fed, mountain stream. The creek is dyked as it flows through Whistler Village to Green Lake. Green River drains Green Lake and eventually flows to the ocean via the Fraser River. Fitzsimmons Creek is fish bearing and is known to support rainbow trout (*Oncorhynchus mykiss*), bull trout (*Salvelinus confluentus),* kokanee (*Oncorhynchus nerka*), sculpin (*Cottoidea sp.*) and three-spined stickleback (*Gasterosteus aculeatus*) (MOE, 2024). The section of Fitzsimmon Creek assessed, north of proposed hole #6, had an average width of 13.32 m with a gradient of 3 %.

Photo 8. Fitzsimmons Creek and pedestrian bridge access north of the LLDGC. October 13, 2023.

Helen's Corner Wetland

Helen's Corner wetland comprises of a large marsh and swamp wetland complex adjacent to the existing LLGDC and proposed expansion holes. Fish are unlikely present in the wetland as it is tenuously connected to Fitzsimmons Creek via an intermittent outflow. The area does provide an important wetland habitat for potential amphibian species and foraging habitat for mammals, birds and reptiles that could frequent the area.

Photo 9. Helen's Corner Wetland. October 13, 2023.

Helens Corner Wetland Outflow Channel North

An intermittent channel outflows from the north of Helen's Corner Wetland and eventually connects to the fish bearing waters of Green Lake by the diversion channel of Fitzsimmons Creek. There was no surface water connection or discernible channel that connects from Helen's Corner Wetland and likely water flows subsurface to the channel.

The channel was split into 5 reaches during the assessment due to the differing morphology of the channel.

Reach 1

Reach 1 of the channel is a narrow shallow channel and flows from the connection point to the Fitzsimmons Creek diversion channel along Old Mill Road trail and through the hydro right of way adjacent to the existing hole 18. Reach 1 passes through several culverts as numerus existing trails overlap the channel. The channel riparian area is particularly disturbed within the current hydro-right of way. Two small wooden bridges cross reach 1 which provide access from hole 9 to hole 10 on the existing course. The average width in Reach 1 was 1.68 m with an average slope gradient of 10%.

Photo 10: Typical morphology of Reach 1. October 13, 2023

Reach 2

Reach 2 is a depression-like feature of the channel that widens in width to a pond, east of the existing hole 12. The depression area likely only contains water during spring melt and high periods of rain and was classified as wetland during the REPA assessment.

Photo 11: Typical depression morphology of Reach 2. October 13, 2023.

Reach 3

Reach 3 was a wider section of the channel with a shallow channel morphology that likely only receives surface water during snow melt and storm events. Average channel width within Reach 3 was measured at 9.47 m with a slope gradient of 3%.

Photo 12: Typical morphology of Reach 3. October 13, 2023

Reach 4

Reach 4 was another swamp depression/wetland area within the channel likely only wetted during spring and fall months after rainfall.

Photo 13: Typical wetland morphology of Reach 4. October 13,2023.

Reach 5

Reach 5 was similar to Reach 3, with a wider channel with a shallow channel morphology due to the infrequent flow of surface water. This section of the channel also likely only flows surface water during spring snow melt. As mentioned previously there was no identifiable surface water connection point between Reach 5 and Helen's Corner Wetland. The average channel width assessed within Reach 5 was 9.31 m with an average slope gradient of 3%.

Photo 14. Typical morphology of Reach 5. November 8, 2023.

Helens Corner Wetland Outflow Wetland Complex Southwest

During the REPA assessment, a wetland outflow complex was delineated flowing southwest from the mapped Helen's Corner Wetland on the RMOW mapping website. The wetland swamp complex consists of shallow water depressions around the proposed area for hole 15 and is intersected by the existing Toads of the Short Forest bike trail by a small wooden bridge. The south edge of the wetland complex flows to ground as it crosses Lower Panorama trail by a culvert. Subsurface water flow is anticipated in the depression of land between the slopes in which the proposed holes 16 and 17 are located. A ditch is located along the existing trail Spruce Grove Connector; however no surface flow was noted on the slopes after the ditch discharges and no surface water connection to Spruce Grove Wetland is apparent.

The wetland complex also outflows west across Centennial trail and eventually into a culvert at the entrance to Scandinave Spa. Potential connection to Spruce Grove Wetland from the culvert is unknown. A ditch is located that flows southeast on Riverbend Road and a culvert outflows onto the bank of Spruce Grove Wetland, however surface connection is unverified from the connection above.

Photo 15: Southwest Outflow from Helen's Corner Wetland Complex. November 14 ,2023.

Spruce Grove Wetland

A large wetland is located at toe of the slope at Spruce Grove, adjacent to the proposed first expansion disc golf hole. This wetland has an existing bridge crossing from the vehicle parking area to the trails and slope where the proposed expansion is proposed. The Spruce Grove Wetland collects water from the surrounding slopes and outflows into the fish-bearing Fitzsimmons Creek. A ditch flows from the toe of the slope, north of the existing playing fields and Whistler Waldorf School buildings, and connects to the Spruce Grove Wetland.

Photo 16: Spruce Grove Wetland. November 14, 2023.

2.5.1. Riparian Areas Protection Regulation

In British Columbia, the Riparian Areas Protection Regulation (RAPR) of the *Riparian Areas Protection Act* is the governing legislation to determine setbacks on watercourses that ensure no harmful alteration disruption or destruction of natural features, functions and conditions that support fish life processes occurs in the riparian area (FLNRORD, 2019).

The RAPR applies to all residential, commercial and industrial development activities proposed within 30m of a watercourse that is fish-bearing or connected by surface flow to a fish-bearing watercourse. It should also be noted that the Federal *Fisheries Act* may supersede the RAPR and in some cases approval may be required under Section 35(2) of the Act. In addition, the *Water Sustainability Act* applies to all watercourses regardless of whether they are fish-bearing or connected fish-bearing watercourses.

However, development activities taking place in park lands under local government jurisdiction are typically exempt from RAPR if the activities are not considered commercial or industrial development (FLNRORD, 2019).

2.5.2. Riparian Ecosystem Protection Areas

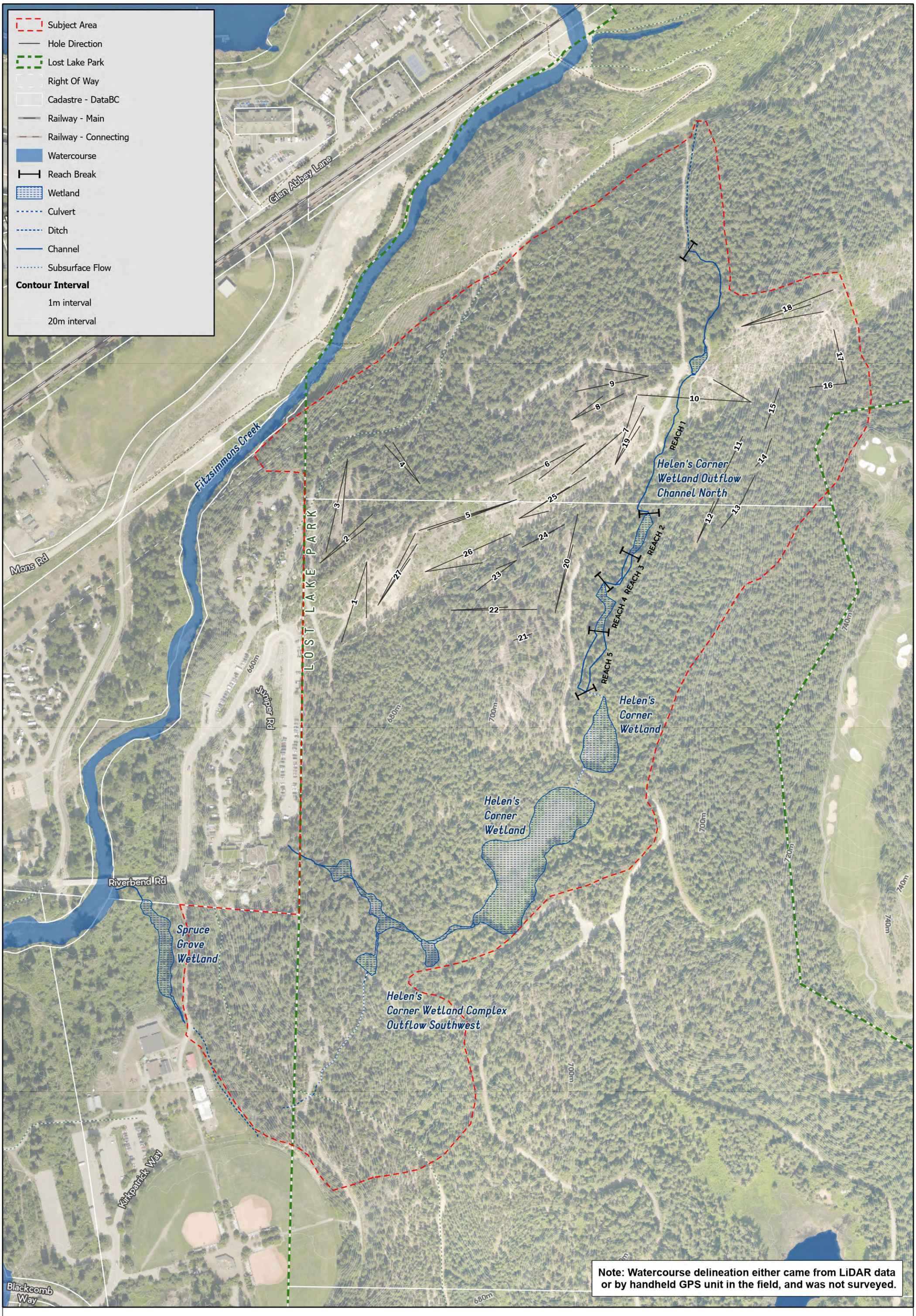
The RMOW OCP defines a Riparian Ecosystem Protection Area (REPA) as 'Land within 30 meters of the high-water mark of a stream as mapped by the municipality and shown on Schedule J' of the OCP. REPAs are protected from development due to the potential for high biodiversity and range of habitat features offered by these areas. REPAs also apply to any other applicable watercourses not shown on Schedule J that are discovered during environmental assessments.

The following watercourses on the subject area are currently identified in Schedule J of the OCP:

- Fitzsimmons Creek
- Helens Corner Wetland
- Patial section of the Helens Corner Wetland Outflow Channel North
- Spruce Grove Wetland

The following watercourses were not listed on Schedule J, but were delineated during the field aquatic assessment:

- Helens Corner Wetland Outflow Wetland Complex Southwest.
- Northern Section of the Helens Corner Wetland Outflow Channel North.



GIS Cartographer: Oliver Chew
Date: *2024-04-24*
CERG File #: 013-18-06
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL RESOURCE GROUP LTD

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Meters

Map 3 - Existing Watercourse

Lost Lake Disc Golf Course EIS
Whistler
British Columbia

2.6. Socio-Economic Conditions

2.6.1. Cultural and Heritage Resources

The subject site is within the traditional territories of the Squamish and Lil'wat Nations, as mapped within their respective Land Use Plans. They have historical ties to the land that includes utilization of the natural resources of the Whistler Valley area (Squamish Nation, 2001) (St'át'imc First Nation, 2004).

2.6.2.Other Undertakings in the Area

Mining

No current coal, mineral and placer claims exist on the subject property (BC Gov, 2024a). A no registration reserve for mineral and placer claims exists over the LLDGC subject area for the Whistler Resort (Site ID 329124). The most common purpose of no registration reserves is to prohibit registration or rights required within recreational areas or on lands close to residential centers (BC Gov 2024c).

Recreation and Tourism

The LLDGC subject area also shares recreation activities and features from other Lost Lake Park recreation uses. In the summer months a network of double-wide, gravel-surfaced trails is used for hiking/walking activities e.g Old Mill Road, Lower Panorama and Centennial. These same trails are used by cross country skiers and snowshoers in the snow-covered winter months. A network of mountain bike trails also exists adjacent to the LLDGC and are popular with beginner and intermediate mountain bike riders in the Whistler area during the snow-free summer months. The existing trail network can be viewed on Map 1.

Forestry Management

The LLDGC is outside the boundaries of the Whistler Community Forestry and no active harvesting has occurred in the area within the last 60 years. (BC Gov, 2024a). A cut block polygon registered as its last harvest year in 1960 is located west and adjacent to the Fairmont Golf Course. From field observation, it is estimated that the forest in the LLDGC was selectively harvested for timber at the same time, with remnants of old logging roads and laydown areas throughout the subject site that are currently used as hiking and biking trails. During field observations it was further noted that the forest within the LLDGC was recently fuel managed for wildfire mitigation treatments throughout the existing and proposed expansion alignments.

Ground Water

No groundwater wells are located within the LLDGC subject area (BC Gov, 2024a).

Anthropogenic Features

Anthropogenic features within the LLDGC subject area include:

- BC Hydro powerlines and associated tower and line infrastructure.
- Disc golf tee boxes and baskets associated with the existing course.
- Signage associated with the existing Disc Golf course and trails.
- Existing trail network and associated wooden bridges.

Adjacent Land Use

The LLDGC subject area is bounded by CN Rail and Nickalaus North golf course to the north, Fairmont Chateau golf course to the east, further municipal Lost Lake parkland to the south and Spruce Grove Park, Whistler Waldorf School, Scandinave Spa and Riverside Campground to the west.

3. Environmental Impacts and Constraints

3.1. Physical Environment

3.1.1. Climate

The climate in the subject area has high levels of precipitation however climate is not considered a constraint to the expansion or enhancement of the LLDGC.

3.1.2. Geology

The geology of the site is not expected to pose a constraint to the to the expansion or enhancement of the LLDGC.

3.1.3. Geomorphology

The geomorphology of the subject site poses no obvious constraints to the to the expansion or enhancement of the LLDGC.

3.1.4. Hydrology

The natural hydrology of the subject area poses a constraint to the expansion or enhancement of the LLDGC. Natural drainage and hydrology of the surrounding slopes from existing watercourses that flow surface water and groundwater flows should be retained and protected from disc course enhancement and expansion wherever possible. The *Water Sustainability Act* protects and manages all impacts to, and uses of, natural surface water and groundwater systems in BC and would constrain any activities below the top of bank of surface watercourses identified within the subject area.

3.2. Terrestrial Environment

3.2.1.Soils

An assessment of the soils of the subject area is outside the scope of this EIS.

3.2.2. Vegetation

Existing Course Impact Analysis

Methodology

A field assessment was conducted on November 8th and 10th, 2023, by Simon Fry, R.P.Bio, and Hannah Grant, B.S.c. The objective of this field assessment was to determine the environmental impacts of existing disc golf holes. Holes situated under the BC hydro powerline right of way were excluded from the analysis as these areas were disturbed and mainly unvegetated. The following holes were assessed: 2, 3, 4, 8, 9, 11, 12,13, 14, 15, 16, 17, 20, 21, 22, 23 and 24. Holes 1, 5, 6, 7, 10, 18, 19, 25, 26, and 27 were excluded due to the BC Hydro powerline right of way.

The area of impact was determined through visual assessment of the density of vegetation, visible scarring of trees, erosion, and soil compaction. Areas where vegetation was absent, damaged or lower in density in comparison to surrounding areas, trees scarred or bark impacted by discs, and eroded or compacted soils were all included within the area of impact. The perimeter of the impacted area was mapped in the field to create an impact polygon in square meters was then quantified using desktop analysis.

The number of trees removed for each hole was quantified through stump counts and size of tree was estimated through measurement of stump diameter and classified into the following categories: 1-10cm, 10-20cm, 20-30cm, 30+cm, 50+cm.

Results

Stump count analysis during the EIS displayed that on average 21 trees were removed per hole for the creation of the existing disc golf holes (Table 6). The majority of trees removed were smaller in size, at 1-20 cm in diameter (Table 6). Smaller trees were likely removed to open up vegetation in the forest for sight lines and to allow a clearer throw of the disc to the basket (Photo 17 to Photo 19).

Table 6: Stump counts of trees removed for each existing disc golf hole.

Disc Golf Hole number	Diameter of Trees removed at each hole					
	1-10cm	10-20cm	20-30cm	30+	50+	Total # of stumps
Hole #2	18			1		19
Hole #3	17	8	6			31
Hole #4	28	13	10	1		52
Hole #8	5	7	6			13
Hole #9	11	9	5	1		26
Hole #11	11	17	5			33
Hole #12	6	1	2	2		11
Hole #12B	11	5	1			17
Hole #13	15	9	5			29
Hole #14	17	9	1			27
Hole #15	2	3				5
Hole #16	2	2	1			5
Hole #17	6	7	3			16
Hole #20	21	20	6			47
Hole #21	1	1	1			3
Hole #22	9	4	2			15
Hole #23	3	6	4		1	13
Hole #24	9	4	4			17
Average	11	7	4	1	1	21

Photo 17: Several small stumps at ground level at hole #4 and typical soil compaction and root exposure on fairways.

Photo 18: Stump at the hole #9 basket and typical root exposure.

Photo 19: Small stumps on the slope at hole #13 and typical soil compaction and root exposure on fairway. November 8, 2023.

The impact area from existing disc golf activities resulted in a loss of understory vegetation including small shrubs, herb species and moss. Regular foot traffic occurred in playing areas throughout the holes and the vegetation was likely disturbed by compaction and impacted areas were left with mostly bare soils. The loss of understory vegetation and removal of top soils exposed bare soil and also led to the exposure of tree roots within the playing area. Exposed tree roots can lead to a compromise in potential tree health by further erosion and foot traffic. Soil compaction and exposed roots were observed in all high foot traffic areas of the holes including fairways and around baskets (Photo 18).

Areas of impact to the forest from each disc golf hole ranged from 0.038 ha to 0.238 ha (Photo 7) (Map 4). The average disc golf hole length was 57 m with an average impact area of 0.987 ha. The average impact area per meter of hole length was 16.18 m^2.

Table 7: Area impacted by existing LLDGC holes.

Disc Golf Hole number	Length of hole (m)	Area of Impact (ha)	Impact Area per meter length (m^2)
Hole #2	57.84	0.128	25.66
Hole #3	96.17	0.238	24.79
Hole #4	53.41	0.129	24.15
Hole #8	73.60	0.196	26.60

Hole #9	73.16	0.141	19.31
Hole #11	42.65	0.059	13.79
Hole #12	37.84	0.065	17.16
Hole #12B	45.66	0.038	8.42
Hole #13	63.24	0.081	12.73
Hole #14	36.85	0.049	13.37
Hole #15	43.51	0.039	8.95
Hole #16	37.71	0.044	11.71
Hole #17	48.13	0.058	12.10
Hole #20	94.86	0.141	14.85
Hole #21	44.62	0.080	17.86
Hole #22	84.50	0.125	14.80
Hole #23	52.44	0.066	12.61
Hole #24	39.88	0.049	12.39
Total	1026.07	1.747	291.25
Average	*57*	0.097	16.18

Other Noted Features in Existing Impacted Areas

Field assessments found tree bark in the general alignment of tee boxes and fairways were impacted from disc deflection from disc golf play. Tree bark was impacted on one side of the tree from the throwing direction of disc golf players. Two observations were made on tree bark impacts on the disc golf course:

1) Young trees or lodgepole pine species displayed deeper gauges through the outer and inner bark resulting in sap flow from the tree (Photo 20).
2) Mature trees displayed bark indentations or chipping from disc throws confined to the outer bark (Photo 21)

The gouges to young trees and lodgepole pine tree bark were observed to have a greater impact to tree bark than mature trees as the inner bark had been exposed. The impact of the gouges to tree bark on resulting tree health is not determined, but may include increased exposure to insect infestation, disease or fungal infection. Additionally, damage to tree bark may loosen the trunk's integrity and lead to generally deteriorating tree health.

