Geotechnical Assessment:

Bella Coola Airport Runway Resurfacing

Prepared for:
HM Aero Aviation Consulting

July 31, 2026

Project Manager: Hans Jorgensen, P. Eng.
Project Number: 26-H-042

CCIB CERTIFIED INDIGENOUS BUSINESS

SoilTech

Version History		
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0	Final Version	July 31, 2026

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1. Introduction

HM Aero Aviation Consulting (HM Aero) commissioned SoilTech to conduct a geotechnical assessment for the Bella Coola Airport Resurfacing Project in Bella Coola, BC. The project area is outlined in Figure 1. The legal description for the property is:

- LOT 1, PLAN VIP56294, SECTION 2 & 3, TOWNSHIP 2, COAST RANGE 3 LAND DISTRICT, EXCEPT PLAN VIP61325, & PART FORMERLY PART OF THE BED OF THE BELLA COOLA RIVER BELLA COOLA AIRPORT SEE 749-00335.414 FOR LEASABLE AREA (PID: 018-217-176)

To conduct this assessment, we have:

- Discussed the project with HM Aero.
- Carried out a site assessment of the property and surrounding area including:
  - A desktop study of existing geotechnical information, internal project information and public data relevant to the development, geology, and water conditions at the site.
  - A field assessment, including a site investigation.
- Determined the subsurface conditions.

Based on the assessment findings, we have provided geotechnical analysis, discussion, and recommendations for:

- The anticipated subsurface conditions in the development area
- Frost environment and conditions
- General site preparation
- Re-use of in situ soils
- Pavement structures

2. Project Description

The existing runway asphalt is reaching the end of its service life and is in poor condition. Block, transverse, and longitudinal cracking are present along its length. We investigated and analysed the existing runway structure and subgrade conditions to evaluate resurfacing options. The target Pavement Load Rating (PLR) is 7 and the target aircraft is a Beechcraft 1900D.

3. Site Assessment

To assess the site, we carried out a desktop study and a field assessment. For the desktop study we reviewed:

- Government of Canada Open Maps – Surficial Geology
- Geological Survey of Canada Map 1329A
- Google Earth Imagery
- 2019 LidarBC data
- BC Groundwater Wells and Aquifers Database

The field assessment was carried out on June 10, 2026, and included a borehole investigation program.

3.1 Site Description and Background

The existing Bella Coola Airport runway is within the valley floor on the south side of the Bella Coola River. It is approximately 1.3 km in length, and 30 m wide. The area is flat (<1 % gradient). A dike has been built along the section of the south bank of the Bella Coola River where it is close to the runway. The surrounding undeveloped area has been cleared and is covered with grass and some small shrubs and immature trees. Drainage channels run into the Bella Coola River to the east and west of the runway. Undocumented fill and disturbed soils may be present in the area due to previous earthworks related to clearing/grubbing, regrading, and construction of the runway.

