Keystone Environmental
Knowledge-Driven Results

November 28, 2014

Mr. Dallyn Willis
Western Forest Products Inc.
Suite 510 – 700 West Georgia Street
Vancouver, BC V7Y 1A1

Dear Sir/Madame:

Re: Performance Verification Plan for Certificate of Compliance at Former Squamish Pulp Mill, Woodfibre, BC (Uplands Portion)
MOE Site ID: #9930
Keystone Environmental Project No. 11644

Keystone Environmental Ltd. (Keystone Environmental) has prepared this Performance Verification Plan (PVP) in support of an application for a risked-based Certificate of Compliance (CofC) for the uplands portion of the property located at the Former Squamish Pulp and Paper Mill, Woodfibre, BC (herein referred to as the "Site"). The Site has MOE Site ID: 9930.

The PVP presents the principal risk management measures that apply at the Site to ensure the Site CofC remains valid (i.e., the key risk management controls of Schedule B of the Site CofC which must remain in place at the Site). The PVP was prepared in accordance with BC Ministry of Environment (MOE) Administrative Guidance 14: Performance Verification Plans, Contingency Plans, and Operations and Maintenance Plans (MoE, 2014). The PVP was based on the findings of report titled "Uplands Human Health and Ecological Risk Assessment – Former Squamish Pulp Mill, Woodfibre, BC"[1], and a Confirmation of Remediation report[2] for the Site.

DETERMINATION OF REMEDIATION TYPE

Based on the risk management measures for the Site, (i.e., the use of engineered and institutional controls to mitigate/eliminate risks at the Site and lack of imminent risks in the event that controls were either not implemented or were implemented but were rendered ineffective) the Remediation Type applicable at the Site is considered to be Type 2 (Case 2).

Under a Remediation Type 2 (Case 2) scenario, MOE (2014) indicates that a PVP is required and an operations and maintenance plan may be required. A contingency plan is not required.

[1] Keystone Environmental (2014a).
[2] Keystone Environmental (2014b).

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Environmental Consulting
Engineering Solutions
Assessment & Protection

REQUIRED RISK CONTROLS

The principal risk controls which must be maintained at the Site include the following items:

- Should any construction or underground utility maintenance activities take place on-Site, both currently and in the future, that intersect with contaminated excavation vapour or groundwater, a health and safety plan must be prepared. This plan must be prepared by a qualified health and safety officer to mitigate incidental excavation vapour inhalation and skin contact with groundwater by occupational workers.
- Future enclosed buildings at the Site must be slab on grade or contain basements.
- Contaminated soils at TP07-44, MW06-23 and MW06-88 must continue to be capped by at least 1 m of uncontaminated soils.
- Deep rooting vegetation must not be allowed to establish themselves at the capped/remediated areas located at TP07-44, MW06-23, and MW06-88.
- An asphalt/concrete (or equivalent) cover must continue to exist at the area of the Site previously containing industrial operations.
- The overall grade of AEC 3 and AEC 4 (Figure 1) must not be reduced.
- The general public must not access the industrial areas of the Site.
- The groundwater must not be used as a source of drinking water.

REQUIRED ACTIONS TO IMPLEMENT THE REQUIRED RISK CONTROLS

A PVP is required to ensure that the identified risk controls for the Site are present or implemented, and maintained.

Performance verification actions for the Site which must be implemented immediately, along with supporting documentation which may be requested by the Director at any given time, include the following:

- The Site owner/operator must continue to ensure that the general public is discouraged from accessing the industrial areas of the Site. Security plans should be made available upon request by the Director.
- The Site owner/operator must ensure that groundwater is not used as a source of drinking water. Documentation detailing drinking water access should be made available upon request by the Director.
- Health and safety plans have been prepared by a qualified professional prior to trench work at the Site exceeding 1 m. Health and safety plans detailing the mitigation measures used to prevent risk should be made available upon request by the Director.
- Mandatory communication by the Site owner/operator with building designers to ensure construction of future enclosed buildings at the Site will be strictly limited to at-grade or have concrete basements. Future development plans should be made available upon request by the Director.
- The overall grade of AEC 3 and AEC 4 (Figure 1) must not be reduced. Future development plans should be made available upon request by the Director.