Photo 20: Example of bark impact on young lodgepole pine species from disc deflections on hole #2. November 8, 2023.

Photo 21: Example of bark chipping/indentations on mature Douglas-fir tree on hole #9. November 8, 2023.

- Subject Area
- TEM
- Hole Direction
- Wildlife Tree
- Impact Area
- Lost Lake Park
- Right Of Way
- Cadastre - DataBC
- Railway - Main
- Railway - Connecting
- Watercourse
- Wetland
- Culvert
- Ditch
- Channel
- Subsurface Flow

Course Features

- Course Start
- Basket
- Practice Basket
- Short Tee
- Long Tee
- XL Tee
- Parking

Contour Interval

- 1m interval
- 20m interval

Glen Abbey Lane
Mons Rd
Juniper Rd
Riverbend Rd
Kirkpatrick Way
Blackcomb Way
LOST LAKE PARK

TEM #2a
8 AM j 6mC
2 DF j 6mC

TEM #1a
5 DK j 5mC
5 AM j 5mC

TEM #3
6 DF j 6mC
4 DK j 6mC

TEM #7
10 PL 3

TEM #1b
5 DK j 5mC
5 AM j 5mC

TEM #4
10 AM 6mC

TEM #5
10 DK
6mC

TEM #2b
8 AM j 6mC
2 DF j 6mC

TEM #6
6 AM 5C
4 DF 5C

660m
680m
700m
720m
740m

GIS Cartographer: Oliver Chew
Date: *2024-05-15*
CERG File #: 013-18-06
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

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0 50 100 200 300 400
Meters

Map 4 - Existing Vegetation Disturbance

Lost Lake Disc Golf Course EIS
Whistler
British Columbia

Predicted Impact Area for Conceptual Course

Methodology

The field assessment conducted on November 8th and 10th by Simon Fry, R.P.Bio, and Hannah Grant, B.Sc. also examined the potential environmental impacts of the proposed conceptual holes. Cascade personnel used handheld GPS devices containing the location of proposed alignments and surveyed each hole using the Disc Golf Environmental Suitability Guidelines (Cascade, 2023), identifying high Environmentally Sensitive Areas (ESA) and other environmental values. Results of the proposed alignment surveys are presented in Table 8.

High ESA areas were observed in five of the proposed course alignments related to riparian areas of watercourses. They included proposed holes 1, 3, 9, 15 and 16. Further details of the high ESA riparian areas are presented in Section 3.5.

Predicted impact areas for the conceptual course were calculated by multiplying the proposed length of each hole by the average impact area per meter (16.18 m) for the existing course (Table 8). Impacts on the forest habitat from proposed expansion holes are expected be similar to that observed in the existing holes including:

- Loss of forest understory vegetation (shrubs, herbs and mosses).
- Soil compaction from recreational users' foot traffic around tee box, fairway and basket of disc golf holes.
- Tree bark damage impacts to mature and young trees from disc deflections.

The predicted impact area is based on current impacts before recommendations are implemented in disc golf course design (Map 5). The construction of conceptual holes is predicted to impact a total of 3.685 ha of understory vegetation (Table 8). One conceptual hole would predict to cause an average impact area of 0.154 ha to understory vegetation (Table 8). If recommendations are implemented in course design as per Section 4, impacted areas of forest vegetation are anticipated to decrease.

Conceptual holes number 5, 12, 20 and 22 have overlapping area with existing holes. For these holes, the length of the hole within the existing impact area was subtracted from the overall length of the hole. Proposed holes 13, 24 and 23 were not analyzed as they were within the BC Hydro Right of Way.

Results

Table 8: Predicted impact areas to forest vegetation from conceptual expansion hole alignments.

Conceptual course hole #	Length of hole (m)	Predicted Impact Area (ha)	High ESA Present Y/N
1	77.72	0.126	Y- 30 m REPA of Spruce Grove Wetland
2	93.88	0.152	N
3	82.34	0.133	Y- potential for overlap with 30 m REPA of Helen's Corner Wetland Outflow Southwest Complex.
4	99.86	0.162	N

5*	178.88	0.086	N
6	99.49	0.161	N
7	132.95	0.215	N
8	137.82	0.215	N
9	89.78	0.145	Y- potential overlap with 2 m riparian setback SPEA area of Helen's Corner Wetland Outflow North Ditch.
10	67.34	0.109	N
11	173.26	0.280	Y- Potential for overlap with 30 m REPA of Helen's Corner Wetland Outflow North.
12*	96.77	0.081	N
14	185.67	0.300	N- However, wildlife trees found within alignment (See Section 2.4.1)
15	87.08	0.141	Y- overlap with Helen's Corner Wetland Outflow Southwest Complex and associated 30 m REPA.
16	86.07	0.139	Y- Helen's Corner Wetland Outflow Southwest Complex and associated 30 m REPA area
17	92.23	0.149	N
18	83.02	0.134	N
19	127.97	0.207	N
20*	117.77	0.123	Y- Potential for overlap with 30 m REPA of Helen's Corner Wetland Outflow North.
21	62.41	0.101	N
22*	69.04	0.067	N
25	84.34	0.142	N
26	81.67	0.132	N
27	113.56	0.184	N

Total	*2436.58*	*3.685*	-
Average	105.94	*0.154*	-

*Existing impacts from existing holes subtracted from overlapping alignment

Proposed Expansion Holes Key Findings for Vegetation

Wildfire Fuel Treatment Areas and Disturbed Area

Proposed holes #1, #2, #16, #17 and #18 were found to be within areas that had received wildfire fuel treatment works on the understory of the forest. Young trees and shrubs had been removed from this section of the forest and vegetation percentage cover on the forest floor was observed to be less than untreated sections of forest in the subject area. Proposed holes #3, #4 and #9 were also in close proximity to wildfire treatment areas adjacent to trails.

Hole#1 was in a previously disturbed open area with little understory vegetation, which was likely an old access road for the Scandinave Spa. Hole #6 alignment was in a previously disturbed open area with minimal understory vegetation, likely a former harvesting laydown area.

There are no federal or provincial protections or constraints that currently exist related to forest habitat regarding the LLDGC enhancements or expansion. The forest habitat in the LLDGC is designated a SEPA area by RMOW OCP, which is addressed below in Section 3.4.5.

Rare and Endangered Plant Species

A list of plant species at risk that are known to occur within the geographical region of the site's forest district and biogeoclimatic zone is provided in Table 3. However, none of these species has the potential to occur on the subject area due to specific habitat requirements, and rare and endangered plant species are not considered constraining to the enhancement or expansion of the LLDGC.

Rare and Endangered Ecological Communities

Three blue-listed ecological communities of concern are located on the subject area within the existing and expansion areas of the LLDGC. These ecosystems at risk are at a young and mature structural stage. No federal or provincial protections currently exist for ecological communities of concern; however, the RMOW OCP designates them as a SEPA (see Section 3.4.5).

Mature ecosystems at risk are not considered as valuable as those associated with old growth forest, as mature forest containing these ecosystems is not rare in BC. However, mature forests, if allowed to persist and develop, will eventually transition into old growth forest. Additionally, the Standards for Mapping Ecosystems at Risk in British Columbia states that "Generally, structural stage 6 (mature) and 7 (old) are most likely to contain the at-risk ecological community. Structural stage 5 (young) may provide recruitment where there is little or no structural stage 6 or 7 remaining." (MOE, 2006).

- Subject Area
- Existing Hole
- Existing Impact Area
- Proposed Holes
- Proposed Hole Impacts
- Proposed Restored Areas
- Retained Impact Area
- Lost Lake Park
- Wildlife Tree
- Culvert
- Ditch
- Channel
- Subsurface Flow
- Wetland
- Watercourse
- Right Of Way
- Cadastre - DataBC
- Building Footprints
- Railway - Main
- Railway - Connecting

Trails

- Access
- Black Diamond
- Blue Square
- Green Circle
- White Circle

Contour Interval

- 1m interval
- 20m interval

Proposed Hole Impact Area	3.9ha
Existing Impact Area (1.8ha)	
Proposed Restored Area	1.2ha
Retained Impact Area	0.5 ha

GIS Cartographer: Oliver Chew
Date: *2024-05-15*
CERG File #: 013-18-06
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL
RESOURCE GROUP LTD

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0 50 100 200 300 400
Meters

Map 5 - Proposed Vegetation Disturbance

Lost Lake Disc Golf Course EIS
Whistler
British Columbia

3.3. Wildlife and Wildlife Habitat

3.3.1. Mammals

Mammals that may utilize the subject area are not considered constraining to the proposed enhancement and expansion LLDGC activities. Best management practices for working around wildlife should be implemented during any expansion and enhancement activities and by recreational users of the course, as detailed in Section 4 below.

3.3.2. Birds

All trees within the subject area provide potential nesting sites for a range of bird species. The BC *Wildlife Act* states:

A person commits an offence if the person, except as provided by regulation, possesses, takes, injures, molests or destroys

(a) A bird or its egg,
(b) The nest of an eagle, peregrine falcon, gyrfalcon, osprey, heron or burrowing owl or,
(c) The nest of a bird not referred to in paragraph (b) when the nest is occupied by a bird or its egg.
(BC Gov, 1996)

The *Migratory Bird Act* provides year-round protection to pileated woodpecker nests from damage, disturbance and destruction. Any trees within the subject area that contain woodpecker nesting cavities, occupied or unoccupied, will be constraining to tree removal works in association with enhancement or expansion LLDGC activities.

Any enhancement or expansion activities for the LLDGC will be also constrained by the *Wildlife Act* if tree removal occurs during the nesting bird season of April 1 to September 1, or if any raptor nests are found on the site. Should any tree removal occur within the nesting bird season, a songbird nesting survey should be conducted by a Qualified Environmental Professional (QEP) to ensure compliance with the *Wildlife Act*.

3.3.3. Amphibians and Reptiles

Common amphibians and reptiles potentially inhabiting riparian areas, wetlands and associated forest habitat within the LLDGC are not constraining to course enhancement or expansion. The western toad is a known species at-risk within the Lost Lake Park area, and recommendations for protection of these species is listed in Section 3.3.4. Best management practices for working around wildlife should be implemented during any activities, as detailed in Section 4 below.

3.3.4.Rare and Endangered Wildlife Species

There are many at-risk wildlife species with the potential to occur within the geographic region and biogeoclimatic zone of the subject site (see Table 9 in Appendix A). However, species that have the potential to occur in the specific habitat provided by the site are limited to the following:

- Northern goshawk
- Western toad
- Common nighthawk
- Evening grosbeak

- Wolverine
- Little brown myotis
- Clodius parnassian
- Band-tailed pigeon
- Bull trout

A species that is listed as Endangered, Extirpated or Threatened within Schedule 1 of *Species At Risk Act* (SARA) is legally protected under the Act by certain prohibitions. A species that is listed within Schedule 1 of SARA with the classification of Special Concern will not receive protection under the SARA general prohibitions. SARA contains prohibitions that make it an offence to:

- kill, harm, harass, capture, or take an individual of a species listed in Schedule 1 of SARA as endangered, threatened or extirpated;
- possess, collect, buy, sell or trade an individual of a species listed in Schedule 1 of SARA as endangered, threatened or extirpated;
- damage or destroy the residence (e.g. nest or den) of one or more individuals of a species listed in Schedule 1 of SARA as endangered, threatened or extirpated, if a recovery strategy has recommended the reintroduction of that extirpated species.

Northern Goshawk, Common Nighthawk, Evening Grosbeak and Band Tailed Pigeon

Potential breeding and nesting habitat exists for the four rare and endangered avian species that may occur on site with the presence of mature multi-layered coniferous forest with associated wildlife trees and snags. Northern goshawk nest in large trees surrounded by mature forest, preferring to forage in forests that provide prey and hunting opportunities typically found in mature and old forests (FLNRORD, 2013). Common nighthawk are known to breed in Whistler (Brett, 2022), ground nesting in open sites. Evening grosbeak are also known to exist in the Whistler area and suitable habitat is found on site for nesting. The band-tailed pigeon may breed in Whistler and, due to the presence of suitable nesting habitat on site, may breed on the subject property. Should any tree removal occur for LLDGC enhancement or expansion activities within the breeding and nesting season, April 1 to September 1, a bird nest survey should be conducted by a QEP.

Western Toad

Western toads are yellow-listed (secure/least at risk of being lost) by the BC Conservation Data Centre and listed as a species of concern under the federal *Species At Risk Act* (SARA). Western Toads spend 95% of their life in terrestrial habitats, using aquatic environments to breed. Lost Lake is known as a primary breeding site for western toads. There are three main migration events in the Lost Lake area as adults move to and from Lost Lake for breeding in the spring and toadlets leave the lake in late summer for upland habitat. The toads may move 1 km or more from breeding sites to foraging and hibernation areas, movements up to 7 km from breeding sites were recorded on Vancouver Island (Ministry of Environment, 2014). Toads hibernate underground in the winter, often in small mammal burrows and coarse woody debris. Recent studies found western toads preferred rotted root wads that provide natural burrows into the earth and protection from the frost line (Wind, 2020).

The western toad is protected under the provincial *Wildlife Act* from killing, wounding, and taking of individual species, the western toad is also listed as a species of special concern under SARA. A species that is listed as Endangered, Extirpated or Threatened within Schedule 1 of SARA is legally protected under the Act by certain prohibitions, but a species that is listed with the classification of special concern will not receive protection under the SARA general prohibitions.

As with all species at risk habitat in BC, western toad habitat is only protected by SARA on non- Federal lands if it is legally described as critical habitat under special emergency measures of protection. The western toad habitat within the project boundaries is not legally protected from development; however, as

a known SARA occurrence within the study area, impacts, mitigation measures and management consideration should be considered in disc golf course design and maintenance activities.

Clodius Parnassian

It is possible that this butterfly occurs at low elevations in Whistler, and may occur in the riparian area of wetlands and tributaries identified within the subject area. Its larval food is *Dicentra* species, which in Whistler would be Pacific bleeding heart (*Dicentra formosa*). Wetlands and tributaries should be protected from any activities associated with the LLDGC

Little Brown Myotis

Little brown myotis hibernacula include caves, abandoned mines and wells, and are not likely to occur on the subject site. Maternity roost habitat includes human structures, caves, cliff crevices, and cavities and loose bark of large trees (Gov. of Canada, 2015). Maternity roosting in tree cavities and loose bark may occur on the subject site from April 1 onwards through the summer months. If any tree removal is planned on the subject site, a QEP should conduct a search of large wildlife trees with loose bark or cavities within the development area to ensure no active roosts are disturbed. Wildlife trees identified within the subject area should be retained where possible.

Wolverine

Breeding and habitat use by wolverine may occur in the Brandywine, Callaghan, Fitzsimmons and Cheakamus River riparian areas, along with Whistler Mountain and Blackcomb Mountain alpine areas (Brett, 2022). Wolverine prefer ecologically intact areas, but may occur on the subject area when moving between territories. However, as dens are constructed in talus boulders, along eskers, under deadfall, under logs in avalanche debris, or in snow tunnels at higher elevations and tundra (Gov. of Canada, 2014), denning is unlikely to occur on the subject site.

Bull Trout

Bull Trout are cold water specialists which have been identified as having more specific habitat requirements than other salmonids. Bull trout have been identified within Green Lake and Fitzsimmons Creek. Their specialization as a cold water species makes them highly susceptible to activities such as riparian timber harvesting. Loss of stream shading can lead to elevated water temperatures (both daily mean and peak temperatures), which can be problematic for a species that is seldom found in streams or lakes where temperatures rise above 15°C. LLDGC enhancement and expansion activities should not impact the riparian area of Fitzsimmons Creek to retain important riparian habitat for bull trout.

3.4. Valued Ecosystem Components

3.4.1. Wildlife Trees

Wildlife trees identified within the subject area that contain active dens or nesting/roosting cavities may be constraining to LLDGC enhancement and expansion activities during the breeding season of the animal. Songbird nests are protected when occupied, raptor nests are protected year-round (BC Gov, 1996) and pileated woodpecker nests are protected for 36 months after the nest site was last occupied by any migratory bird species (MOF, 2023).

Wildlife tees should be retained in disc golf design wherever possible and wildlife trees should be outside of active playing areas (tee boxes, fairways and baskets). A buffer of 5 m should be provided from these areas. There are no provincial or federal constraints to wildlife tree removal if the tree does not contain raptor nests, pileated woodpecker nesting cavities, or a nest of a species named within the *Migratory Birds Act*. Prior to any proposed tree removal in the subject area, a QEP should conduct a survey of the

proposed area and an appropriate buffer zone for any songbird, raptor, or pileated woodpecker nests should be implemented if a nest is found.

3.4.2. Coarse Woody Debris

The presence of coarse woody debris (CWD) in the subject area presents valuable habitat to various species of mammals, reptiles and amphibians that may occur in the subject area including the western toad. Pieces of CWD, of varying sizes and stages of decay, should be retained within the areas of the subject area with any expansion or enhancement disc course activities. Where possible, and in consideration of wildfire treatment prescriptions, CWD within course playing areas that must be removed should be relocated to forested areas out of bounds of the course playing areas.

3.4.3. Wildlife Movement Corridor

The value of the subject site as a wildlife movement corridor is limited as it is fragmented by surrounding roadways and residential development. The riparian areas of watercourses identified on the subject area should retained where possible to allow small scale wildlife movement corridors.

3.4.4. Rock Slopes

No rock slopes were observed on the subject site.

3.4.5.Sensitive Ecosystem Protection Area (SEPA)

The subject site is located within a SEPA as designated in Schedule K of the Whistler OCP. The property was determined to contain SEPA priority habitat as listed below:

- Ecosystems at risk
- Potential species at risk habitat

Ecosystems at risk

The Cascade QEP identified three blue-listed ecosystems at risk within the vegetated polygons in the subject area, as shown on Map 2. The ecosystems at risk on the subject area exist in a young and mature forest structural stage, which is considered less rare and endangered than an old growth forest structural stage, and are fragmented by the highway at the southern property border and the residential development on the northern and western property borders. As such, they have less integrity and value than intact, old growth ecosystems.

As blue-listed ecosystems at risk cover the entire subject area, it is not possible to avoid impacts to understory forest vegetation with enhancement and expansion LLDGC activities. Any activities should therefore minimize alteration, damage or disruption to the ecosystems at risk.

Detailed disc golf course design by experienced course designers like Indesign can implement the recommendations in Section 4 to reduce impact areas on the forest habitat by disc golf activity. The existing course was built by a dedicated grass roots club, and with appropriate professional planning and design the disc golf course can utilize mitigation measures in Section 4 to reduce the impacts within the SEPA areas that were observed in the existing course. The reconfiguration of the existing LLDGC would also offer the opportunity to restore 1.2 ha of forest habitat from unused areas of the existing holes (Map 5).

Potential species at risk habitat

Nine animal species at risk have the potential to occur on the subject area. The removal of understory forest habitat for the proposed alignments would reduce some of the available habitat in certain areas; however, viewed at a landscape level the impact area is a minimal part of the surrounding forested area. As clodius parnassian may be associated with the riparian areas on site, locating proposed expansion activities outside of riparian areas where possible prevents any potential impacts to this blue-listed butterfly.