3.2 Geomorphology and Surficial Geology

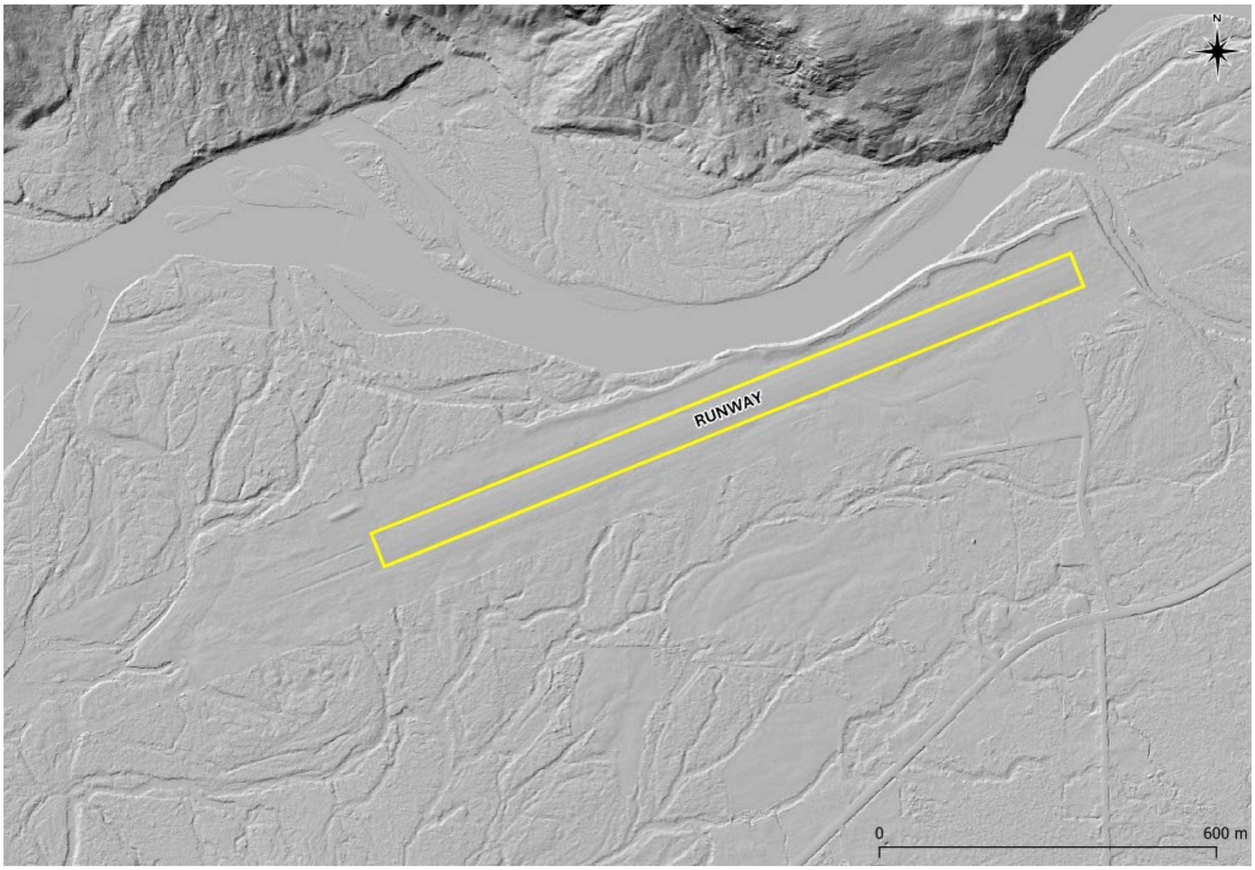

Figure 1. The runway location and historical channel meanders shown on a hillshade map created from LidarBC 2019 data.

The geomorphology and surficial geology of the area have been greatly influenced by land forming events that have occurred since the Frasier Glaciation:

- During deglaciation a large meltwater channel formed across the valley.
- Meltwater entered the valley inland from the west and through drainage channels from the surrounding mountains.
- As the melt water waned the channels reduced to a series of smaller meandering channels with the main flow forming a braided river.
- The channels eventually reduced to what are now know as the Bella Coola River and its tributaries.
- The past meandering of the channels creating a vast network of interconnected channel paths that extend throughout the valley floor as seen in Figure 1.
- Variable interbedded sediments deposits formed through erosion and deposition within the former channel paths. The rate of water flow and volumes dictated soil deposition. Coarse-grained sediments consisting of gravel and sand were deposited within the faster moving water, and fine-grained sands, silts, and clays were deposited in where water slowed and over floodplain areas.

The site is within an alluvial terrace deposit consisting of gravel and sand with interbedded silt. The runway stretches across the historical channel meanders and is underlain by layers of gravel, sand, and silt with variable thicknesses and depths.

3.3 Site Investigation

We carried out a site investigation along the runway on June 10, 2026. Subsurface conditions were reviewed in seven boreholes, BH26-01 to BH26-07, at the locations shown in Figure 2. The boreholes were excavated with a track-mounted rotary drill (K.R.G. Drilling Ltd.) under the direction of our field personnel. As the boreholes were advanced, we observed and recorded subsurface conditions encountered at each location. At select depths we performed field soil tests and collected soil samples from the excavated soil. The samples were submitted to our laboratory for soil index tests. Following our review and sample collection the boreholes were backfilled with the excavated soil and bentonite and patched with cold patch asphalt.

