Appendix J:

Shadow Flicker Assessment

Amherst Community Wind Farm
Shadow Flicker Assessment Report
November 2014

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Report Information

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** The WindPRO v2.9, Decibel Module Calculation Results for Enercon E-92 2.3 MW @ 98m Hub Height. To review General Specification for the Enercon E-92 please contact:

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1. Introduction

Natural Forces Wind Inc. has undertaken a shadow flicker impact assessment for the proposed Amherst Community Wind Farm to assess the potential impact of shadow flicker on the surrounding shadow receptors. Details outlining the shadow receptors, prediction methodology and assumptions made for the assessment are included herein, with complete WindPRO results supplied in the annexes. This report also provides background information on shadow flicker.

As there are very few federal, provincial or municipal guidelines or policies for governing or quantifying what is an acceptable amount of shadow flicker at this time, the German standards, *Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windenergianlagen*, have been adopted for this study. Often, careful site design in the first instance is recommended, followed by industry accepted mitigation strategies thereafter. This assessment will be used as supporting documentation to demonstrate compliance with these standards. The shadow flicker analysis was conducted using the Shadow module of the software package, WindPRO version 2.9.

2. Background

Flicker is caused by incident light rays on a moving object which then casts an intermittent shadow on a receptor. This intermittent shadow, perceived as a change in light intensity to an observer, as it pertains to wind turbine generators (WTG), is referred to as shadow flicker. Shadow flicker is caused by incident sun rays on the rotor blades as they turn.

For shadow flicker to occur, the following criteria must be met:

1. The sun must be shining and not obscured by any cloud cover.
2. The wind turbine must be between the sun and the shadow receptor.
3. The line of sight between the turbine and the shadow receptor must be clear. Light-impermeable obstacles, such as vegetation, buildings, awnings etc., will prevent shadow flicker from occurring at the receptor.
4. The shadow receptor has to be close enough to the turbine to be in the shadow.

3. Policy and Guidelines

As previously stated, there are no municipal, provincial or federal guidelines or policies for governing or quantifying what is an acceptable amount of shadow flicker. As a result, the German standards have been adopted for this study. The German shadow flicker guidelines provide a means of quantifying acceptable levels of shadow flicker exposure based on the astronomic worst case. Acceptable levels at shadow receptors are:

- no more than 30 hours per year of astronomical maximum shadow (worst case); and
- no more than 30 minutes on the worst day of astronomical maximum shadow (worst case).

The guidelines also stipulate two factors that limit the shadow flicker effect, due to optic conditions in the atmosphere:

1) the angle of the sun over the horizon, which must be at least 3 degrees; and
2) the blade of the WTG must cover at least 20 % of the sun.

Receptors not exposed to more than 30 minutes per day on the worst affected day or a total of 30 hours per year from all surrounding wind turbines are considered unlikely to require technical mitigation.

4. General Description of Project Site and Surrounds

The proposed Amherst Community Wind Farm consists of a maximum of 3 WTGs located in the Municipality of Cumberland County, Nova Scotia. Enercon E-92 wind turbines are being considered for the project and therefore are used in this assessment, however if the turbine type was to change, a new shadow flicker assessment would be conducted.

The project site is situated approximately 5.5 kilometers east of Amherst in between Pumping Station Road and John Black Road.

5. Description of Receptors

There are 314 points of reception taken into consideration for this shadow flicker assessment. The receptors are mostly residential buildings and/or seasonal camps located within 2,500 metres (m) of the nearest proposed WTG.

Details of receptor locations and distances to nearest WTG are detailed in Table 1. Receptor IDs included in Table 1 correspond with the WindPRO generated map included in Annex A.

Table 1: Description of receptors.

Point of Reception ID	Location (UTM Zone 20, NAD 83)		Distance from receptor to: (meters)		
	Easting	Northing	Wind Turbine 1	Wind Turbine 2	Wind Turbine 3
A	410687	5077694	1472	1924	1636
B	412917	5075407	2000	1816	2259
C	412770	5077450	2016	2293	2449
D	411637	5077534	1348	1775	1719
E	412772	5077381	1979	2246	2412
F	412548	5077384	1799	2093	2230
G	411522	5074857	1486	1039	1426
H	410752	5077687	1447	1902	1628
I	410886	5077728	1459	1919	1674
J	409985	5078587	2565	2996	2642
K	411218	5077847	1562	2021	1847
L	412545	5077331	1764	2051	2197
M	412672	5076299	1550	1593	1933
N	411712	5077716	1545	1971	1914
O	408873	5077294	2464	2709	2250
P	408859	5074597	2825	2600	2393
Q	412869	5077709	2252	2549	2682
R	412802	5075612	1811	1666	2096
S	412515	5077219	1675	1950	2109
T	410620	5077696	1495	1943	1642
U	412931	5075350	2038	1844	2290
V	409450	5077924	2339	2700	2276
W	411964	5077748	1685	2086	2078
X	411426	5077867	1608	2059	1929
Y	410833	5077687	1429	1887	1630
Z	411651	5077709	1516	1948	1878
AA	412356	5075531	1448	1242	1687
AB	410362	5077647	1557	1983	1636

