**DEVELOPMENT PERMIT NO. 725-62**

OWNERS: Finz Resort Inc.
2001 – Eagle Bay Road
Blind Bay, BC V0E 1H1

1. This Riparian Areas Regulation AND Lakes 100 m Development Permit is issued subject to compliance with all the Bylaws of the Regional District applicable thereto, except as specifically varied or supplemented by this Permit.

2. This Permit applies only to the lands described below:

   Lot 1, Sections 17 and 20, Township 22, Range 10, West of the 6th Meridian, Kamloops Division Yale District, Plan EPP51931

   PID: 029-706-955

   which property is more particularly shown outlined in bold on the Location Maps attached hereto as Schedule A.

3. This Permit is issued pursuant to Sections 12.3 and 12.4 of the "Electoral Area 'C' Official Community Plan Bylaw No. 725" in support of a proposal to install a new sewerage system, construction of a washroom addition onto the existing restaurant building and the construction of a fence occurring within 30 m of Shuswap Lake as more particularly shown on the Sewerage System Design Plan attached hereto as Schedule B-1, and the Site Plan attached hereto as Schedule B-2.

4. An amendment to the Permit will be required if development is not in substantial compliance with this Permit.

5. This Permit is issued based on the Riparian Areas Assessment Report completed by Trina Koch, R.P. Bio, of Western Water Associates Ltd. dated January 20, 2016, attached hereto as Schedule C; which satisfy the requirements of the Riparian Areas Regulation (RAR) Development Permit Area as set out in Electoral Area `C` Official Community Plan Bylaw No. 725.

6. This Permit is issued based on the Hydrogeology Assessment completed by Daniel Watterson, P. Geo., of Watterson Geoscience Inc., dated June 15, 2015, attached hereto as Schedule D; and the Sewerage System Design Brief and Plans, completed by Jayme Franklin, P.Eng., of Franklin Engineering Ltd., dated June 4, 2015, attached hereto as Schedule E which satisfy the requirements of the Lakes 100 m Development Permit Area as set out in Electoral Area `C` Official Community Plan Bylaw No. 725.

7. It is understood and agreed that the Regional District has made no representation, covenants, warranties, guarantees, promises or agreement (verbal or otherwise) with the developers other than those in the permit.

8. This Permit shall inure to the benefit of and be binding upon the parties hereto and their respective heirs, executors, administrators, successors and assigns.

9. This Permit is NOT a building permit.

AUTHORIZED AND ISSUED BY the Manager of Development Services of the Columbia Shuswap Regional District on the _____day of_____, 2016.

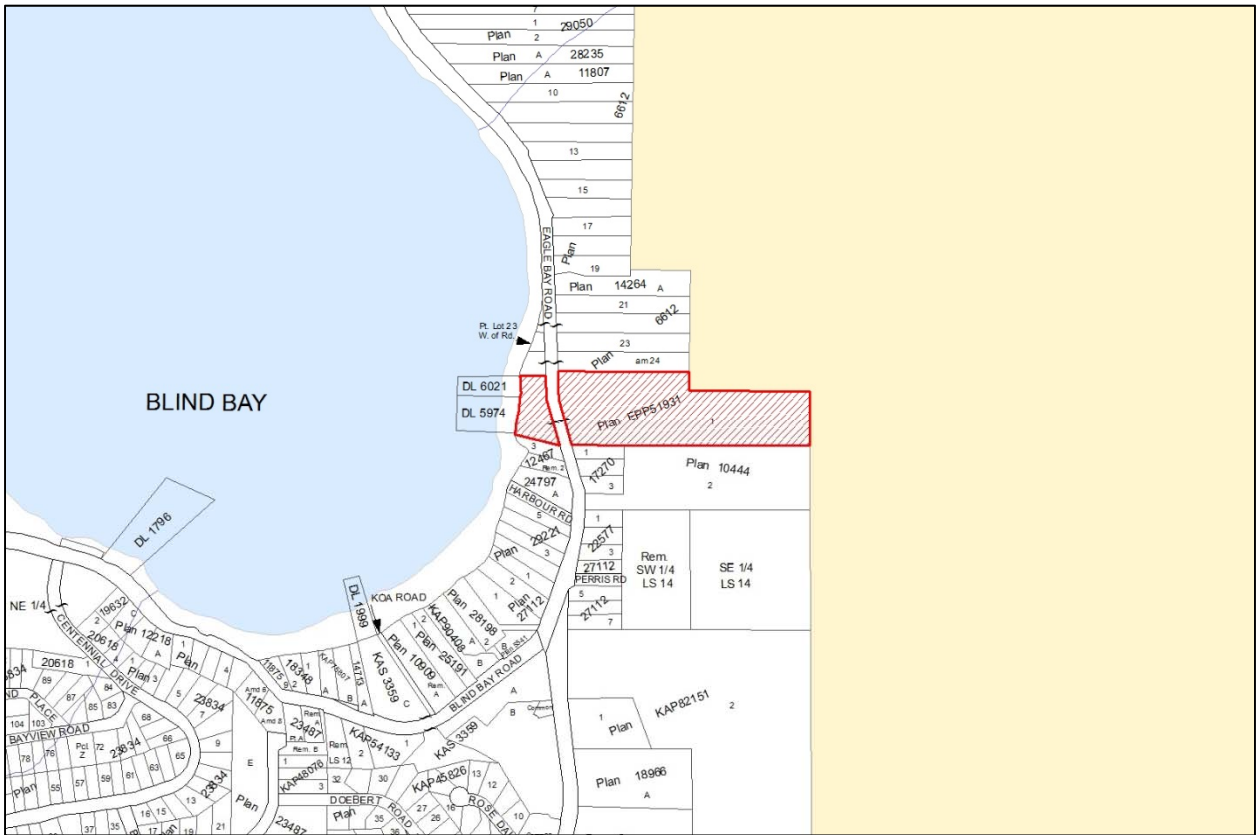
_____
Gerald Christie
Manager, Development Services

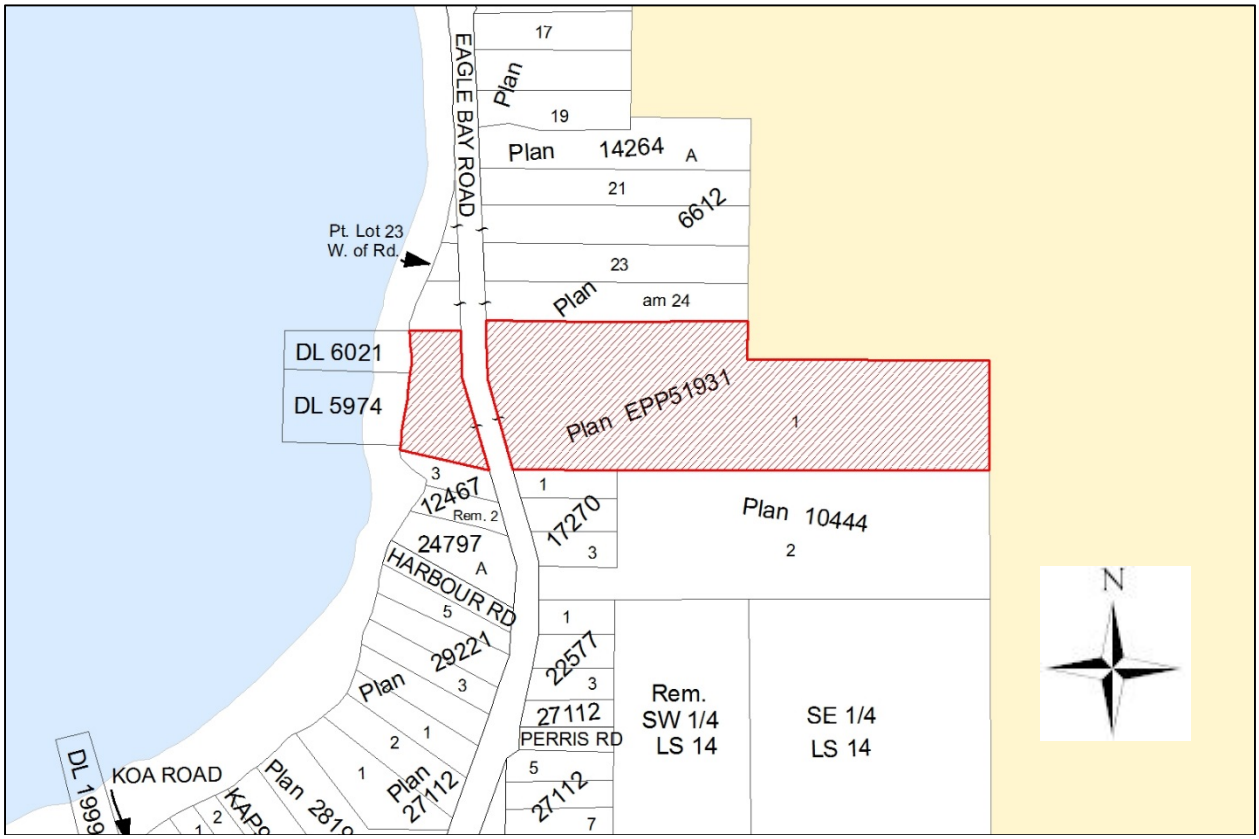
PLEASE NOTE:

1) Pursuant to Section 926(1) of the *Local Government Act*, if the development of the subject property authorized by this permit is not substantially commenced within two years after the issuance of this permit, the permit automatically lapses.

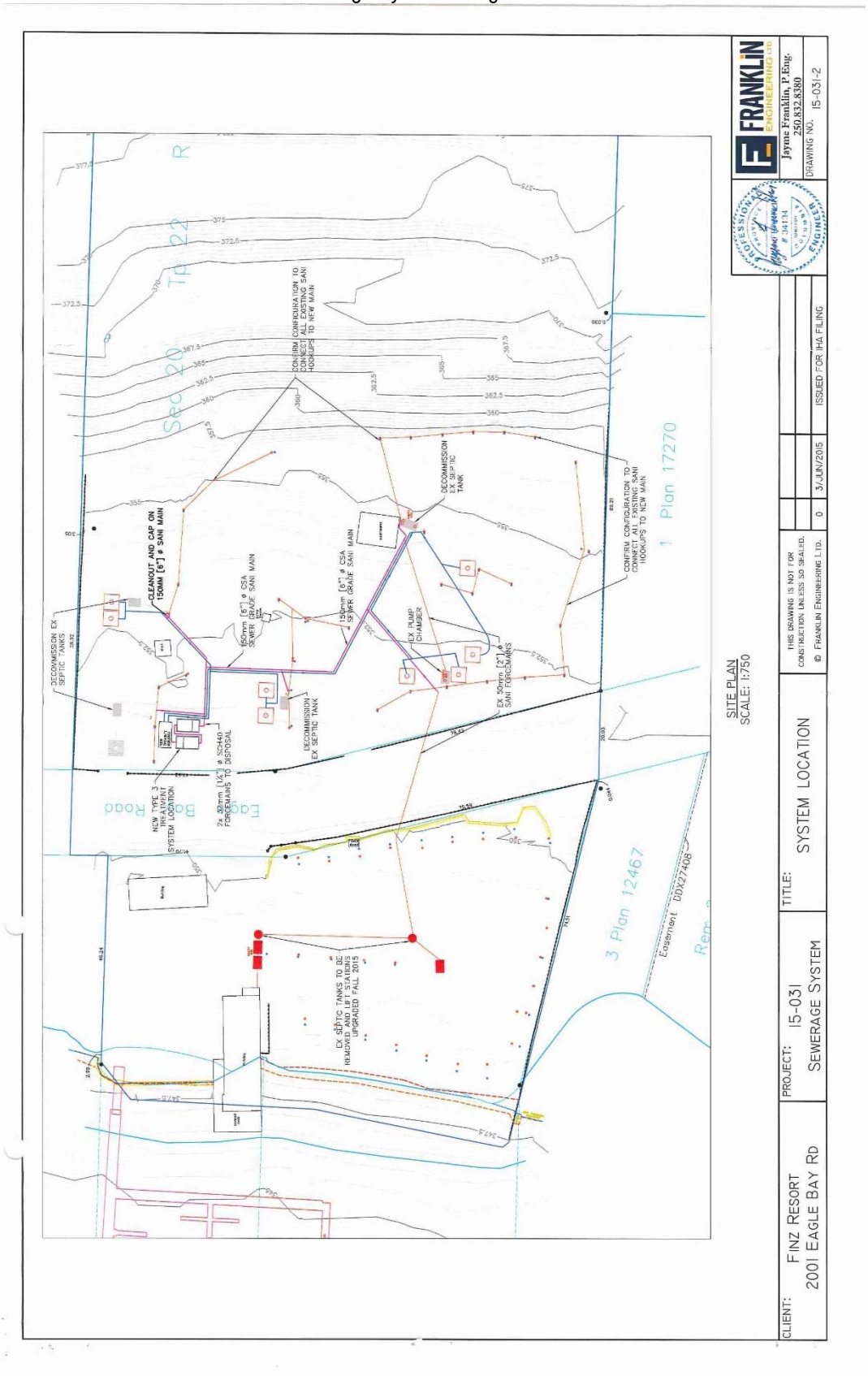
2) This Permit addresses Local Government regulations only. Further permits or authorizations may be required from Provincial and Federal governments. It is the owner's responsibility to call Front Counter BC at 1-877-855-3222 regarding this project.