Performance verification actions for the Site which require inspection by the Site owner/operator annually, along with supporting documentation which may be requested by the Director at any given time, include the following:

- Mandatory annual inspection by the Site owner/operator to ensure that deep-rooting vegetation continues not to be established at TP07-44, MW06-23, and MW06-88. Documentation and photographs must be made available upon request by the Director.
- Mandatory annual inspection by the Site owner/operator to ensure that the engineered uncontaminated cap present at TP07-44, MW07-23, and MW06-88 remains in place. Figures 1 and 2 present these areas as well as their metes and bounds. Documentation and/or photographs must be made available upon request by the Director.

Performance verification actions for the Site which require inspection by the Site owner/operator every 5 years, along with supporting documentation which may be requested by the Director at any given time, include the following:

- Mandatory inspection annually for the first 5 years, every 5 years thereafter, by the Site owner/operator to ensure that an asphalt/ concrete (or equivalent) cover continues to exist at the area of the Site previously containing industrial operations. The PVP may be revised as necessary during the first 5 years. Documentation and/or photographs must be made available upon request by the Director.

Other reporting requirements for performance verification records include the following:

- The Director must be notified promptly by the person(s) responsible for the Site if performance verification actions indicate that any of the required risk controls are not being met. The following information must be submitted to the Director with the notification, or as soon as practicable thereafter:
- The time period over which risk controls were not in place or implemented
- The nature of the excursion(s)
- The temporary or permanent corrective measures implemented or to be implemented
- An implementation schedule
- Supporting documentation
- If requested by the Director, a report signed by an Approved Professional must be submitted for review to the Director and must include the following:
- An evaluation of the performance of the risk controls
- Recommendations for modification of the performance verification plan, along with supporting rationale
- Interpretation of current and cumulative results of the performance verification actions undertaken
- Supporting documentation

SUMMARY RATIONALE AND CONCLUSION

Human Receptors

The upland HHERA identified risks for Construction Workers and Utility Workers from exposure to substances in trench vapours via inhalation, and/or skin contact with groundwater. Risks were identified for these receptors who may be involved in a soil excavation event(s) exceeding 1 m below the ground surface. Operable exposure pathways, hence risks, do not exist should excavations not exceed 1 m in depth and as long as the overall grade of the Site remains as is. If excavations are expected to exceed 1 m in depth, appropriate health and safety measures are recommended. Appropriate health and safety measures may include those which would prevent the inhalation of vapour COCs and skin contact with groundwater.

Institutional controls to prevent risk were also recommended including no construction of enclosed buildings containing basements, and prevention of Site access by the general public.

Ecological Receptors

During a risk assessment completed by Keystone Environmental (2013), a potential for risk was also identified for mixed grasses, soil invertebrates, American robin, Olive-sided Flycatcher, and meadow vole from exposures to one or more contaminants in surface soil. The Keystone Environmental (2013) HHERA recommended the use of either one of three mitigation methods to reduce risk. These included the following:

- The removal of contaminated soils to a depth of 1 m at both TP07-44, MW06-23 and MW06-88 followed by its replacement with uncontaminated fill material, or
- The placement of an uncontaminated fill layer, to a depth of 1 m, over the soils currently located at TP07-44, MW06-23, and MW06-88, or
- The placement of a barrier, impenetrable by most terrestrial organisms, over the soils currently located at TP07-44, MW06-23 and MW06-88.

Figures 1 and 2 present these upland areas to be mitigated for risk.

The Confirmation of Remediation report, by Keystone Environmental (2014c) reported that TP07-44, MW06-23 and MW06-88 were remediated by covering the areas with clean granular cover material consisting of sand and gravel, which was then compacted into 1 m thick cover. A seed mix consisting of grass and clover species was then spread out on this cover.

From the Keystone Environmental (2014a) HHERA and addendum (2014b), implementation of the cap was sufficient to address risks for terrestrial ecological receptors at these three areas, excluding deep-rooting vegetation. The Keystone Environmental (2014) HHERA and addendum (2014b) recommended the additional mitigation measure of preventing the establishment of deep rooting vegetation at TP07-44, MW06-23, and MW06-88. Given the site-specific conditions of AECs 2, 3, 4, and 32, complete exposure pathway-COC combinations are not operable for deep rooting vegetation. Therefore risks to deep-rooting trees were found to be acceptable. For risks to continue to remain acceptable for deep rooting vegetation, the following controls must remain in place:

- Engineered control(s) consisting of pavement/slab or suitable equivalent cover such as at least 1 m of clean fill with no deep rooting vegetation must remain in place at AECs 2 and 32. AECs 2 and 32 coincide with the area of the Site previously containing industrial operations.
- Engineered control(s) consisting of soil caps must remain in place at AEC 4.
- Intrinsic control(s) consisting of the overall grade must be largely maintained as is both currently and in the future at AEC 3 and AEC 4.

