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ECOLOGICAL ASSESSMENT FOR PROPOSED DRIVEWAY

6824 Stoney Hill Road, Duncan, BC

PREPARED FOR:

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DOSSIER: 22.0066-001

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ECOLOGICAL ASSESSMENT

6824 Stoney Hill Road, Duncan, BC

1 Introduction

1.1 Background

A proposal to construct a driveway on the property located at 6824 Stoney Hill Road, Duncan, has triggered the requirement for an Ecological Assessment (EA). The driveway will provide access from Stoney Hill Road to the proposed building site of the residence, that will be built on the western side of the property, close to the marine foreshore area (Figure 1). An environmental report for the proposed house was prepared by Madrone in 2019 (Madrone 2019).

The Municipality of North Cowichan (MNC), who are responsible for managing development in this area, have established Development Permit Areas (DPAs) to help protect the integrity of sensitive habitat types throughout the municipality. The DPA process helps to identify areas and features that may be susceptible to degradation, as well as recommending mitigation measures that can be applied to eliminate or reduce potential impacts.

According to the North Cowichan web map (maps.northcowichan.ca), most of the driveway will occur in a DPA-4 (Natural Hazard Area). The scope of this EA will address some, but not all of the requirements under DPA 4 (a geo tech engineer will address the important DPA 4 requirements).

1.2 Objectives

The primary objective of the EA is to assess the scope of the construction activities, such as the construction footprint and methods that will be used as part of construction and determine potential impacts to any sensitive ecological features (including any watercourses and associated riparian area).

The secondary objectives are to list mitigations to minimize impacts to sensitive habitats and possible rare elements. The driveway will pass through a healthy young forest so tree protection and conservation will be discussed. Figure 1 shows the location of the proposed driveway in relation to the two mentioned DPA (s).

In this report there will be some overlap with the material presented in the 2019 Madrone report, however the focus of this report is to discuss the impact of the driveway on that portion of the property outside the DPA-3 area.

It is understood that the client will be responsible for the DP application, using this EA as supporting documentation.