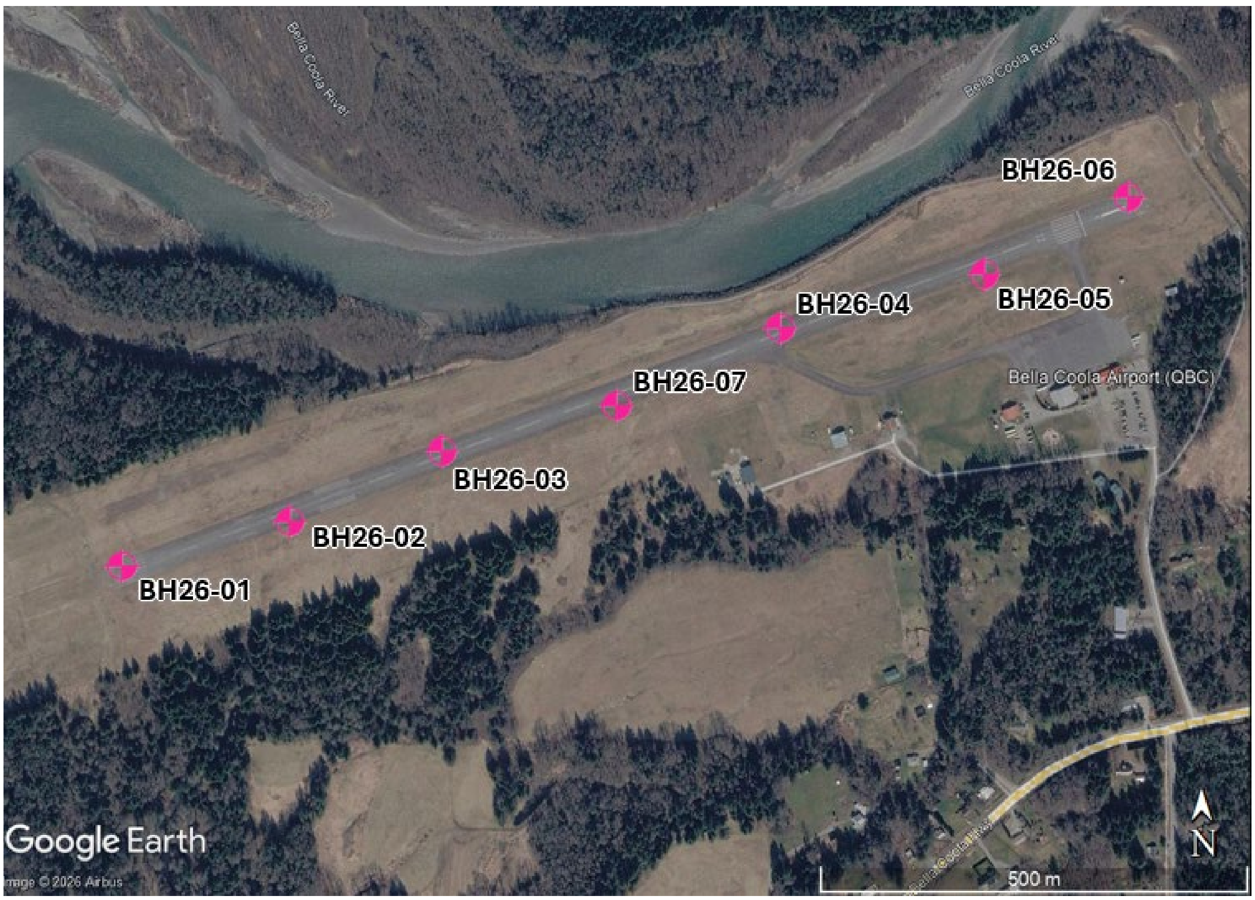

Figure 2. The subject property and borehole investigation locations, shown on 2026 Google Earth imagery.

We classified the soil conditions in accordance with the Modified Unified Soil Classification System (MUSCS). Soil index tests were carried out on select samples to determine soil properties and to confirm our field observations. The observed soil and groundwater conditions, sampling depths, field measurements, and index test results are detailed in the investigation logs in **Appendix A**. Detailed laboratory reports for the soil index tests are in **Appendix B**.