Coarse woody debris should be retained wherever to retain potential hibernating habitat for the western toad while adhering to wildfire fuel treatment prescriptions in the area. Additionally, expansion activities should avoid the 30 m riparian buffer from Fitzsimmons Creek to prevent any impacts to bull trout habitat.

In order to avoid impact to habitat for the avian and bat species at risk that may occur in the proposed LLDGC expansion area, surveys for nests and roosts of these species should be conducted by a QEP prior to any vegetation or tree removal. Should the recommendations within this report be adhered to, no impacts to species at risk are expected to occur and impacts to species at risk habitat is expected to be minimal.

3.5. Aquatic Environment

3.5.1. Riparian Areas Protection Regulation

Development activities taking place in park lands under local government jurisdiction are typically exempt from RAPR if the activities are not considered commercial or industrial development (FLNRORD, 2019). Any enhancement and expansion of LLDGC activities within 30 m of the high-water mark (HWM) of the watercourses identified on site would be exempt from the RAPR as the RMOW would be conducting the activities which are not commercial or industrial in nature within park land.

3.5.2. Riparian Ecosystem Protection Area

Watercourses delineated by the QEP during subject area investigations receive a 30 m REPA setback as per the Whistler OCP for the following watercourses (Map 6).

- Fitzsimmons Creek
- Helens Corner Wetland
- Helens Corner Wetland Outflow Channel North
- Helens Corner Wetland Outflow Wetland Complex Southwest
- Spruce Grove Wetland

The RMOW requested the QEP conduct a REPA assessment for the watercourses within the subject area during the EIA. The high-water mark for Fitzsimmons Creek and Helen's Corner Wetland was delineated from lidar mapping data for the REPA assessment. Helens Corner Wetland Outflow Channel North highwater mark was flagged in the field adjacent to existing disc golf courses and the high-water mark was recorded by GPS. The same process was conducted for Helens Corner Wetland Outflow Wetland Complex Southwest and Spruce Grove Wetland.

The QEP utilized the detailed assessment methodology from the RAPR to provide setbacks based on the subject area watercourses. The Streamside Protection and Enhancement Area (SPEA) was produced for each watercourse for consideration in this report. The following SPEA setbacks were calculated for the watercourses within the subject area based on watercourse morphology and detailed assessment:

- Fitzsimmons Creek SPEA: 30 m
- Helens Corner Wetland SPEA: 15 m, Shade Zone of Sensitivity (ZOS): 30 m
- Helens Corner Wetland Outflow Channel North
    - Ditch SPEA: 2m
    - Reach 1 SPEA: 10 m
    - Reach 2 SPEA: 15m and Shade ZOS 30 m
    - Reach 3 SPEA: 10 m
    - Reach 4 SPEA: 15 m and Shade ZOS 30 m
    - Reach 5 SPEA: 27.93 m
- Helens Corner Wetland Outflow Wetland Complex Southwest: SPEA: 15 m and Shade ZOS 30 m
- Spruce Grove Wetland: SPEA: 15 m and Shade ZOS 30 m

The QEP defined sections of the watercourses as ditches based on the definition from the RAPR methodology that these sections were manmade and straight and followed boundaries of the Nordic trails collecting drainage from the trails surface (FLNROD, 2019). A REPA boundary was not designated to the ditches (Map 6) as it is not listed as a stream under the REPA guidelines as below:

Stream includes any of the following: (a) a watercourse whether it usually contains water or not; (b) a pond, lake, river creek or brook; (c) a spring that is connected by surface flow to something referred to in paragraph (a) or (b); (d) a wetland(OCP, 2019).

The QEP recommends the 2 m SPEA setback is utilized for the ditch riparian protection areas.

Existing REPA Impacts

The existing disc golf holes on the LLDGC overlap the 30 m REPA boundary of Helens Corner Wetland Outflow Channel North. Existing Holes #9, #10, #19 and connecting walking trails overlap the REPA area (Map 6). However, the holes are located within the hydro right of way and riparian vegetation has been mostly removed from this area except for small shrubs within the channel. The watercourse within this section has a very shallow and narrow morphology and was likely disturbed and redirected during the construction of Old Mill Road. Due to the existing impact of the REPA from the hydro right of way and existing trails, the continued use of the LLDGC is unlikely to further impact the watercourse or surrounding REPA.

Proposed Expansion Hole Alignment REPA Impacts

Proposed Expansion Hole Alignments were outside the REPA setbacks for Fitzsimmons Creek and Helen's Corner Wetlands (Map 6). The following proposed hole alignments overlap REPA areas of other watercourses within the study area:

Helens Corner Wetland Outflow Channel North

- Proposed Hole #9 alignment could overlap the Old Mill Road Ditch 2m SPEA setback (Map 6).

- Proposed Hole #11 alignment could overlap the 30 m REPA area, however would be outside the SPEA area for Reach 1.
- Proposed Hole #20 alignment could overlap the 30 m REPA setback, however would be outside of the SPEA setback for Reach 2.

Helens Corner Wetland Outflow Wetland Complex Southwest

Proposed hole #3, #15 and #16 overlap with the REPA setbacks for the wetland complex (Map 6):

- Proposed hole #3 would be outside of the SPEA setback. The REPA area is intersected south of the proposed hole by the 5 m wide gravel surfaced Nordic trail “Centennial”.
- Proposed hole #16 would be outside of the SPEA setback. The REPA area is intersected between the proposed hole and the wetland by the 5 m wide gravel surfaced Nordic trail “Centennial” and the REPA has been wildfire fuel treated.
- Proposed hole #15 is within REPA and SPEA setbacks, and the alignment crosses the wetland complex. There are no existing disturbances in this area.

Spruce Grove Wetland

Proposed Hole #1 overlaps the REPA setback, however would be outside the 15 m SPEA setback (Map 6):

- The 5 m wide gravel surfaced Nordic trail “Spruce Grove Connector” intersects the REPA between the wetland and the proposed hole.
- Wildfire fuel treatment activities have been conducted in The REPA area within hole #1 alignment, removing forest understory vegetation.

3.6. Socio-Economic Conditions

3.6.1. Cultural and Heritage Resources

Any enhancement and expansion activities within the LLDGC should follow RMOW’s First Nation consultation procedures.

- Subject Area
- Existing Hole
- Existing Impact Area
- Proposed Hole Impacts
- Proposed Holes
- Lost Lake Park
- Wetland
- Watercourse
- SPEA
- REPA
- Shade ZOS
- LWD ZOS
- LFI ZOS
- Right Of Way
- Cadastre - DataBC
- Railway - Main
- Railway - Connecting

Trails

- Access
- Black Diamond
- Blue Square
- Green Circle
- White Circle

Contour Interval

- 1m interval
- 20m interval

Fitzsimmons Spit
Old Mill Road
Hooktender
Green Lake Loop
Jelly Roll Gumdrop
Glen Abbey Lane
Muffin Man
Gandy Dancer
Lost Lake Trail
Son of Mr. Greenjeans
Lost Lake Connector
Fitzsimmons Creek
Centennial
Gee I like Your Pants
Hydro Cut
Foreplay
Helen's Corner Wetland Outflow Channel North
Mons Rd
Juniper Rd
Treacherous Cretins
Tommy Moore
Central Scrutinizer
Toads of the Short Forest
Zappa/Cretins Connector
Helen's Corner Wetland
Riverbend Rd
Spruce Grove Wetland
Zoot Allures
Elephant Bridge
Elephant Bridge Connector
Dwarf Nebula
Packard Goose
I'm Not Satisfied
Molly Hogan
Poler's Road
Ms. Pinky
Pinocchio's Furniture
Lower Panorama
Donkey Puncher
Soap & Old Clothes
Spruce Grove Connector
Kirkpatrick Way
NESTERS
LOST LAKE PARK
Blackcomb Way
660m
680m
700m
720m
740m

Note: Watercourse delineation either came from LiDAR data or by handheld GPS unit in the field, and was not surveyed.

GIS Cartographer: Oliver Chew
Date: *2024-05-15*
CERG File #: 013-18-06
Projection: NAD 1983 UTM Zone 10N

CASCADE ENVIRONMENTAL RESOURCE GROUP LTD

N

0 50 100 200 300 400
Meters

Map 6 - REPA Assessment

Lost Lake Disc Golf Course EIS
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British Columbia

3.6.2. Other Undertakings in the Area

Timber Harvesting

Timber harvesting presents no constraints to enhancement and expansion activities within the LLDGC.

Mining

Mining presents no constraints or concerns no constraints to enhancement and expansion activities within the LLDGC.

Recreation and Tourism

Multiple trails occur on the subject area. The location of these trails should be considered in any enhancement expansion activities to ensure that recreational trail users are not impacted by disc golf activities. Connecting trails between expansion holes should also consider trail traffic and good sightlines when merging to trails.

Anthropogenic Features and Adjacent Land Users

Adjacent land users do not constrain enhancement and expansion activities for the LLDGC. Scandinave Spa and Riverside camping currently have a vehicle parking area adjacent to existing hole #1 of the course and conflicts for parking have occurred between the recreational LLDGC users and the commercial business. Enhancement and expansion LLDGC activities should consider staging areas for recreational users to minimize vehicle parking conflicts.

4. Conclusions and Recommendations

4.1. Conclusion and Discussion

This report details the baseline environmental conditions and identifies exiting environmental impacts observed from the existing LLDGC and potential environmental constraints and potential impacts from enhancement and expansion activities for the LLDGC. Existing impacts from LLDGC activities included loss of understorey forest vegetation, soil compaction, young tree removal, tree bark damage from discs and tree root exposure from regular player foot traffic. An average of 21 trees were found to be removed within each disc golf hole playing area with the majority at 0-20 cm in DBH. Forest understory vegetation was found to be impacted at an average of 972 m^2 per disc golf hole, to a total of 17, 473 m^2 for the eighteen holes analyzed within this EIS. Tree bark impacts were observed from disc deflection on each hole with young trees or lodgepole pine species displaying gouges through the outer and inner bark, and mature trees displaying bark indentations or chipping from disc throws confined to the outer bark.

Two SEPA priority habitat areas were identified in the existing course: ecosystems at risk and potential species at risk habitat. Three blue-listed ecosystems at risk were identified in the subject area. Large tracts of undisturbed plant communities are considered ecologically more important than second growth communities, and the previously harvested and fragmented young and mature forest within the subject area represents less valuable ecosystems at risk than unlogged old growth forest. Nine animal species at risk have the potential to occur on the subject area. The removal of understory forest habitat would reduce the available habitat in certain areas for certain species; however, viewed at a landscape level the impact area is a minimal part of the surrounding forested area. Retention of mature trees, coarse woody debris and wildlife trees where possible will minimize any impacts from the proposed LLDGC expansion.

REPA areas outside of the BC Hydro line right of way were not observed to be impacted by the existing LLDGC. The REPA areas within the BC Hydro line right of way overlap 3 existing holes; however, the riparian vegetation is disturbed by existing trails and regular vegetation brushing from BC Hydro, and additional impacts from the existing LLDGC were not observed.

Cascade personnel assessed the proposed conceptual alignments in the field. Wetland habitat, considered a high ESA area, was discovered in the Helens Corner Wetland Outflow Wetland Complex Southwest, which overlaps conceptual hole #15. High ESA areas were also assessed in riparian/REPA areas associated with this wetland complex and Spruce Grove Wetland, in which the conceptual alignments are proposed. Parts of REPA areas overlapping the proposed holes contain existing human disturbance from existing trails and wildfire thinning activities. All other conceptual hole areas did not intrude into high ESA areas. Two SEPA priority habitat areas were identified in the proposed alignments including ecosystems at risk and potential species at risk habitat. Construction of proposed conceptual holes cannot completely avoid impacts on ecosystems at risk as all the forested area is considered a blue ecosystem at risk. Construction of conceptual holes is predicted to impact a total of 3.7 ha of understory vegetation. Therefore, minimizing anticipated impacts to forest habitat as observed in the existing LLDGC is recommended through mitigation measures displayed below implemented by professional disc golf course designers such as Indesign. The reconfiguration of the existing LLDGC would also offer the opportunity to restore 1.2 ha of forest habitat from unused areas of the existing holes (Map 5).

This EIS concludes that the enhancement and proposed expansion LLDGC alignments can occur on the subject area following applicable environmental federal, provincial and municipal legislation and

guidelines by implementing the following recommendations below for existing course improvements and proposed expansion hole alignments. Recommendations are also informed by publications reviewed that address professional design and planning of disc golf courses to reduce erosion and compaction on disc golf courses written by professional ecologists and landscape architects (PDGA Environment Committee, 2021).

4.2. Recommendations

Existing Course

Vegetation and SEPA Areas

1) Defined fairway trails (Photo 22) should be considered where hard surfaces are not present e.g. granite rock through all disc golf holes assessed in the EIA.
2) A defined trail and trail tread (e.g. mulch) should be added between a hole basket to the next tee pad to prevent soil compaction and trails should be designed to discourage shortcuts using landforms or vegetation blocks. Soil compacted areas beyond the trails outside of playing areas should receive soil aeration treatment and signage to inform players of the rehabilitation zones. Priority areas are described below:
    a) Trail tread with mulch should be defined between the basket of hole #3 and tee box of hole #4 to prevent further compaction and vegetation disturbance from trail braiding. The area outside of the trail should be remediated by aerating the soils and allowing natural vegetation to establish.
    b) Trail tread with mulch should be defined from the basket of hole #8 to hole #9 and the alignment changed from the Hole #8 shortest distance tee pad from the basket to reduce braiding.
    c) Trail tread with mulch should be defined from the basket of hole #11 to the tee of hole #12. Walking direction is confusing between the holes, resulting in a large unnecessarily braided area.
    d) The old alignment for hole #12 with the pole basket should be removed and remediated by fencing and aerating compacted soils. The nearby wildlife tree #1 would also be avoided from play.
    e) A split rail fence should be installed between hole #12 and hole #13 on the bottom of the slope to prevent braiding on the slope.
    f) Trail tread with mulch should be defined from the basket of hole #22 to the tee box of hole #23. Walking direction is confusing between the holes, resulting in a large unnecessarily braided area.
3) Wayfinding signage should be installed throughout the course on wooden posts instead of screws into trees to provide clear direction on trails from the basket to the next tee pad.
4) Wooden stairs should be implemented in steeper areas to reduce braiding and compaction. Priority areas are described below:
    a) Wooden stairs should be installed on the steep section between the basket of hole #14 and the tee pad of hole #15, along with a bench-cut defined trail.
    b) Wooden stairs should be installed from the fairway to the basket of hole #16 on top of the rock.

5) Out-of-bound markers should be installed to define playing areas and encourage users to remain inside fairway boundaries reducing impacts to the surrounding forest.

6) Mulching should be incorporated in areas of high foot traffic, including around tee boxes and baskets (where suitable) to prevent further soil compaction and protect tree roots.

7) Impact protection should be used in high strike zones of susceptible trees (e.g. close proximity to the tee) including lodgepole pine and young trees. Vertical wooden stakes could be trialed as a protection method.

8) Opportunities to provide a boot-cleaning brush stand (Photo 23) should be explored at the entrance of the course, with educational signage to encourage users to clean boots of material before and after using the course to prevent the spread of invasive species.

9) A maintenance plan should be developed with the local user group to allow long-term management of soil erosion and vegetation retention. Annual monitoring of trail braiding conditions and mitigation actions e.g. mulching and vegetation retention should be conducted to correct actions and implement mitigation where needed.

10) The local user group should be consulted to consider seasonal course closures (e.g. during spring snow melt) to mitigate erosion issues during wet conditions, similar to the programs initiated on the Blackcomb Mountain bike trails (Micro-climate trail).

REPA

11) Construction of split rail fence should be considered in coordination with BC Hydro on Old Mill Road and Tommy Moore trails beneath the BC hydro right-of-way. Fencing would protect the remaining riparian shrub vegetation outside of the existing area of human disturbance for the Helen's Corner Wetland Outflow Channel North alignment and prevent trail braiding shortcuts between hole #9 and #10.

Proposed Alignments and Enhancements

Vegetation and SEPA Areas

12) Existing tree and shrub vegetation should be retained as much as possible with a detailed course design produced by professionals utilizing the recommendations of this report.

13) Proposed expansion hole alignments should utilize existing areas of human disturbance wherever possible in course expansion design to minimize further impacts to forest understorey vegetation. Specific examples include:

    a) Proposed hole alignment #1 should utilize the remnant cleared access road leading to the Scandinave Spa property.

    b) Proposed hole alignment #1, #2, #16, #17 and #18 should utilize the wildfire fuel-treated areas which have largely removed of understory vegetation, minimizing further impacts.

    c) Proposed hole #6 should utilize the existing cleared harvesting laydown area to minimize understory vegetation impacts.

    d) Proposed holes should utilize existing impacted areas of existing holes if a full course redesign is proposed.

e) Proposed holes should utilize the existing gravelled 5 m wide Nordic trails in the area to connect and provide access between holes on the course where possible.

f) Reconfiguration of the LLDGC should restore approximately 1.2 ha of existing impacted playing area to its natural forest understory habitat (Map 5).

14) Course design should be implemented to minimize disc strikes to lodgepole pine species and young trees from tee areas to prevent bark impacts. Wooden stakes should be positioned adjacent to susceptible trees where required. Forest vegetation polygons with greater stands of lodgepole pine species will include 02 site series and lesser amounts in 03 site series. Polygons 3 and 5 contain the most lodgepole pine tree species susceptible to disc strikes. Lesser amounts of lodgepole pine species are found within Polygons 1, with sporadic individuals in Polygon 2 and Polygon 4.

15) Defined fairway trails (Photo 22) should be considered where hard surfaces are not present e.g. granite rock to minimize soil compaction.

16) Defined connecting trails should be constructed with a mulch trail between each basket and the next tee pad. This should discourage trail braiding and retain forest understorey habitat.

17) Tee boxes should be made from pervious materials (e.g. wood slats or pervious concrete) to prevent soil compaction.

18) Mulching should be incorporated in areas of predicted high foot traffic, including around tee boxes (Photo 22) and greens (where suitable) to prevent soil compaction in forest habitat.

19) Wooden steps and bench cutting should occur in any steeper gradient connecting trails between holes to minimize erosion from foot traffic in steeper areas.

20) Signed out-of-bounds areas should be implemented in course design to minimize the area of impact from tee pad to basket and therefore retain understorey forest habitat.

21) Wayfinding signage should be installed throughout the course from each basket to tee box where required to provide clear direction on trails and prevent trampling of vegetation. Signage should be positioned on course posts secured within the ground to prevent signage being screwed into trees and impacting tree health.

22) Prior to any tree removal for enhancement or expansion holes, a QEP should be retained to conduct a survey for the presence of any of the rare and endangered species listed in this report as potentially occurring in the area, and their residences/habitat.

23) A QEP should also be retained to conduct a survey for raptor nests and pileated woodpeckers nesting cavities prior to any tree removal. If tree removal is proposed within the bird nesting window of April 1 to September 1 for enhancement and expansion holes the QEP should also conduct a songbird nesting survey to avoid contravention of the *Wildlife Act* and the *Migratory Birds Act*.

24) Any coarse woody debris that must be removed in playing areas of proposed expansion areas should be re-located to an alternate area out of bounds of the course within the surrounding forest to provide habitat on the forest floor for wildlife including the western toad. Large stumps should be left in place wherever possible in course design to provide potential western toad overwintering hibernating habitat.