DP 725-62 Schedule A



Schedule B-1 - DP 725-62
Sewerage System Design Plan



Schedule B-2 - DP 725-62
Site Plan

FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

## Riparian Areas Regulation: Assessment Report

Please refer to submission instructions and assessment report guidelines when completing this report.

Date: January 20, 2016

### I. Primary QEP Information

| | | | | | |
|---|---|---|---|---|---|
| First Name | Trina | Middle Name | Anne | | |
| Last Name | Koch | | | | |
| Designation | R.P.Bio. | Company | Western Water Associates Ltd. | | |
| Registration # | 2631 | Email | trina@westernwater.ca | | |
| Address | 106-5145 26th street | | | | |
| City | Vernon | Postal/Zip | V1T 8G4 | Phone # | 250-541-1030 |
| Prov/state | BC | Country | Canada | | |

### III. Developer Information

| | | | |
|---|---|---|---|
| First Name | Craig | Middle Name | |
| Last Name | Russenholt | | |
| Company | Finz Resort Inc. | | |
| Phone # | 604-328-6942 | | |
| Address | 21-2550 Golf Course Drive | | |
| City | Blind Bay | Postal/Zip | V1E 1H1 |
| Prov/state | BC | Country | Canada |

### IV. Development Information

| | | | |
|---|---|---|---|
| Development Type | Commercial -- addition of washrooms to an existing restaurant and the addition of a roof structure to an existing patio | | |
| Area of Development (ha) | 0.013 | Riparian Length (m) | 100 |
| Lot Area (ha) | 0.63 | Nature of Development | Construction |
| Proposed Start Date | January 20, 2016 | Proposed End Date | December 1, 2016 |

### V. Location of Proposed Development

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Street Address (or nearest town) | 2001 Eagle Bay Road | | | | | | |
| Local Government | CSRD | | | City | Blind Bay, BC | | |
| Stream Name | Shuswap Lake | | | | | | |
| Legal Description (PID) | 029-706-955 | | | Region | Columbia Shuswap | | |
| Stream/River Type | Lake | | | DFO Area | Interior BC | | |
| Watershed Code | 128 | | | | | | |
| Latitude | 50 | 52 | 50.13706 | Longitude | 119 | 21 | 49.50214 |

FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

***Table of Contents for Assessment Report***

## *Section 1. Description of Fisheries Resources Values and a Description of the Development proposal*

Note: Some content has been highlighted to convey its importance.

**1.1. Information Sources**

Existing development and fisheries resource values were assessed using information collected from online resources and information documented during a field assessment completed by Trina Koch, R.P.Bio., on January 7, 2016. Site conditions on this day were overcast and cold (about -5°C) with about 12 cm of fresh snow covering the property. The onsite assessment concentrated on the riparian assessment area (RAA) located within 30 m of the high water mark (HWM) of Shuswap lake (348.7 m.a.s.l). Online resources included Fisheries Inventory Data Queries[1], BC Water Resources Atlas[2], BC Conservation Data Center[3] and the Columbia Shuswap Regional District (CSRD) online mapping application[4].

Information about the proposed development was provided by Mr. Russenholt. Information on zoning and bylaws was found in the CSRD Official Community Plan (OCP) Bylaw 725 and discussed with Dan Passmore, CSRD Director of Development Services.

**1.2 Existing Development**

The project area is located at Finz Resort, which has the primary address of 2001 Eagle Bay Road in Blind Bay BC (Figure 1, Photograph 1). The Resort also includes 2000 Eagle Bay Rd, which is located directly across the road from the primary address. The entire property (2001 and 2000) is 0.63 HA in size and has a long rectangular-shape. It is located on the southeastern side of Blind Bay and includes 100 m of Shuswap Lake's shoreline. Foreshore land tenures on the property include #13281 and #10444. The property is zoned as foreshore waterfront commercial.

In 2009,a failing concrete retaining wall was replaced with a retaining wall constructed of large blast rock under a Section 9 *Water Act* notification (Photographs 1 and 4). Because the retaining wall was constructed below the original HWM, its creation established an adjusted HWM as shown in Figures 3 and 4. Within the same year, a brick patio (Photograph 2) surrounded by plexi-glass railings was installed (Photograph 3) between the original HWM and the adjusted HWM. The resulting patio area was 119.5 $m^2$ (Figure 3). A row of cedar shrubs lined the patio along its southern boundary (Photograph 2).

In April of 2015, a fuel tank, surrounded by a chain link fence, was installed about 30 m from the HWM near the northern property boundary. The fuel tank was designed by Regal Enviro Safe

[1] a100.gov.bc.ca/pub/fidq/welcome.do
[2] webmaps.gov.bc.ca/imf5/imf.jsp?site=wrbc
[3] env.gov.bc.ca/cdc/
[4] mapping.csrd.bc.ca/Html5/?viewer=property

Manufacturers and has a lockable fill/spill box, drain back valve, capped sounding port and an M&M camlock dust cap.

In June of 2015 the existing sewerage system was upgraded to a Ecofluid Type 3 System. Works were completed under a CSRD DP and the new sewerage system was certified with Interior Health. Work involved decommissioning old septic tanks within the entire property, upgrading lift stations, installing a new main line, tying sanitary sewers into the main line, upgrading a pump chamber and severing connections to the former disposal system.

Existing development within the 15 m SPEA includes the original patio, eight sanitary sewers, eight landscaped campsites, a beach access trail, a restaurant and parking area (Figure 3).

Under RAR, permanent structures within the SPEA are considered 'grandfathered'. The original patio is considered a permanent, grandfathered structure because (1) it was installed below the HWM under the 2009 Section 9 *Water Act* notification for retaining wall installation and (2) installation was prior to CSRD enacting Bylaw 725. Table 1 lists all of the existing structures within the SPEA and provides justification for status as permanent or temporary based on RAR protocol.

**Table 1. Permanent and Temporary Structures within the SPEA**

| Existing Structures inside SPEA | Permanent / Temporary | Justification |
|---|---|---|
| Restaurant | Permanent | Compliant with standards required at the time of construction and existing zoning |
| Brick Patio and Railing | Permanent | Most of the patio works took place below the original HWM, works below the original HWM were permitted under the 2009 *Section 9 Water Act* Approval application for the retaining wall, patio installation was prior to CSRD enacting the OCP RAR DP requirement |
| Retaining Wall | Permanent | Works below the original high water mark were permitted under the 2009 *Section 9 Water Act* Approval application |
| Parking Area | Permanent | Associated with the permitted restaurant and store |
| Septic System | Permanent | Authorized use is incompliance with Ministry of Health and CSRD OCP zoning |
| Camp Sites | Permanent | Complies with CSRD Zoning |
| Landscaping | Temporary | Landscaping can be improved to provide more natural riparian conditions |
| Trail | Temporary | Does not have permanent structures associated with it (ramps, bridges) |

**1.3 Proposed Development**

Proposed development is located within 30 m of Shuswap Lake, referred to as the Riparian Assessment Area (RAA) under RAR. It includes the placement of a 222.0 $m^2$ roof structure over the

119.5 $m^2$ original patio area and the addition of a 13.9 $m^2$ washroom to the east side of the restaurant. Only the roof structure is located within the 15m SPEA (Figure 4).

Ninety percent of the roof structure was constructed in the Fall and Winter of 2015 which has included the removal of railings and footings, pouring of a concrete tiebeam across existing footings for structural integrity, replacement of a row of cedar shrubs with other ornamental shrubs and erection of wooden framing and stained cedar roofing. Because the roof structure was built without a RAR DP from the CSRD (required under Bylaw 725 as of March 20, 2014), the developer has stopped work until a RAR DP is in place. Remaining roof construction will involve placing metal roofing on the wooden frame and installing rain gutters. The proposed roof structure will manage stormwater by routing it directly to the garden north of the structure.

Construction of the public bathroom facilities will involve tying new plumbing into existing plumbing, adding framing, drywall, electrical and siding to a 13.9 $m^2$ area attached to the southeastern corner of the restaurant building located next to the existing electrical room, which is an existing 'lean-to' style addition. New washroom construction is just outside of the SPEA and will not involve cement pouring. The addition will have the same 'lean-to' roof line as the electrical room.

A silt fence will be installed prior to construction works to reduce the possibility of sediment entering Shuswap lake. The proposed location of the silt fence is shown in Figure 4. A schedule of project timing is provided in Table 2.

**Table 2. Proposed Project Timing**

| Action | Timing | Location in Relation to SPEA | Mitigation |
|---|---|---|---|
| Remaining Roof Construction | January 2016 | A portion is outside of the grandfathered patio area located within the SPEA | Silt fence along the retaining wall, environmental monitor |
| Washroom Construction | February 2016 | Outside of the SPEA | Silt fence will stay in place during washroom construction, materials and construction will not encroach the SPEA. |
| Vegetation Mitigation | Sept 2016 | Within SPEA | vegetation compensation |

**Because the newly erected roof structure overlaps the original patio by an area of 102.5 $m^2$ within the SPEA, we propose a total compensation area of 126.9 $m^2$ where native shrubs should be planted** (Figure 4). Planting Plan details are provided in Section 1.5.

**1.4 Fisheries Resource Values**

The assessment of fisheries resources included a review of connectivity to downstream habitats, documented fish species, foreshore fisheries habitat, current riparian and foreshore condition and potential for species at risk. Biophysical conditions of the site were assessed on January 5th 2016.

Shuswap Lake flows into the Thompson River. There is adequate connectivity to the Thompson River so that fish species in the Thomspon River (Table 3) have the capacity to enter Shuswap Lake[5]. However, only chinook, whitefish, coho, sockeye, sculpins and redside shiner are known to commonly inhabit foreshore areas of the lake[5]. Scientific names of the fish species are provided in Table 3.