3.4 Subsurface Conditions

The natural surficial soil deposit can generally be classified as two types which can be described as follows:

- Gravel and Sand
  - Poorly graded gravel and sand with trace silt and clay.
  - Compact to dense consistency
  - In situ moisture contents between 3% and 21%
- Silt
  - Silt with varying amounts of sand and trace gravel
  - Low plasticity
  - Soft to stiff consistency
  - In situ moisture contents between 21% and 38%, which ranges from near the plastic limit to near the liquid limit of the soil

Within the borehole depths we observed the Gravel and Sand with an interbedded a layer of Silt. The Silt layer was observed in all boreholes. It was of variable thickness and varied between 0.3 m and 2.1 m depth from the runway surface. Shallow groundwater was observed in all boreholes and varied from 2.0 m and 2.6 m below the runway surface elevation. The groundwater varies seasonally and is likely highest during the spring melt.

3.4.1 Existing Pavement Structure and Subgrade Conditions

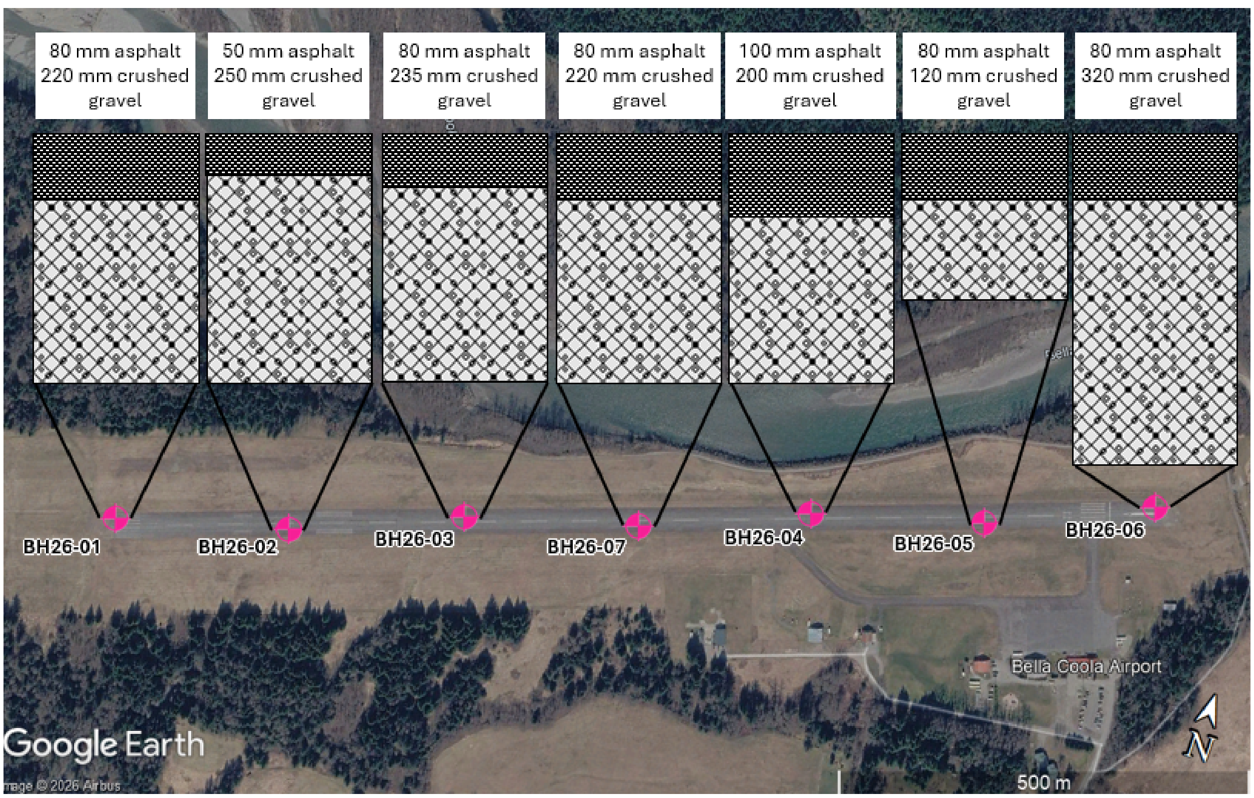

Figure 3. Existing pavement structure observed at each borehole location, shown on Google Earth 2025 imagery.