25) If stumps and coarse woody debris are required to be removed from the course during course enhancement or expansion activities, removal should occur outside of the hibernating time for western toads of November to February (Wind, 2020).

26) The four wildlife trees identified with proposed areas for hole #14 and #17 should be designed to be outside of the fairway and playing areas and in signed out-of-bounds areas to minimize disturbance to these features. A 5 m buffer is recommended from the wildlife trees to fairways/playing areas. If a wildlife tree is proposed for removal a QEP must conduct a search prior to removal for any species at risk nests, raptor and pileated woodpecker nests to ensure compliance with the *Wildlife Act* and *Migratory Bird Act*.

27) Opportunities to provide a boot-cleaning brush stand (Photo 23) should be explored at the entrance of the proposed course as per recommendation point 8.

28) Any constructed expansion and enhancement holes should remain closed until all mitigative actions for erosion and vegetation retention are completed e.g. connector trails, mulching, signage. Soil compaction and vegetation impacts and harder to manage once they have occurred.

29) A maintenance plan should be developed with the local user group to allow long-term management of any expansion holes to prevent soil erosion and support vegetation retention. Annual monitoring of trail braiding conditions, and mitigation actions, e.g. mulching and vegetation retention, should be conducted to correct actions and implement mitigation where needed.

30) Waste receptacles should be placed in frequently used areas around the proposed expansion holes in wildlife secure containers to secure waste and prevent wildlife habituation in the area while adhering to the RMOW Garbage Disposal and Wildlife Attractants Bylaw (RMOW, 2008).

Aquatic and REPA Recommendations

31) The proposed hole 15 alignment should be designed to be outside of the top of bank of the Helens Corner Wetland Outflow Wetland Complex Southwest and retain the natural hydrology of the area. Any proposed works beyond top of bank would require authorization under the *Water Sustainability Act*.

32) Reduce impacts to the REPA of Helens Corner Wetland Outflow Wetland Complex Southwest for proposed hole #15, #16 and #3 through sound course design and planning, making use of signed out-of-bounds areas where required. If proposed holes intersect REPA areas for hole #15 and #16, mature trees should not be removed from these REPA areas to retain shading and litter fall functions to the wetland complex.

33) The proposed hole #11 and #20 alignments should be designed to avoid the 30 m REPA from Helens Corner Wetland Outflow Channel North.

34) The proposed hole #9 should be designed to avoid the 2 m SPEA setback from the ditch.

35) Proposed holes #6 and #7 should be designed to avoid the 30 m REPA area from Fitzsimmons Creek.

36) Proposed hole #1 should utilize the existing area of human disturbance of the remnant access road within the 30 m REPA to minimize understory vegetation impacts.

37) The sub-surface hydrological drainage pattern identified between holes #16 and #17 (Map 6) should be considered in course design and a designated trail and wooden platform should cross this terrain to avoid soil compaction and possible erosion.

38) Install wooden bridge crossings across the ditch from Old Mill Road to proposed hole #9 at the tee pad and basket access trail to minimize disturbance from recreational players.

39) Any proposed activities below the top of bank of any watercourse identified within this EIS must be authorized by a Section 11 application for changes in about a stream under the *Water Sustainability Act*.

Photo 22: Example of mulching and fairway trail in San Francisco Disc Golf Course

Photo 23: Boot brush and educational signage at Brandywine BC Park

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6. Appendix

6.1. Appendix A: Table 10: Wildlife Species at Risk Potentially Occurring on the Subject Site

Table 9: Wildlife Species at Risk Potentially Occurring on the Subject Site.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Northern goshawk *Accipiter gentilis laingi*	Red	Threatened	Coastal forests of BC, especially central and northern coastal islands. Habitat consists of extensive forests with large stands of mature trees and dense canopies, large trees are important in providing nesting and perching platforms.	**Possible –** extensive forest with large stand of mature trees within LLDGC subject area.
Green sturgeon *Acipenser medirostris*	Blue	Special Concern	Found in estuaries, lower reaches of large rivers, and in salt or brackish water off river mouths.	**None** – no suitable habitat.
White sturgeon *Acipenser transmontanus*	-	Endangered	Occurs along the Pacific Coast of British Columbia. Significant populations are restricted to large river systems.	**None –** no suitable habitat.
Northwestern pond turtle *Actinemys marmorata*	Red	Extirpated	Two specimen were collected in the lower Fraser Valley in the 1930s and another observed in 1966. There have been no other sightings in BC.	**Unlikely** – not observed in the Whistler area.
Western grebe *Aechmophorus occidentalis*	Red	Special Concern	Marshes, lakes, and bays; in migration and winter also sheltered seacoasts, less frequently along rivers (Subtropical and Temperate zones).	**Unlikely** – not observed in Whistler area.
White-throated swift *Aeronautes saxatalis*	Blue	-	Primarily mountainous country, especially near cliffs and canyons where breeding occurs; forages over forest and open situations in a variety of habitats (Subtropical and Temperate zones).	**Unlikely** – no cliffs or canyons.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Oregon forestsnail *Actinemys marmorata*	Red	Endangered	Habitat requirements of *A. townsendiana* are poorly known. It occupies mixedwood and deciduous forests, typically dominated by Bigleaf Maple (*Acer macrophyllum*).	**Unlikely –** no bigleaf maple.
Nelson's sparrow *Ammospiza nelsoni*	Red	-	BREEDING: Freshwater marshes and wet meadows in interior and brackish marshes along coast. Nests on ground in matted bed of rushes or under mat of grasses, in dense grass or sedges, or several centimeters above wet ground in dense clump of grass.	**Unlikely** – no marshes, meadows or dense grass on site.
Western toad *Anaxyrus boreas*	Yellow	Special Concern	Various upland habitats around ponds, lakes, reservoirs, and slow-moving rivers and streams. Sand beaches utilized for breeding.	**Possible –** Lost lake is a known breeding ground a western toad can forage in surrounding forest habitat.
Mountain beaver *Aplodontia rufa*	Yellow	Special Concern	This subspecies is associated with coniferous, mixed and Red Alder forests on moist slopes or hillsides near small streams or seeps. Humid sites with a dense understory are ideal. An important requirement is deep soils suitable for excavating burrow systems and tunnels.	**Unlikely** – habitat range is Fraser Valley area.
Great blue heron *Aredea herodias fannini*	Blue	Special Concern	Aquatic areas <0.5 m deep, fish bearing streams and rivers, undisturbed nesting in tall trees. Known to occur in Whistler.	**Unlikely –** no fish bearing watercourses.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Emma's dancer *Argia emma*	Blue	-	Along rivers, creeks and sometimes wave-washed lake beaches.	**Unlikely** – no known occurrences in Whistler area.
Vivid dancer *Argia vivida*	Blue	Special Concern	Rare. Associated with cool or hot springs. Montane. Southern B.C. from the Coast Mountains to the Rockies.	**Unlikely** – no springs on subject area
Coastal tailed frog *Ascaphus truei*	Yellow	Special Concern	Although they may be found in fish-bearing streams, tailed frogs typically occur in non-fish bearing, permanent, cold, fast flowing mountain streams that flow over rocky substrates.	**Unlikely –** no suitable habitat on subject area.
Short-eared owl *Asio flammeus*	Blue	Special Concern	In general, any area that is large enough, has low vegetation with some dry upland for nesting, and that supports suitable prey may be considered potential breeding habitat, although many will not have breeding short-eared owls. Nearby water is a requirement for nesting habitat.	**Unlikely – n**ot found in the Whistler area*.
Burrowing Owl *Athene cunicluaria*	Red	Endangered	Habitat includes open grasslands, especially prarie, plains and savanna, sometimes other open areas such as vacant lots near human habitation or airports.	**Unlikely** – not found in the Whistler area*.
Upland sandpiper *Bartramia longicauda*	Red	-	Preferred habitat includes large areas of short grass for feeding and courtship with interspersed or adjacent taller grasses for nesting and brood cover.	**Unlikely** – not known in the Whistler area.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
American bittern *Botaurus lentiginosus*	Blue	-	Nests primarily in inland freshwater wetlands, sometimes in tidal marshes or in sparsely vegetated wetlands or dry grassy uplands.	**Unlikely** – no known sightings in Whistler area*.
Marbled murrelet *Brachyramphus marmoratus*	Blue	Threatened	Coastal areas within 2 km of shore, occasionally on rivers and lakes within 20 km of the ocean in old growth forest. Closest known occurrence is Toba River.	**Unlikely –** no old growth forest on site.
Brant *Branta bernicla*	Blue	-	In winter, this species occurs primarily in marine situations that are marshy, along lagoons and estuaries, and on shallow bays, often in areas with eelgrass. Areas dominated by large freshwater lakes and estuaries provide important summer molting areas.	**Unlikely** – no suitable habitat on subject area.
Rough-legged hawk *Buteo lagopus*	Blue	-	Grasslands, field, marshes, sagebrush flats, and open cultivated areas; sometimes rat-infested garbage dumps. Nests on cliffs (typically) or in trees in arctic and subarctic, in tundra, mountain sides, forests with plenty of open ground.	**Unlikely** – not observed in Whistler area.
Green heron *Butorides virescens*	Blue	-	Aquatic areas, especially slow moving, shallow waters with good riparian cover. Known to occur in the Whistler area*.	**Unlikely –** no appropriate watercourses, Lost Lake closest possible habitat