The use of these additional mitigation measures as well the currently implemented cap is acceptable and is sufficient to mitigate risks to ecological receptors including deep-rooting trees.

Asbestos Disposal Area

The historical hazardous waste asbestos disposal area was closed in accordance with a closure plan approved by the MOE. The closure of the disposal area involved installation of an impermeable cap and a covenant has been placed on the land title restricting future use of that area. Requirements of the Closure Plan must be maintained.

CONCLUSION

In summary, it is our opinion that the actions identified above are sufficient to ensure performance verification of the risk controls required for this Site.

GENERAL LIMITATIONS AND CONFIDENTIALITY

Findings presented in this report are based upon the results of a field investigation including a chemical injection remediation plan, the drilling of boreholes, construction of monitoring wells, collection and analysis of soil, water, and vapour samples. Geologic observations and analytical results reflect conditions encountered at a specific test location. Site conditions (geologic, hydrogeologic, and chemical characterization) may vary from that extrapolated from the data collected during this investigation. Consequently, while findings and conclusions documented in this report have been prepared in a manner consistent with that level of care and skill normally exercised by other members of the environmental science and engineering profession practising under similar circumstances in the area at the time of the performance of the work, this report is not intended, nor is it able to provide a totally comprehensive review of present or past site environmental conditions.

This report has been prepared solely for the internal use of Western Forest Products Inc. and for review by the BC Ministry of Environment, the Contaminated Sites Approved Professionals (CSAP) Society, Patrick Allard, and Reidar Zapf-Gilje, pursuant to the agreement between Keystone Environmental Ltd. and Western Forest Products Inc. By using this report, Keystone Environmental Ltd., Western Forest Products Inc., CSAP, Mr. Allard, and Mr. Zapf-Gilje agree that they will review and use the report in its entirety. Any use which other parties make of this report, or any reliance on or decisions made based on it, are the responsibility of such parties. Keystone Environmental Ltd. accepts no responsibility for damages, if any, suffered by other parties as a result of decisions made or actions based on this report.

If you should have any questions, please do not hesitate to contact the signatories below.

Sincerely,

Keystone Environmental Ltd.

Original signed by

Michael Geraghty, M.Sc., P. Geo., A.P., PMP
Department Head
Contaminated Sites Group

Original signed by

Andrew Wan, M.ET., R.P.Bio.
Senior Risk Assessor

Original signed by

Shannon Bard, Ph.D., R.P.Bio.
Department Head
Risk Assessment and Biological Services

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ATTACHMENTS:

- References
- Figures

REFERENCES

Keystone Environmental
Knowledge-Driven Results

REFERENCES

Keystone Environmental, 2013. Uplands Human Health and Ecological Risk Assessment – Former Squamish Pulp Mill, Woodfibre, BC, dated August, 2013.

Keystone Environmental, 2014a. Uplands Human Health and Ecological Risk Assessment – Former Squamish Pulp Mill, Woodfibre, BC, dated October, 2014.

Keystone Environmental, 2014b. Addendum to the Uplands Human Health and Ecological Risk Assessment – Former Squamish Pulp Mill, Woodfibre, BC, dated November, 2014.

Keystone Environmental, 2014c. Confirmation of Remediation Former Squamish Pulp Mill Site, Woodfibre. Dated November, 2014.

MoE. 2014. Administrative Guidance 14. Performance Verification Plans, Contingency Plans, and Operations and Maintenance Plans. BC Ministry of Environment, February 2014.

FIGURE

Keystone Environmental

NOTE: THIS DRAWING IS FOR GENERAL INFORMATION ONLY.
LOT BOUNDARIES AND FEATURES ARE APPROXIMATE.