**Table 3. Documented fish species in the Thompson River System**

| Common Name | Scientific Name | Common Name | Scientific Name |
|---|---|---|---|
| River lamprey | *Lampetra ayresi* | Chum salmon | *O. keta* |
| White sturgeon | *Acipenser transmontanus* | Pink salmon | *O. gorbuscha* |
| Chiselmouth | *Acrocheilus alutaceus* | Coho salmon | *O. kisutch* |
| Lake chub | *Couesius plumbeus* | Rainbow trout | *O. mykiss mykiss* |
| Carp | *Cyprinus carpio* | Sockeye salmon | *O. nerka* |
| Peamouth chub | *Mylocheilus caurinus* | Chinook salmon | *O. tshawytscha* |
| Northern pikeminnow | *ptychocheilus oregonesis* | Bull trout (char) | *Salvelinus confluentus* |
| Longnose dace | *Rhinichthys cataractae* | Lake trout | *S. namaycush* |
| Leopard dace | *R. falcatus* | Burbot | *Lota lota* |
| Redside shiner | *Richardsonius balteatus* | Lake whitefish | *Coregonus c1upeaformis* |
| Longnose sucker | *Catostomus catostomus* | Pygmy whitefish | *Prosopium coulteri* |
| Bridgelip sucker | *C. columbianus* | Mountain whitefish | *P. wi/liamsoni* |
| White sucker | *C. commersoni* | Prickly sculpin | *Cottus asper* |
| Largescale sucker | *C. macrocheilus* | Slimy sculpin | *C. cognatus* |
| Mountain sucker | *C. platyrhynchus* | Torrent sculpin | *C. rhotheus* |
| Cutthroat trout (westslope) | *Oncorhynchus clarki lewisi* | | |

The Shuswap Watershed Mapping Project[6] identifies the foreshore along the property as being located within Segment 207, which is 907 m long. Segment 207 was given a high Aquatic Habitat

[5] T.G. Brown and P. Winchell Fish Community of Shuswap Lake's Foreshore. Canadian Technical Report of Fisheries and Aquatic Sciences 2568. Fisheries and Oceans Canada Science Branch, Pacific Region. Pacific Biological Station Nanaimo, B.C. http://www.dfo-mpo.gc.ca/Library/287112.pdf

[6] Ecoscape. 2011. Shuswap Watershed Mapping Project. http://a100.gov.bc.ca/appsdata/acat/documents/r17784/Shuswap_FIM_1268927125640_e5480e8e83f1b990a513d1f90f08b9e8705af8cf2a9eadc1464bef3e38e1f419.pdf

Index (AHI) rating because it is within a fisheries migration corridor and provides habitat for sockeye spawning, char spawning and juvenile rearing[7].

Foreshore features of the property include a marina consisting of four main floating platforms supported by piers. A hinged walkway connects the floating structure to the eastern end of the property next to a retaining wall constructed of large blast rock located slightly below the high water mark (Photograph 11). The retaining wall separates the existing brick patio from the beach. Beach and foreshore substrate observed on January 7, 2016 consisted of mostly gravel and sand with some small cobble. The seasonal timing of the field assessment limited the extent to which aquatic and riparian vegetation could be observed. Aquatic vegetation and large woody debris were not observed. The natural state of the foreshore at the eastern end of the property appeared highly altered. The foreshore appeared to be in a more natural state where it bordered the lakefront campsites west of the restaurant.

Riparian vegetation observed included native and ornamental vegetation. A row of ornamental shrubs lined the southern boundary of the roof structure adjacent to the patio (Figure 3 and Photograph 10). Riparian vegetation west of the restaurant had been planted to provide delineation of a pathway to the beach and privacy for camp sites (Photograph 18). Large weeping willows (*Salix × sepulcralis*) lined the shoreline and ornamental maples and cedars lined the boundaries of each site (Photograph 15). Two large cottonwood (*Populus trichocarpa*) overhung the water near the property's western boundary closest to the shoreline (Photograph 16).

Endangered species or species at risk were not observed on the property and have not been documented by the BC government within 1 km of property[8]. The closest species at risk is a masked species located 750 m to the west. Masked species are not identified by BC's Conservation Data Centre in order to protect the species from being captured or otherwise disturbed by the public.

**1.5 Riparian Planting Plan**

The following Riparian Planting Plan should be completed in September or October of 2016. Planting should not occur in June, July or August.

The goal of the planting plan is to densify the planting areas with as many native riparian plantings as possible based on spacing requirements. Annual survivability of the plantings should be at least 90%. A landscape professional should be hired to complete the planting.

Proposed planting areas include the narrow dividing areas between the eight waterfront campsites as shown in Figure 4. The total planting area is 126.9 $m^2$ to compensate for the 102.5 $m^2$ encroachment that the proposed roof structure overlaps the original patio. The compensation area is larger than the encroachment area since there are already trees planted between the camp sites which use up some of the availabe planting area.

[7] Shuswap Lake Watershed Mapping http://cmnmaps.ca/SHUSWAP/
[8] BC Government. Conservation Data Center. http://www.env.gov.bc.ca/cdc/

Because adequate trees already exist within the proposed planting areas we propose the addition of native riparian shrubs and grasses to these areas as shown in Table 4. Suitable riparian shrubs include Saskatoon berry, mountain alder, red-osier dogwood, Oregon-grape, chokecherry, Nootka rose, woods rose, red raspberry, blue elderberry and common snowberry (scientific names provided in Table 4). Shrubs should be a least a 15 cm pot size at the time of planting. The attached *Plant Nurseries and Seed Supplies List* provides information on various native plant and seed suppliers in BC. The landscape professional can choose from the shrubs listed in Table 4 at his or her own discretion based on site conditions.

The landscape professional should visit the site in early Spring (e.g. April) to determine the number and type of plants required and soil conditions. Invasive weeds should be removed from the campsite before planting occurs. Due to deep snow conditions during the site investigation soils were not readily accessible. Soil conditions were assumed to be adequate for the above plantings based on the existing vegetation within the planting areas. However, the landscape professional may require the addition of topsoil to ensure planting success. After the plantings are in place, drought resistant native plant seed should be broadcast in any disturbed areas to discourage invasive plants from establishing. Mulch mats should be placed around the base of each planting to help it retain moisture. Protective wire cages should be placed around each planting or groups of plants to protect them from wildlife browsing (ex. beaver).

**Table 4. Suggested Riparian Shrubs and Native Grass Seed**

| Riparian Shrubs | Common Name | Spacing (m) | Size |
|---|---|---|---|
| *Amalanchier alnifolia* | Saskatoon berry | 2 m o.c. | 15 cm pot |
| *Alnus incana ssp.* | *Tenulifolia* Mountain alder | 1 m o.c. | 15 cm pot |
| *Cornus stolonifera* | Red-osier dogwood | 1 m o.c. | 15 cm pot |
| *Mahonia aquifolium* | Oregon-grape | 1 m o.c. | 15 cm pot |
| *Prunus virginiana* | Chokecherry | 2 m o.c. | 15 cm pot |
| *Rosa nutkana* | Nootka rose | 1 m o.c. | 15 cm pot |
| *Rosa woodsii* | Woods rose | 1 m o.c. | 15 cm pot |
| *Rubus idaeus* | Red raspberry | 1 m o.c. | 15 cm pot |
| *Sambucus cerulea* | Blue elderberry | 1 m o.c. | 15 cm pot |
| *Symphocarpus alba* | Common snowberry | 1 m o.c. | 15 cm pot |
| **Native Grass Seed** | | | |
| Drought-resistant Shuswap riparian native seed mix | | | |

FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

***Section 2. Results of Riparian Assessment (SPEA width)***

Attach or insert the Form 3 or Form 4 assessment form(s). Use enough duplicates of the form to produce a complete riparian area assessment for the proposed development

Form 3 Detailed Assessment Form
Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

## 2. *Results of Detailed Riparian Assessment*

Refer to Chapter 3 of Assessment Methodology

Date: January 20, 2016

Description of Water bodies involved (number, type) | Shuswap Lake

| | |
|---|---|
| Stream | |
| Wetland | |
| Lake | Shuswap |
| Ditch | |
| Number of reaches | 1 |
| Reach # | 1 |

### Site Potential Vegetation Type (SPVT)

| | Yes | No | |
|---|---|---|---|
| SPVT Polygons | | X | Tick yes only if multiple polygons, if No then fill in one set of SPVT data boxes |

I, *(name of qualified environmental professional)*, hereby certify that:
a) I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;
b) I am qualified to carry out this part of the assessment of the development proposal made by the developer *(name of developer)*;
c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and
d) In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation.

Polygon No: 1

| | LC | SH | TR |
|---|---|---|---|
| SPVT Type | | | X |

Method employed if other than TR
SPVT is TR (tree)

### Zone of Sensitivity (ZOS) and resultant SPEA

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Segment No: | 1 | Southeast side of the bay | | | | | |
| LWD, Bank and Channel Stability ZOS (m) | 15 | | | | | | |
| Litter fall and insect drop ZOS (m) | 15 | | | | | | |
| Shade ZOS (m) max | 10 m | South bank | Yes | | No | X | |
| Ditch | Justification description for classifying as a ditch (manmade, no significant headwaters or springs, seasonal flow) | | | | NA | | |
| Ditch Fish Bearing | Yes | | No | | If non-fish bearing insert no fish bearing status report | | |
| **SPEA maximum** | **15** | (For ditch use table3-7) | | | | | |

I, Trina Koch, hereby certify that:
a) I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;
b) I am qualified to carry out this part of the assessment of the development proposal made by the developer Craig Russenholt;
c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and
d) In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation.

Form 3 Detailed Assessment Form
Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

***Comments***

| |
|---|
| Because the property is located on the southeast side of the lake, the shade ZOS results in a irregular shaped shade setback that is about 12 m away from the HWM at its greatest distance (delineated on Figures 2,3, and 4). |

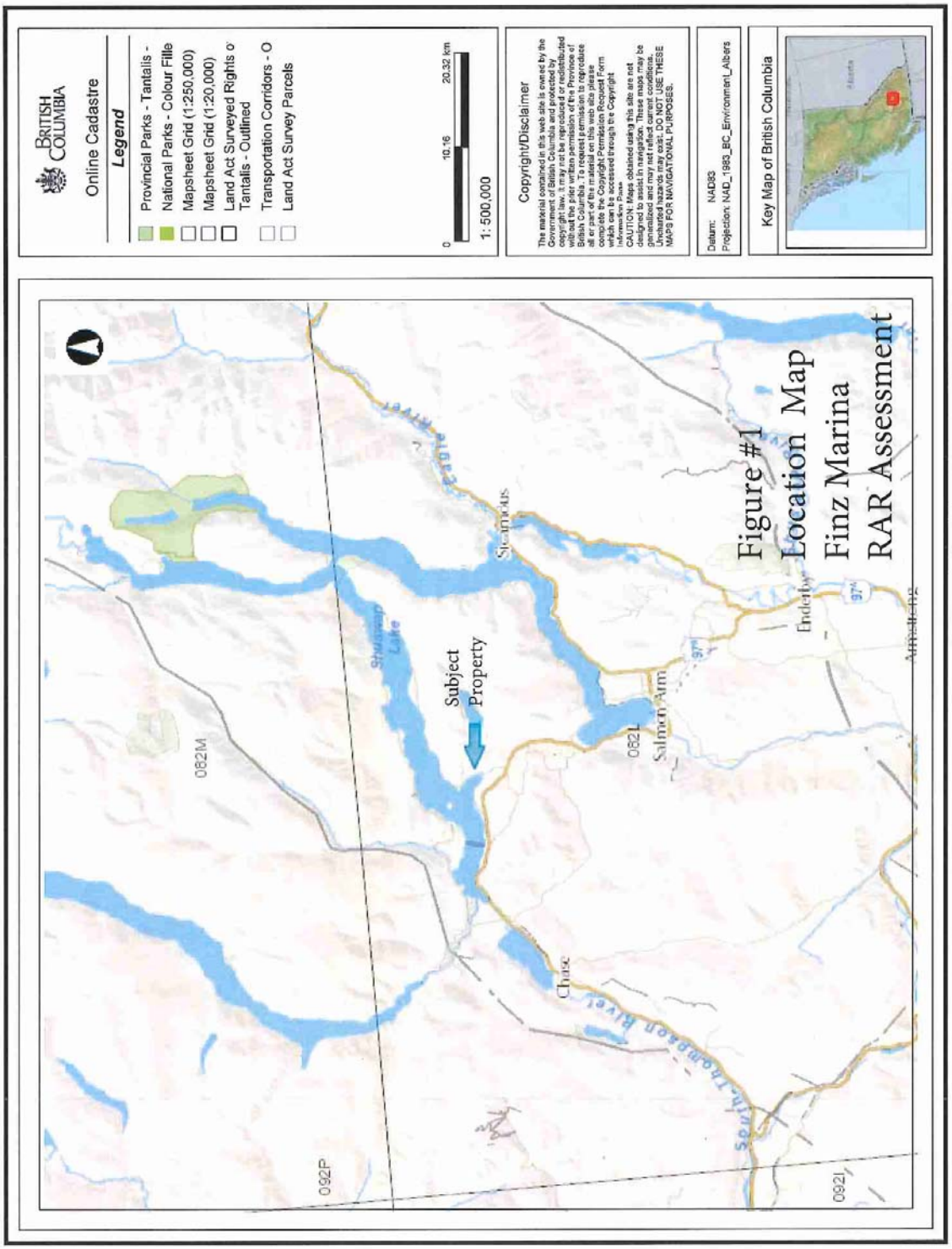
FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