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Smith's longspur *Calcarius pictus*	Blue	-	BREEDING: Dry, grassy, and hummocky tundra. NON-BREEDING: in migration and winter in grassy and weedy areas, fields, prairies and airports.	**Unlikely** – no suitable habitat in subject area.
Red knot *Calidris canutus*	Red	Threatened / Endangered	Primarily seacoasts on tidal flats and beaches, less frequently in marshes and flooded fields. On sandy or pebbly beaches, especially at river mouths; feeds on mudflats, loafs and sleeps on salinas and salt-pond dikes.	**None** – no suitable habitat in subject area.
Western pine elfin *Callophrys eryphon sheltonensis*	Blue	-	Alpine/Tundra / Krummholtz / Unknown Grassland/Shrub / Shrub - Natural / Unknown Wetland / Bog / Facultative - frequent use.	**Unlikely** – no suitable habitat in subject area.
Johnson's hairstreak *Callophrys johnsoni*	Red	-	Primary habitat consists of older coniferous forests, especially those with Western Hemlock (*Tsuga heterophylla*) that are infected by dwarf mistletoe (*Arceuthobium tsugense*). However, it is also found in other forest types, most notably in Ponderosa Pine (*Pinus ponderosa*) or Gray Pine (*P. sabiniana*) forests infected with Western Dwarf Mistletoe (*A. campylopodum*).	**Unlikely** – not known to occur in the Whistler area.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Canada warbler *Cardellina canadensis*	Blue	Threatened	In migration, this warbler uses various forest, woodland, scrub, and thicket habitats, mostly in humid areas. In winter, it occurs in forested areas of foothills and mountains.	**Unlikely** – not known to occur in the Whistler area.
Western thorn *Carychium occidentale*	Blue	-	In low elevation forests in rich, relatively undisturbed leaf litter; usually dominated by Bigleaf maple.	**Unlikely** – no suitable habitat in subject area.
Salish sucker *Catostomus* sp. 4	Red	Threatened	Habitat includes lowland streams and associated ponds and (in Washington) lakes.	**Unlikely** –not observed in Whistler area.
Common wood-nymph *Cercyonis pegala incana*	Red	-	Common Woodnymphs occur across southern BC in grassy forest openings, clearcuts, roadsides, meadows, and stream banks.	**Unlikely** – not known in Whistler area.
Roosevelt elk *Cervus elaphus roosevelti*	Blue	-	Roosevelt Elk, inhabiting the southern coastal rainforests, are usually found in valley bottoms in most seasons, even in summer in some areas. Herbs and stands of shrub seedlings, along with riparian areas, provide the main foraging areas for Roosevelt Elk, while older forests supply security cover against predators.	**Unlikely** – no old growth forest on site, in close proximity to residential dwellings and high levels of traffic nearby.
Northern rubber boa *Charina bottae*	Yellow	Special Concern	Rubber Boas are most often associated with low elevation mountainsides. Here they can take advantage of warm aspect slopes.	**Unlikely** – closest known location is Pemberton.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Hoffman's checkerspot *Chlosyne hoffmanni*	Red	-	Openings and meadows in valleys in Canadian Zone forest.	**Unlikely** – not known to occur in the Whistler area.
Lark sparrow *Chondestes grammacus*	Blue	-	Nests are either on the ground or close to the ground (most often within 4 meters) in woody vegetation. Ground nests may be located in areas of sparse ground cover such as those areas associated with burning, moderate to heavy grazing, or poor or eroded soils.	**Unlikely** – not known to occur in the Whistler area.
Common nighthawk *Chordeiles minor*	Yellow	Threatened	Mountains and plains in open coniferous forest, savanna, grassland and towns. Nesting occurs on the ground on a bare site in an open area.	**Possible –** coniferous forest and open areas on the subject site.
Painted turtle *Chrysemys picta* pop. 1	Red	Endangered	Painted turtles live in slow-moving, shallow waters with soft bottoms, basking sites, and aquatic vegetation.	**Unlikely –** not known in the Whistler area.
Hairy-necked tiger Beetle *Cicindela hirticollis*	Blue	-	Associated with sand beaches.	**Unlikely-** no suitable habitat.
Evening grosbeak *Coccothraustes vespertinus*	Yellow	Special Concern	Coniferous (primarily spruce and fir) and mixed coniferous- decidouous woodland, second growth, and occasionally parks; in migration and winter in a variety of forest and woodland habitats, and around human habitation.	**Possible -** foraging and nesting habitat in the riparian areas of Helens Corner Wetland.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Yellow-billed cuckoo *Coccyzus americanus*	Red	-	Open woodland (especially where undergrowth is thick), parks, deciduous riparian woodland; in the West, nests in tall cottonwood and willow riparian woodland. Nests in deciduous woodlands, moist thickets, orchards, overgrown pastures; in tree, shrub, or vine, an average of 1-3 meters above ground.	**Unlikely** – not known in Whistler area.
Sharp-tailed snake *Contia tenuis*	Red	Endangered	In British Columbia, the Sharp-tailed Snake occurs in low-elevation woodland habitats dominated by Douglas-fir, arbutus and/or Garry oak. The snakes are often found in small openings on talus rocky outcrops and on warm hillsides	**Unlikely –** outside of distribution range.
Olive-sided flycatcher *Contopus cooperi*	Blue	Threatened	Mixed coniferous-deciduous forest with old growth snags along forest edges. Known to occur in the Whistler area*.	**Unlikely –** no old growth snags on site.
Townsend's big-eared bat *Corynorhinus townsendiii*	Blue	-	On the West Coast, Townsend's big-eared bats are found regularly in forested regions and buildings, and in areas with a mosaic of woodland, grassland, and/or shrubland. In California and Washington, they are known from limestone caves, lava tubes, and human-made structures in coastal lowlands, cultivated valleys, and nearby hills covered with mixed vegetation.	**Unlikely –** no cliffs, caves or structures on site.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Coastrange sculpin (Cultus ssp.) *Cottus aleuticus* pop. 1	Red	Threatened	Confined to the deeper waters of a low elevation montane lake.	**Unlikely –** not known in the Whistler area.
Puget oregonian *Cryptomastix devia*	Red	Extirpated	In the US, it is a mature forest specialist; inhabits moist old-growth and late successional forests and riparian areas at low and mid elevation; in course woody debris and leaf litter.	**Unlikely** – no suitable habitat on site.
Black swift *Cypseloides niger*	Blue	Endangered	Nests behind or next to waterfalls and wet cliffs, on sea cliffs and in sea caves.	**Unlikely -** not near ocean or suitable cliff nesting habitat.
Monarch *Danaus plexippus*	Red	Special Concern	In general, breeding areas are virtually all patches of milkweed in North America and some other regions. The critical conservation feature for North American populations is the overwintering habitats, which are certain high altitude Mexican conifer forests or coastal California conifer or Eucalyptus groves as identified in literature.	**Unlikely -** no suitable habitat.
Coastal giant salamander *Dicamptodon tenebrosus*	Blue	Threatened	Larvae and paedomorphic adults usually inhabit clear, cool or cold, well-oxygenated streams and often take cover under stones.	**Unlikely** – not known in the Whistler area.
Bobolink *Dolichonyx oryzivorus*	Blue	Threatened	This species generally selects habitat with moderate to tall vegetation, moderate to dense vegetation, and moderately deep litter.	**Unlikely –** not known in the Whistler area.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Alkali bluet *Enallagma clausum*	Blue	-	Lakes / Pond/Open Water / Facultative - frequent use Other Unique Habitats / Alkali Ponds/Salt Flats / Facultative - frequent use.	**Unlikely** – not known in the Whistler area.
Silver-Spotted Skipper *Epargyreus clarus californicus*	Red	-	Pretty much any place with lots of the major foodplants which are usually ROBINIA or AMORPHA whether wild or culitvated, native or not. Strays possible in any habitat.	**Unlikely** – site does not contain robina or amorpha.
Horned Lark *Eremophila alpestris strigata*	Red	Endangered	Habitat consists of large expanses of bare or thinly vegetated land, including fields, prairies, dunes, upper beaches, airports, and similar areas with low/sparse grassy vegetation.	**Unlikely** – not known in Whistler area.
Propertius Duskywing *Erynnis propertius*	Red	-	Butterfly; Open oak or mixed woodlands with the foodplant oaks.	**Unlikely –** no oak on site.
Western Pondhawk *Erythemis collocata*	Blue	-	Around ponds and marshy lakes, especially where floating plants occur.	**Unlikely** – not known in the Whistler area.
Steller Sea Lion *Eumetopias jubatus*	Blue	Special Concern	Marine habitats include coastal waters near shore and over the continental slope.	**None** – no marine habitat.
Rusty Blackbird *Euphagus carolinus*	Blue	Special Concern	Breeds in habitats that are dominated by coniferous forest with wetlands nearby including bogs, marshes and beaver ponds. During the winter, it is found in wet woodlands, swamps, and pond edges and often forages in agricultural lands.	**Unlikely** – unlikely to be resident in Whistler*.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Dun Skipper *Euphyes vestris*	Blue	Threatened	The Dun Skipper is known from southern Vancouver Island, the Lower Mainland, and the Fraser River canyon upstream to Lillooet.	**Unlikely** – not known in Whistler.
Prairie Falcon *Falco mexicanus*	Red	-	Primarily open situations, especially in mountainous areas, steppe, plains or prairies. Typically nests in pot hole or well-sheltered ledge on rocky cliff or steep earth embankment.	**Unlikely** – no cliff areas on subject site.
Peregrine Falcon *Falco peregrinus anatum*	Red	Special Concern	Cliff edges near water, interior rivers and wetlands*.	**Unlikely –** unlikely to be present in Whistler*.
Gyrfalcon *Falco rusticolus*	Blue	-	Usually nests on cliff ledges, ideally beneath sheltering overhang; sometimes nests in trees or on man-made structures.	**Unlikely** – not known in the Whistler area*.
Tufted Puffin *Fratercula cirrhata*	Blue	-	Nests on offshore islands or along the coast.	**Unlikely –** no suitable habitat.
Northern Fulmar *Fulmarus glacialis*	Red	-	Pelagic. Nests in colonies primarily on sea cliffs, less frequently on low flat rocky islands.	**Unlikely –** no suitable habitat.
Prairie Fossaria *Galba bulimoides*	Blue	-	Physical barriers, particularly for flowing water, is presence of upland habitat between water connections. High waterfalls and anthropogenic barriers to water flow such as dams are barriers as they limit movement in an upstream direction.	**Unlikely** – barrier of waterfalls restrict from Whistler.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Dusky Fossaria *Galba dalli*	Blue	-	Physical barriers, particularly for flowing water, is presence of upland habitat between water connections. High waterfalls and anthropogenic barriers to water flow such as dams are barriers as they limit movement in an upstream direction.	**Unlikely** – barrier of waterfalls restrict from Whistler.
Pygmy Fossaria *Galba parva*	Blue	-	On wet mud flats, lakeshores and riverbanks.	**Unlikely** – no Whistler observations.
Wolverine *Gulo gulo luscus*	Blue	Special Concern	A range of habitat types from valley bottoms to alpine meadows, strongly associated with the presence of large ungulate prey.	**Possible**.
Star Gyro *Gyraulus crista*	Blue	-	Habitat is freshwater.	**Unlikely –** no Whistler observations.
Northern Abalone *Haliotis kamtschatkana*	Red	Endangered	Habitat is predominantly kelp beds along outer well-exposed coasts.	**Unlikely –** no suitable habitat.
Pale Jumping-Slug *Haliotis kamtschatkana*	Blue	-	In dry to moist coniferous forests, on and around mossy stumps, rocks and logs; also in leaf litter.	**Unlikely** – habitat range is southeast BC.
Western Branded Skipper *Hesperia Colorado oregonia*	Red	-	A butterfly of open arid land habitats, this skipper is especially common on hillsides and in valleys.	**Unlikely** – no known occurrences in the Whistler area*.
Barn Swallow *Hirundo rustica*	Blue	Threatened	Open areas, fields, ponds with vertical nesting habitat, especially buildings. Known to occur in the Whistler area*.	**Unlikely** - no suitable habitat.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Caspian Tern *Hydroprogne caspia*	Blue	-	Seacoasts, bays, estuaries, lakes, marshes, and rivers.	**Unlikely** – migrates through Whistler*, but unlikely to nest on or around the subject site.
Yellow-breasted chat *Icteria virens*	Red	Endangered	Associated with shrubby and riparian habitats with open canopies and dense subcanopy layers.	**Unlikely** - no suitable habitat.
California gull *Larus californicus*	Blue	-	Seacoasts, bays, estuaries, mudflats, marshes, irrigated fields, lakes, ponds, dumps, cities, and agricultural lands.	**Unlikely** – migrates through Whistler*, but unlikely to nest on or around the subject site.
Hoary bat *Lasiurus cinereus*	Blue	-	Habitat includes primarily deciduous and coniferous forests and woodlands, including areas altered by humans. Foraging habitat includes various open areas, including spaces over water and along riparian corridors	**Unlikely –** no known occurrences in Whistler.
Snowshoe hare, washingtonii subspecies *Lepus americanus washingtonii*	Red	-	Dense cover of coniferous or mixed forests, with abundant understory vegetation. Non-fragmented, adequately sized patches of forests, deciduous woodlands, orchards, tree plantations, and riparian woodlands provide the preferred range of foraging and breeding habitats.	**Unlikely –** no known occurrences in the Whistler area.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Short-billed Dowitcher *Limnodromus griseus*	Blue	-	mudflats, estuaries, shallow marshes, pools, ponds, flooded fields and sandy beaches. Prefers shallow salt water with soft muddy bottom, but visits various wetlands during migration.	**Unlikely** - no suitable habitat.
Hudsonian Godwit *Limosa haemastica*	Red	Threatened	Nests on grassy tundra, near water. Bogs and marshes. Near coast or river. Nests on the ground in a sparsely lined depression, in or under edge of prostrate dwarf birch or on dry top of hummock in sedge marsh.	**Unlikely** - no suitable habitat.
Western Screech-Owl *Megascops kennicottii kennicotti*	Blue	Threatened	Associated with riparian zones with Broadleaf Maple or Black Cottonwood	**Unlikely** - no suitable habitat.
Lewis's Woodpecker *Melanerpes lewis*	Blue	Threatened	Three distinct habitats are used in British Columbia: open areas with scattered trees, riparian forests adjacent to open areas; and burns.	**Unlikely** - no suitable habitat.
Black Scoter *Melanitta americana*	Blue	-	Mostly coastal waters, less commonly on large inland lakes and rivers when not breeding. Nests near lakes and pools on grassy or bushy tundra and in northern taiga.	**Unlikely** - no suitable habitat.
Surf Scoter *Melanitta perspicillata*	Blue	-	Primarily marine littoral areas, less frequently in bays or on freshwater lakes and rivers.	**Unlikely -** migrates through Whistler*, but unlikely to nest on or around the subject site.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Long-tailed weasel *Mustela frenata altifrontalis*	Red	-	Cultivated field, alpine, tundra, conifer forest, grassland, rocky habitat and wetlands	**Unlikely -** only known to occur in the lower mainland.
Southern Red-backed Vole *Myodes gapperi occidentalis*	Red	-	Conifer forest, riparian area, bog	**Unlikely -** only known to occur in the lower mainland.
Little brown myotis *Myotis lucifugus*	Yellow	Endangered	Summer roosts are in buildings and other man-made structures, tree cavities, rock crevices, caves and under the bark of trees. Uses underground habitat such as caves for hibernacula. Confirmed in the Whistler Area*.	**Possible** – tree cavities, rock and mature forest on the subject area.
Yuma myotis *Myotis yumanensis*	Blue	-	Found in a wide variety of upland and lowland habitats, including riparian, desert scrub, moist woodlands and forests, usually near open water.	**Unlikely –** no known occurrences in Whistler*.
Double-crested Cormorant *Nannopterum auritum*	Blue	-	Lakes, ponds, rivers, lagoons, swamps, coastal bays, marine islands, and seacoasts; usually within sight of land. Nests on the ground or in trees in freshwater situations, and on coastal cliffs	**Unlikely –** occurs infrequently in Whistler*.
Long-billed Curlew *Numenius americanus*	Blue	Special Concern	Prairies and grassy meadows, generally near water.	**Unlikely** – no suitable habitat.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Black-crowned Night-heron *Nycticorax nycticorax*	Red	-	Marshes, swamps, wooded streams, mangroves, shores of lakes, ponds, lagoons; salt water, brackish, and freshwater situations. Roosts by day in mangroves or swampy woodland.	**Unlikely** – not known to occur in Whistler.
Grappletail *Octogomphus specularis*	Red	-	Along wooded streams draining lakes	**Unlikely** – North end of range is Lower Faser Valley*.
Audouin's Night-stalking Tiger Beetle *Omus audouini*	Red	Threatened	Low elevation coastal terrain. All sites in B.C. are less than 20 m above sea level and within 3 km of the saltwater shoreline	**Unlikely** – no suitable habitat.
Cutthroat trout *Oncorhynchus clarkii clarkii*	Blue	-	Sea-run populations, freshwater-resident populations (lacustrine and fluvial) and headwater stream populations.	**Unlikely –** no suitable habitat.
Sinuous snaketail *Ophiogomphus occidentis*	Blue	-	Fly along clear streams and sandy lakeshores; uncommon in settled areas, at least partly because the burrowing larvae are sensitive to changes in water flow and siltation.	**Unlikely –** never been documented in Whistler*.
Mountain goat *Oreamnos americanus*	Blue	-	Alpine and subalpine habitat; steep grassy talus slopes, grassy ledges of cliffs, or alpine meadows. Usually at timberline or above. May seek shelter and food in stands of spruce or hemlock in winter.	**Unlikely -** site is not above timberline.
Sage Thrasher *Oreoscoptes montanus*	Red	Endangered	Sagebrush plains, primarily in arid or semi-arid situations, rarely around towns	**Unlikely** – no suitable habitat.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Indra Swallowtail *Papilio indra*	Red	-	Caterpillar Hosts: Aromatic herbs of the parsley family (Apiaceae) growing among rocks. Adult Food: Flower nectar.	**Unlikely** – no suitable habitat.
Clodius parnassian *Parnassius clodius pseudogallatinus*	Blue	-	Populations on the coast occur in moist riparian habitats along low-elevation streams. Wet subalpine meadows and subalpine riparian habitats are used at higher elevations.	**Possible** – ephemeral riparian habitat.
Band-tailed pigeon *Patagioenas fasciata*	Blue	Special Concern	Coniferous and mixed deciduous lowland forests. Known to occur in the Whistler area*.	**Possible –** coniferous forest found in subject area.
American White Pelican *Pelecanus erythrorhynchos*	Red	-	Habitat includes rivers, lakes, reservoirs, estuaries, bays, and open marshes, sometimes inshore marine habitats	**Unlikely** – not known to occur in Whistler.
Red-necked Phalarope *Phalaropus lobatus*	Blue	-	Primarily pelagic, sometimes occurring in migration on ponds, lakes, open marshes, estuaries, and bays	**Unlikely** – outside of usual range*.
Rocky mountain physa *Physella propinqua*	Blue	-	This species is found in permanent, cool water habitats, most often in lakes. Pools in medium rivers or shallow water of lakes.	**Unlikely –** no known occurrence in or near Whistler*.
Sunset physa *Physella virginea*	Blue	-	The type locality of this species is Mountain Lake, but otherwise the habitat needs of this species are unknown.	**Unlikely**– no known occurrence in or near Whistler*.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Gopher snake, catenifer subspecies *Pituophis catenifer catenifer*	Red	Extirpated	Known habitats include agriculture, cultivated field, rock, talus.	**Unlikely –** no suitable habitat.
Meadow Rams-horn *Planorbula campestris*	Blue	-	This species is found in vegetated vernal ponds, swamps, and springtime flooded portions of permanent water bodies.	**Unlikely** – no suitable habitat.
American Golden-Plover *Pluvialis dominica*	Blue	-	Short grasslands, pastures, golf courses, mudflats, sandy beaches, and flooded fields.	**Unlikely** – no suitable habitat.
Eared grebe *Podiceps nigricollis*	Blue	-	Marshes, ponds and lakes; in migration and winter also salt lakes, bays, estuaries and seacoasts.	**Unlikely** – not known in Whistler area.
Purple Martin *Progne subis*	Blue	-	A wide variety of open and partly open situations, frequently near water or around towns	**Unlikely** – outside of usual range.
Cassin's Auklet *Ptychoramphus aleuticus*	Red	Special Concern	Mostly pelagic, less frequently along rocky seacoasts.	**Unlikely** – no suitable habitat.
Northern red-legged frog *Rana aurora*	Blue	Special Concern	Wetlands, pools, and riparian areas of upland forests.	**Unlikely** - no known occurrences north of Callaghan Valley*.
Oregon Spotted Frog *Rana pretiosa*	Red	Endangered	Usually it occurs in vegetated shallows or among grasses or sedges along the margins of streams, lakes, ponds (including those behind beaver dams), oxbows, springs, and marshes.	**Unlikely –** not observed in the Whistler area.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
American Avocet *Recurvirostra americana*	Blue	-	Lowland marshes, mudflats, ponds, alkaline lakes, and estuaries	**Unlikely –** Mainly in central interior.*
Nooksack Dace *Rhinichthys cataractae - Chehalis lineage*	Red	Endangered	Adult habitat is riffles, typically with a loose coarse-gravel substrate and a flow of around 0.25 m/sec; young occur in shallow margins of the tail ends of pools with mud/sand substrates; eggs usually are found near the top ends of riffles	**Unlikely** – no known occurrence in Whistler.
Bull trout *Salvelinus confluentus*	Blue	-	The bottom of deep pools in cold rivers and large tributary streams, often in moderate to fast currents with temperatures of 45-50 F; also large coldwater lakes and reservoirs.	**None –** no suitable habitat.
Bull trout *Salvelinus confluentus pop. 28*	Blue	Special Concern	The Southcoast British Columbia populations inhabit the Skagit, Squamish, Ryan, Lillooet, Pitt and Lower Fraser Rivers, the Pitt, Birkenhead, Chilliwack, and Chehalis Lakes, and Phelix and Ure Creeks.	**Possible –** Located in Fitzsimmons Creek adjacent to subject area.
Townsend's Mole *Scapanus townsendii*	Red	Endangered	Pastures, prairies, and shrub habitats in lowlands and flood plains, and occasionally in true fir (ABIES) forests	**Unlikely -** only known to occur in the lower mainland.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Black-throated Green Warbler *Setophaga virens*	Blue	-	Breeds in coniferous, mixed coniferous-deciduous, and entirely deciduous forests, including forest edge, second growth, hemlock forest, cedar-grown pastures, larch bogs, and swamps. In migration and winter, occurs in various open forest, woodland, scrub, second growth, and thicket habitats ; prefers forest canopy and edges, pasture trees, and semi-open, sometimes in low scrubby second growth	**Unlikely -** nearest record in Fort Saint John.
Pacific water shrew *Sorex bendirii*	Red	Endangered	Inhabits the coastal lowlands of northern California, Oregon, Washington and British Columbia, where it is restricted to the lower Fraser River valley.	**Unlikely** – restricted to southern and lower elevation habitat.
Olympic shrew *Sorex rohweri*	Red	-	Mixed deciduous forest of red alder, birch, Sitka spruce, western hemlock; Sitka spruce-western hemlock forest; lodgepole pine forest; and in canary grass bordering a ditch ~15 m from a mixed forest	**Unlikely -** only known to occur in the lower mainland.
Trowbridge's shrew *Sorex trowbridgii*	Blue	-	Mature forest (dry or moist) with abundant ground litter; forested canyons and ravines, and swampy woods; deep rank grass near salmonberry thickets (Destructioin Island off Washington); riparian fringe areas (but not streamside); under chaparral (at southern edge of range); cut forest if sufficient ground cover present	**Unlikely -** only known to occur in the lower mainland.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Zerene Fritillary *Speyeria zerene bremnerii*	Red	-	Deciduous forest, grassland and meadow.	**Unlikely -** no suitable habitat.
Herrington Fingernailclam *Sphaerium occidentale*	Blue	-	Vernal pools and ditches, among grass and leaves.	**Unlikely -** no known occurrence in Whistler.
Rocky Mountain Fingernailclam *Sphaerium patella*	Red	-	Lakes, rivers, sloughs, and streams.	**Unlikely -** no known occurrence in Whistler.
Striated fingernailclam *Sphaerium striatinum*	Blue	-	Thrives in both lotic and lentic environments and on mud, sand, gravel and rock substrates and is most abundant at water depths of less than 2m.	**Unlikely -** no known occurrence in Whistler or near Whistler*.
Pygmy Longfin Smelt *Spirinchus* sp. 1	Red	-	Large, oligotrophic, fiord lakes.	**Unlikely -** no known occurrences in Whistler.
Widelip Pondsnail *Stagnicola traski*	Blue	-	Unknown.	**Unlikely -** no known occurrences in Whistler.
Forster's Tern *Sterna forsteri*	Red	-	Freshwater and salt marshes, in migration and winter also seacoasts, bays, estuaries, rivers and lakes.	**Unlikely –** outside of usual range.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Spotted owl *Strix occidentalis*	Red	Endangered	Dense forest and deep wooded canyons; generally in mature stands or old growth; requires cool summer roosts. Nests on broken tree top, cliff ledge, in natural tree cavity, or in tree on stick platform, often the abandoned nest of hawk or mammal; sometimes in cave.	**Unlikely** – unlikely to occur in Whistler*.
Autumn Meadowhawk *Sympetrum vicinum*	Blue	-	In ponds, slow streams and lakes with dense, emergent vegetation	**Unlikely –** not known to occur in Whistler.
Ancient Murrelet *Synthliboramphus antiquus*	Blue	Special Concern	Mostly offshore or pelagic, mainly over the continental shelf and slope; also close to shore in some areas. In winter, commonly within sight of land, especially around Vancouver Island.	**Unlikely -** no suitable habitat.
Black Petaltail *Tanypteryx hageni*	Blue	-	Found in seepage areas and bogs, flat or on hillsides, often associated with streams and usually not under forest canopy in wet mountain ranges.	**Unlikely -** no suitable habitat.
Eulachon *Thaleichthys pacificus*	Blue	-	Found near shore and in coastal inlets and rivers. Possibly to 625 m depth. Spends most of its life in the sea, returning to freshwater streams to spawn.	**Unlikely -** not known to occur in the Whistler area.

Common Name Scientific name	Status		Habitat Requirements	Potential Occurrence
	BC List	SARA		
Wandering Tattler *Tringa incana*	Blue	-	Mostly restricted to the alpine zone, usually breeds along rocky or scrubby vegetated edges of mountain streams and lakes; frequents rapidly-flowing streams and tundra habitats, wet meadows, moraine deposits, scree slopes, braided rivers, sometimes found in forest clearings away from water.	**Unlikely -** no suitable habitat.
Barn Owl *Tyto alba*	Red	Threatened	Fields of dense grass. Open and partly open country (grassland, marsh, lightly grazed pasture, hayfields) in a wide variety of situations, often around human habitation	**Unlikely -** no suitable habitat.
Common Murre *Uria aalge*	Red	-	Pelagic and along rocky seacoasts. Nests in the open or in crevices on broad and narrow cliff ledges, on stack (cliff) tops, and on flat, rocky, low-lying islands	**Unlikely -** no suitable habitat.
Grizzly bear *Ursus arctos*	Blue	Special Concern	Non-forested or partially forested sites with a wide range of foraging opportunities and choice of habitats.	**Unlikely -** site is close to urban development, although grizzly bear have been spotted in the RMOW.

All references from CDC BC ecosystems explorer (BC MOE, 2024) except *references from Brett 2022.

6.2. Appendix B: Field Notes Observations for Each LLDGC Existing and Expansion Hole

Observations:

Disc Golf Hole number	Observations	
Hole #2	Pine trees are most affected by disc golf damage. Bigger. Douglas-firs and Cedars impacted but bark stays intact, shrub removed from undergrowth, roots exposed in high traffic areas including fairway and basket green.	 
	designated trail to hole #2 tee.	

		
Hole #3	Fairway tree impacted from golf hits on bark less so around basket. Root and soil compaction around basket.	

		
	Define a trail from basket #2 to tee #3.	
	no designated trail has led to braiding between holes 3 and 4	

Hole #4	damage to bark to trees closest to tee box 4. Young fairway trees and pines showing most impact. Root erosion on fairway and basket green.	 

		
	litter	
Hole #8	less soil compaction and root exposure due to bedrock. Trees impacted by tee area 8 9 and 10 very exposed with extensive	

	vegetation removal.	 

Hole #9	tree bark impacts to Douglas-fir with chipped bark . Greater impacts to pine gorging inner bark and releasing sap. Root exposure and soil compaction in fairway and basket green.	 

		
Hole #11	Trees 30-40ft from tee impacted from golf disc's bark chipping, younger trees bark creating deeper cuts. Greater root erosion than previous hole due to steeper slope.	

		 
	Designate connection trail from basket of 11 to tee of 12 to mitigate trail braiding.	

Hole #12	Bark chipping from discs on large cedar next to basket. Exposed roots next to basket.	
Hole #12a	No frequently used no signs of bark chipping. Recommend to close. Wildlife tree near basket.	

Hole #13	bark chipping one pines. Root erosion from steeper slope.	