Point of Reception ID	Location (UTM Zone 20, NAD 83)		Distance from receptor to: (meters)		
	Easting	Northing	Wind Turbine 1	Wind Turbine 2	Wind Turbine 3
AC	413531	5075487	2539	2405	2835
AD	409342	5076720	1832	2017	1559
AE	412583	5075822	1534	1433	1844
AF	411398	5077908	1643	2096	1958
AG	412629	5077251	1788	2053	2222
AH	408937	5076375	2187	2280	1844
AI	411274	5077854	1573	2031	1869
AJ	408809	5077359	2549	2798	2339
AK	411218	5077771	1486	1945	1774
AL	409789	5073827	2799	2419	2432
AM	411056	5077731	1445	1906	1699
AN	409952	5077647	1793	2179	1779
AO	411435	5077793	1537	1987	1863
AP	412657	5076391	1538	1609	1932
AQ	411822	5074852	1598	1184	1612
AR	411931	5077767	1686	2091	2074
AS	412980	5077625	2289	2566	2722
AT	412722	5076231	1601	1623	1975
AU	411337	5077903	1629	2084	1934
AV	409973	5077612	1753	2138	1738
AW	412848	5075349	1965	1764	2211
AX	410575	5077689	1504	1949	1640
AY	412716	5075955	1628	1571	1965
AZ	410809	5077676	1423	1880	1618
BA	409819	5077307	1654	1991	1559
BB	412854	5075234	2028	1804	2256
BC	410573	5078822	2593	3050	2769
BD	411281	5077776	1496	1953	1796
BE	411755	5074975	1458	1045	1475
BF	409573	5077673	2078	2428	2000
BG	412840	5075082	2099	1847	2303
BH	411385	5077782	1517	1969	1835
BI	412181	5075412	1374	1111	1567
BJ	409564	5077151	1781	2066	1615
BK	409521	5077076	1784	2053	1598
BL	411829	5075161	1330	951	1401
BM	409821	5077822	2011	2397	1995
BN	412926	5075138	2139	1905	2359

Point of Reception ID	Location (UTM Zone 20, NAD 83)		Distance from receptor to: (meters)		
	Easting	Northing	Wind Turbine 1	Wind Turbine 2	Wind Turbine 3
BO	411328	5077855	1581	2036	1886
BP	412716	5077559	2039	2335	2470
BQ	409280	5073978	2954	2630	2550
BR	412052	5077442	1482	1850	1897
BS	411061	5077829	1542	2004	1796
BT	412655	5076219	1535	1555	1908
BU	409819	5073832	2780	2398	2415
BV	413605	5075505	2604	2476	2904
BW	412682	5077344	1884	2156	2317
BX	410520	5078801	2584	3040	2752
BY	410203	5073611	2830	2410	2509
BZ	409689	5077214	1706	2015	1571
CA	412647	5076460	1535	1625	1935
CB	410561	5077786	1600	2046	1738
CC	410282	5077768	1702	2126	1773
CD	410532	5077683	1515	1956	1639
CE	412639	5077501	1942	2240	2373
CF	408957	5076550	2181	2309	1863
CG	410871	5077619	1354	1814	1564
CH	409864	5077809	1974	2363	1963
CI	410056	5078619	2563	2999	2653
CJ	411620	5074792	1577	1137	1535
CK	410139	5073616	2847	2431	2519
CL	413559	5075468	2571	2436	2867
CM	412846	5075215	2031	1803	2256
CN	409496	5077941	2319	2684	2264
CO	413083	5075431	2140	1973	2412
CP	412040	5077678	1666	2054	2068
CQ	410988	5077728	1446	1908	1685
CR	409723	5077872	2113	2494	2086
CS	410429	5077688	1562	1996	1661
CT	410008	5077764	1849	2249	1861
CU	410131	5078630	2543	2983	2645
CV	411555	5077917	1686	2129	2023
CW	409514	5077056	1782	2046	1591
CX	412671	5076075	1564	1541	1917
CY	411191	5077777	1491	1950	1773
CZ	413150	5077878	2577	2865	3008

Point of Reception ID	Location (UTM Zone 20, NAD 83)		Distance from receptor to: (meters)		
	Easting	Northing	Wind Turbine 1	Wind Turbine 2	Wind Turbine 3
DA	411129	5077856	1568	2029	1836
DB	409209	5076469	1922	2044	1598
DC	412591	5077280	1773	2046	2206
DD	412888	5077758	2298	2598	2728
DE	410214	5077780	1747	2166	1804
DF	410075	5073646	2842	2432	2507
DG	409777	5077617	1891	2256	1839
DH	412653	5076088	1544	1525	1899
DI	411499	5077845	1602	2048	1935
DJ	412983	5078023	2544	2861	2971
DK	409292	5076881	1924	2136	1677
DL	410501	5077760	1598	2039	1720
DM	409648	5073801	2891	2522	2514
DN	412013	5077394	1420	1789	1835
DO	412938	5075690	1912	1793	2215
DP	412810	5077685	2191	2492	2621
DQ	410251	5077632	1602	2017	1652
DR	410048	5077769	1829	2233	1850
DS	412838	5075164	2051	1814	2268
DT	412752	5075742	1719	1604	2023
DU	412809	5075941	1722	1663	2058
DV	412727	5075907	1650	1579	1979
DW	412556	5075942	1475	1411	1806
DX	412602	5075989	1510	1461	1849
DY	412665	5076029	1565	1528	1911
DZ	411436	5074795	1526	1071	1436
EA	411323	5074711	1590	1129	1463
EB	411343	5074557	1745	1285	1613
EC	411223	5074585	1706	1244	1547
ED	411200	5074416	1874	1412	1702
EE	411046	5074410	1880	1421	1675
EF	410991	5074359	1933	1477	1716
EG	410962	5074302	1992	1537	1769
EH	410847	5074207	2099	1648	1854
EI	410735	5074078	2244	1798	1981
EJ	410669	5074028	2305	1862	2033
EK	410614	5073961	2382	1941	2103
EL	410502	5073855	2511	2076	2218