***Section 3. Site Plan***

Insert jpg file below

**Site Plan**


BRITISH COLUMBIA
Online Cadastre
Legend
Provincial Parks - Tantalis -
National Parks - Colour Fille
Mapsheet Grid (1:250,000)
Mapsheet Grid (1:20,000)
Land Act Surveyed Rights o
Tantalis - Outlined
Transportation Corridors - O
Land Act Survey Parcels
0
10.16
20.32 km
1: 500,000
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Datum: NAD83
Projection: NAD_1983_BC_Environment_Albers
Key Map of British Columbia
Figure #1
Location Map
Finz Marina
RAR Assessment
Subject Property
Shuswap Lake
Salmon Arm
Chase
Enderby
Thompson River
092P
092L
082M
082L
97


SITE PLAN
Lot 1, Sec 17 and 20,
Tp 22, R 10, W6M, KDYD,
Plan EPP51931
Figure #2
OVERALL SITE PLAN
FINZ MARINA RAR ASSESSMENT
Plan EPP51931
Sec 17
Sec 20
Tp 22
R 10
W6M
Rem 2 Plan 10444
1 Plan 17270
Amended Lot 24 (C32100F)
Plan 6612
Rem 23
West Part 23
Eagle Bay Road
Subject Property
2000 Eagle Bay Road
3 Plan 12467
Rem 2 Plan 12467
A Plan 24797
Shuswap Lake
DL 6021
DL 5974


SITE PLAN of Part of
Lot 1, Sec 17 and 20,
Tp 22, R 10, W6M, KDYD,
Plan EPP51931
BCGS 82L.084
LEGEND
DL 6021
DL 5974
Plan EPP51931
Eagle Bay Road
Restaurant
covered deck
shed
fuel tank
landing steps
Store
holding tank
pump shed
deck
pathway
concrete pad
347.5
350
Figure #3
EXISTING CONDITIONS
FINZ MARINA
RAR ASSESSMENT


SITE PLAN of Part of
Lot 1, Sec 17 and 20,
Tp 22, R 10, W6M, KDYD,
Plan EPP51931
BCGS 82L084
LEGEND
DL 6021
DL 5974
Plan EPP51931
Eagle Bay Road
Restaurant
covered deck
shed
fuel tank
landing steps
Store
holding tank
pump shed
deck
Total Planting Area
126.9m²
347.5
350
SPEA Setback Calculation Table
SPVT = TR (TREE)
Zones of Sensitivity
Large Woody Debris
Litter Fall
Shade
15m
15m
30m due south of HWM
SPEA= largest of the ZOS values = 15m
Figure #4
PROPOSED CONDITIONS
FINZ MARINA
RAR ASSESSMENT

FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

## *Section 4. Measures to Protect and Maintain the SPEA*

This section is required for detailed assessments. Attach text or document files, as need, for each element discussed in chapter 1.1.3 of Assessment Methodology. It is suggested that documents be converted to PDF *before* inserting into the assessment report. Use your "return" button on your keyboard after each line. You must address and sign off each measure. If a specific measure is not being recommended a justification must be provided.

| | |
|---|---|
| 1. Danger Trees | Total of 0 danger trees were determined to be located on the property. Overhanging cottonwoods are located at the western boundary of the property away from where tents or picnic tables are located. |

I, (Trina Koch), hereby certify that:
a) I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;
b) I am qualified to carry out this part of the assessment of the development proposal made by the developer Craig Russenholt;
c) I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation

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| 2. Windthrow | Windthrow is not a significant safety issue on this property. Although downed branches from the black cottonwood and weeping willows likely occur throughout the growing season they do not present a substantial hazard to campers since most of the windthrow would appear to occur along the beach. The property is well monitored by owners who remove dead branches from the large trees regularly. The windthrow is beneficial to the fisheries habitat as it contributes woody debris to the foreshore. |

I (Trina Koch), hereby certify that:
a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;
b. I am qualified to carry out this part of the assessment of the development proposal made by the developer, Craig Russenholt;
c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation

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|---|---|
| 3. Slope Stability | Slope stability is not a concern on the property as the maximum slope within the RAA is abut 5%. The area is well vegetated with trees and grass. |

I, Trina Koch, hereby certify that:
a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;
b. I am qualified to carry out this part of the assessment of the development proposal made by the developer Craig Russenholt;
c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation

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|---|---|
| 4. Protection of Trees | Trees will be protected by the placement of a silt fence, cautious use of heavy equipment near the SPEA boundary and environmental monitoring during construction near the SPEA. Newly planted trees will be protected with caging to prevent wildlife browsing. |

I, Trina Koch, hereby certify that:
a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;
b. I am qualified to carry out this part of the assessment of the development proposal made by the developer Craig Russenholt;
c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation

FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

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|---|---|
| 5. Encroachment | Further encroachment into the SPEA will be avoided by cautious use of heavy equipment near the SPEA boundary and environmental monitoring during construction near the SPEA. |

I, Trina Koch, hereby certify that:
a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;
b. I am qualified to carry out this part of the assessment of the development proposal made by the developer Craig Russenholt;
c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation

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|---|---|
| 6. Sediment and Erosion Control | Sediment and erosion control will be completed by the placement of a silt fence just beyond the 15 m SPEA boundary near proposed construction. The environmental monitor will provide mitigative solutions to the contractor if erosion and control situations occur during construction. Work will not take place during heavy rain or high water conditions. |

I, Trina Koch, hereby certify that:
a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;
b. I am qualified to carry out this part of the assessment of the development proposal made by the Craig Russenholt;
c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation

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|---|---|
| 7. Stormwater Management | Stormwater runoff from the resort building is routed directly to the ground via roof drainage onto splash pads that flow onto vegetation. The proposed roof structure will manage stormwater in the same fashion. Stormwater collected in the eves will be directed into the garden areas north of the roof structure. |

I, Trina Koch, hereby certify that:
a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;
b. I am qualified to carry out this part of the assessment of the development proposal made by the developer _____ (*name of developer*) ;
c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation

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|---|---|
| 8. Floodplain Concerns (highly mobile channel) | Flooding is not a concern for the proposed development as it is located above the HWM. |

I, Trina Koch, hereby certify that:
a. I am a qualified environmental professional, as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;
b. I am qualified to carry out this part of the assessment of the development proposal made by the Craig Russenholt;
c. I have carried out an assessment of the development proposal and my assessment is set out in this Assessment Report; and In carrying out my assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation

FORM 1

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## *Section 5. Environmental Monitoring*

Attach text or document files explaining the monitoring regimen Use your "return" button on your keyboard after each line. It is suggested that all document be converted to PDF *before* inserting into the PDF version of the assessment report. Include actions required, monitoring schedule, communications plan, and requirement for a post development report.

**5.1 Environmental Monitoring**

Environmental monitoring will be required during the completion of the roof structure, during washroom construction and after the planting plan is completed. Environmental monitoring results should be summarized in a memo and shared with the property owner and the CSRD. One year after planting and proposed construction is complete, the environmental monitor will visit the site to assess the survivability of the plantings and report on how the existing development complies with RAR. Results of the site assessment will be included in a RAR Post Development Report and submitted to the RAR Notification System. A suggested environmental monitoring schedule is shown in Table 5.

**Table 5. Environmental Monitoring Schedule**

| Monitoring Task | Description |
|---|---|
| *One visit during roof structure construction* | The Environmental Monitor will review mitigation outlined in the RAR Assessment with construction crews and monitor works for RAR compliance. |
| *One visit during washroom construction* | Because works are immediately adjacent to the SPEA the Environmental Monitor will monitor works for compliance with RAR. |
| *One visit immediately after the completion of the planting plan* | The Environmental Monitor will monitor works for compliance with the RAR Assessment. |
| *One visit one year after the completion of the planting plan and proposed construction* | Results of the site assessment will be included in a RAR Post Development Report and submitted to the RAR Notification System. |

**5.2 Communications Plan**

The Environmental Monitor will confirm with the construction manager that work is underway before visiting the site. Contact information will be shared prior to the first monitoring visit.

**5.3 Requirements for a Post-Development Report**

A post-development report will be completed one year after the proposed construction and plantings are complete. An environmental monitor will inspect the development for compliance with RAR, complete a post-development report based on their findings and submit it to the RAR Notification System.

FORM 1

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### *Section 6. Photos*

Provide a description of what the photo is depicting, and where it is in relation to the site plan.

## Photos

Photograph 1. Aerial view of project area prior to roof structure construction - Summer 2015

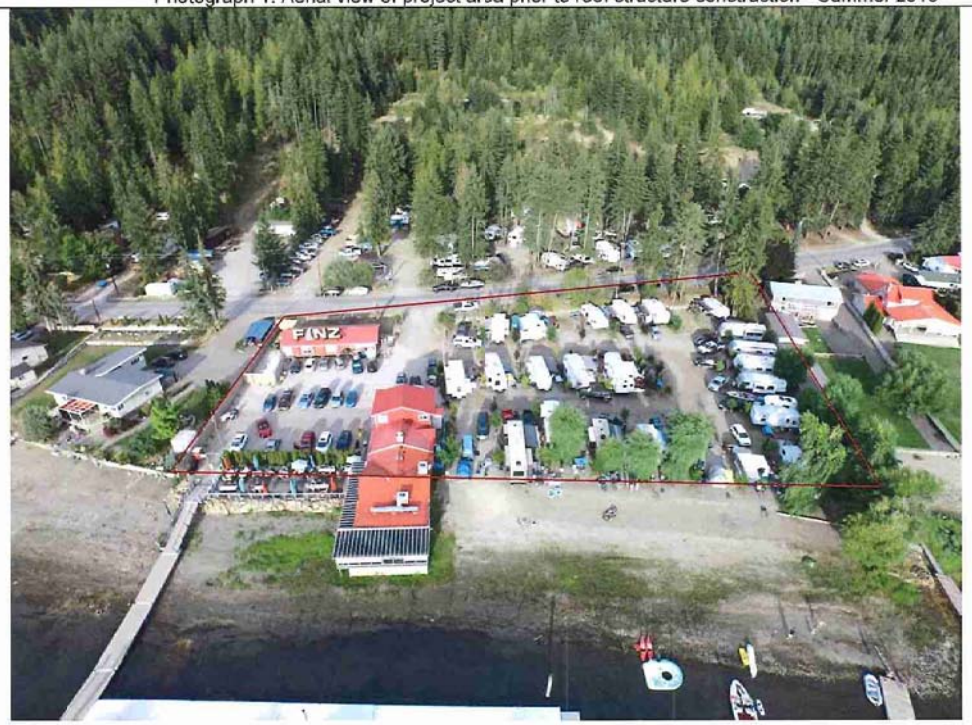


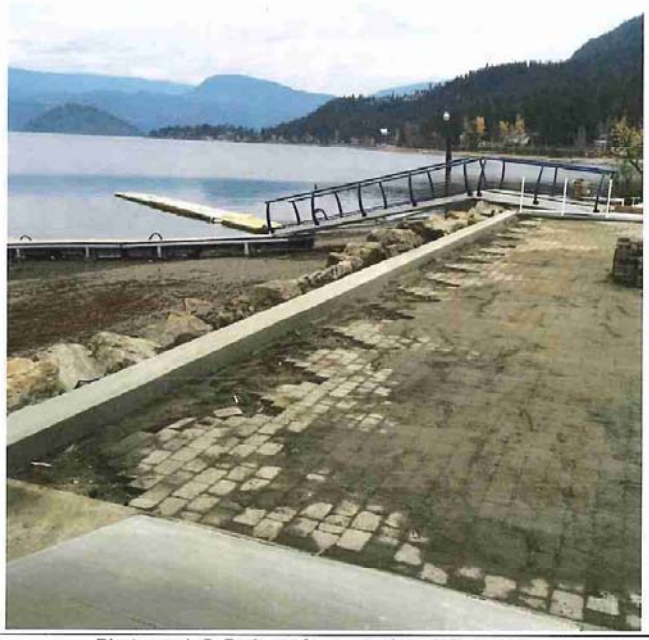
Photo Form
Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