Hole #14	first pine from tee box severe bark removal from disc's. Pines behind first tree from tee has some signs of impact. Steep sidehill causing greater root exposure and slope erosion.	 

Hole #15	Fencing between 14 and 15. Steep eroded section between 14 basket and 15 tee box. Stairs reccommedned.	 

	Root exposure and erosion present next to basket, steep side hill adding to erosion.	 

Hole #16	Minimal impacts to tree bark. Erosion of roots in fairway and basket area.	 

Hole #17	Larger wood required to block side trail.	
	stand of pine trees 30ft from tee box impacted from disc's. Fairway merges with comfortably numb trail. Root erosion on slope. Joins BC Hydro right of way at basket.	

		
Hole #20	Bark chips used on tree roots around fairway effective to protect roots. Recommend to use chips around use around tee box.	 

Hole #21	Natural shedding of bark on pines, slight chipping on firs on fairway, barrier may protect trees.	 

		
Hole #22	Soil erosion and root erosion on fairway and basket. Mainly Douglas-fir trees so only bark chipping and not many pines.	 

		
Hole #23	Young hemlock showing bark damage from tee shots. Larger firs showing bark chipping, roots exposed at basket.	

Hole #24	Bark chipping from tee shot. Root exposure around basket.	  

Conceptual course hole #	Comments	Photos
1	Spruce grove wetland high water mark just below trail alignment until this point.	
	Cleared area and old road alignment good area for first hole. Understory has been wildfire fuel treated.	
2	Mature forest, wildfire fuel treatment, no high ESA's.	

3	rock outcrop at end of hole. No high ESA's. Fire thinned branches.	
4	Wetter at lower section towards BC Hydro line., fire thinned better to use upper elevation terrain where possible. No high ESA's.	
5	Located within existing areas of impact- holes # 2, 3 and 4	

6	Young forest, no high ESA's.	
	Trail /previously disturbed area just south of and running adjacent to proposed hole, just off main trail. Potential location to re-route hole #6.	
	A second previously disturbed site just north of proposed hole. Likely old laydown site for harvesting operations.	
7	No high ESA's young forest.	

8	lost lake trail previously disturbed area/road	
	bottom of slope before hydro right of way likely wetter soils no wetland features observed	
9	Steeper terrain due to orientation on slope, no high ESA's.	

10	Mature forest many stumps from previous logging. No high ESA's.	
11	Tree core sample, no high ESA's.	

12	No high ESA's.	
14	depression/low point.	
	Mature remnant Douglas-fir, 825mm. Recommend to avoid from course design.	

	open forest minimal shrub cover. No high ESA's.	
	Wildlife tree	
15	Connector trail, existing disturbance near center of conceptual hole #15.	

	Conceptual hole #15 intersects with wetland high water mark and High ESA.	
16	Fuel treated. No ESA in alignment.	

17	Mature stand , no high ESA's , fuel treated. Steep drop off and valley west of 17.No surface water drainage likely sub surface drainage.	
18	No high ESA. Ditch at bottom of slope. Fuel treated. Young forest presence of pine.	
19	Adjacent to existing holes 23 and 24 no High ESA's	
20	Overlapping existing holes 12 and 13 no High ESA's.	

21	Young forest with many rocky outcrops on steeper slope. No High ESA's.	
22	Overlapping existing holes 16 and 17. No High ESA's.	
23	Overlapping existing hole 18 and BC Hydro Right of Way. No high ESA's.	
24	Overlapping existing hole 7 and BC Hydro Right of Way. No high ESA's.	
25	Adjacent to hole existing hole 20. No High ESA.	

26	Open rocky bedrock surficial material. No high ESA's.	
27	Open understory with minimal shrub. Extensive moss cover. No high ESA	

16. Appendix F: Analysis of Course Routing Plans for Lost Lake Disc Golf Course.

Prepared by: INdesign Disc Golf Inc, Cascade Environmental Research Group and, the Resort Municipality of Whistler.

ANALYSIS OF COURSE ROUTING PLANS FOR

LOST LAKE DISC GOLF COURSE.

Prepared for:
The Resort Municipality of Whistler.

Prepared by:
INdesign Disc Golf Inc.

Additional information provided by:
The Resort Municipality of Whistler and
Cascade Environmental Research Group.

Date: Sept 25, 2024

Further to the Disc Golf Course Feasibility Study completed by INdesign in 2024, the Resort Municipality of Whistler has requested three distinct course routing options for the renewal of the disc golf course in Lost Lake Park. The three scenarios presented by the municipality are:

PDS 1: Rejuvenate existing Lost Lake course within existing footprint, reducing 27 to 18 holes AND;

A: Develop a second smaller course near Function Junction OR;

B: Develop a second larger course in the upper Whistler Interpretive Forest.

PDS 2: Reconfigure existing Lost Lake course to connect with Spruce Grove Park.

PDS 3: Expand footprint to connect with Spruce Grove Park & north of the existing course.

All three course routing options provided here by INdesign Disc Golf incorporate the recommendations of the Environmental Impact Study prepared by Cascade Environmental Group Ltd dated April 26, 2024. The baseline maps in this document are taken from the environmental impact study. In completing these routing options, INdesign Disc Golf has used the existing course footprint as much as possible, minimized the crossing of riparian areas, made use of existing pathways and fuel managed areas, and has taken into consideration the other environmental considerations laid out in the impact study.

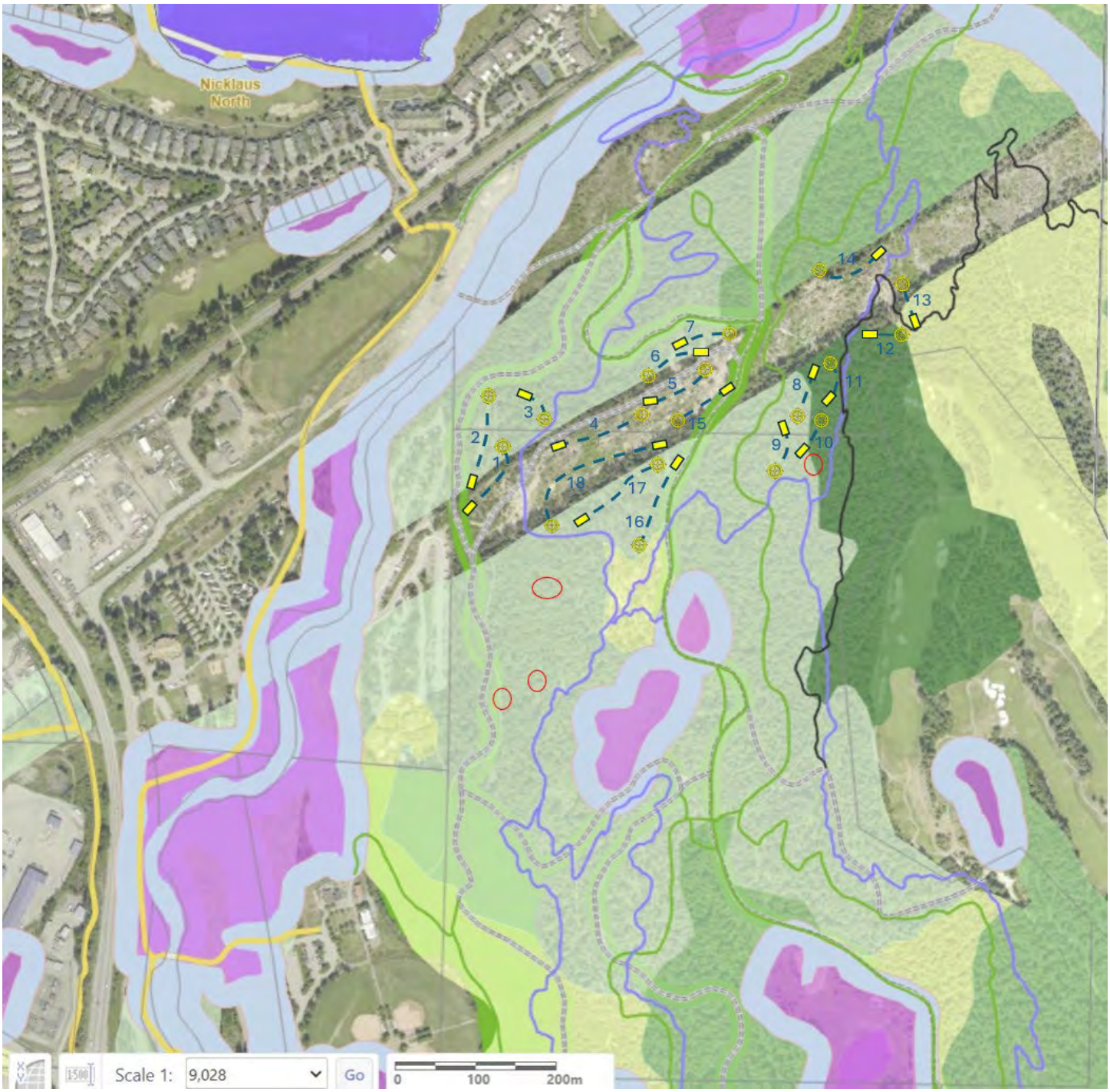
In addition to the environmental recommendations, the three course routing scenarios provided seek to accomplish the following objectives:

1. To address access challenges,
2. To reduce liability exposure to the RMOW,
3. To dramatically improve the level of safety for disc golfers and other park users,
4. To provide a course that is suitable for a wide range of ages, skill levels, and abilities,
5. To build on a vision that reflects the uniqueness of the surrounding area and the historical uniqueness of “Whistler disc golf”,
6. To provide a wide variety of shot making - 18 or 27 unique and memorable experiences,
7. To align the profile of disc golf in Whistler in line with the other recreational activities in the valley,

The three scenarios provided are conceptual course routing plans and are presented to demonstrate how a course design will work within the parameters provided. Detailed course routing and design will be initiated once a final land use plan is confirmed.

Possible Development Scenario 1

Rejuvenate existing Lost Lake course within existing footprint, reducing 27 to 18 holes.



- Tee Pad
- Basket
- Disc Golf Routing
- Trail (Difficult)
- Trail (Medium)
- Trail (Easy)
- Valley Trail (Paved)
- Nordic Ski Trail / FSR
- Significant Tree (retain)
- Lake
- Wetland
- 30m Riparian Buffer
- Logged Forest (<100 years)
- Unlogged Mature (100-249 years)
- Old Forest (250-399 years)
- Ancient Forest (400+ years)
- Fuel Managed Areas

PDS 1: INdesign.

Strengths:	Weaknesses:
• Improves safety by eliminating holes that cross non-disc golf trails. • Additional challenge through some longer holes. • No new land is used. • Riparian areas that are currently in the field of play are protected. • Lowest installation cost of the three options with only 18 holes and up to 36 teepads.	• Reduction from 27 to 18 holes reduces player capacity at a time when participation levels continue to grow. • Overall net reduction of space with the removal of existing unsafe areas, and the riparian area. • Continuation of a lack of nearby parking which does not solve the issue of disc golfers parking in private parking area • Long walk from designated parking area which limits access. • New course of 18 holes requires use of the much more physical demanding upper high sloped area of the course (map holes 8-14) which further affects access and overall enjoyment. • One 18-hole layout would likely lead to much greater traffic on the steep sloped areas potentially leading to greater erosion control efforts. • While a few holes will offer increased challenge, most of the holes will be similar to the current course and may result in a continuation of "improvised" holes being created to create higher degrees of challenge. • Moving to a course of 18 holes will most likely be viewed as an overall loss by the disc golf community. * • Reduces safety because of the increased congestion by fewer holes.

Additional Comments:

The space gained on a per hole basis by moving from 27 to 18 holes is substantially offset by the reduction of space that is required to eliminate the throwing of discs across bike trails, pedestrian paths and near baskets of other holes. Overall, this option would result in marginally higher quality disc golf course but at a loss of other factors mentioned above.

Due to capacity and demand factors, this scenario is only viable if development of a second course elsewhere in the community occurs.

See PDS - 1A and PDS - 1B on pages 6 and 7.

PDS 1: Cascade Environmental.

Strengths:	Weaknesses:
• No additional impacts to surrounding understory forest vegetation.	• High ESA riparian area of Helen's Corner Wetland Outflow Channel North is within the existing footprint. However, due to the existing impact of the REPA from the hydro right of way and existing trails, the continued use of the LLDGC is unlikely to further impact the watercourse or surrounding riparian area.

PDS 1: RMOW.

Strengths:	Weaknesses:
• Existing amenities available; waste collection, bike racks.	• Creates greater safety concerns/user conflicts because of increased congestion with fewer holes. • Parking issues not addressed. • Public transit not offered. • Travel to course start may discourage some users; 900 metre traverse to start. • Capacity issues not addressed. • No potential for washroom building, limited to pit-toilet only. • No drinking water available. • Level of challenge remains low. • BC Hydro vegetation clearing occurs.

PDS 1 - A: Develop a second smaller course near Function Junction OR; Cascade Environmental.

Strengths:	Weaknesses:
• The hydro right of way area within the area has provided an area less environmentally sensitive to develop a course due to existing disturbance.	• Expected High ESA riparian and Large and Old Cottonwood areas present from Millar Creek and associated tributaries. • A new area developed away from the existing Lost Lake Disc Golf Course (LLDGC) for recreational disc golf activities will cause new disturbance impacts from the activity on surrounding vegetation and wildlife. • Steep Slopes in area likely leading to potential erosion from disc golf activities. • High and moderately high-rated grizzly bear (Ursus arctos) forage habitat polygons have been identified northwest and east of the area on the upper reaches of the slope.

PDS 1 - A: RMOW.

Strengths:	Weaknesses:
• Dispersion will alleviate pressure on existing Lost Lake course. • Course design would avoid hiking and biking trails, user conflicts and major safety concerns. • Location caters to Whistler's largest resident population, Cheakamus. • Valley Trail and public transit accessible. • Easily accessible course start. • Opportunity to increase level of challenge or allow for increased level of challenge at Lost Lake course. • Amenities available; waste collection, bike racks. • Unique course character with great views. • Support for local food and beverage offerings.	• Creates greater safety concerns/user conflicts because of increased congestion with fewer holes. • Parking may create challenges for nearby businesses. • No potential for washroom building, limited to offering a pit-toilet only. • No drinking water available. • BC Hydro vegetation clearing occurs. • Lands not entirely managed by RMOW.

PDS 1 - B: Develop a second larger course in the upper Whistler Interpretive Forest.

Cascade Environmental.

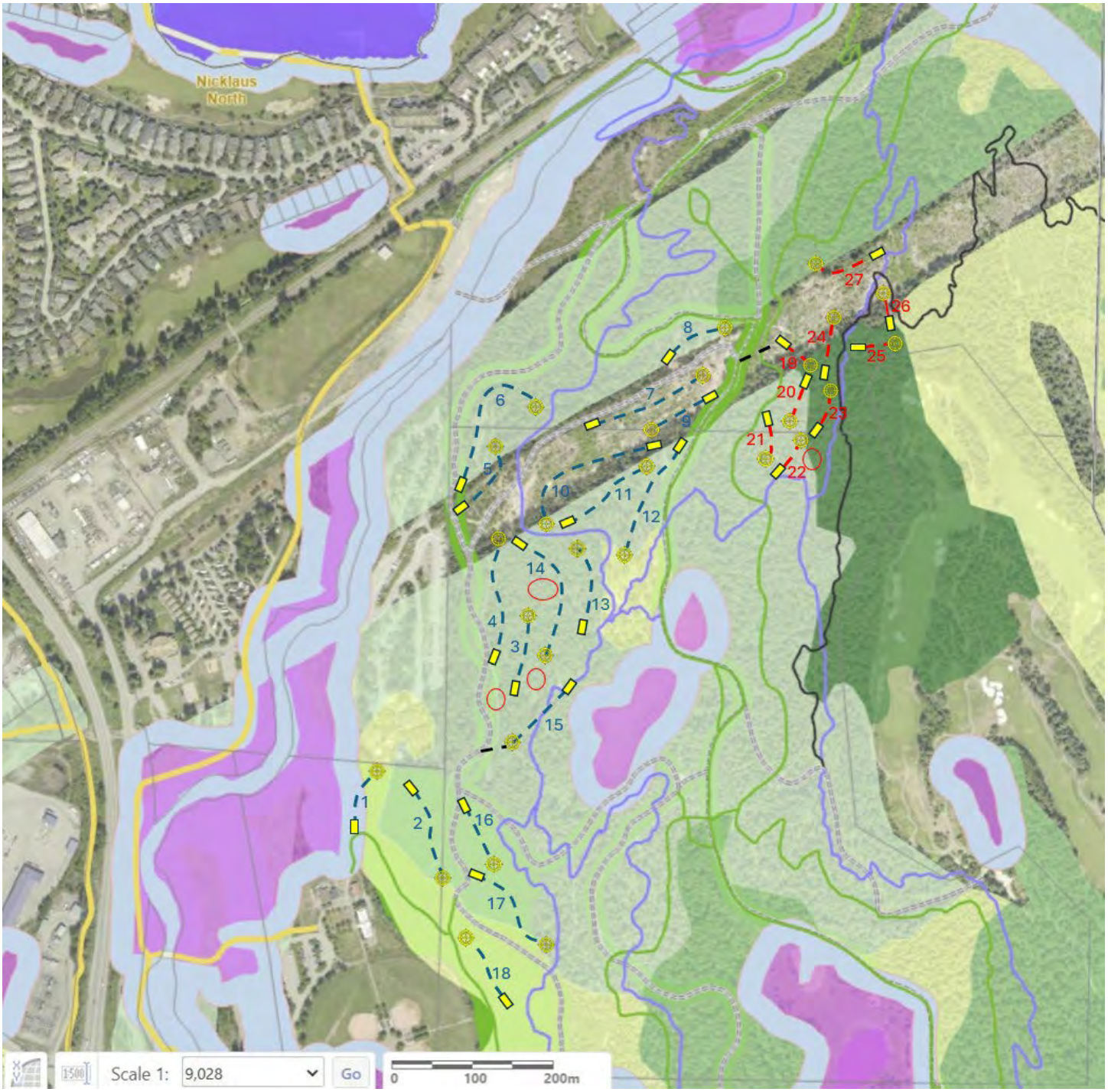
Strengths:	Weaknesses:
• Fuel management within the area has provided an area less environmentally sensitive to develop a course due to existing disturbance to understory vegetation.	• A new area developed away from the existing LLDGC for recreational disc golf activities will cause new disturbance impacts from the activity on surrounding vegetation and wildlife. • High ESA riparian areas of fish bearing Cheakamus River and mapped tributary to Cheakamus River intersect the area.

PDS 1 - B: RMOW

Strengths:	Weaknesses:
• Dispersion will alleviate pressure on existing Lost Lake course. • Course design would avoid hiking and biking trails, user conflicts and major safety concerns. • Can make use of existing forest service road. • Location caters to Whistler's largest resident population, Cheakamus. • Potential to develop small parking area. • Opportunity to increase level of challenge or allow for increased level of challenge at existing Lost Lake course. • Amenities available; waste collection, bike racks. • Mixed course character of open and forested lands.	• Creates greater safety concerns/user conflicts because of increased congestion with fewer holes. • Forest service road managed by others. • Challenging 4.5km on Forest Service Road no potential for washroom building, limited to offering a pit-toilet only. • No drinking water available. • Lands not managed by RMOW.