Point of Reception ID	Location (UTM Zone 20, NAD 83)		Distance from receptor to: (meters)		
	Easting	Northing	Wind Turbine 1	Wind Turbine 2	Wind Turbine 3
EM	410440	5073776	2603	2170	2304
EN	410381	5073715	2678	2248	2374
EO	410338	5073669	2734	2306	2426
EP	410299	5073643	2770	2344	2458
EQ	410268	5073611	2810	2385	2496
ER	410183	5073596	2851	2432	2528
ES	410112	5073628	2845	2432	2514
ET	409024	5074298	2892	2619	2469
EU	408806	5076791	2370	2535	2081
EV	408762	5076595	2380	2508	2063
EW	408811	5076539	2325	2445	2001
EX	408876	5076594	2267	2400	1953
EY	408902	5076567	2237	2367	1920
EZ	408851	5076499	2281	2395	1953
FA	408876	5076468	2253	2363	1922
FB	408823	5076389	2301	2394	1959
FC	409006	5076580	2136	2272	1824
FD	409036	5076615	2111	2256	1806
FE	408848	5077333	2503	2751	2293
FF	408816	5077274	2508	2746	2287
FG	408790	5077254	2524	2758	2299
FH	408765	5077234	2540	2769	2310
FI	408854	5077222	2453	2687	2228
FJ	408834	5077189	2459	2687	2228
FK	408784	5077149	2491	2710	2251
FL	408889	5077170	2401	2630	2171
FM	408899	5077029	2343	2552	2093
FN	408906	5077257	2419	2661	2202
FO	408933	5077225	2381	2621	2162
FP	408968	5077195	2337	2575	2117
FQ	408987	5077171	2310	2546	2088
FR	408982	5077077	2281	2503	2044
FS	408965	5077052	2288	2505	2046
FT	409085	5077090	2189	2421	1962
FU	409119	5077060	2147	2376	1917
FV	409165	5076994	2080	2303	1844
FW	409080	5076943	2144	2352	1893
FX	409096	5076843	2101	2292	1834

Point of Reception ID	Location (UTM Zone 20, NAD 83)		Distance from receptor to: (meters)		
	Easting	Northing	Wind Turbine 1	Wind Turbine 2	Wind Turbine 3
FY	409023	5076890	2184	2378	1920
FZ	409149	5076893	2064	2267	1809
GA	409213	5076950	2021	2239	1780
GB	409262	5076909	1961	2176	1717
GC	409201	5076822	1994	2188	1730
GD	409617	5077923	2222	2597	2183
GE	409763	5077549	1854	2211	1789
GF	409784	5077492	1800	2154	1730
GG	409801	5077452	1761	2112	1688
GH	409838	5077414	1708	2059	1636
GI	409894	5077483	1713	2078	1664
GJ	409861	5077504	1752	2115	1699
GK	409887	5077667	1851	2232	1827
GL	409938	5077562	1739	2116	1710
GM	410012	5077627	1739	2130	1735
GN	409988	5077526	1679	2058	1655
GO	410074	5077535	1629	2019	1625
GP	409927	5077710	1857	2245	1847
GQ	410091	5077651	1709	2109	1725
GR	410175	5077737	1731	2144	1775
GS	410244	5077747	1703	2123	1763
GT	410304	5077752	1677	2103	1752
GU	410219	5077668	1649	2063	1696
GV	410242	5077624	1600	2013	1647
GW	411329	5077781	1507	1962	1815
GX	411616	5077845	1634	2071	1983
GY	411648	5077836	1635	2070	1989
GZ	412916	5077837	2370	2676	2799
HA	412949	5077888	2429	2736	2857
HB	412979	5077927	2477	2785	2905
HC	412665	5077213	1799	2053	2232
HD	412710	5077128	1796	2031	2229
HE	412732	5077070	1790	2012	2221
HF	412619	5076996	1656	1877	2087
HG	412763	5076976	1779	1980	2208
HH	412634	5076917	1638	1841	2067
HI	412751	5076885	1735	1919	2161
HJ	412621	5076849	1601	1791	2027

Point of Reception ID	Location (UTM Zone 20, NAD 83)		Distance from receptor to: (meters)		
	Easting	Northing	Wind Turbine 1	Wind Turbine 2	Wind Turbine 3
HK	412751	5076815	1712	1881	2135
HL	412612	5076785	1571	1748	1995
HM	412607	5076709	1543	1703	1964
HN	412606	5076659	1530	1677	1947
HO	412613	5076560	1516	1636	1925
HP	412961	5074234	2757	2412	2864
HQ	412627	5076481	1517	1615	1920
HR	412861	5073989	2883	2511	2954
HS	413071	5074350	2749	2423	2879
HT	412749	5076324	1627	1674	2013
HU	413229	5075453	2266	2112	2548
HV	409888	5077361	1635	1986	1564
HW	413009	5074477	2615	2297	2755
HX	410404	5077677	1564	1995	1655
HY	410466	5077689	1547	1984	1655
HZ	408680	5076222	2443	2501	2080
IA	408648	5076184	2476	2527	2110
IB	408619	5076158	2506	2553	2137
IC	408593	5076117	2535	2573	2162
ID	408550	5076083	2580	2613	2204
IE	408425	5075931	2721	2727	2333
IF	408403	5075924	2743	2749	2355
IG	408566	5075990	2573	2589	2189
IH	408572	5075967	2570	2582	2184
II	408553	5075947	2592	2600	2204
IJ	408424	5075815	2739	2726	2343
IK	408401	5075793	2766	2749	2368
IL	408389	5075769	2782	2762	2383
IM	408453	5075840	2706	2697	2311
IN	408437	5075832	2723	2713	2328
IO	408864	5076443	2263	2368	1929
IP	408708	5076635	2439	2572	2126
IQ	408926	5076353	2197	2285	1851
IR	408670	5076609	2473	2600	2155
IS	408683	5076628	2463	2594	2148
IT	408617	5076701	2539	2680	2231
IU	408572	5076771	2595	2745	2295
IV	408540	5076735	2620	2763	2315