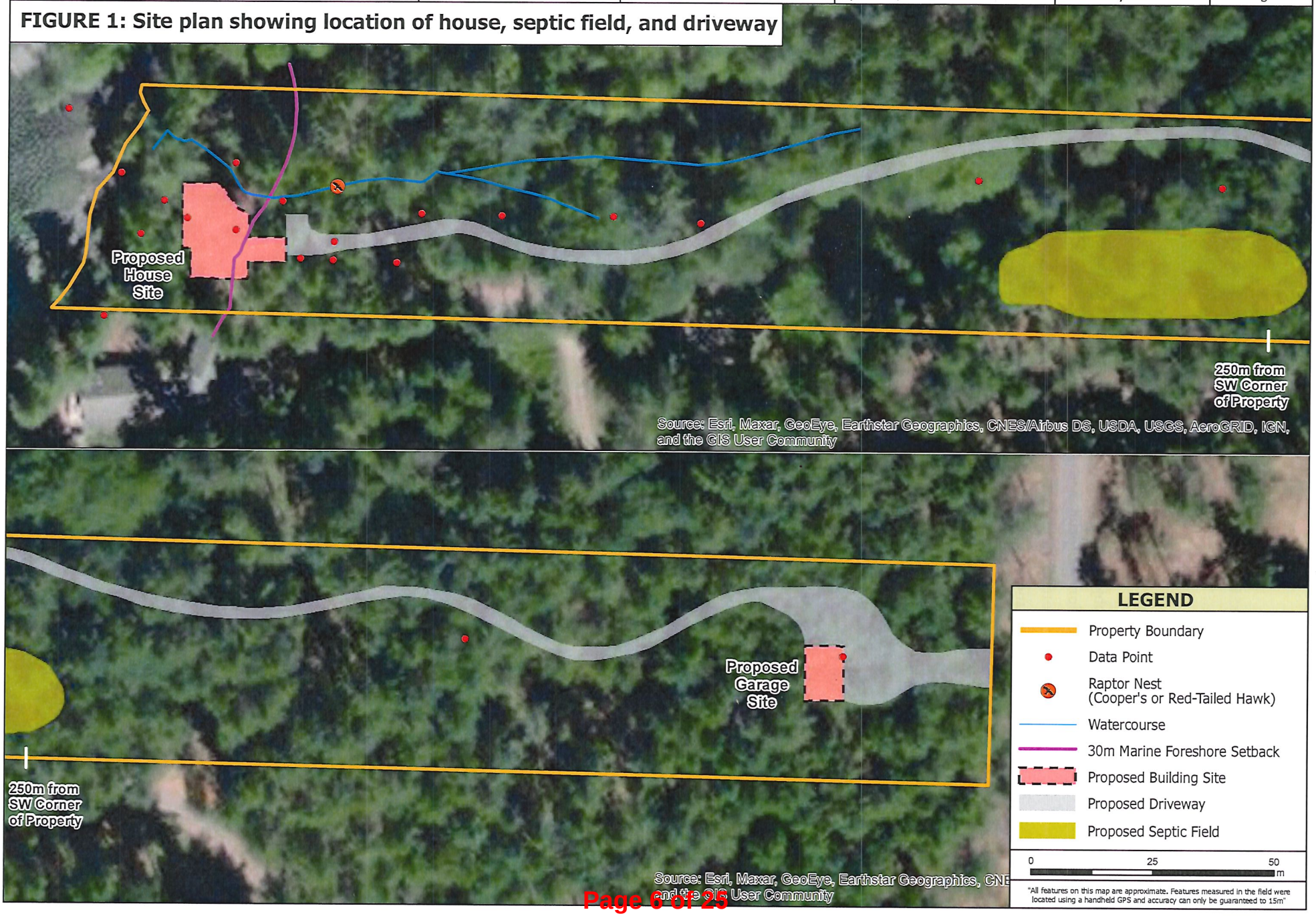
2 Assessment Area

The subject property is located on the eastern side of Maple Bay, on Stoney Hill Point. The property is currently accessed using the driveway on the neighbouring property to the south – parts of which appear to straddle the property line. The property is 450 m long and approximately 30 m wide, encompassing an area that is about2 ha (5 acres) (Figure 1).

MADRONE environmental services ltd	**PROJECT:** Ecological Assessment: 6824 Stoney Hill Road		**LOCATION:** North Cowichan, BC	**CLIENT:** Cam Fox	**DOSSIER:** 22.0066
	ASSESSED BY: Harry Williams, MSc, RPBio, PAg, QEP	**FIELD VISIT:** March 24, 2022	**MAP SCALE:** 1:1,000	**MAPPING DATE:** April 19, 2022	**DRAWN BY:** Jeff Kruys

N W E S

FIGURE 1: Site plan showing location of house, septic field, and driveway



3 Description of Proposed Driveway

The driveway is planned to be about 450 m long and will extend from Stoney Hill Road in the east to the western end of the property. The current plan does not have any of the driveway within the 30 m DPA-3 zone. The driveway meets with the garage about 4-5m east of the 30 m boundary (based on the boundary location shown on the survey). The rest of the driveway is within the DPA-4 area.

The eastern portion of the driveway will be built close to, and roughly parallel to, the northern property line. A property line setback for the driveway is not officially required, however the intent will be to remain at least 3 m off the property line. Near the 200 m mark (from Stoney Hill Road), the driveway will turn towards the southern property line, where it will follow the path of an existing older road and continue on that side of the property as far as the proposed residence. The existing road was built some years ago to provide access for a drilling rig that was testing groundwater. This road is clearly defined but in poor shape and will require an upgrade by applying a roadbase of 3" crushed rock.

A 550 sq foot garage will be built close to Stoney Hill Road for vehicle use and storage (Figure 1). Other than the clearing required for the driveway and garage, the forest will remain largely intact.

4 Assessment Methodology

4.1 Background Research

This part of the report will draw on pertinent information from the 2019 Madrone report. That report focused on the DPA-3 area and the proposed house, but the methodology and background research did apply to the entire property. The relevant sections of the 2019 report are summarized below.