Possible Development Scenario 2

Reconfigure existing Lost Lake course to connect with Spruce Grove Park.



- Tee Pad
- Basket
- Disc Golf (Holes 1-18)
- Disc Golf ("back 9")
- Trail (Difficult)
- Trail (Medium)
- Trail (Easy)
- Valley Trail (Paved)
- Nordic Ski Trail / FSR
- Trail Connection
- Significant Tree (retain)
- Lake
- Wetland
- 30m Riparian Buffer
- Logged Forest (<100 years)
- Unlogged Mature (100-249 years)
- Old Forest (250-399 years)
- Ancient Forest (400+ years)
- Fuel Managed Areas

PDS 2: INdesign.

Strengths:	Weaknesses:
• Start and finish of course is near Valley Trail, transit, public parking, washroom facilities and other park amenities (Spruce Grove Park). • Additional space allows for an 18-hole modern course (blue fairways) while maintaining an additional 9-hole loop (red fairways) that retains the "feel" of the current course. • Potential of 4-5 par 4 holes within the 18-hole layout. • Additional 9-hole loop consists of 9 short and technical holes with an element of physical fitness. • With the "extra" 9-hole loop being more physically demanding, traffic on the steep slopes will be lighter than with option A • Increased variety of shot making. • Suitable for a wide range of skill level • Riparian areas and wildlife trees are protected. • The area shown by hole 14 and 15 on the map could potentially incorporate fairways as firebreaks. • A significant amount of the additional land used has recently been fuel managed. • Players looking to play a short loop of 9 holes can play holes 1-4, and finish with holes 14-18. • Could support regional level competitions. • With careful management could use some existing Nordic ski trails for course play.	• Footprint of the course is enlarged to bridge from the current course to Spruce Grove Park. • Cost of additional targets, teepads, pathways, and signage of 27 holes vs 18 holes with scenario A. • Not ideal flow to have the "extra" 9 - hole loop accessed in the middle of the round on the main 18-hole section. • Loop of back 9 is quite congested with several "filler" holes that are necessary due to space constraints and tree density. • Access to extra 9 requires a player to decide to play 18 or 27 holes early in the round. • Increase in the overall length of the course requires a slight increase in ongoing maintenance.

Additional Comments:

The "extra 9" loop would only require one teepad per hole

This scenario is a substantial improvement in course quality over scenario A as it maintains 27 holes and adds challenge through increasing technical requirements and length, especially on holes with second (longer) teepads.

The introduction of par 4s has a dramatic effect on the repeat playability of a course. When two shots are required to get to the target area, the approach to the target is different almost every time as it depends on where the first shot landed. With an additional throw required on these holes, it also encourages more strategic thinking. This day-to-day variability keeps things fresh and is especially appreciated by those players who play a course on a frequent basis.

This scenario would improve overall user experience for players with a much broader skill level and would eliminate the current need to walk about 700 metres from the designated parking area to the start and finish of the course. This is an important consideration to address the ongoing trespass situation.

PDS 2: Cascade Environmental.

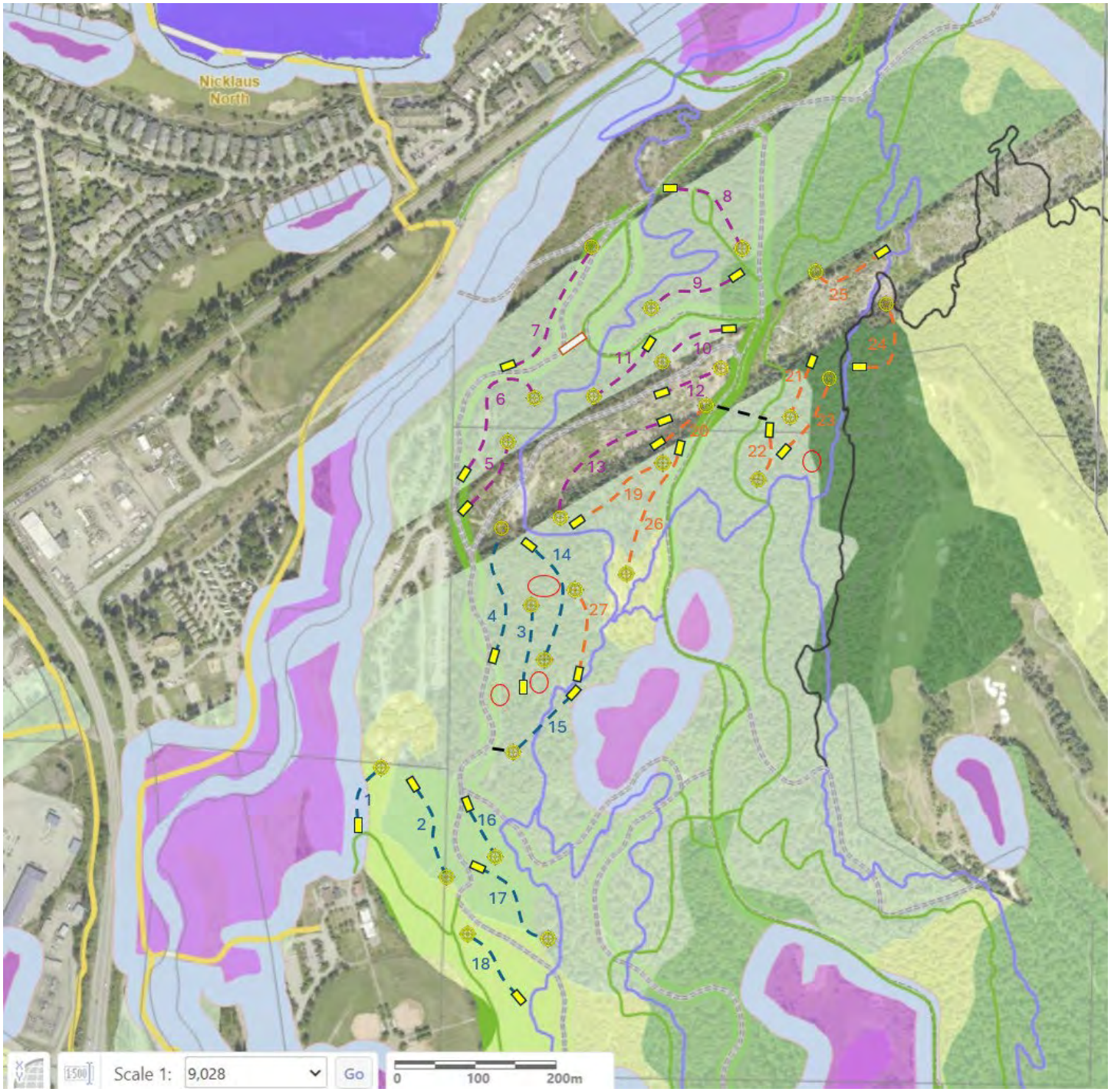
Strengths:	Weaknesses:
• Fuel management within the area has provided an area less environmentally sensitive to develop a course due to existing disturbance to understory forest vegetation. • Existing disturbance from an inactive access road to Scandinave Spa offers an opportunity for a hole in an existing disturbed area. • High ESA riparian areas can be avoided with good course design. • Nordic trails in the area provide existing connecting trail access to proposed hole alignments from LLDGC to Spruce Grove.	• Twelve proposed holes in routing alignment plan in the Spruce Grove extension area would have an estimated 1.838 ha impact to forest understory vegetation from the creation of the holes. • High ESA riparian areas from Helen's Corner Wetland Complex Outflow Southwest and Spruce Grove Wetland are located within the area and should be avoided where possible in routing design.

PDS 2: RMOW.

Strengths:	Weaknesses:
• Will address safety concerns or lessen user conflicts. • Parking available, lessening impacts on privately owned lands (Scandinave Spa). • Valley Trail and public transit accessible. • Travel to course start minimized. • Alleviates capacity issues with a longer, redesigned course layout. • Amenities available; washroom, waste collection, drinking water, bike racks. • Opportunity to increase level of challenge in selected areas.	• BC Hydro vegetation clearing occurs.

Possible Development Scenario 3

Expand footprint to connect with Spruce Grove Park & north of the existing course.



- Tee Pad
- Basket
- Disc Golf (Loop 1)
- Disc Golf (Loop 2)
- Disc Golf (Loop 3)
- Trail (Difficult)
- Trail (Medium)
- Trail (Easy)
- Valley Trail (Paved)
- Nordic Ski Trail / FSR
- Trail Connection
- Road Connection
- Significant Tree (retain)
- Lake
- Wetland
- 30m Riparian Buffer
- Logged Forest (<100 years)
- Unlogged Mature (100-249 years)
- Old Forest (250-399 years)
- Ancient Forest (400+ years)
- Fuel Managed Areas

PDS 3: INdesign.

Strengths:	Weaknesses:
In addition to the strengths listed for PDS 2: • Scenario 3 adds more to the top end by adding more length, more par 4s, and higher levels of challenge from the long teepads. • The quality of the third loop of 9 holes is significantly improved over option B. • Players can play a short loop of 9 holes, play all 27 holes, or two different sets of 18 holes. Once completing hole 4, players can choose which loop of 9 (black or green) to play before playing holes 14-18 to finish. • Potential of 8-10 par 4s over the 27 holes. • Additional holes to the north of the existing course makes use of an existing access road, prior equipment trail, and an unused walking/biking trail. • Suitable for up to Provincial level competition. • With the number of holes being the same as with scenario 2, there is little increase in fixed costs such as teepads, baskets, dedicated pathways, signage, etc, over option B. • With careful management could use some existing Nordic ski trails for course play.	• Footprint of the course is enlarged over PDS 2. • A new short section of access road would be required near hole 7 (see map) to redirect other park users to the parallel access road. • Additional land used results in a slight increase in course fairway maintenance over scenario 2.

Additional Comments:

This scenario yields the best overall user experience for the greatest number of people. It would be thoroughly enjoyable for beginners, occasional players, right up to regional professionals, and suitable for young children up to those enjoying their retirement years. It is a modest, but significant, jump up from PDS 2 and would certainly result in a course that is rated amongst the best in the province.

PDS 3: Cascade Environmental.

Strengths:	Weaknesses:
• Fuel management within the area has provided an area less environmentally sensitive to develop a course due to existing disturbance to understory forest vegetation. • Existing disturbance from an inactive access road to Scandinave Spa offers an opportunity for a hole in an existing disturbed area. • High ESA riparian areas can be avoided with good course design. • Nordic trails in the area provide existing connecting trail access to proposed hole alignments from LLDGC to Spruce Grove. • Reconfiguration of existing course and providing an extension allows for professionally redesigned course to minimize forest understory impacts while restoring 1.2 ha of impacted areas from the user-constructed course. • Proposed hole #6 in the north area of the existing course could utilize the existing cleared harvesting laydown area to minimize understory vegetation impacts. • North extension has available areas to avoid and minimize high riparian ESA areas where possible with good course design. • Nordic trails in the north extension area provide existing connecting trail access to proposed hole alignments from LLDGC.	• Twelve proposed holes in routing alignment plan in the Spruce Grove extension area would have an estimated 1.838 ha impact to forest understory vegetation from the creation of the holes. • High ESA riparian areas from Helen's Corner Wetland Complex Outflow Southwest and Spruce Grove Wetland are located within the area and should be avoided where possible in routing design. • The creation of proposed holes in both extension areas as per the routing plan is estimated to impact 3.7 ha of understory forest vegetation. However, 1.2 ha of the existing course can be restored after reconfiguration.

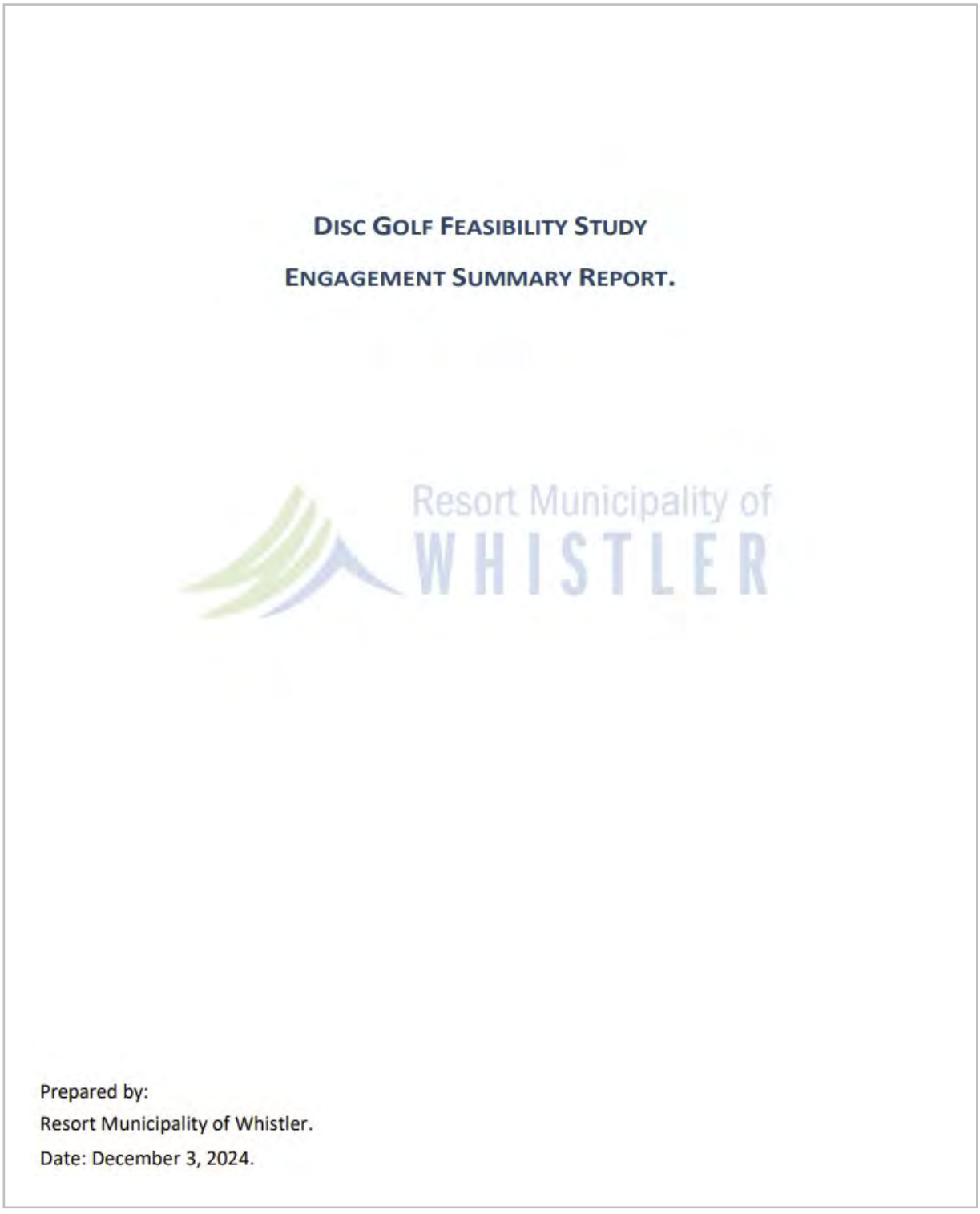
PDS 3: RMOW.

Strengths:	Weaknesses:
• Will address safety concerns or lessen user conflicts. • Parking available, lessening impacts on privately owned lands (Scandinave Spa). • Valley Trail and public transit accessible. • Travel to course start minimized. • Alleviates capacity issues with a longer, redesigned course layout. • Amenities available; washroom, waste collection, drinking water, bike racks. • Opportunity to increase level of challenge.	• BC Hydro vegetation clearing occurs.

Given the Environmental Impact Study and the subsequent work we have done to develop these three scenarios, we are confident that we will be able to produce a final design that reflects the recommendations in the report. We look forward to continuing this process and helping facilitate a project that will not only lead the way in terms of environmental considerations and applications but also form a blueprint for other courses around North America to follow.

17. Appendix G: Disc Golf Feasibility Study Engagement Summary Report.

Prepared by: The Resort Municipality of Whistler; Parks Planning.



DISC GOLF FEASIBILITY STUDY

ENGAGEMENT SUMMARY REPORT.

Resort Municipality of WHISTLER

Prepared by:
Resort Municipality of Whistler.
Date: December 3, 2024.

The Resort Municipality of Whistler utilized several methods of engagement throughout the feasibility study.

1. Meetings and Course Walkthroughs:

We met with interested parties such as the Whistler Disc Golf Club and the Lost Lake Nordic ski operations. These stakeholders provided valuable input on how the course could fit into the existing recreational landscape and what improvements or changes might be needed.

2. Online Survey via QR Code on Course:

An online survey was made accessible to players and visitors through a QR code placed on the course. This method allowed for easy and immediate feedback from those directly using the course, ensuring the data collection was tied to the specific location.

Summary of Survey Responses:

1. Over 60% of players are between the ages of 25 to 45 years old,
2. 65% of players rated the course 4/5 or higher,
3. While the course is appreciated for its scenic beauty, variety, and challenge, there are several common concerns around infrastructure (tee pads, baskets, signage) and course maintenance. These aspects appear to be key areas for improvement.
4. 83% of players would recommend this course to others,
5. Feedback highlights several key areas for improvement.
    - There is a strong desire for redesigns to increase challenge, improve tee pads, and enhance accessibility.
    - Maintenance issues like slippery or uneven tee pads, dead trees, and tripping hazards.
    - Amenities and infrastructure improvements include installing water stations, restroom facilities and improved parking.
    - Signage and wayfinding could be improved to help players navigate the course with clear directional markers and non players when entering the course or fairway.
    - General feedback includes adding more variety to the course, such as new holes, and increasing municipal support for regular course maintenance,
6. Over 75% of course users arrived by car,
7. 95% of course users who completed the survey were Canadian residence,

The detailed report can be found on page 4.

3. Data Collection via Trail Counter:

A **trail counter** was used on the course to gather real-time data on how many people were using the disc golf course. This provided quantifiable insights into the volume of traffic the course received, helping to determine its popularity and usage patterns.

4. Data Monitoring via UDisc:

UDisc, a widely-used app among disc golfers, provided additional data. UDisc helped track the number of rounds played, player demographics, course ratings, and other metrics that are crucial for understanding the disc golf community's behavior. While we acknowledge not all Lost Lake course users are enrolled as a Udisc user, it still gives us an insightful look at how the course is being used.

The recent addition of Udisc's "dashboard" was developed specifically for municipalities, and other governing bodies, to make informed decisions around disc golf in their respective communities.

Figure 1. Course usage from 2020 – 2024.