Point of Reception ID	Location (UTM Zone 20, NAD 83)		Distance from receptor to: (meters)		
	Easting	Northing	Wind Turbine 1	Wind Turbine 2	Wind Turbine 3
IW	408677	5076803	2499	2659	2206
IX	408645	5076834	2536	2700	2247
IY	408583	5076908	2614	2785	2331
IZ	408971	5076639	2179	2325	1875
JA	409016	5076651	2137	2288	1836
JB	408928	5076992	2304	2509	2051
JC	410435	5078635	2445	2898	2596
JD	411332	5078365	2088	2545	2377
JE	411342	5078397	2120	2577	2411
JF	413544	5075493	2549	2417	2847
JG	413205	5075446	2247	2090	2527
JH	410460	5073823	2552	2119	2255
JI	410234	5073606	2825	2403	2508
JJ	410171	5073620	2832	2414	2508
JK	410079	5073674	2814	2405	2479
JL	409784	5073681	2930	2544	2568
JM	409799	5073696	2910	2523	2549
JN	409810	5073852	2767	2387	2400
JO	409707	5073761	2896	2520	2525
JP	409624	5073854	2858	2494	2478
JQ	409638	5073866	2840	2476	2461
JR	409477	5073946	2862	2517	2469
JS	409397	5073956	2901	2564	2503
JT	409033	5074316	2873	2601	2449
JU	409241	5076446	1888	2007	1562
JV	410583	5077810	1615	2062	1759
JW	410806	5077700	1447	1904	1642
JX	410799	5077727	1475	1932	1669
JY	410836	5077708	1448	1907	1651
JZ	411084	5077830	1542	2004	1801
KA	411343	5077856	1584	2038	1891
KB	411351	5077763	1493	1946	1806
KC	411559	5077890	1661	2103	2000
KD	411573	5077865	1640	2081	1983
KE	411583	5077836	1615	2055	1961
KF	411645	5077877	1673	2109	2025
KG	411628	5077731	1529	1963	1887
KH	411682	5077731	1548	1977	1912

Point of Reception ID	Location (UTM Zone 20, NAD 83)		Distance from receptor to: (meters)		
	Easting	Northing	Wind Turbine 1	Wind Turbine 2	Wind Turbine 3
KI	412061	5077716	1709	2097	2110
KJ	412836	5077338	2010	2264	2444
KK	412749	5076218	1628	1646	2001
KL	412462	5075862	1406	1312	1719
KM	412490	5075869	1431	1341	1746
KN	412775	5075725	1746	1628	2048
KO	412808	5075957	1718	1663	2057
KP	412854	5075174	2059	1825	2279
KQ	412847	5075131	2077	1834	2290
KR	412833	5075144	2058	1816	2271
KS	411782	5074810	1619	1197	1618
KT	412319	5075502	1432	1213	1661
KU	411597	5074808	1554	1113	1509
KV	411500	5074910	1429	982	1370
KW	411473	5074877	1454	1003	1383
KX	411438	5074808	1513	1059	1426
KY	411474	5074807	1522	1070	1444
KZ	410737	5074093	2229	1783	1966
LA	412703	5075931	1621	1556	1953
LB	411232	5074559	1733	1271	1574

6. Description of Sources

6.1. Turbine Locations

A map of the project area with the proposed WTG layout is illustrated in Annex A. The existing Amherst Wind Farm, owned by Capstone, located on the Tantramar Marsh is approximately 7.5 kilometers North West. There are no existing or proposed wind farms within 5 kilometers the project, thus it is unlikely any cumulative shadow flicker effects will occur. Coordinates of the wind turbines are given below in Table 2. Turbine ID numbers included in Table 2 with the WindPRO generated figures included Annex A.

Table 2: Coordinates of proposed turbine locations.

WTG ID Number	Proposed WTG Location (UTM Zone 20, NAD 83)	
	Easting	Northing
1	411,122 m E	5,076,288 m N
2	411,150 m E	5,075,827 m N
3	410,754 m E	5,076,059 m N

6.2. Turbine Types

The model of WTGs being considered for the proposed wind farm is the Enercon E-92 2.0 MW. The E-92 2.0 MW have the same hub height and blade length as the E-92 2.3 MW, however the turbine is derated to 2.0 MW.

This model utilizes horizontal axis, upwind, 3-bladed, and a microprocessor pitch control system. Table 3 below outlines their main characteristics.

Table 3: Enercon E-92 2.3 MW turbine characteristics. (Enercon, 2012)

Generator Type	Rotor Diameter (m)	Hub Height (m)	Swept area (m^2)	Rated Output (MW)
E-92 2.0	92	98	6648	2.0
E-92 2.3	92	98	6648	2.3

7. Impact Assessment

7.1. Prediction Methodology

The shadow flicker impact was calculated at each receptor using the Shadow module of the software package, WindPRO version 2.9. The model simulates the Earth's orbit and rotation, to provide the astronomical maximum shadow, also known as the astronomical worst-case scenario. The astronomical maximum shadow calculation assumes that for every day of the year:

1. The sky is cloudless between sunrise and sunset,
2. The turbines are always in operation, and
3. The wind direction changes throughout the day such that the rotor plane is perpendicular to the incident sun rays at all times.