Photograph 2 Pre-development patio conditions – Fall 2015

Photograph 3. Patio railing footings are revealed – Fall 2015

Photo Form
Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

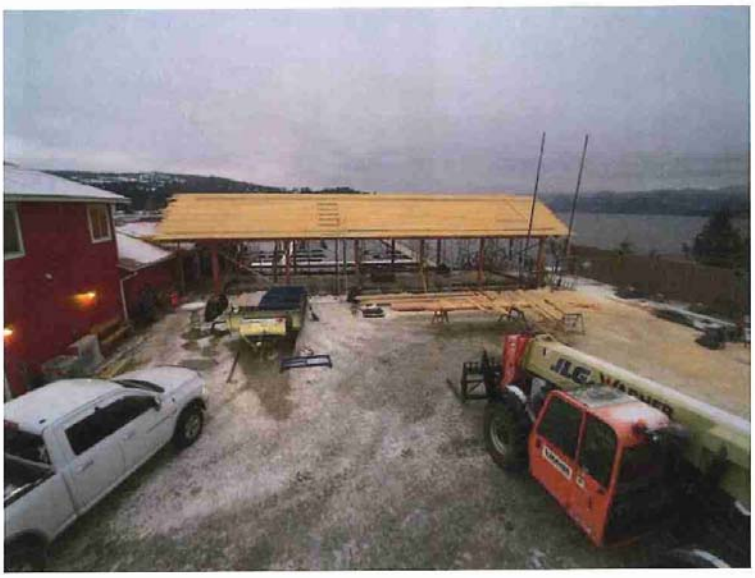
Photograph 4. Replacement of patio railing footings with roof structure footings- Fall 2015



Photograph 5. Patio roof construction - Winter 2015

Photo Form
Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

Photograph 6. Roof structure construction - Winter 2015



Photograph 7. Existing restaurant with line work of the proposed washroom footprint including the mechanical room (mech) as well as the men's and women's washroom areas.- Winter 2015

Photo Form
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Photograph 8. Footings along the retaining wall - January 2016

Photograph 9. Roof structure – untreated cedar - January 2016

Photo Form
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Photograph 10. South side of roof structure – new vegetation has replaced the row of cedar shrubs – January 2016

Photograph 11. Foreshore conditions northeast of the patio and restaurant – January 2016

Photo Form
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Photograph 12. Northwestern property boundary roughly within the SPEA - January 2016


Photograph 13. Area outside the SPEA but within the Riparian Assessment Area: a shed, garbage bin and the back of the restaurant where the new washroom is proposed - January 2016

Photos Page 7 of 10
C:\Users\WWAL1\Dropbox (WWA)\WWAL\Projects\2015\15-082-01 Blind Bay RAR\RAR Folders\Form_5_photos.doc

Photo Form
Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

Photograph 14. Two rows of cedar shrubs located west of the restaurant- January 2016

(a)

(b)

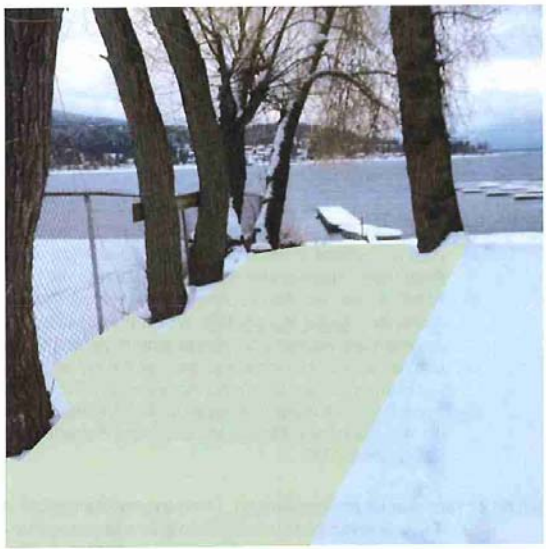
Photo Form
Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

Photograph 15. Vegetation in the SPEA closest to the shoreline along eight waterfront camp sites west of the restaurant – January 2016

Photograph 16. Black cottonwood overhangs the water at the western property boundary – January 2016

Photo Form
Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

Photograph 17. Portion of proposed planting area (green shading) at western fenceline – January 2016



Photograph 18. SPEA located west of the restaurant – January 2016

FORM 1

Riparian Areas Regulation - Qualified Environmental Professional - Assessment Report

## *Section 7. Professional Opinion*

**Assessment Report Professional Opinion on the Development Proposal's riparian area.**

Date January 20 2016

1. I, Trina Koch R.P. Bio

*Please list name(s) of qualified environmental professional(s) and their professional designation that are involved in assessment.)*

hereby certify that:

a) I am a qualified environmental professional(s), as defined in the Riparian Areas Regulation made under the *Fish Protection Act*;
b) I am/We are qualified to carry out the assessment of the proposal made by the developer, Craig Russenholt, which proposal is described in section 3 of this Assessment Report (the "development proposal"),
c) I have carried out an assessment of the development proposal and my/our assessment is set out in this Assessment Report; and
d) In carrying out my/our assessment of the development proposal, I have followed the assessment methods set out in the Schedule to the Riparian Areas Regulation; AND

2. As qualified environmental professional(s), I hereby provide my/our professional opinion that:

a) if the development is implemented as proposed by the development proposal there will be no harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes in the riparian assessment area in which the development is proposed, **OR**

(Note: include local government flex letter, DFO Letter of Advice, or description of how DFO local variance protocol is being addressed)

b) [X] if the streamside protection and enhancement areas identified in this Assessment Report are protected from the development proposed by the development proposal and the measures identified in this Assessment Report as necessary to protect the integrity of those areas from the effects of the development are implemented by the developer, there will be no harmful alteration, disruption or destruction of natural features, functions and conditions that support fish life processes in the riparian assessment area in which the development is proposed.

[NOTE: **"qualified environmental professional"** means an applied scientist or technologist, acting alone or together with another qualified environmental professional, if
(a) the individual is registered and in good standing in British Columbia with an appropriate professional organization constituted under an Act, acting under that association's code of ethics and subject to disciplinary action by that association,
(b) the individual's area of expertise is recognized in the assessment methods as one that is acceptable for the purpose of providing all or part of an assessment report in respect of that development proposal, and
(c) the individual is acting within that individual's area of expertise.]

Mr. W.C. Russenholt, Principal
Finz Resort
2001 Eagle Bay Road
Blind Bay, BC V0E 1H1

June 15, 2015

Via email: crussenh@jetstream.net

Re: CSRD DPA Hydrogeology Assessment – Septic System Upgrades at Finz Resort, Blind Bay, BC

Dear Mr. Russenholt:

Watterson Geoscience Inc. (WGI) understands that domestic septic treatment and disposal system upgrades are to be constructed at the above-referenced resort property. This property is situated at 2001 Eagle Bay Road on the east shore of Blind Bay on Shuswap Lake.

As the planned septic upgrades are situated within 100 m of Shuswap Lake, the Columbia-Shuswap Regional District (CSRD) Development Permit Area (DPA) Bylaw 725 Sections 12.3.8 (c) (d) and (e) requires

- an assessment of site hydrogeological conditions,
- an evaluation of the suitability for site soils to accept stormwater runoff and landscape irrigation,
- an assessment of potential negative environmental impacts on Shuswap Lake water quality resulting from installation and operation of the upgraded septic system, and
- identification of potential impacts on nearby surface water bodies (Shuswap Lake).

This work must be completed by a Qualified Environmental Professional. The intent of this report is to address Bylaw 725 requirements.

**SEPTIC DISPOSAL SYSTEM CHARACTERISTICS**

Based on information provided by you (Finz) and Mr. Jayme Franklin, P.Eng. with Franklin Engineering Ltd. (Franklin), WGI understands the following:

- The Finz resort includes RV and camping sites, a marina and moorage, a marine gas station with convenience store and a restaurant. Site occupancy is seasonal with little to no use during the winter;
- The existing sewage treatment system consists of numerous single and double chambers, lift stations and infiltration basins. This Type 1 system was first constructed in the 1980s and was last upgraded in 2009. The existing tanks will be removed and the existing lift stations will be upgraded. Based on available information, no system failures such as daylighting effluent or odors have occurred in the infiltration area;
- The resort's daily design flow rate is 22,500 L/day (4,950 IGPD). This flow is based on full occupancy of the 175-seat restaurant at 60 L/seat and 40 RVs at 300 L/day/RV;
- The new septic system will consist of an Ecofluid MBR membrane treatment package plant with two 5,000 IG Leko Precast concrete equalization tanks. This system will produce Type 3 quality

effluent with 5-day Biological Oxygen Demand ($BOD_5$) and Total Suspended Solids (TSS) concentrations less than 10 mg/L, and fecal coliform concentrations less than 400 CFU/100 mL;

- The treated waste water will dispersed to ground into eight (8) rapid infiltration basins (RIBs) as shown in Figure 1. Each basin is approximately 3.7 m wide by 3.7 m wide by 2.5 m deep, with a capacity of at least 13.7 $m^3$ each. Total RIB volume is approximately 110 $m^3$ and the total basal infiltration area is approximately 110 $m^2$. Based on maximum daily flow, the maximum hydraulic loading rate (HLR) will be less than 0.2 $m^3$/day per $m^2$ of infiltration area, or about 2.8 $m^3$/day or about 0.4 IGPM per RIB. In addition, this low HLR conservatively does not account for any infiltration from the RIB sides; and
- The new treatment system will be located on the east side of Blind Bay Road and the RIBs are distributed throughout the RV and camping area (Figure 1). The treatment tanks are located approximately 70 m and the infiltration areas are located between 90 m and 130 m from the lake High Water Mark (HWM), respectively (Figure 1).

**PROPERTY CHARACTERISTICS**

No publically published information regarding overburden geology characteristics is readily available for the resort area, however in 2007 Horizon Engineering Inc. (Horizon) completed an extensive geotechnical investigation of the entire property (2007, Horizon). This investigation included drilling 25 geotechnical test holes, documenting subsurface soil characteristics and observing depth to groundwater. Seven (7) boreholes were completed in the proposed treatment and infiltration area (Figure 1).

In general, the Horizon subsurface investigation in the treatment and RIB area encountered topsoil overlying sand and silty sand, with trace to some gravel to about 9 m below ground surface (bgs). Although silt was encountered in two boreholes located west of Eagle Bay Road, deep fine to medium sand was consistently present throughout most of the property.

Soils in the proposed septic treatment and infiltration area were further observed during a site visit conducted by Franklin and WGI on May 5, 2015. Three test pits were excavated in the western part of the treatment and infiltration area (Figure 1). The test pits extended to between 1.2 and 1.6 m bgs, and encountered fill soil overlying former topsoil and brown fine sand. This sand was damp with increasing density with depth. A dense silt and clayey silt layer was encountered at the bottom of each test pit, likely the same horizon as that encountered in the drilling program. Bedrock was not observed in the resort area during the field observations nor by the drilling and test pit program.

No groundwater was observed in the test pits however the near-surface soil included scattered red-brown mottling, indicative of seasonal saturated conditions. Groundwater was encountered in the infiltration area boreholes between approximately 3.2 and 3.6 m bgs, which is below the silt and clay layer encountered in the test pits.