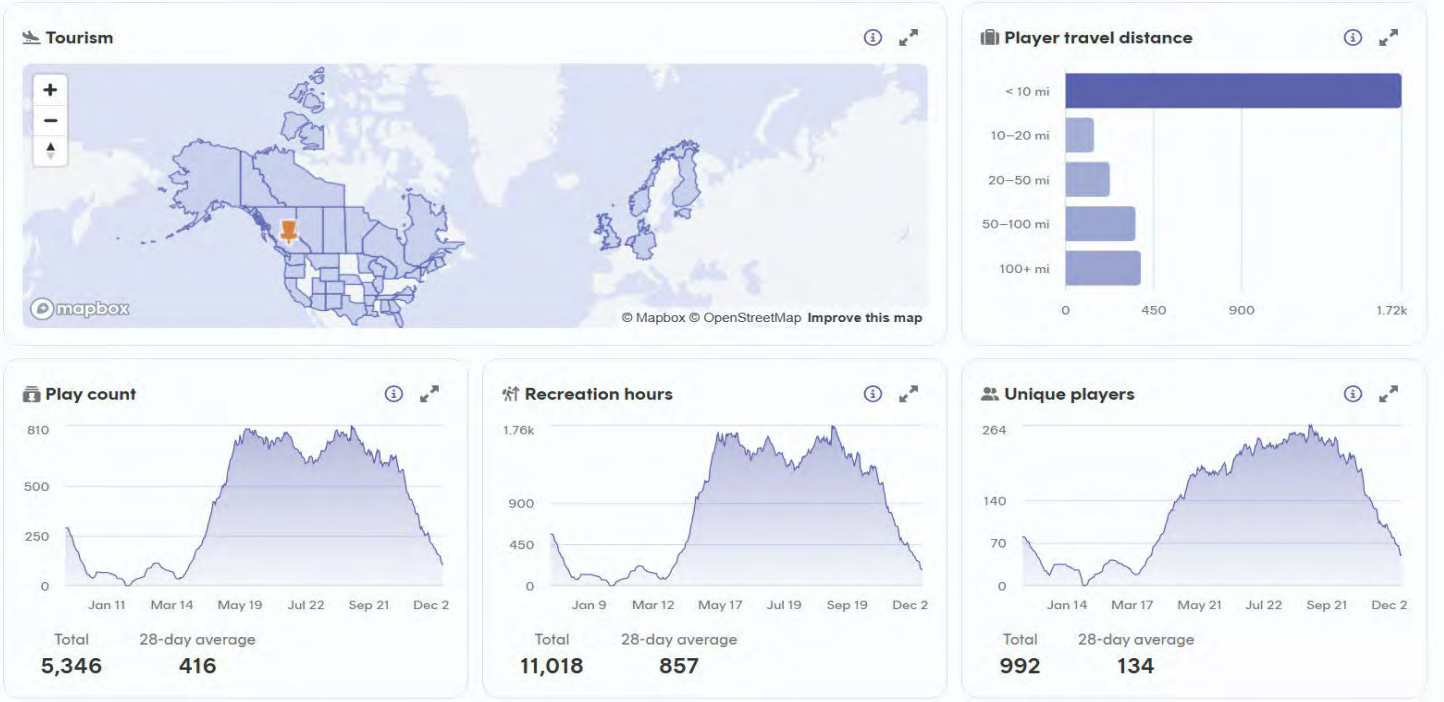


Figure 2. Snapshot of Udisc's "dashboard" showing course statistics.

By utilizing these different methods, we gathered both qualitative (meeting and survey responses) and quantitative (trail counters and app data) data. This comprehensive approach allowed us to make well-informed decisions based on feedback from users, operators, and interested parties.

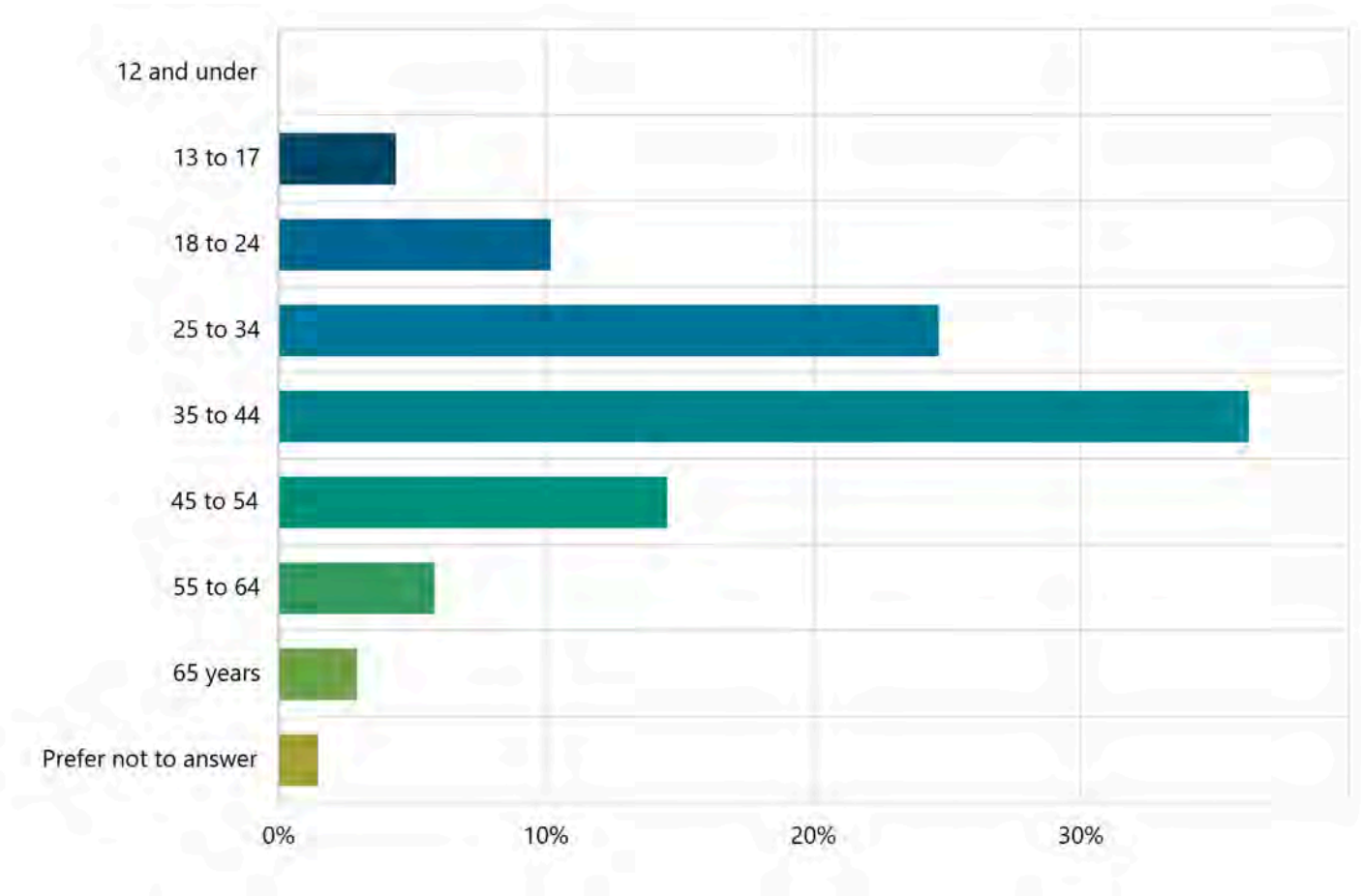
Closed

Lost Lake Disc Golf Course
Municipal Facilities Feedback

68 Contributors	69 Contributions

Contribution Summary

1. What is your age? Required
Multi Choice | Skipped: 0 | Answered: 69 (100%)

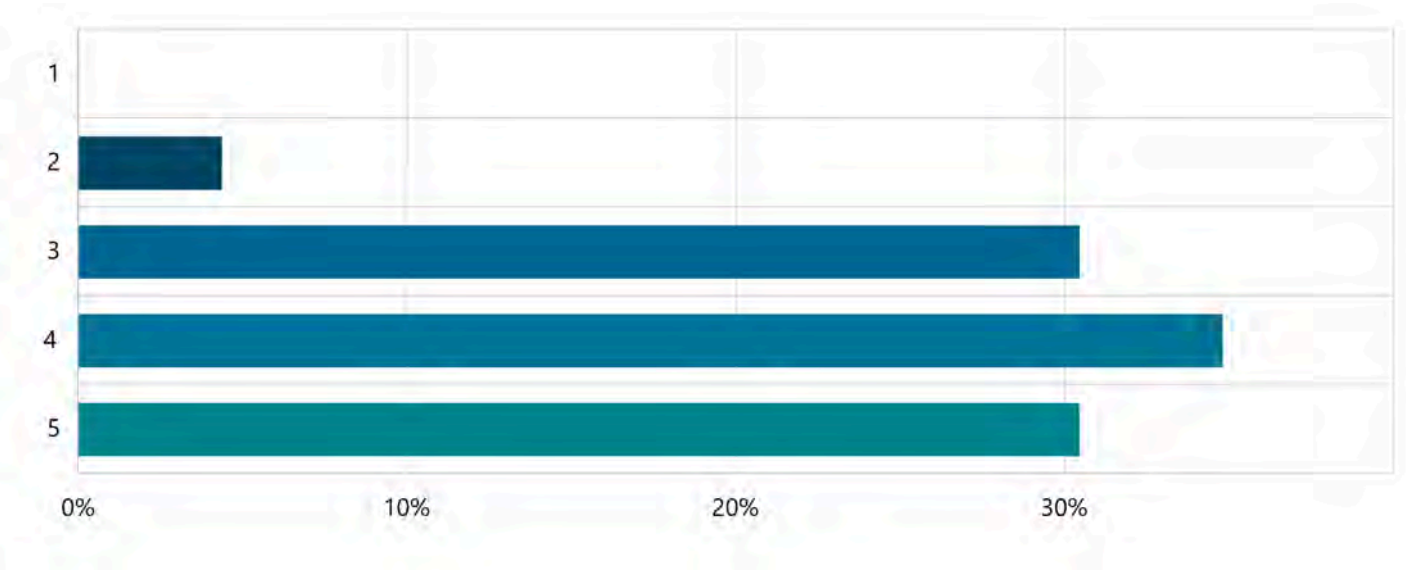


Answer choices	Percent	Count
12 and under	0%	0
13 to 17	4.35%	3
18 to 24	10.14%	7
25 to 34	24.64%	17
35 to 44	36.23%	25
45 to 54	14.49%	10

55 to 64	5.80%	4
65 years	2.90%	2
Prefer not to answer	1.45%	1
Total	**100.00%**	**69**

2. On a scale of 1 to 5, how was your experience at the Lost Lake Disc Golf Course today? (1 being very poor, 5 being excellent) Required

Multi Choice | Skipped: 0 | Answered: 69 (100%)



Answer choices	Percent	Count
1	0%	0
2	4.35%	3
3	30.43%	21
4	34.78%	24
5	30.43%	21
Total	**100.00%**	**69**

3. What was your primary reason for your score?

Long Text | Skipped: 2 | Answered: 67 (97.1%)

Sentiment

Positive	Mixed	Negative	Neutral	Unclassified
42% (28)	31% (21)	21% (14)	6% (4)	0% (0)

Tags

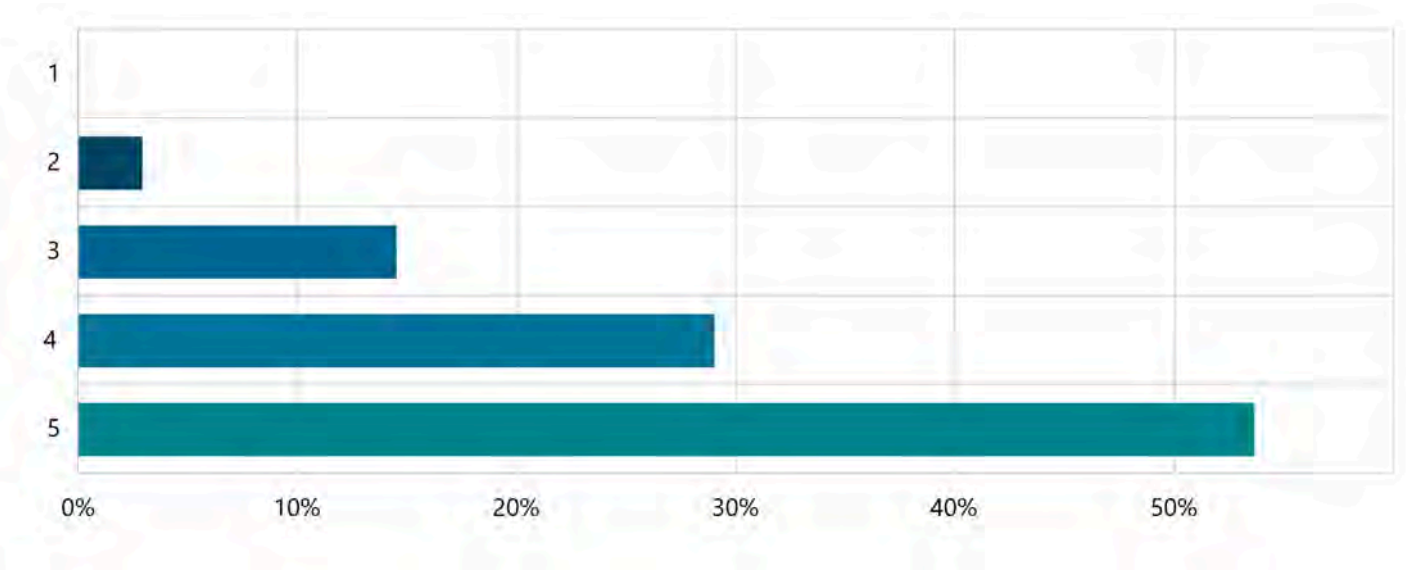
No tag data

Featured Contributions

No featured contributions

4. On a scale of 1 to 5, how likely are you to recommend playing the Lost Lake Disc Golf Course to others? (1 not very likely, 5 being very likely) Required

Multi Choice | Skipped: 0 | Answered: 69 (100%)



Answer choices	Percent	Count
1	0%	0
2	2.90%	2
3	14.49%	10
4	28.99%	20
5	53.62%	37
Total	**100.00%**	**69**

5. Do you have a recommendation on how we can improve your experience?

Long Text | Skipped: 6 | Answered: 63 (91.3%)

Sentiment

Positive	Mixed	Negative	Neutral	Unclassified
25% (16)	17% (11)	19% (12)	38% (24)	0% (0)

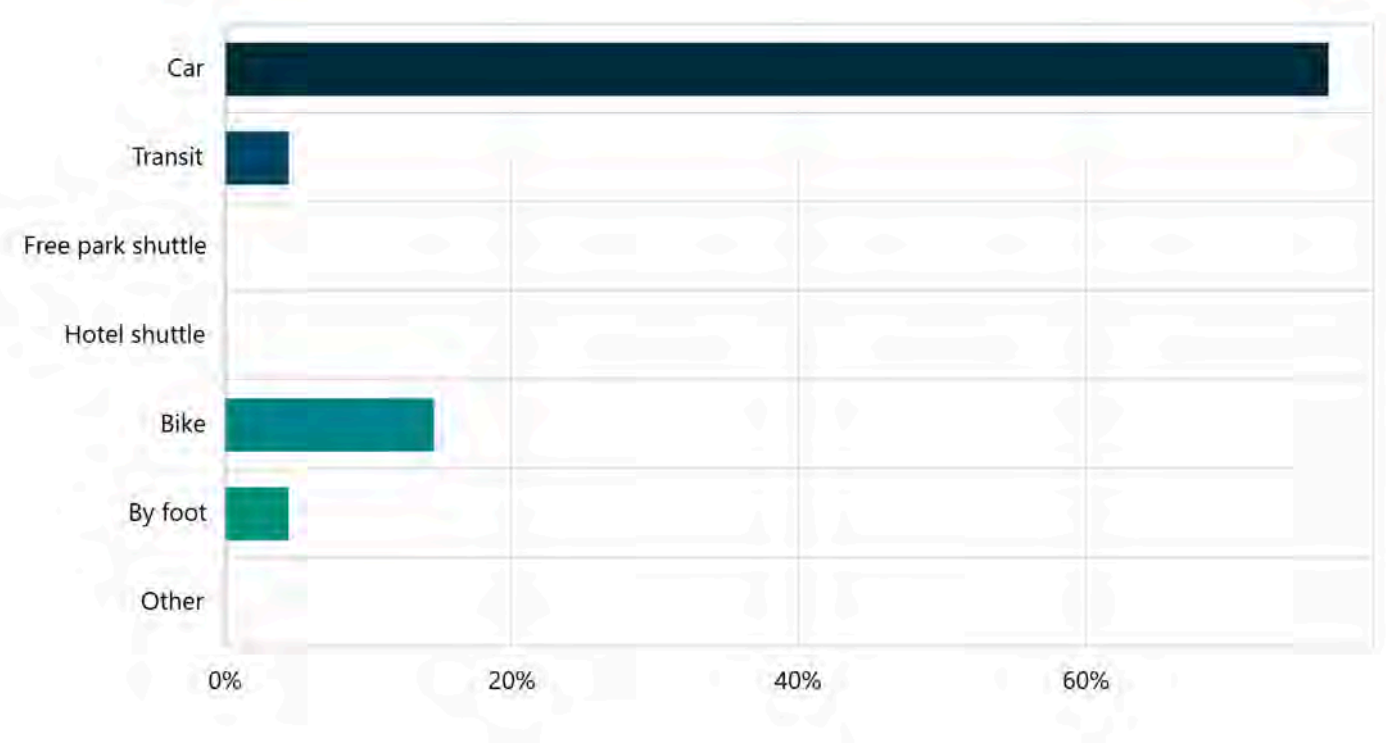
Tags

No tag data

Featured Contributions

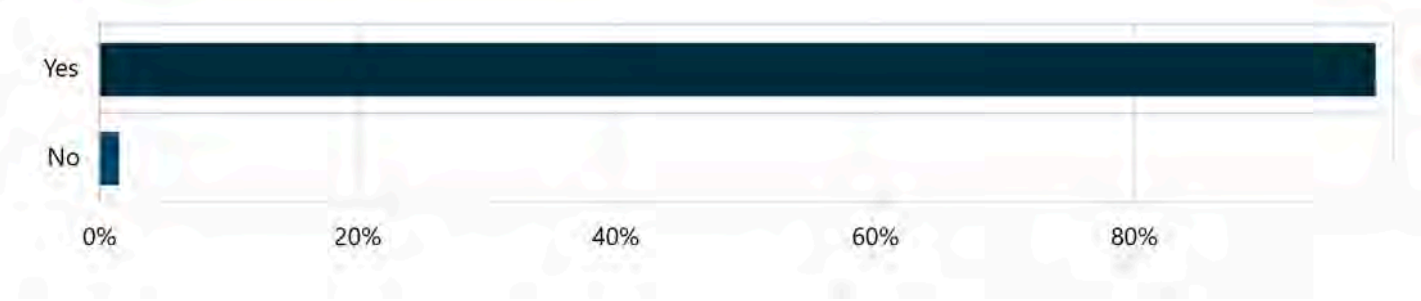
No featured contributions

6. How did you travel to the Lost Lake Disc Golf Course today? Required
Multi Choice | Skipped: 0 | Answered: 69 (100%)



Answer choices	Percent	Count
Car	76.81%	53
Transit	4.35%	3
Free park shuttle	0%	0
Hotel shuttle	0%	0
Bike	14.49%	10
By foot	4.35%	3
Other	0%	0
Total	**100.00%**	**69**

7. Do you currently live in Canada? Required
Multi Choice | Skipped: 0 | Answered: 69 (100%)



Answer choices	Percent	Count
Yes	98.55%	68
No	1.45%	1
Total	**100.00%**	**69**

8. What is your postal code?

Short Text | Skipped: 1 | Answered: 68 (98.6%)

Sentiment

No sentiment data

Tags

No tag data

Featured Contributions

No featured contributions

9. Where are you visiting from?

Short Text | Skipped: 6 | Answered: 63 (91.3%)

Sentiment

No sentiment data

Tags

No tag data

Featured Contributions

No featured contributions