The position of the sun relative to the wind turbine rotor plane and the resulting shadow is calculated in steps of one minute intervals throughout a complete year. If the rotor plane, assumed to be a solid disk equivalent in size to the swept area shown in Table 3 casts a shadow on a receptor window during one of these intervals, it is registered as one minute of potential shadow impact.

As previously noted, following the German guidelines, the impact of shadow flicker on surrounding receptors is limited by two factors; the first being that the angle of the sun over the horizon must be greater than 3 degrees, due to optic conditions in the atmosphere which cause the shadow to dissipate before it could potentially reach a receptor and the second is that the blade of the wind turbine must cover at least 20% of the incident solar rays in order to have a noticeable effect. Distances from WTGs to receptors are shown in Table 1.

Each receptor was treated as a 'greenhouse' with 3m high windows for 360° of the building. Furthermore, no topographical shielding (other buildings, barns, trees etc.) has been considered between the wind turbines and receptors. This is a worst-case assumption and results in a conservative prediction of the potential shadow flicker impacts.

7.2. Results of Shadow Flicker Predictions

The results of the shadow flicker prediction model at each receptor prove compliance with the German standards of no more than 30 hours per year of astronomical maximum shadow (worst case), and no more than 30 minutes on the worst day of astronomical maximum shadow (worst case). Table 4 shows the results of the receptors that are predicted to experience any shadow hours. The receptors not included in Table 4 are not predicted to encounter any shadow flicker impacts.

While all receptors are subject to less than 30hrs/year or 30mins/day, the highest worst case shadow flicker modelled was 12 hours 44 minutes per year and at a maximum of 26 minutes per day. Tabulated results for the Enercon E-92 2.3 MW can be found in Table 4, while modelled results representing shadow flicker hours per year and WindPRO generated shadow flicker calendars are mapped in Annex B.

Table 4: Predicted shadow flicker for E-92 2.3 MW @ 98 m hub height.

Receptor ID	Shadow hours per year (h/year)	Shadow days per year (days/year)	Max shadow hours per day (h/day)
BI	12:44	42	0:26
AA	11:13	64	0:18
KL	8:17	48	0:16
BK	8:16	48	0:14
CW	7:45	52	0:14
KM	7:44	44	0:16
HV	6:57	36	0:14
AE	6:55	41	0:15
DW	6:44	41	0:15
KT	6:34	40	0:19
DX	6:12	38	0:15
LA	5:26	36	0:14
AY	5:22	37	0:13
DY	5:21	36	0:14
CX	5:06	37	0:13
DH	5:06	35	0:14
BT	4:31	33	0:13
M	4:13	34	0:12
AT	4:12	32	0:13
HO	4:02	33	0:12
HQ	3:59	34	0:12
AP	3:58	33	0:12
CA	3:55	33	0:12
BJ	2:48	21	0:10
DT	2:40	18	0:13
KN	2:38	18	0:13
DV	2:35	18	0:13
AD	2:28	19	0:12
KK	2:13	16	0:12
HN	2:11	17	0:12
HT	2:08	16	0:12
HM	2:06	17	0:11
JU	2:05	16	0:12
DB	2:00	16	0:11

HL	2:00	16	0:11
HJ	1:52	17	0:10
HH	1:50	17	0:11

8. Conclusions and Recommendations

Natural Forces Wind Inc. has completed a thorough assessment to evaluate the astronomical worst case shadow flicker impact of the proposed Amherst Community Wind Farm at receptor locations within 2,500 m of a proposed wind turbine generator. Based on the parameters used to run the shadow flicker prediction model via WindPRO, it has been shown that the predicted duration of shadow flicker emitted by the wind turbine generators at all points of reception is less than the widely accepted German guidelines that were used in this assessment. As a result of this study, no mitigation strategies are recommended.

9. References

Enercon Canada (2012). *Enercon E-92 2.3 MW Wind Turbine Generator data sheet.*

Nielson, P. (2012). *Windpro 2.8 user guide*. (1st ed.). Denmark: EMD International A/S.

WEA-Schattenwurf-Hinweise (2002). *Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windenergianlagen (Notes on the identification and assessment of the optical pollutions of Wind Turbines).* WindPRO