The ground surface in the infiltration area slopes down to the west towards Shuswap Lake at an approximately 5% slope. As such, shallow groundwater flow likely follows surface topography with flow to the west towards Shuswap Lake.

Importantly, no evidence of groundwater seepage or standing water was observed in the infiltration area nor along the lake beach front which should be the local groundwater discharge area. This finding indicates good infiltration characteristics.

Field observations, and test pit and drilling findings indicate that although clay and silty clay was encountered at relatively shallow depths west of the infiltration area, this horizon was not encountered in the remainder of the infiltration area which suggests it is not continuous across the property and thus should not affect RIB performance.

Although no information regarding soils into which the RIBs were constructed is available, based on the test pit and borehole findings the RIBs are designed to discharge into deep sand which will have excellent infiltration characteristics. This finding explains why seepage or odors from the Type 1 effluent have not historically been observed at the ground surface in the RV or downgradient area.

Based on information provided by Finz, potable water for the property is obtained from two surface water sources located offshore in water at least 12.5 m deep. The adjacent properties to the north and south also obtain potable water from Shuswap Lake. Online water supply mapping provided by the BC Ministry of Environment (MoE) shows only one surface point of diversion (POD) (Z123769) located off the resort shore. This POD was apparently submitted to support a heat exchanger and was refused. POD F01561 is shown for the adjacent property to the north, while two PODs, both listed as F038737, are shown for the adjacent property to the south.

Using records available from the online MoE water well database, the closest water well (Well ID 82694) is located approximately 115 m south and hydraulically cross-gradient to the resort property. This well was drilled to about 26.5 m below ground surface (bgs) and encountered silty sand, sand and gravel with rocks. Bedrock was not encountered. Static water level in this well was reported at 9.1 m bgs and the well was reported to produce about 1.5 L/s (25 US GPM). The next closest well is located approximately 173 m south of the resort. Well 27157 was drilled to 18.3 m bgs and encountered shale bedrock at 17.4 m bgs. This sand and gravel well produced approximately 0.6 L/s (10 US GPM) however the static water level was not reported.

No overburden aquifers have been mapped by MoE for the resort area, however bedrock Aquifer 233 is mapped for the hillside east of the resort area. This low productivity, low demand and moderate vulnerability aquifer is primarily used for domestic purposes.

**SEPTIC AND STORMWATER DISPOSAL SYSTEM EFFECTS ON POTABLE AND LAKE WATER QUALITY**

As noted above, septic effluent produced by the proposed Ecofluid Type 3 system will be of very high quality with $BOD_5$ (5-day biological oxygen demand) and TSS (total suspended solids) concentrations at 10 mg/L or less. The advance treatment system will also reduce fecal coliform concentrations to less than 400/ mL. Any remaining coliforms in the effluent will commonly bind to soil particles, fine-grained materials, and organic matter within the first meter or two from the surface (Brown, et al 1979). Numerous studies have shown that coliforms do not survive longer than a few weeks in groundwater (Health Canada, 2006).

The most significant constituents in sewage effluent from properly constructed and operated Type 3 onsite treatment and disposal systems include low concentrations of nitrogen (as nitrate) and phosphorus along with small concentrations of biological and other constituents. Most phosphorus is retained in activated waste sludge and is effectively removed by settling and subsequent tank pumping. Phosphorus that is discharged to the environment is quickly precipitated or adsorbed in soil, such that most to almost all discharged phosphorus is eliminated from effluent no more than a few meters from the infiltration area, even after years of effluent disposal (Scope, 2006). Concentrations of other waste water constituents commonly decline due to aerobic and anaerobic biodegradation and by adsorption onto mineral surfaces in the unsaturated zone and in groundwater.

The proposed septic system's concrete treatment and equalization tanks will be constructed without seams joining the tank's sides and floor. This construction method significantly minimizes the potential for leakage. The only potential pathway for leaks would be from cracks through the tank wall or from piping connections, which are highly unlikely to occur under normal operating conditions.

In the unlikely event that effluent leakage occurs, the aerated silty sand soil will limit any negative effects on lake water quality as the treatment and disposal system's distances from Shuswap Lake are well beyond the 30 m minimum setback distance stipulated in SPM Ver. 3 Table II-19.

Stormwater runoff from the resort building roofs is routed directly to ground via roof drains, which then discharge to splash pads. Construction of a small treatment building (Figure 1) will not significantly increase the stormwater runoff volume. As this runoff originates solely from building roofs, this runoff is not contaminated and no potential effects on Shuswap Lake water quality is expected from infiltration of this runoff.

**CONCLUSIONS**

Therefore, although the upgraded septic system will be situated within the 100 m distance stipulated in CSRD Bylaw 725, it is my professional opinion that construction, installation and operation of the treatment system upgrades will not negatively impact Shuswap Lake water quality.

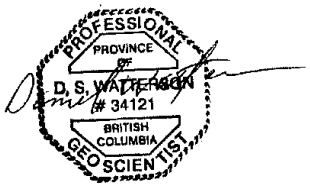
Proper septic system design and operation, very high quality effluent, low hydraulic loading rate, good soil characteristics, relatively deep groundwater, seasonal occupancy, good residential housekeeping practices and long distance to the lake shoreline will ensure that local groundwater and downgradient lake water will not be affected by septic operation and no health or environmental impacts will result from long-term treated effluent disposal into ground.

It is important to note that over time, operation of the proposed membrane treatment system will substantially improve groundwater quality in the resort area vicinity. Concentrations of all potential contaminants will decline as "cleaner" water gradually displaces the older, poorer quality water. As this water eventually migrates to and discharges from the westerly lake shore, lake water quality adjacent to the resort will gradually improve.

In addition, the minimal increase in runoff volume and implementing proper stormwater management and disposal practices should minimize the potential for stormwater to compromise local groundwater and downslope surface water quality.

Please be advised that I am a member in good standing in the Association of Professional Engineers and Geoscientists of British Columbia (APEGBC) and I am acting within my area of expertise. This assessment has been carried out in accordance with generally accepted engineering and environmental practice. In preparing this analysis I have relied in good faith on information provided by others, the accuracy of which I cannot attest. Please contact the undersigned if you have any questions or wish to discuss any aspect of this report.

**Watterson Geoscience Inc.**




Daniel Watterson, P.Geo. (BC, AB), LHG (WA)
Principal Hydrogeologist

**References**

BC Ministry of Environment. BC Water Resources Altas.
http://www.env.gov.bc.ca/wsd/data_searches/wrbc/index.html

BC Onsite Sewage Association. Sewerage System Standard Practice Manual Version 2. September 2007, updated 2010.

Brown, K. W., Wolf, H. W., Donnelly, K., C.Slowey, J. F. 1979. The Movement of Fecal Coliforms and Coliphages Below Septic Lines. Journal of Environmental Quality 8: 121–125

Health Canada. 2006. Guidelines for Canadian Drinking Water Quality: Guideline Technical Document, *Escherichia coli.* Prepared by the Federal-Provincial-Territorial Committee on Drinking Water, Ottawa, Ontario February 2006

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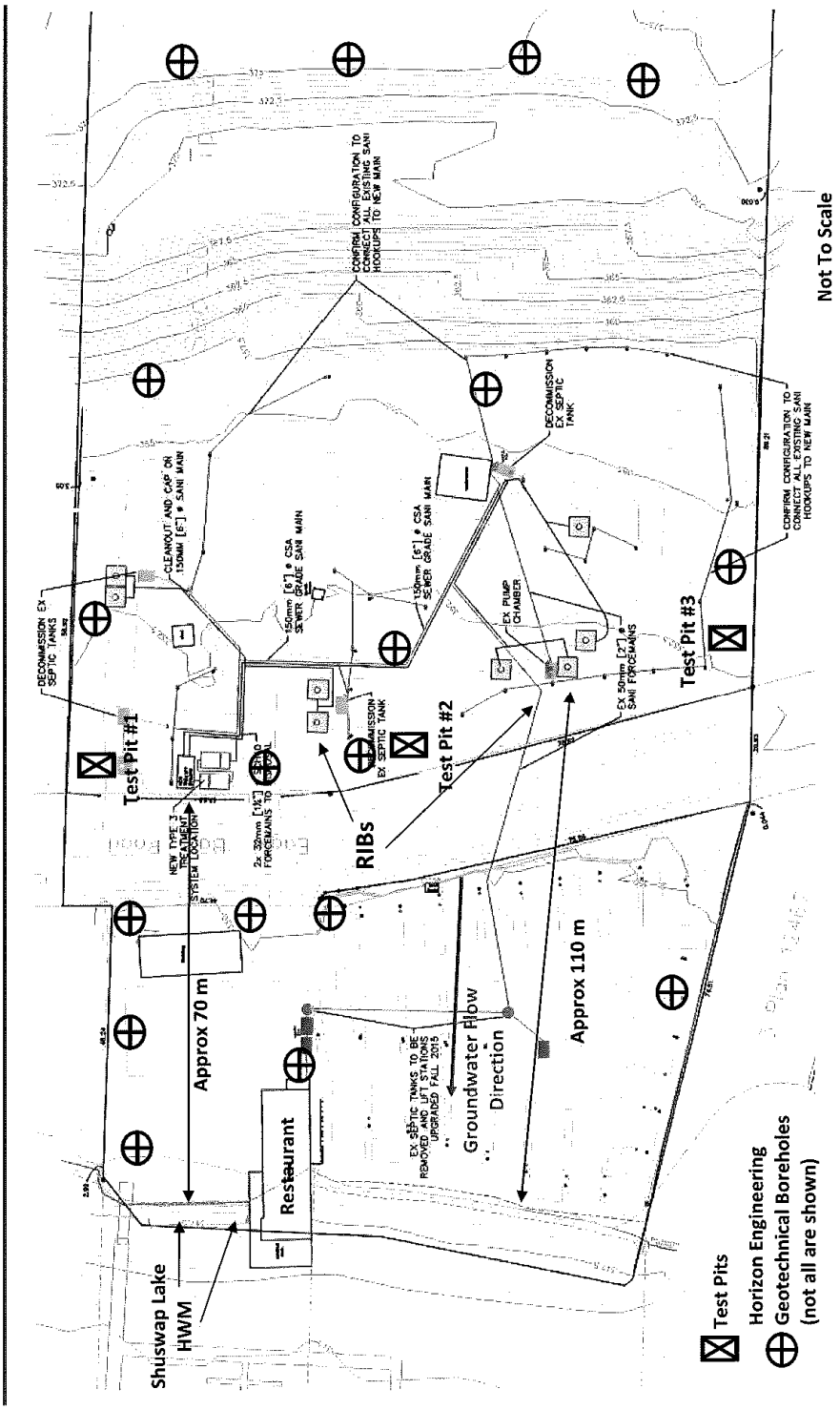
SCOPE Newsletter, No. 63. *Special Issue: Fate of Phosphorus in Septic Tanks.* European Centre of Employers and Enterprises (CEEP). January 2006.

Weiss, P., G. LeFevre,, and J. Gulliver. 2008. Contamination of Soil and Groundwater Due to Stormwater Infiltration Practices: A Literature Review. University of Minnesota, St. Anthony Falls Laboratory Project Report No.515.




| | | |
|---|---|---|
| *Watterson Geoscience Inc.* Groundwater Consulting Services | CSRD DPA Hydrogeological Assessment Onsite Treatment and Disposal System Upgrades | Site Layout |
| | | Project No. 15-020 |
| Source: Franklin Eng. Drawing No. 15-031-2 | Client: Finz Resort | Figure 1 |

**FRANKLIN ENGINEERING LTD.**
PO Box 2590, 420A 4th Street NE
Salmon Arm, BC V1E 4R5
*Phone* 250.832.8380

June 4, 2015

**FINZ RV RESORT DESIGN BRIEF**

**RE: Sewage Disposal System for 1992 Eagle Bay Road, Blind Bay, BC**

**Roll #: 20-789-08185.000**
**Legal: Lot 1, Plan KAP10444, Sec 17, Twp 22, R 10 W6M LD 25 exc plan 13281**

Note: This filing is for upgrades to on-site pre-treatment, from Type 1 to Type 3.