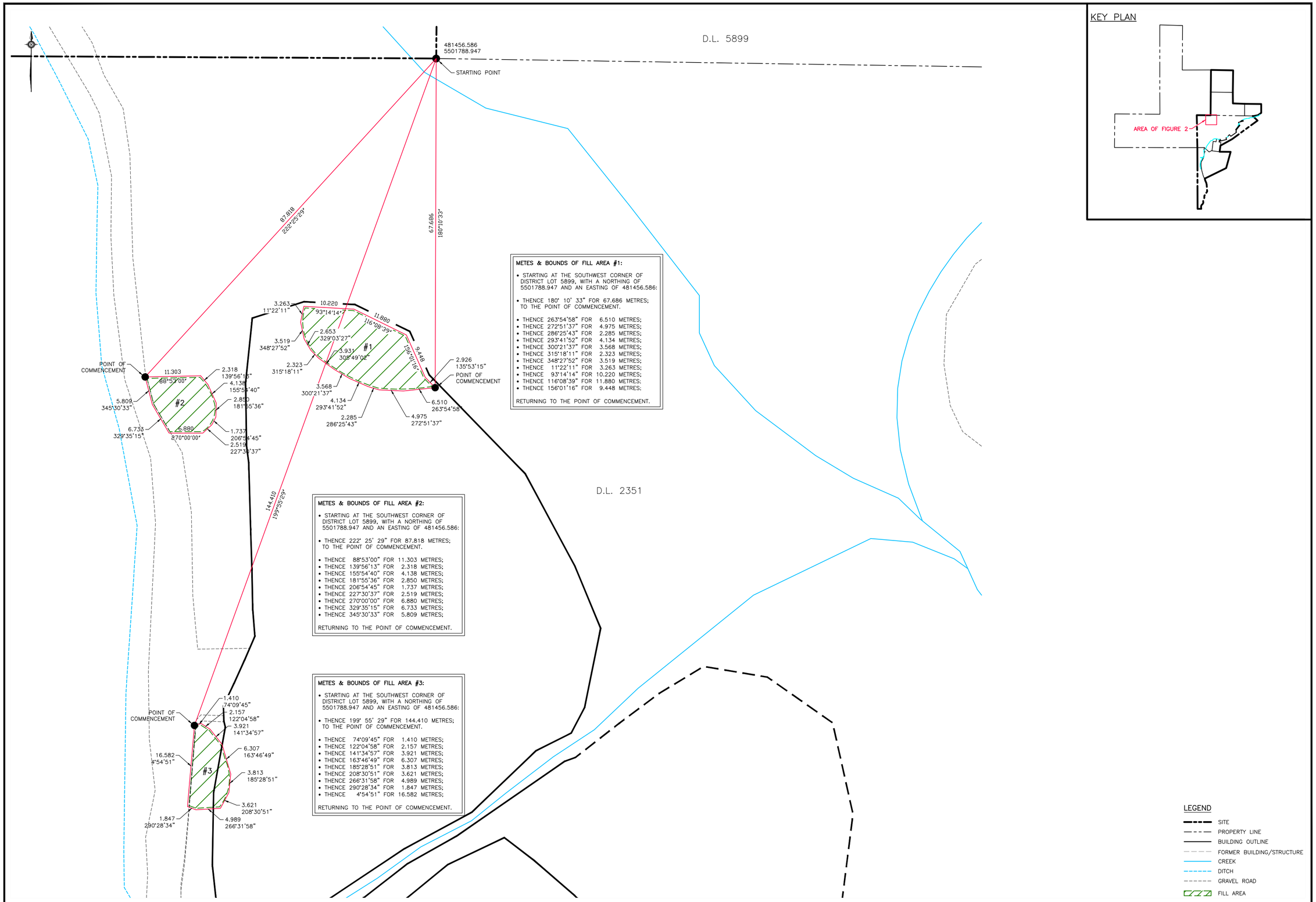
50m 0 100m
SCALE: 1:2500(approx.)

Former Squamish Pulp Mill (Woodfibre)
Squamish, B C
Western Forest Products Inc.