4.1.1 Sensitive Ecosystems

An ecosystem is defined as a portion of landscape with relatively uniform dominant vegetation; a sensitive ecosystem is one that is fragile and/or rare. Sensitive ecosystems are particularly valuable in that they often provide critical habitat for Species at Risk, are often associated with a high level of biodiversity, and may provide wildlife habitat including travel corridors. The Municipality of North Cowichan's interactive map was used to determine whether any sensitive habitat types had been identified on or near the subject property.

4.1.2 Rare Element Occurrences

The Ministry of Environment and Climate Change Strategy (MECCS) maintains the Conservation Data Centre (CDC) database of potentially occurring red and blue-listed animal and plant species for BC. This database was checked to verify whether any rare plants, animals or ecosystems occur on or adjacent to the subject property.

4.1.3 Wildlife Tree Atlas

The Wildlife Tree Atlas was accessed to locate any Wildlife Trees (e.g. raptor nests) on or around the subject property. Local knowledge and previous work conducted in the general study area related to Bald Eagle (*Haliaeetus leucocephalus*) was used to locate identified nest sites.

4.1.4 Riparian Areas

The provincial habitat wizard and fisheries information summary system (FISS)was accessed to determine if any fish-bearing streams occur on or close to the subject property.

5 Field Assessment

A field assessment was completed on March 24th, 2022. The focus of the site visit was to review the proposed driveway footprint to ensure that all sensitive sites or features, and potential impacts to them, were considered. The property was traversed in both directions with the client to determine the best driveway location in terms of a suitable roadbed, but also in terms of minimizing impacts to the existing forested areas. Photos were taken along the proposed route, and discussions were had concerning the exact route in difficult areas (such as steep or rocky areas).

6 Results

6.1 Sensitive Ecosystems

A check of the SEI mapping database did not reveal any occurrences of any listed sensitive ecosystems on or near the study area.

6.2 Rare Element Occurrences

The red-listed Douglas-fir / dull Oregon grape (zonal – site series 01) forest type was shown to occur throughout the subject property. This ecosystem occurs over the majority

of Stoney Hill Point, including the subject property. It occurs on soils that are well-drained, and nutrient medium.

6.3 Wildlife Tree Atlas

As per the Wildlife Tree Atlas, the closest documented raptor nest is approximately 100 m north-east of the subject property. This nest, known to have supported Bald Eagles (registration number BAEA 104-018), was last confirmed to be active in 2001.

In addition to this, field work by Madrone staff in 2015 confirmed that there is a cluster of nests on the north-western tip of Stoney Hill Point (900 m distance from the subject property): BAEA 104-002; BAEA 104-004; BAEA 104-005; and BAEA 104-023. In addition to these nests, breeding was confirmed at a new nest located in the same general area in 2015. As of 2022, BAEA 104-004 is known to no longer exist, but the status of the other nests is unknown.

As noted in the 2019 report, an inactive raptor nest does occur in a 35 cm diameter Douglas-fir tree close to the northern property line (Figure 1), but no birds were identified on the nest or in the immediate vicinity during the site visit on March 24, 2022.

6.4 Local Government Habitat Mapping

According to municipal mapping, a 30m DPA-3 area has been applied to the 30m marine foreshore area. The rest of the property is classified as DPA-4 (Natural Hazard Areas), due to localized steep topography. No other terrestrial sensitive habitat types have been identified by the local government on the subject property or in the immediate vicinity.

6.5 Riparian Areas

Based on the background research, including the North Cowichan web map, no documented fish-bearing streams occur on or near the subject property. However, a small non-gazetted watercourse does occur on the property which will be discussed in a later section.

7 Site Description

The subject property slopes down from Stoney Hill Road towards the western edge of the property (on Maple Bay). Up to the present, a shared driveway with the property to the south has provided vehicle access.