A. Design Daily Flow for the Site = 22500 LPD or 4950 IGPD based on a 175-seat restaurant @ 60 LPD per seat and 40 RV sites @ 300 LPD per site.

B. General characteristic of the site: A large, treed and open campground at the foot of a steep hillside, across Eagle Bay Rd from Shuswap Lake.

C. Soils Assessment:

Soil Profile #1:
- 0 to 500mm – Topsoil, loam with organics, roots of grasses and shubs, structureless, dry.
- 500mm to 2000mm – Sand of a fair structure and consistence.

Soil Profile #2:
- 0 to 500mm – Topsoil, loam with organics, roots of grasses and shubs, structureless, dry.
- 500mm to 1500mm – Sand of a fair structure and consistence.

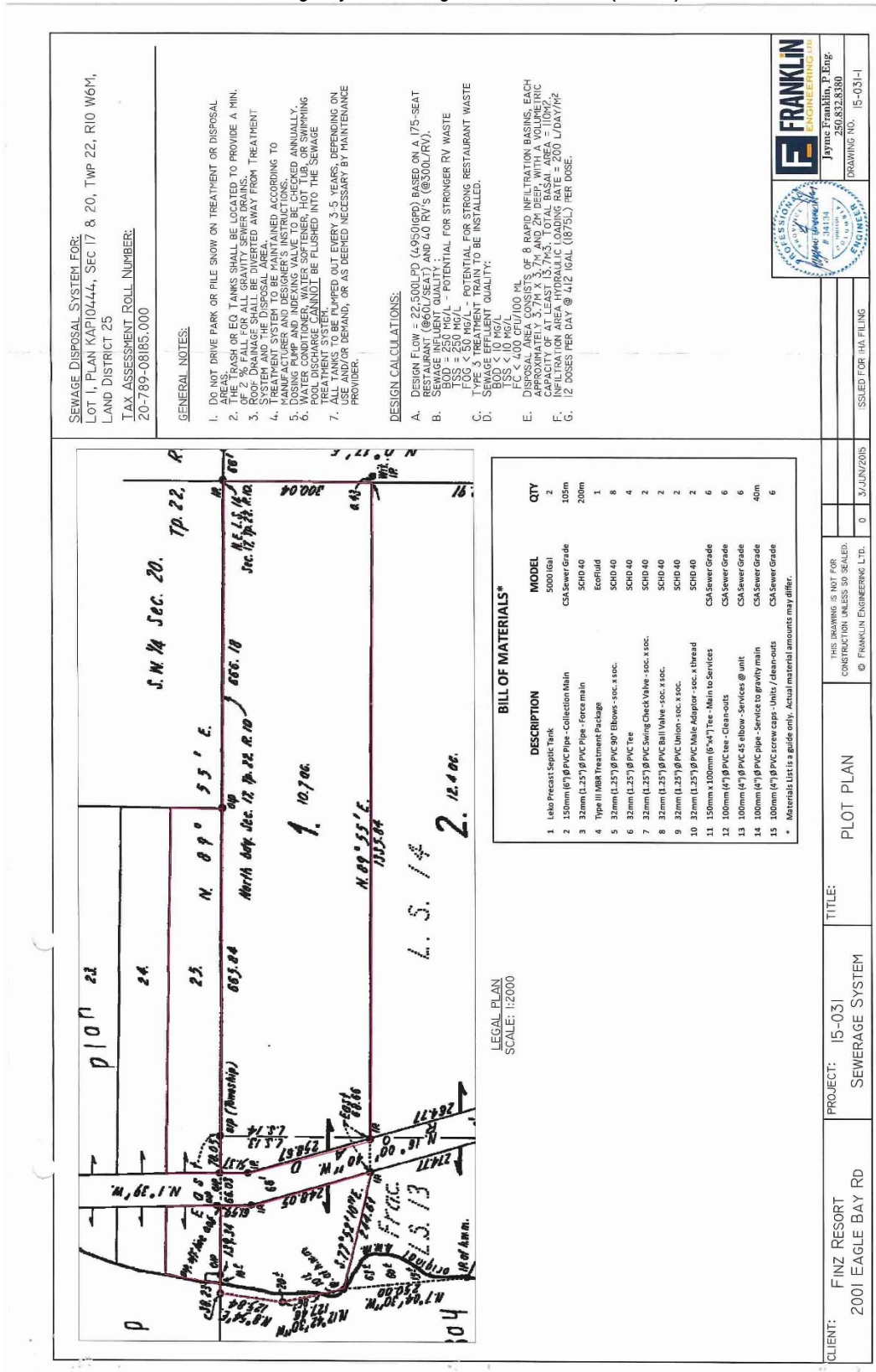
D. Pre-treatment consists of a Type 3 Membrane Bioreactor manufactured by Toray, installed by EcoFluid. Anticipated effluent quality standards:
BOD: <10 mg/L
TSS: <10 mg/L
FC: <400 CFU/100mL

E. Distribution System to consist of eight existing infiltration basins to disperse of Type 3 treatment effluent. Infiltration basins meet the latest US EPA Class V standards, under specification 40 CFR 144.81 of 2004.

F. Storm Water Management: Drawing Notes address requirements for drainage to be diverted away from system and disposal area.


Jayme Franklin, P.Eng.
Franklin Engineering Ltd.

**Job No. 15-031-S**


SEWAGE DISPOSAL SYSTEM FOR:
LOT 1, PLAN KAP10444, SEC 17 & 20, TWP 22, R10 W6M, LAND DISTRICT 25
TAX ASSESSMENT ROLL NUMBER:
20-789-08185.000
GENERAL NOTES:
1. DO NOT DRIVE PARK OR PILE SNOW ON TREATMENT OR DISPOSAL AREAS.
2. THE TRASH OR EQ TANKS SHALL BE LOCATED TO PROVIDE A MIN. OF 2 % FALL FOR ALL GRAVITY SEWER DRAINS.
3. ROOF DRAINAGE SHALL BE DIVERTED AWAY FROM TREATMENT AND DISPOSAL AREAS.
4. TREATMENT SYSTEM TO BE MAINTAINED ACCORDING TO MANUFACTURER AND DESIGNER'S INSTRUCTIONS.
5. DOSING PUMP AND INDEXING VALVE TO BE CHECKED ANNUALLY.
6. WATER CONDITIONER, WATER SOFTENER, HOT TUB, OR SWIMMING POOL DISCHARGE CANNOT BE FLUSHED INTO THE SEWAGE TREATMENT SYSTEM.
7. ALL TANKS TO BE PUMPED OUT EVERY 3-5 YEARS, DEPENDING ON USE AND/OR DEMAND, OR AS DEEMED NECESSARY BY MAINTENANCE PROVIDER.
DESIGN CALCULATIONS:
A. DESIGN FLOW = 22,500L/D (4,950IGPD) BASED ON A 175-SEAT RESTAURANT (@60L/SEAT) AND 40 RV'S (@300L/RV).
B. SEWAGE INFLUENT QUALITY :
BOD = 250 MG/L - POTENTIAL FOR STRONGER RV WASTE
TSS = 250 MG/L
FOG < 50 MG/L - POTENTIAL FOR STRONG RESTAURANT WASTE
C. TYPE 3 TREATMENT TRAIN TO BE INSTALLED.
D. SYSTEM EFFLUENT QUALITY:
BOD < 10 MG/L
TSS < 10 MG/L
FC < 400 CFU/100 ML
E. DISPOSAL AREA CONSISTS OF 8 RAPID INFILTRATION BASINS, EACH APPROXIMATELY 3.7M X 3.7M AND 2M DEEP, WITH A VOLUMETRIC CAPACITY OF ATLEAST 13.7M3. TOTAL BASAL AREA =110M2.
F. INFILTRATION AREA HYDRAULIC LOADING RATE = 200 L/DAY/M2
G. 12 DOSES PER DAY @ 4.12 IGAL (18.75L) PER DOSE.
LEGAL PLAN
SCALE: 1:2000
BILL OF MATERIALS*
DESCRIPTION | MODEL | QTY
1 Leko Precast Septic Tank | 5000 IGal | 2
2 150mm (6") ØPVC Pipe - Collection Main | CSA Sewer Grade | 105m
3 32mm (1.25") ØPVC Pipe - Force main | SCHD 40 | 200m
4 Type III MBR Treatment Package | EcoFluid | 1
5 32mm (1.25") ØPVC 90° Elbows - soc. x soc. | SCHD 40 | 8
6 32mm (1.25") ØPVC Tee | SCHD 40 | 4
7 32mm (1.25") ØPVC Swing Check Valve - soc. x soc. | SCHD 40 | 2
8 32mm (1.25") ØPVC Ball Valve - soc. x soc. | SCHD 40 | 2
9 32mm (1.25") ØPVC Union - soc. x soc. | SCHD 40 | 2
10 32mm (1.25") ØPVC Male Adaptor - soc. x thread | SCHD 40 | 2
11 150mm x 100mm (6"x4") Tee - Main to Services | CSA Sewer Grade | 6
12 100mm (4") ØPVC tee - Clean-outs | CSA Sewer Grade | 6
13 100mm (4") ØPVC 45 elbow - Services @ unit | CSA Sewer Grade | 6
14 100mm (4") ØPVC pipe - Service to gravity main | CSA Sewer Grade | 40m
15 100mm (4") ØPVC screw caps - Units / clean-outs | CSA Sewer Grade | 6
* Materials List is a guide only. Actual material amounts may differ.
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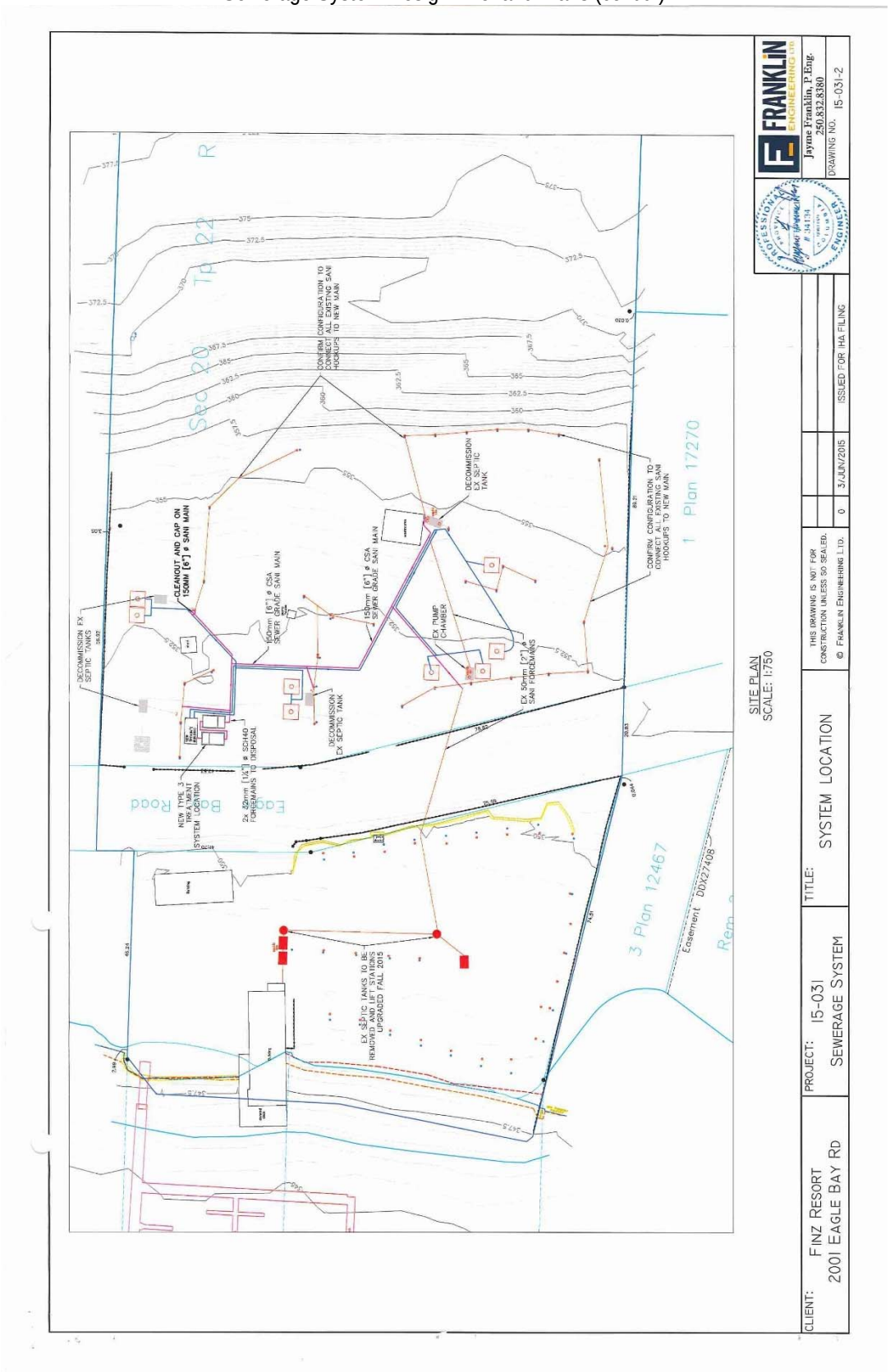
250.832.8380
DRAWING NO: 15-031-1
CLIENT: FINZ RESORT
2001 EAGLE BAY RD
PROJECT: 15-031
SEWERAGE SYSTEM
TITLE: PLOT PLAN