The existing runway pavement structure is highly variable and is shown in Figure 3. The existing asphalt surface has extensive block, transverse, and longitudinal cracking. The asphalt thickness ranged from

50 mm to 100 mm in the investigated locations. The crushed gravel base layer ranged from 120 mm to 320 mm in thickness. The pavement structure was installed over the natural soils.

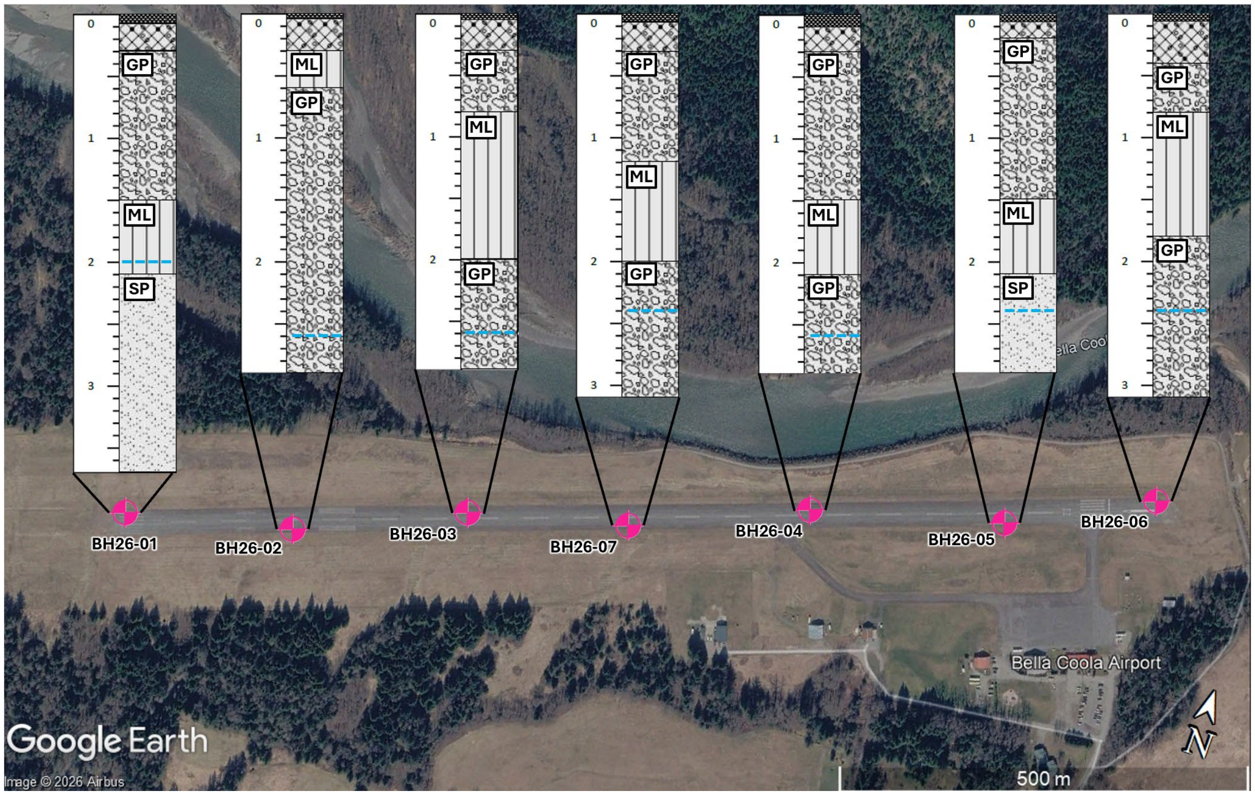

Figure 4. Existing pavement structure and subsurface conditions in each investigation location with groundwater levels, shown on Google Earth 2026 Imagery.

Figure 4 highlights variable runway subgrade conditions, specifically the depth and thickness of an underlying weak silt layer.