The majority of the property is treed, dominated by Douglas-fir (*Pseudotsuga menziesii*). The area has formerly been logged, and the age of the current forest ranges from 55 – 70 years. Due to the fairly dry and rocky soil, tree growth is modest. In areas with slightly more moisture western redcedar (*Thuja plicata*) and bigleaf maple (*Acer macrophyllum*) occur. Common shrubs include salal (*Gaultheria shallon*), Oregon grape (*Mahonia nervosa*), and oceanspray (*Holodiscus discolor*). Scattered arbutus (*Arbutus menziesii*) and western yew (*Taxus brevifolia*) also occur. Sword fern is common in shady areas.

The watercourse that was noted in the 2019 report was examined during the 2022 field visit (Figure 1). Water was flowing intermittently in portions of the creek, and there were signs of recent scouring that likely occurred during the high rainfall events of November 2021. However, the watercourse is likely dry during the summer, so it could be described as seasonal. Also, as noted in the 2019 report, due to the existence of a barrier for fish near the beach, under the Riparian Areas Protection Regulation (RAPR), this watercourse is not classified as a stream. The watercourse runs roughly parallel to the northern property line in the western portion of the property. Despite not being applicable to the RAPR, the drainage still represents a "watercourse" as per local government bylaws and will require a protective setback.

8 Mitigation Measures

8.1 Tree Management During Driveway Construction

A number of trees (mostly Douglas-fir) will be removed to provide space for the driveway. However, an effort will be made to conserve as many trees as possible

Any tree removal along the driveway corridor must be limited to what is absolutely necessary to allow for the driveway construction. During construction it is important to protecting any living trees that remain close to the driveway footprint. Construction-related activities such as excavating, piling soil/fill around tree stems and compaction of soil from machinery could cause damage to the roots and stems of these surrounding trees.

Driveway construction activities will likely not involve significant excavations, based on the shallow soils and occurrence of bedrock close to the surface. This decreases the potential for direct or indirect damage to the nearby trees. Nonetheless, care must be taken when operating machinery to avoid impacting the surrounding trees. The following measures must be taken during construction to help protect trees:

- avoid damaging the stems and/or limbs of the surrounding trees during the operation of machinery
- do not pile soil or other material around the stems of trees
- avoid compacting the soil within the rooting zones of surrounding trees (this can change the drainage regime)
- excavate carefully and avoid damaging roots (especially roots that are greater than 3 cm in diameter); and
- if roots are encountered and absolutely need to be cut, avoid shattering the roots – the roots must be cut cleanly.

8.2 Managing Debris from Cleared Trees

- The trunks of smaller removed trees may be cut into 4' lengths and left on the ground - as they provide nutrients to the soil and provide microhabitat for small animals.
- Branches and greenery remaining after tree removal could be chipped and stockpiled for use in erosion and sediment control (see Section 8.5), or garden mulch. Leaving large intact branches on the forest floor could be a forest-fire hazard. Small branches, that rot quickly, could remain on the ground where cleared.
- Avoid excessive trampling and/or disturbance to the native vegetation while removing trees.

8.3 Rare Ecosystem Conservation

The red-listed ecosystem represented by the Douglas-fir / dull Oregon grape plant community is widespread throughout Stoney Hill Point and occurs over the majority of the subject property. Minimizing tree removal will help maintain this forest type.

8.4 Hydrocarbon Management during Driveway Construction

In addition to being clean (i.e., free from leaks and excessive grease/oil on the body) and in good working order, any heavy equipment working anywhere on the site (e.g. excavator) must carry a small, storable emergency spill containment kit with at least a 30 litre sorbent capacity. In addition, a larger spill containment kit (sorbent capacity of at least 80 litres) must be located on the subject property when machinery is in operation.

The smaller (30 litre sorbent capacity) spill kits to be located in heavy machinery must contain the following:

- 20 absorbent pads (for oil, gas and diesel);
- 2 3"x 4' absorbent socks;
- 2 disposal bags; and
- 1 pair of Nitrile gloves.

The larger (80 litre sorbent capacity) site-level spill kit must contain the following:

- 30 absorbent pads (for oil, gas and diesel);
- 15 universal absorbent pads;
- 2 18" x 18" oil absorbent pillows;
- 3 3" x 4' absorbent socks (for oil, gas and diesel);
- disposal bags;
- 2 pairs of Nitrile gloves;
- 1 spill instruction sheet; and
- 1 laminated list of contents.