SITE PLAN
SCALE: 1:750
CLIENT: FINZ RESORT
2001 EAGLE BAY RD
PROJECT: 15-031
SEWERAGE SYSTEM
TITLE: SYSTEM LOCATION
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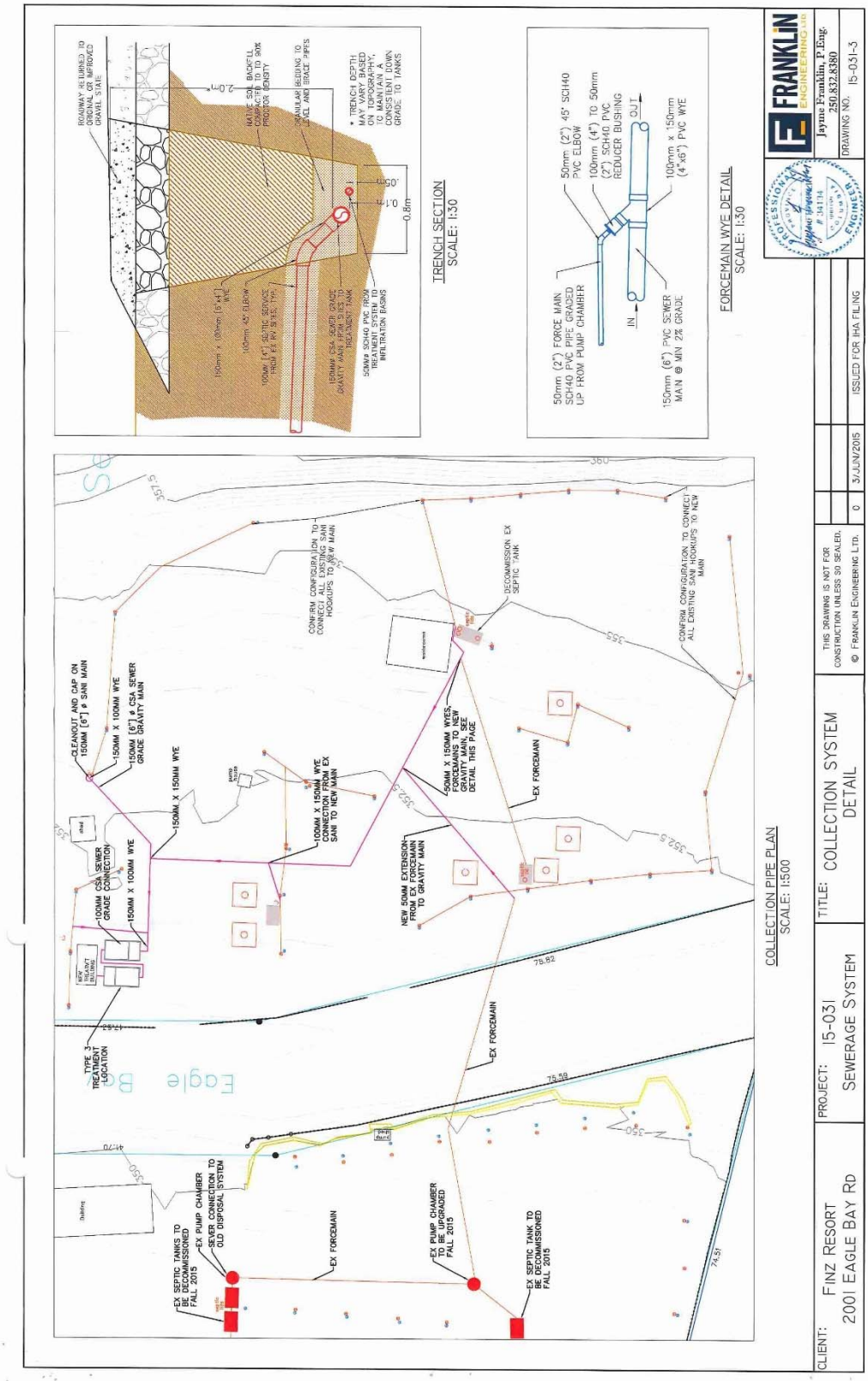
DRAWING NO. 15-031-2
CLEANOUT AND CAP ON 150MM [6"] ø SANI MAIN
DECOMMISSION EX SEPTIC TANKS
NEW TYPE 3 PACKAGE SEWAGE TREATMENT PLANT SYSTEM LOCATION
2x 50mm [1½"] ø SCH40 FORCEMAINS TO DISPOSAL
DECOMMISSION EX SEPTIC TANK
150mm [6"] ø CSA SEWER GRADE SANI MAIN
EX PUMP CHAMBER
EX 50mm [2"] ø SANI FORCEMAINS
DECOMMISSION EX SEPTIC TANK
CONFIRM CONFIGURATION TO CONNECT ALL EXISTING SANI HOOKUPS TO NEW MAIN
CONFIRM CONFIGURATION TO CONNECT ALL EXISTING SANI HOOKUPS TO NEW MAIN.
EX SEPTIC TANKS TO BE REMOVED AND AT TANKS UPGRADED FALL 2015
Eagle Bay Road
Sec 20 Tp 22 R
1 Plan 17270
3 Plan 12467
Easement DDX27408


TRENCH SECTION
SCALE: 1:30
FORCEMAIN WYE DETAIL
SCALE: 1:30
COLLECTION PIPE PLAN
SCALE: 1:500
CLIENT: FINZ RESORT
2001 EAGLE BAY RD
PROJECT: 15-031
SEWERAGE SYSTEM
TITLE: COLLECTION SYSTEM DETAIL
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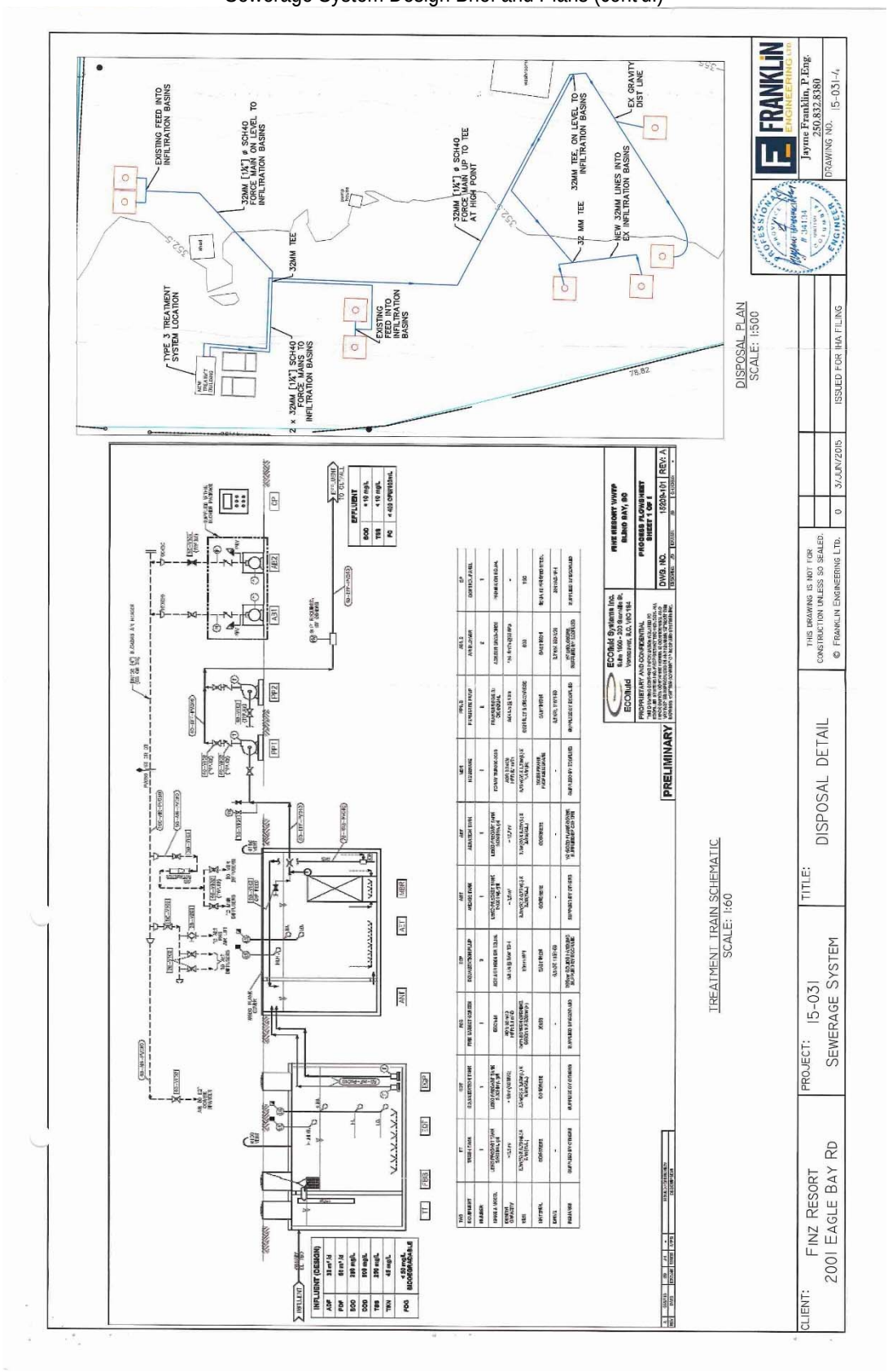
DRAWING NO: 15-031-3


EXISTING FEED INTO INFILTRATION BASINS
32MM [1¼"] ø SCH40 FORCE MAIN ON LEVEL TO INFILTRATION BASINS
32MM TEE
TYPE 3 TREATMENT SYSTEM LOCATION
2 x 32MM [1¼"] SCH40 FORCE MAINS TO INFILTRATION BASINS
EXISTING FEED INTO INFILTRATION BASINS
32MM [1¼"] ø SCH40 FORCE MAIN UP TO TEE AT HIGH POINT
32MM TEE, ON LEVEL TO INFILTRATION BASINS
NEW 32MM LINES INTO EX INFILTRATION BASINS
EX GRAVITY DIST LINE
DISPOSAL PLAN
SCALE: 1:500
TREATMENT TRAIN SCHEMATIC
SCALE: 1:60
PRELIMINARY
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CLIENT: FINZ RESORT 2001 EAGLE BAY RD
PROJECT: 15-031 SEWERAGE SYSTEM
TITLE: DISPOSAL DETAIL