3.5 Frost Conditions

Frost penetration depth is based on the air-freezing index and mean annual temperature for the site. For the Bella Coola, BC area, the air freezing index is 592 Degree-Days °C and the mean annual temperature is 3.5 °C. The estimated maximum frost penetration depth is 1.7 m.

4. Discussion and Recommendations

The following sections detail the anticipated conditions and the relevant geotechnical design, recommendations, and considerations.

4.1 Subsurface Conditions and Soil Characteristics

The natural soil conditions below the runway consist of layered Gravel and Sand with an interbedded layer of Silt. The two soil types have the following properties and characteristics:

- The Sand and Gravel:
  - Has high permeability.
  - Has low frost susceptibility.
  - Has moderate to good subgrade strength

- The Silt:
  - Has low permeability
  - Is highly frost susceptible and in the given deposit could be prone to ice lensing and thus significant frost heave.
  - Is moisture sensitive making it prone to weakening if disturbed or loaded in a wet condition.
  - Is a weak subgrade material.

Groundwater was observed between 2.0 m and 2.6 m below the existing runway surface and likely reaches higher elevations during the spring melt season. The groundwater elevation will influence the behaviour and relative strength of the Silt. As a result, the subgrade will be weakest during periods of high water.

4.2 Frost Considerations

Based on Figure 3.3.1 from the Manual of Pavement Structural Design ASG-19, the recommended minimum pavement structure thickness for frost protection in the area is 0.7 m. Considering the natural Sand and Gravel underlying the pavement structure as non-frost susceptible, the only location which does not meet this minimum pavement structure thickness is BH26-02, where the Silt layer exists directly beneath the existing base layer. There is potential for ice lensing and frost heave in this location due to the thin pavement structure and underlying Silt subgrade but based on field observations significant frost heave has not occurred to date.

4.3 Existing Runway

The pavement structure of the runway is not thick enough to meat the design target for the given subgrade conditions. The existing runway structure is weakest where:

- The weak Silt layer is the closest to the underside of the pavement structure
- The Silt layer is thick
- The Gravel and Sand layer is thinly deposited over the Silt
- The Silt layer is near the groundwater table
- The base layer is less than 0.3 m thick
- The asphalt is less than 75 mm thick

Some combination of these traits is present at each of the investigation locations. The weakest areas are at BH26-02, BH26-03, BH26-05, and BH26-06.

4.3.1 Pavement Load Rating

We evaluated the existing pavement structures using Transport Canada Pavement Load Rating (PLR) methodology. Transport Canada now uses the ICAO Aircraft Classification Number/Pavement Classification Number (ACN–PCN) system for pavement reporting. The equivalent PCN ratings for the existing pavement structure were calculated using the regression curve equation method.

We considered the following in our analysis:

- The natural Silt is the weak component of the subgrade and falls within a Category D subgrade. We estimate it has a nominal bearing strength of 55 kN.
- Most of the natural Gravel and Sand meets the gradation specifications for Select Granular Subbase so where a layer is present between the silt and existing pavement structure it performs as a subbase layer, so we have accounted for it as part of the pavement structure.

- The natural Gravel and Sand is generally at a lower degree of compaction than a constructed subbase and has more variable gradation, so we have applied an 80 % reduction factor in considering it as a subbase layer.

The Equivalent Granular Thickness (EGT) of the existing pavement structure observed at each borehole location, and their corresponding PLR and PCN ratings are detailed in Table 1. The resulting PLR rating is well below the target rating of 7 at all locations.

Table 1. PLR/PCN Ratings for Existing Pavement Structure at Each Investigation Location.

	BH26-01	BH26-02	BH26-03	BH26-04	BH26-05	BH26-06	BH26-07
EGT (m)	0.58	0.33	0.43	0.59	0.52	0.52	0.62
PLR	5.2	3.2	4.0	5.2	4.7	4.7	5.4
PCN	13.9/F/D/ 1.0 MPa/T	6.2/F/D/ 0.5 MPa/T	8.7/F/D/ 1.0 MPa/T	14.3/F/D/ 1.0 MPa/T	11.6/F/D/ 0.5 MPa/T	11.6/F/D/ 1.0 MPa/T	15.5/F/D/ 1.0 MPa/T

4.4 Improvements

To improve the PLR and PCN values of the runway pavement structure without any subgrade remediation, the EGT of the pavement structure must be increased. We considered two options to increase the EGT of the existing runway pavement structure.