Refueling of all machinery must occur at least 20 m away from the watercourse, even if the watercourse is dry. Any chainsaws that are used must run on non-toxic biodegradable chain oil.

8.5 Erosion and Sediment Control

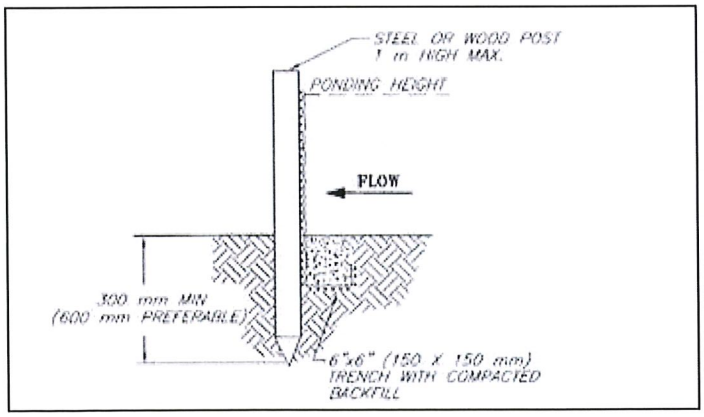
While water flow in the watercourse fluctuates over the seasons, Erosion and Sediment Control (ESC) measures must be considered and implemented where appropriate during construction of the driveway.

During wet weather it is important to try to limit the operation of heavy machinery and exposure of soils on the property. This will help to minimize the potential for erosion and associated sediment mobilization.

The main goal of ESC for the driveway construction is to prevent sediment from entering the watercourse. The following ESC measures, which focus on the control of potential

erosion sources, as opposed to the capture of sediment, must be implemented during construction:

- Limit the extent of vegetation clearance to the absolute minimum;
- Stage vegetation clearance, as opposed to clearing entire areas, to maintain as much vegetation as possible for as long as possible. In this case, depending on construction windows, clear the driveway area first, and then the house site.
- Complete clearing activities during dry periods of weather.
- Mulch areas prone to erosion (e.g., areas on steeper slopes and/or areas consisting of silt or clay) with straw (not hay) and/or wood chips resulting from the branch and limb clearing. The mulch should be applied evenly at a thickness of 2.5 cm - 5.0 cm and should cover at least 80% of exposed areas. Mulching in this way should be focused in areas of exposed soils and may not be required where bedrock occurs at or near the surface.
- While it is unlikely that stockpiles of fill will be generated, if they are, they should be covered with temporary polyethylene sheeting which will prevent soils from being displaced by rain and/or surface flowing water.
- In order to inhibit erosion of exposed areas, surfaces should be left in a roughened state. Surface roughness and loose soils not only encourage water infiltration and the prevention of surface erosion, but also provide preferred growing conditions for vegetation.
- Avoid soil compaction as this can lead to decreased infiltration and increased surface erosion from surface-flowing water. Compacted, smoothed surfaces are generally unsuitable for vegetation establishment.
- While the focus must be on erosion control, sediment fencing may be required in some spots where sediment transport could occur. To be effective, the sediment fencing must be installed properly (see diagram below).



9 Protection of Breeding Birds

9.1 General Mitigation

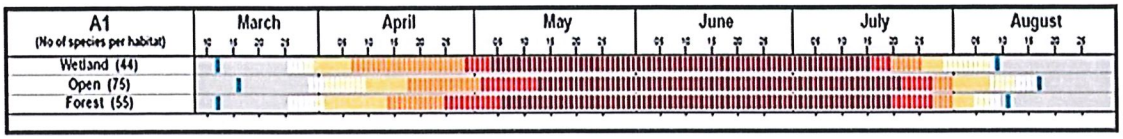
The provincial Wildlife Act (Section 34C) aims to protect to nesting birds, and it is illegal to possess, take, injure, molest, or destroy the nest of a bird when the nest is occupied by a bird or its eggs.