ANNEX A

Results Map

Project:
AMR_WindPro final location 141204

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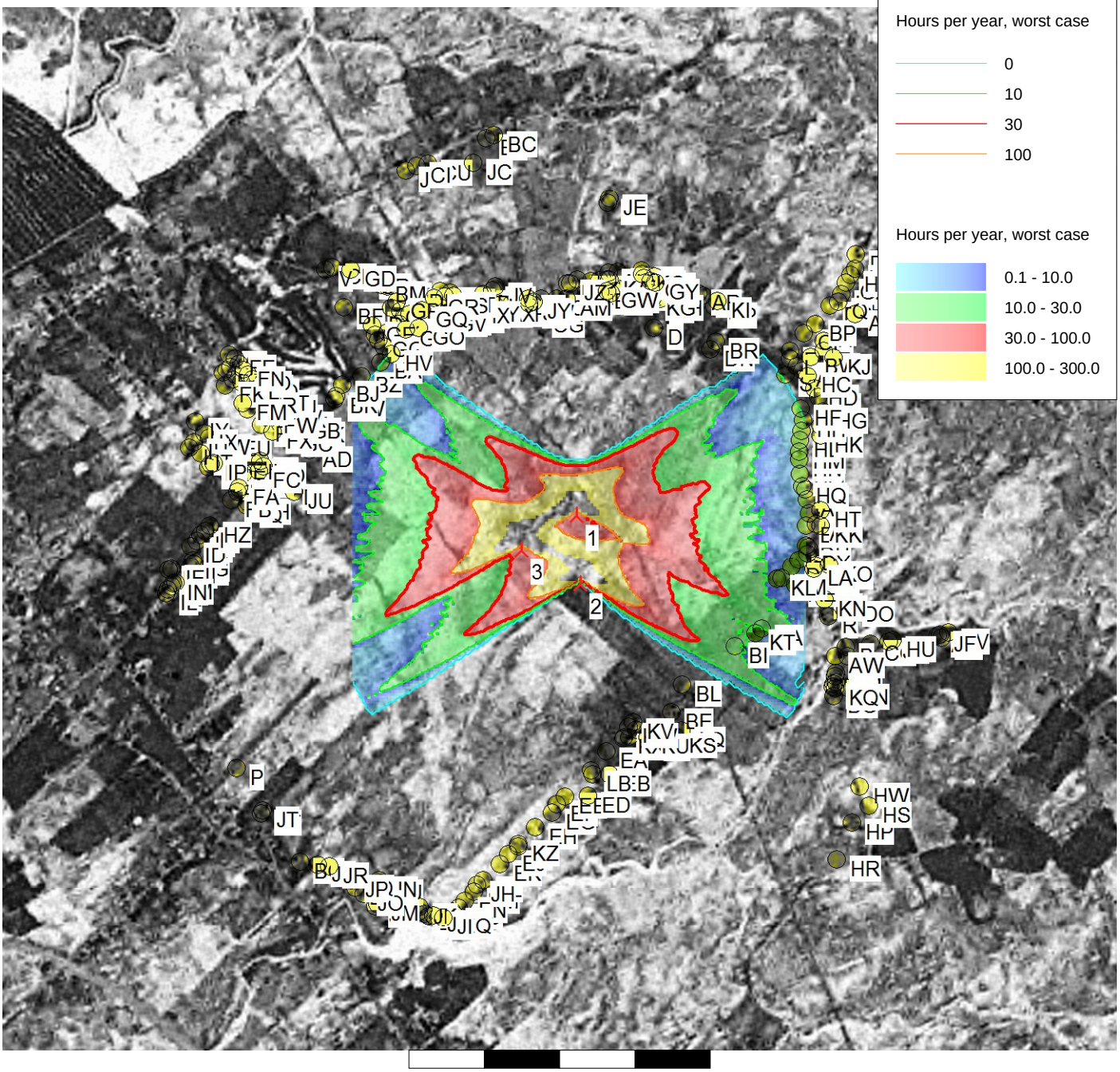
04/12/2014 4:19 PM/2.9.269

SHADOW - Map

Calculation: Amherst Community Shadow Flicker



Map: WindPRO map , Print scale 1:40,000, Map center UTM (north)-NAD83 (US+CA) Zone: 20 East: 410,997 North: 5,076,209

New WTG Shadow receptor

Flicker map level: Height Contours: CONTOURLINE_ONLINEDATA_3.wpo (1)

ANNEX B

WindPRO v2.9, Shadow Module Calculation Results

E92-2.3 MW @ 98m Hub Height

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SHADOW - Main Result

Calculation: Amherst Community Shadow Flicker

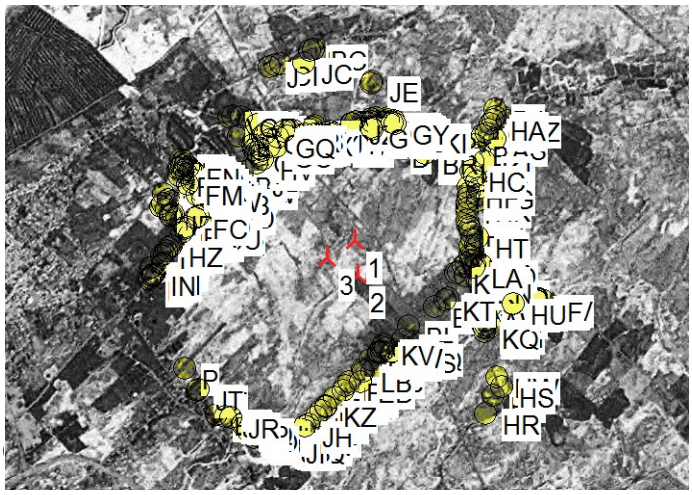
Assumptions for shadow calculations

Maximum distance for influence
Calculate only when more than 20 % of sun is covered by the blade
Please look in WTG table

Minimum sun height over horizon for influence	3 °
Day step for calculation	1 days
Time step for calculation	1 minutes

The calculated times are "worst case" given by the following assumptions:
- The sun is shining all the day, from sunrise to sunset
- The rotor plane is always perpendicular to the line from the WTG to the sun
- The WTG is always operating

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:
Height contours used: Height Contours: CONTOURLINE_ONLINEDATA_3.wpo
Obstacles used in calculation
Eye height: 1.5 m
Grid resolution: 10.0 m