- **Option 1:** A 75 mm asphalt overlay with a geosynthetic pavement reinforcement mesh
- **Option 2:** Full depth remediation involving pulverizing and a new 75 mm layer of asphalt

4.4.1 Option 1- Geosynthetic Reinforcement and Overlay

The existing pavement structure can be improved with an overlay. Increasing the asphalt surface thickness will increase the EGT and as a result improve the PLR/PCN ratings. The poor asphalt conditions are not suitable for a traditional direct overlay or mill and overlay as the overlay would fail prematurely due to reflective cracking. To mitigate this, we recommend incorporating a geosynthetic reinforcement layer over the existing asphalt surface.

We recommend a 75 mm overlay with a layer of GlasGrid 8511 TF pavement reinforcement mesh over the existing asphalt surface. The PLR and PCN values for the resulting pavement structure are detailed in Table 2. The average PLR for Option 1 is 5.7, lower than the target of 7, but it is the most cost-effective way to keep the runway in service.

Table 2. PLR/PCN Values for Option 1 at Each Investigation Location.

	BH26-01	BH26-02	BH26-03	BH26-04	BH26-05	BH26-06	BH26-07
EGT (m)	0.73	0.48	0.58	0.74	0.67	0.67	0.77
PLR	6.2	4.4	5.2	6.3	5.8	5.8	6.4
PCN	20.6/F/D/ 1.0 MPa/T	10.2/F/D/ 1.0 MPa/T	13.9/F/D/ 1.0 MPa/T	21.0/F/D/ 1.0 MPa/T	17.7/F/D/ 1.0 MPa/T	17.7/F/D/ 1.0 MPa/T	22.5/F/D/ 1.0 MPa/T

GlasGrid 8511 TF is a proprietary product and has unique properties. Any proposed substitution will have to be reviewed by SoilTech and may require additional analysis. The product has an integrated tack film which requires proper surface conditions and preparation. Follow the manufacturer's recommendations and standard procedures to install it. We recommending installing a test section and completing the manufacturers recommended pull test. In the event of poor binding to the existing asphalt a tack coat can be applied. If the existing asphalt surface is not deemed smooth enough a level course of asphalt can be implemented.

Place the asphalt surface as per the supplier's recommended procedures. Asphalt should be placed in layers no thicker than four times the nominal aggregate size. Compact it to a minimum average degree of compaction of 98% when comparing the in-situ density to the measured 75 Blow Marshall briquette density for the mix, with no single measured location less than 95%.

4.4.2 Option 2- Full Depth Remediation

Full depth remediation of the existing pavement structure through pulverizing will offer a better improvement to the PLR. Pulverizing grinds the old asphalt and a portion of the existing base material and mixes it with virgin base aggregate to create an asphalt-stabilized base layer which is stronger than a typical base layer. The processed base material is installed and compacted to support a new layer of asphalt.

The maximum blending ratio is 3 parts base aggregate to 1 part asphalt. We estimate the average thickness of the existing asphalt is 80 mm (compacted state) so 240 mm (compacted state) of base aggregate can be mixed with the existing asphalt resulting in an asphalt stabilized base layer thickness of 320 mm (compacted state). For Option 2 we considered this base layer improvement with a 75 mm asphalt overlay which resulted in the PLR improving to an average of 7.0 with most areas over 7. The EGT, PLR and PCN values for the resulting pavement structure are detailed in Table 3.

Table 3. PLR/PCN Values for Option 2: Pulverizing with 75 mm of Asphalt.

	BH26-01	BH26-02	BH26-03	BH26-04	BH26-05	BH26-06	BH26-07
EGT (m)	0.94	0.70	0.80	0.94	0.88	0.88	0.88
PLR	7.5	6.0	6.6	7.5	7.1	7.1	7.1
PCN	31.7/F/D/ 1.0 MPa/T	19.1/F/D/ 1.0 MPa/T	24.1/F/D/ 1.0 MPa/T	31.7/F/D/ 1.0 MPa/T	28.4/F/D/ 1.0 MPa/T	28.4/F/D/ 1.0 MPa/T	28.4/F/D/ 1.0 MPa/T

To create an optimal blend for the stabilized base layer we recommend the following for the pulverizing operations:

- Spread an even 200 mm (loose state) layer of Well Graded Base over the asphalt surface.
- Set the pulverizing depth to 150 mm below the existing asphalt surface.
- Pulverize and blend the materials together.