In addition to Section 34C of the provincial Wildlife Act, migratory birds are also afforded protection under the federal Migratory Birds Convention Act (Section 6). This legislation prohibits the destruction, harm, or disturbance of a migratory bird, its nest, and its young during the breeding season.

Migratory birds that are covered under the *Migratory Bird Convention Act* include a number of species known to visit and breed in the general vicinity of the property. Such birds may include hummingbirds, thrushes, warblers, flycatchers, swallows, and swifts. With the exception of raptors, crows and ravens, and some game birds, all birds and their nests are protected under the *Migratory Bird Convention Act* including birds listed as Species at Risk (Federal Species at Risk Act- SARA).

The breeding season for bird species that may nest on the subject property extends from March 25th to August 10th, as identified in the nesting calendar for zone A1 (zone where subject property is located (see Table 1).

TABLE 1. ZONE A1 MIGRATORY BIRD NESTING PERIODS (ENVIRONMENT CANADA).



Legend for calendars: Number of species in percentage (Blue markers show extreme dates predicted for some atypical parts of the nesting zone where nesting could be earlier or later)

Long description for nesting calendars in zone A

The figure presents a set of 15 calendars showing the proportion in percentage of federally protected species that are predicted to be actively nesting on a given date from March to September for three habitat types: wetlands, open and forest and for five nesting zones: A1, A2, A3, A4 and A5. On each day, the percentage of species is shown according to one of the following six categories: 0 percent, less than 5 percent, 6 to 10 percent, 11 to 20 percent, 21 to 40 percent, 41 to 60 percent and 61 to 100 percent. In addition, markers show extreme dates predicted for some atypical parts of the nesting zone where nesting could occur earlier or later.

For nesting zone A1, within the species used, there are 55 species known to nest in forest habitats. The percentages of species actively nesting are: less than 5 percent from March 26 to 30 and from August 8 to 9, 6 to 10 percent from March 31 to April 1 and from August 5 to 7, 11 to 20 percent from April 2 to 13 and from August 1 to 4, 21 to 40 percent from April 14 to 24 and from July 28 to 31, 41 to 60 percent from April 25 to May 5 and from July 20 to 27, 61 to 100 percent from May 6 to July 19. The markers are on March 12 and August 11. The rest of the calendar dates are zero percent.

To avoid potential impacts to nesting birds or their habitats, and to comply with existing (current) legislation requirements, development activities must be suspended between March 25th and August 10th. If driveway construction activities cannot be suspended during this period, specific areas would need to be checked for nest sites prior to disturbance to prevent impacts to nesting birds. Additional precautionary measures should be considered if vegetation clearing is to take place between March 12th and 25th, or between August 10th and 12th (to include the "outlier" breeding potential).

Based on the restrictions imposed by the breeding bird season, if clearing for the driveway is completed after August 12th, 2022, work on the driveway could continue through the late summer and fall.

9.2 Bald Eagle Nesting Territories

As noted in Section 6.1.3, there are several recorded Bald Eagle nests on Stoney Hill Point including Nest BAEA-104-018, which was recorded close to the north-western corner of the property. As noted, field work and discussions communications with the local

residents indicate that this nest tree has blown down, with the trunk now lying on the beach (confirmed during the field assessment).

Bald Eagle nests are legally protected under Section 34 (b) of the provincial Wildlife Act. In addition, Section 34 states that a person cannot "injure, molest or destroy" a nest site. Development activities have the potential of injuring, molesting or destroying a nest site (e.g. if the development activity results in birds abandoning a nest). The implementation of protective buffers around nests helps prevent nest abandonment. Buffers are a protective measure in keeping with the Ministry of Environment's Guidelines for Raptor Conservation (2013).

The 100 m permanent buffer and 200 m seasonal buffer (February 5th to August 31st) associated with nest BAEA 104-018 would extend onto the subject property; however, this nest is no longer present. With this nest being absent, only the seasonal blasting buffers associated with the nests BAEA 104-005, BAEA 104-023 and the new (2015) nest located between BAEA 104-023 and former nest BAEA 104-004 extend onto the subject property. However, these nests are approximately 800 m away so, based on the location of these nests, none of the permanent (100 m) or general (200m) seasonal buffers apply.