Scale 1:100,000
New WTG
Shadow receptor

WTGs

	UTM (north)-NAD83 (US+CA) Zone: 20				WTG type						Shadow data	
	East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Calculation distance	RPM
			[m]					[kW]	[m]	[m]	[m]	[RPM]
1	411,122	5,076,288	60.4	ENERCON E-92 2,3 MW 2300 92.0 ...	Yes	ENERCON	E-92 2,3 MW-2,300	2,300	92.0	98.0	1,639	16.0
2	411,150	5,075,827	56.1	ENERCON E-92 2,3 MW 2300 92.0 ...	Yes	ENERCON	E-92 2,3 MW-2,300	2,300	92.0	98.0	1,639	16.0
3	410,754	5,076,059	65.1	ENERCON E-92 2,3 MW 2300 92.0 ...	Yes	ENERCON	E-92 2,3 MW-2,300	2,300	92.0	98.0	1,639	16.0

Shadow receptor-Input

	UTM (north)-NAD83 (US+CA) Zone: 20								
No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	410,687	5,077,694	58.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
B	412,917	5,075,407	34.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
C	412,770	5,077,450	74.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
D	411,637	5,077,534	68.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
E	412,772	5,077,381	73.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
F	412,548	5,077,384	70.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
G	411,522	5,074,857	50.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
H	410,752	5,077,687	60.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
I	410,886	5,077,728	60.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
J	409,985	5,078,587	37.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
K	411,218	5,077,847	54.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
L	412,545	5,077,331	70.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
M	412,672	5,076,299	60.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
N	411,712	5,077,716	58.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
O	408,873	5,077,294	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
P	408,859	5,074,597	46.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
Q	412,869	5,077,709	75.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
R	412,802	5,075,612	34.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
S	412,515	5,077,219	70.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
T	410,620	5,077,696	56.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
U	412,931	5,075,350	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"

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SHADOW - Main Result

Calculation: Amherst Community Shadow Flicker

...continued from previous page

UTM (north)-NAD83 (US+CA) Zone: 20

No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
V	409,450	5,077,924	30.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
W	411,964	5,077,748	58.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
X	411,426	5,077,867	51.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
Y	410,833	5,077,687	62.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
Z	411,651	5,077,709	57.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AA	412,356	5,075,531	51.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AB	410,362	5,077,647	53.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AC	413,531	5,075,487	40.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AD	409,342	5,076,720	70.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AE	412,583	5,075,822	48.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AF	411,398	5,077,908	47.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AG	412,629	5,077,251	70.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AH	408,937	5,076,375	64.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AI	411,274	5,077,854	54.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AJ	408,809	5,077,359	33.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AK	411,218	5,077,771	60.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AL	409,789	5,073,827	32.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AM	411,056	5,077,731	61.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AN	409,952	5,077,647	42.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AO	411,435	5,077,793	56.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AP	412,657	5,076,391	63.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AQ	411,822	5,074,852	50.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AR	411,931	5,077,767	57.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AS	412,980	5,077,625	75.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AT	412,722	5,076,231	54.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AU	411,337	5,077,903	49.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AV	409,973	5,077,612	45.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AW	412,848	5,075,349	32.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AX	410,575	5,077,689	57.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AY	412,716	5,075,955	44.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AZ	410,809	5,077,676	62.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BA	409,819	5,077,307	57.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BB	412,854	5,075,234	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BC	410,573	5,078,822	37.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BD	411,281	5,077,776	60.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BE	411,755	5,074,975	57.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BF	409,573	5,077,673	33.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BG	412,840	5,075,082	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BH	411,385	5,077,782	59.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BI	412,181	5,075,412	56.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BJ	409,564	5,077,151	59.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BK	409,521	5,077,076	62.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BL	411,829	5,075,161	66.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BM	409,821	5,077,822	32.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BN	412,926	5,075,138	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BO	411,328	5,077,855	55.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BP	412,716	5,077,559	75.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BQ	409,280	5,073,978	27.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BR	412,052	5,077,442	69.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BS	411,061	5,077,829	58.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BT	412,655	5,076,219	58.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BU	409,819	5,073,832	32.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BV	413,605	5,075,505	39.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BW	412,682	5,077,344	71.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BX	410,520	5,078,801	38.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"

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SHADOW - Main Result

Calculation: Amherst Community Shadow Flicker

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UTM (north)-NAD83 (US+CA) Zone: 20

No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
BY	410,203	5,073,611	28.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BZ	409,689	5,077,214	57.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CA	412,647	5,076,460	64.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CB	410,561	5,077,786	55.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CC	410,282	5,077,768	45.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CD	410,532	5,077,683	58.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CE	412,639	5,077,501	72.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CF	408,957	5,076,550	60.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CG	410,871	5,077,619	65.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CH	409,864	5,077,809	33.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CI	410,056	5,078,619	38.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CJ	411,620	5,074,792	47.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CK	410,139	5,073,616	26.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CL	413,559	5,075,468	40.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CM	412,846	5,075,215	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CN	409,496	5,077,941	30.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CO	413,083	5,075,431	34.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CP	412,040	5,077,678	60.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CQ	410,988	5,077,728	62.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CR	409,723	5,077,872	30.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CS	410,429	5,077,688	55.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CT	410,008	5,077,764	38.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CU	410,131	5,078,630	40.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CV	411,555	5,077,917	50.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CW	409,514	5,077,056	63.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CX	412,671	5,076,075	51.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CY	411,191	5,077,777	60.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CZ	413,150	5,077,878	74.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DA	411,129	5,077,856	56.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DB	409,209	5,076,469	68.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DC	412,591	5,077,280	70.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DD	412,888	5,077,758	75.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DE	410,214	5,077,780	45.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DF	410,075	5,073,646	25.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DG	409,777	5,077,617	37.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DH	412,653	5,076,088	53.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DI	411,499	5,077,845	55.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DJ	412,983	5,078,023	69.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DK	409,292	5,076,881	62.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DL	410,501	5,077,760	55.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DM	409,648	5,073,801	27.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DN	412,013	5,077,394	70.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DO	412,938	5,075,690	32.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DP	412,810	5,077,685	75.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DQ	410,251	5,077,632	49.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DR	410,048	5,077,769	40.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DS	412,838	5,075,164	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DT	412,752	5,075,742	38.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DU	412,809	5,075,941	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DV	412,727	5,075,907	43.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DW	412,556	5,075,942	51.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DX	412,602	5,075,989	50.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DY	412,665	5,076,029	50.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DZ	411,436	5,074,795	49.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EA	411,323	5,074,711	40.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"