To install the pavement structure, we recommend:

- Place the base layer in maximum 200 mm thick layers and compact to 98 % MPD. Bring the soil to near its optimum moisture content for compaction where required.
- Proof-roll the base layer and repair any soft areas before placing any asphalt.
- Place the asphalt surface as per the supplier's recommended procedures. Asphalt should be placed in layers no thicker than four times the nominal aggregate size. Compact it to a minimum average degree of compaction of 98 % when comparing the in-situ density to the measured 75 Blow Marshall briquette density for the mix, with no single measured location less than 95 %.

4.4.3 Materials

Given the remote location of the community economically sourcing material meeting the Transport Canada airport specific standards will be challenging. Instead, we recommend using aggregates and asphalt meeting the British Columbia Ministry of Transportation and Transit (BC MoTT) Standard Specifications for Highway Construction (MoTT Standards) which are more widely available.

Aggregates should withstand the deleterious effects of exposure to freeze-thaw, water, and general construction such as placing, grading, packing, etc. Use aggregates that meet the Aggregate Quality specifications detailed in Section 202.04 of the current MoTT Standards. For Well Graded Base (WGB) use a crushed material with a minimum 60% one-face fracture by mass on particles larger than 4.75 mm. Gradation specifications for the aggregates can be found in Table 4. Use asphalt meeting the specifications for a Class 1 Medium Hot Mix Asphalt. The MoTT recommended asphalt grade for the area is PG 58-28.

Table 4. Aggregate Gradation Specifications.

Particle Size (mm)	Percent Passing
	WGB[1]
75	–
37.5	–
25	100
19	80 – 100
9.5	50 – 85
4.75	35 – 70
2.36	25 – 50
1.18	15 – 35
0.300	5 – 20
0.075	0 – 5

[1]Aggregate particles ≥ 4.75 mm should have a minimum 60% one-face fracture by mass

5. Review and Quality Assurance

This assessment and our recommendations are based on preliminary site plans and conversations with the Client. The final design drawings should be reviewed by SoilTech to confirm the intentions of the geotechnical design recommendations included in this report have been incorporated and are appropriate for the development. Subsurface conditions should be confirmed during construction. If the conditions (i.e., soil, groundwater, etc.) encountered during construction differ from those in our assessment they should be reviewed, as alternate or additional recommendations may be required.

During the subgrade preparation and construction of the pavement structure have SoilTech review excavations, fill materials, fill placement and compaction, proof rolls, and the installation of any geotextile or geogrid products. Depending on weather and site conditions, materials may need to be placed in smaller lift thicknesses, dried, or have water added to achieve the recommended degree of compaction. Testing should be completed on subgrade fill, pavement structure layers, and the materials used to confirm the respective specifications are met.

6. Limitations

The information discussed in this report is based on SoilTech's interpretation and understanding of current site conditions and the referenced documents. This assessment was limited to the references used in our desktop study and the scope of our site investigation. The discussion and recommendations provided are based on the necessary assumption that subsurface conditions across the site are consistent with our findings. If conditions encountered at the site are inconsistent with the findings described above, they should be reviewed by SoilTech, as alternate recommendations or design parameters may be required.

7. Closure

This assessment has been completed by or under the supervision of a qualified professional registered with the Engineers and Geoscientists of British Columbia. This report is intended for the exclusive use of the recipient and their agents. We take no responsibility for any damages suffered from any use of or reliance on information contained within this report by third parties, or for use other than the intended purpose.

If there are any questions or if additional information is required, please contact the undersigned.

Sincerely,

Cam McLeod, E.I.T.

Reviewed by,

Permit to Pratice
No. 1001832

PROFESSIONAL
PROVINCE OF
H. S. JORGENSEN
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July 31, 2026

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Appendix A:

Investigation Logs

Appendix B:

Soil Index Test Reports