While the 1000 m blasting buffers do extend onto the property, these buffers are not applicable due to the fact that the client is proposing on clearing and preparing the roadbed with an excavator, and rock blasting will not be required.

9.3 Raptor Nest Protection (Cooper's or Red-tailed Hawk)

Raptors, including hawks, are important for ecological values (regulating prey populations), economic values (controlling pests), scientific values, and recreational and aesthetic values (bird-watching). Loss of habitat is a threat facing many raptors. However, both Cooper's and Red-tailed hawks are considered to have a "moderate to high" ability to co-exist with humans (MoE 2013) and are not an "At-Risk" species.

With regard to the raptor nest on the subject property, the status of the nest could not be confirmed, meaning that the default is to consider it active. Therefore there should be a undisturbed buffer around the nest of at least 20 m.

10 Watercourse Considerations

As mentioned in the results section, the watercourse on the property is a low magnitude system with widths varying between 0.5 m and 0.75 m. Riparian vegetation (plants typically found along watercourses) is sparse, however typical forest plants such as Sword fern (*Polystichum munitum*) are growing close to the watercourse. Evidence of water movement can be seen in some sections of the watercourse; however, there is not a continuous well-defined drainage channel.

From a regulatory standpoint, the watercourse is not defined as a stream under the Riparian Areas Protection Regulation (RAPR), because it does not support fish or connect by surface flow to fish habitat. However, the drainage is defined as a "watercourse" under the Municipality of North Cowichan's bylaws, and a 15 m watercourse setback applies to the drainage. However, due to the seasonal nature of the watercourse a 10m undisturbed buffer should be adequate. This 10m setback applies to the driveway and does not supersede the 2019 recommendation of a 4m setback close to the house. The 10m setback from the watercourse should be feasible for the majority of the driveway – however the turning area in the driveway adjacent to the house will have a 4m setback.

Other measures that are recommended include:

- The buffer area must remain undisturbed from such activities as machine work, septic infrastructure, gardening, lawn establishment, storage of materials, or dumping of garden refuse.
- During construction of the driveway, as well as the house, mark the location of the watercourse and buffer so that construction activities can avoid it. T
- The most recent building plans for the house have been reviewed and are consistent with the recommendations in the 2019 Madrone report.
- Trees on the north side of the drainage must not be cut in order to maintain the integrity of the habitat around the hawk nest.

11 Summary of Mitigations and Recommendations

The following is a summary of the points made in previous sections of this report:

- Wood remaining from tree clearing for the driveway can be cut into firewood length for personal use, given to neighbours, or donated. Smaller diameter trunks can be cut into 4' lengths and left on-site to decompose. This Coarse Woody Debris (CWD) is beneficial for wildlife and general biodiversity values.

- Branches resulting from the tree removal can be mulched and used for erosion and sediment control and gardening.
- Remaining trees adjacent to the driveway need to be protected during construction.
- Machinery on the property must be clean, in good working condition, and have the specified spill kits readily accessible.
- Following tree removal and preparing the roadbed, several small diameter culverts may need to be installed. It is likely that little additional fill will be required.
- In damp locations the first layer of gravel on the driveway should be 3-inch crushed road base.
- Soil disturbance must be kept to the absolute minimum, and machine activity must be confined to the construction footprint area.
- The breeding bird season extends from March 25th to August 10th. No site clearing can be carried out during this period unless the area is first examined by a biologist and confirms that no active nests are present.
- To protect the small watercourse on the property, the driveway should aim to stay at least 10 metres away from it. This buffer area must remain undisturbed.
- There are no active Bald Eagle nests close to the proposed driveway, so no measures apply – especially considering that blasting will not be required to create the roadbed.
- However, there is a hawk nest on the north side of the small watercourse, therefore this area must remain undisturbed (see Madrone 2019 for more details).
- The landowner has committed to preserving as much of the existing forest as possible on the property (in both the DPA3 and DPA4 areas. Preserving the existing forest will help maintain general biodiversity and ecosystem values.

Please contact the undersigned with questions or comments.