REVISION No.	DATE	PROJECT No.
01	Nov. 2014	11644-105B

Figure 1
Industrial Land Cover Composition

PLOT SCALE: 1:1 DRAWN BY: MS/DK CADD FILE No. 11644\0105B HHERA Uplands\Figs\PVP\Fig1-Land Cover-R1.dwg



METES & BOUNDS OF FILL AREA #1:

- STARTING AT THE SOUTHWEST CORNER OF DISTRICT LOT 5899, WITH A NORTHING OF 5501788.947 AND AN EASTING OF 481456.586:
- THENCE 180° 10' 33" FOR 67.686 METRES; TO THE POINT OF COMMENCEMENT.
- THENCE 263°54'58" FOR 6.510 METRES;
- THENCE 272°51'37" FOR 4.975 METRES;
- THENCE 286°25'43" FOR 2.285 METRES;
- THENCE 293°41'52" FOR 4.134 METRES;
- THENCE 300°21'37" FOR 3.568 METRES;
- THENCE 315°18'11" FOR 2.323 METRES;
- THENCE 348°27'52" FOR 3.519 METRES;
- THENCE 11°22'11" FOR 3.263 METRES;
- THENCE 93°14'14" FOR 10.220 METRES;
- THENCE 116°08'39" FOR 11.880 METRES;
- THENCE 156°01'16" FOR 9.448 METRES;

RETURNING TO THE POINT OF COMMENCEMENT.

METES & BOUNDS OF FILL AREA #2:

- STARTING AT THE SOUTHWEST CORNER OF DISTRICT LOT 5899, WITH A NORTHING OF 5501788.947 AND AN EASTING OF 481456.586:
- THENCE 222° 25' 29" FOR 87.818 METRES; TO THE POINT OF COMMENCEMENT.
- THENCE 88°53'00" FOR 11.303 METRES;
- THENCE 139°56'13" FOR 2.318 METRES;
- THENCE 155°54'40" FOR 4.138 METRES;
- THENCE 181°55'36" FOR 2.850 METRES;
- THENCE 206°54'45" FOR 1.737 METRES;
- THENCE 227°30'37" FOR 2.519 METRES;
- THENCE 270°00'00" FOR 6.880 METRES;
- THENCE 329°35'15" FOR 6.733 METRES;
- THENCE 345°30'33" FOR 5.809 METRES;

RETURNING TO THE POINT OF COMMENCEMENT.

METES & BOUNDS OF FILL AREA #3:

- STARTING AT THE SOUTHWEST CORNER OF DISTRICT LOT 5899, WITH A NORTHING OF 5501788.947 AND AN EASTING OF 481456.586:
- THENCE 199° 55' 29" FOR 144.410 METRES; TO THE POINT OF COMMENCEMENT.
- THENCE 74°09'45" FOR 1.410 METRES;
- THENCE 122°04'58" FOR 2.157 METRES;
- THENCE 141°34'57" FOR 3.921 METRES;
- THENCE 163°46'49" FOR 6.307 METRES;
- THENCE 185°28'51" FOR 3.813 METRES;
- THENCE 208°30'51" FOR 3.621 METRES;
- THENCE 266°31'58" FOR 4.989 METRES;
- THENCE 290°28'34" FOR 1.847 METRES;
- THENCE 4°54'51" FOR 16.582 METRES;

RETURNING TO THE POINT OF COMMENCEMENT.

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NOTE: THIS DRAWING IS FOR GENERAL INFORMATION ONLY. LOT BOUNDARIES AND FEATURES ARE APPROXIMATE.

5m 0 25m

SCALE: 1:500(approx.)

Former Squamish Pulp Mill (Woodfibre)
Squamish, B C
Western Forest Products Inc.

REVISION No.	DATE	PROJECT No.
01	Nov. 2014	11644-105B

Figure 2
Metes & Bounds of Fill Areas

PLOT SCALE: 1:1 DRAWN BY: DK CADD FILE No. 11644\0105B HHERA Uplands\PVP\Figs\Fig2-Metes & Bounds-R1.dwg

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November 27, 2014

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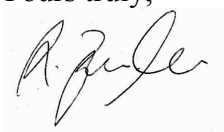
RE: PERFORMANCE VERIFICATION PLAN FOR CERTIFICATE OF COMPLIANCE FORMER SQUAMISH PULP MILL, WOODFIBRE SITE (UPLAND PORTION), SQUAMISH, BC

Dear Michael:

I have reviewed the Performance Verification Plan (PVP), as part of my risk AP review for a COC application for the above referenced site. Based on my review, I conclude that the the PVP adequately address the risk-related conditions of the COC. Please attach a copy of this letter to the PVP.

If you have any questions, please call.

Yours truly,



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Contaminated Site Approved Professional