Prepared by:

*This is a digitally signed duplicate of the official manually signed and sealed document.

Harry Williams MSc RPBio PAg QEP Certified Arborist

References

Madrone 2019. Ecological Assessment for 6824 Stoney Hill Road. Contract Report. Madrone Environmental Services Ltd. Duncan, BC

Habitat Wizard
https://www2.gov.bc.ca/gov/content/environment/plants-animals-ecosystems/ecosystems/habitatwizard

Conservation Data Centre:
http://maps.gov.bc.ca/ess/hm/cdc/

Municipality of North Cowichan – Interactive Web Map
http://maps.northcowichan.ca/mnc_public/

Sensitive Ecosystem Inventory (SEI):
http://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=2124

Wildlife Tree Stewardship Atlas:
http://cmnmaps.ca/wits/

Ministry of Environment – Guidelines for Raptor Conservation. 2013. http://www.env.gov.bc.ca/wld/documents/bmp/raptor_conservation_guidelines_2013.pdf

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APPENDIX 1

Site photos (taken on March 24th, 2022)

Photo of the forest in the eastern portion of the property near Stoney Hill Road. The forest is dominated by young Douglas–fir trees with an age range of 35-65 years. Less windfall has occurred on this portion of the property compared to exposed areas closer to the water. The soils in this area are shallow, with bedrock close to the surface.

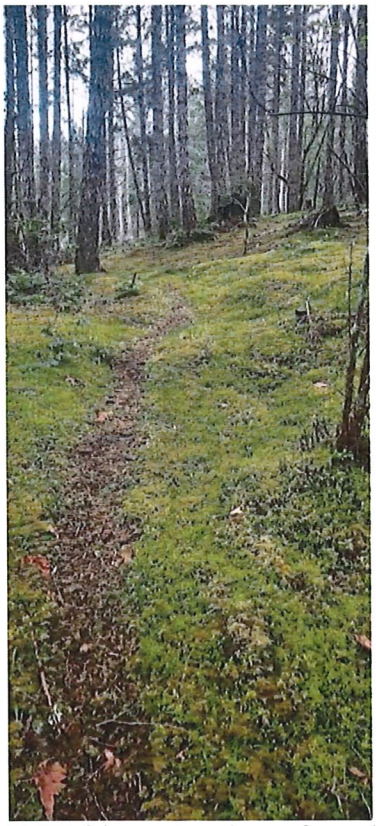
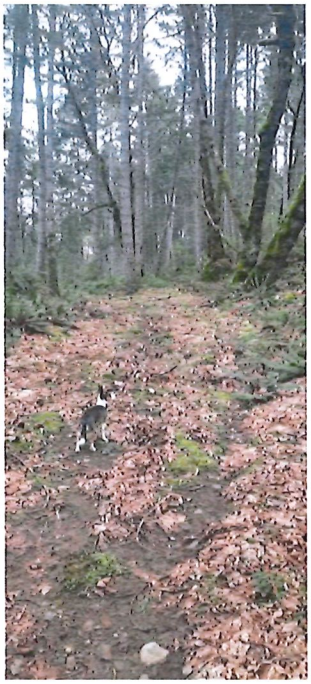


Photo of the property close to Stoney Hill Road showing an existing trail that the driveway will follow. Tree clearing must be kept to a minimum and the driveway route chosen to avoid as many trees as possible.

In this area the driveway will skirt the sides of bedrock outcrop. Some additional fill for the road-bed may be required in this location. The dominant trees in this area are Douglas-fir, with scattered big leaf maple and arbutus.



View of an existing road on the property that was built when the original subdivision was established. The driveway will be built on this existing road footprint for approximately 1/3 of the distance.

Above and below: photos of the existing old road to be followed by the driveway. No watercourses were seen along the eastern portion of the proposed driveway route. A watercourse does occur on the property, but closer to the northern property line.

This portion of the driveway will likely require a culvert.

Another view of the area where a small diameter culvert will be required.

Closer to the proposed house site, the driveway will be positioned parallel to the existing driveway that extends on to the neighbouring property.

View of driveway location close to the proposed residence.