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Project:
AMR_WindPro final location 141204

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Calculated:
05/12/2014 11:16 AM/2.9.269

SHADOW - Main Result

Calculation: Amherst Community Shadow Flicker

...continued from previous page

UTM (north)-NAD83 (US+CA) Zone: 20

No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
EB	411,343	5,074,557	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EC	411,223	5,074,585	33.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
ED	411,200	5,074,416	25.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EE	411,046	5,074,410	30.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EF	410,991	5,074,359	32.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EG	410,962	5,074,302	33.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EH	410,847	5,074,207	34.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EI	410,735	5,074,078	30.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EJ	410,669	5,074,028	30.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EK	410,614	5,073,961	33.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EL	410,502	5,073,855	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EM	410,440	5,073,776	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EN	410,381	5,073,715	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EO	410,338	5,073,669	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EP	410,299	5,073,643	33.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EQ	410,268	5,073,611	31.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
ER	410,183	5,073,596	27.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
ES	410,112	5,073,628	25.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
ET	409,024	5,074,298	44.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EU	408,806	5,076,791	55.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EV	408,762	5,076,595	55.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EW	408,811	5,076,539	58.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EX	408,876	5,076,594	57.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EY	408,902	5,076,567	58.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EZ	408,851	5,076,499	60.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FA	408,876	5,076,468	60.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FB	408,823	5,076,389	61.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FC	409,006	5,076,580	64.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FD	409,036	5,076,615	65.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FE	408,848	5,077,333	33.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FF	408,816	5,077,274	36.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FG	408,790	5,077,254	37.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FH	408,765	5,077,234	39.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FI	408,854	5,077,222	40.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FJ	408,834	5,077,189	41.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FK	408,784	5,077,149	43.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FL	408,889	5,077,170	43.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FM	408,899	5,077,029	53.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FN	408,906	5,077,257	37.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FO	408,933	5,077,225	40.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FP	408,968	5,077,195	43.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FQ	408,987	5,077,171	45.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FR	408,982	5,077,077	51.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FS	408,965	5,077,052	52.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FT	409,085	5,077,090	54.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FU	409,119	5,077,060	55.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FV	409,165	5,076,994	57.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FW	409,080	5,076,943	58.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FX	409,096	5,076,843	62.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FY	409,023	5,076,890	60.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FZ	409,149	5,076,893	60.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GA	409,213	5,076,950	59.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GB	409,262	5,076,909	61.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GC	409,201	5,076,822	65.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GD	409,617	5,077,923	30.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"

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Project:
AMR_WindPro final location 141204

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Calculated:
05/12/2014 11:16 AM/2.9.269

SHADOW - Main Result

Calculation: Amherst Community Shadow Flicker

...continued from previous page

UTM (north)-NAD83 (US+CA) Zone: 20

No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
GE	409,763	5,077,549	42.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GF	409,784	5,077,492	45.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GG	409,801	5,077,452	48.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GH	409,838	5,077,414	50.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GI	409,894	5,077,483	48.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GJ	409,861	5,077,504	46.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GK	409,887	5,077,667	39.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GL	409,938	5,077,562	46.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GM	410,012	5,077,627	44.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GN	409,988	5,077,526	48.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GO	410,074	5,077,535	47.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GP	409,927	5,077,710	39.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GQ	410,091	5,077,651	45.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GR	410,175	5,077,737	45.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GS	410,244	5,077,747	46.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GT	410,304	5,077,752	46.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GU	410,219	5,077,668	48.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GV	410,242	5,077,624	49.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GW	411,329	5,077,781	60.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GX	411,616	5,077,845	54.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GY	411,648	5,077,836	54.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GZ	412,916	5,077,837	73.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HA	412,949	5,077,888	71.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HB	412,979	5,077,927	70.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HC	412,665	5,077,213	70.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HD	412,710	5,077,128	68.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HE	412,732	5,077,070	67.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HF	412,619	5,076,996	68.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HG	412,763	5,076,976	65.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HH	412,634	5,076,917	67.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HI	412,751	5,076,885	64.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HJ	412,621	5,076,849	66.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HK	412,751	5,076,815	64.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HL	412,612	5,076,785	66.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HM	412,607	5,076,709	66.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HN	412,606	5,076,659	65.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HO	412,613	5,076,560	65.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HP	412,961	5,074,234	29.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HQ	412,627	5,076,481	65.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HR	412,861	5,073,989	32.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HS	413,071	5,074,350	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HT	412,749	5,076,324	54.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HU	413,229	5,075,453	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HV	409,888	5,077,361	55.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HW	413,009	5,074,477	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HX	410,404	5,077,677	55.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HY	410,466	5,077,689	57.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HZ	408,680	5,076,222	61.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IA	408,648	5,076,184	62.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IB	408,619	5,076,158	62.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IC	408,593	5,076,117	62.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
ID	408,550	5,076,083	61.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IE	408,425	5,075,931	59.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IF	408,403	5,075,924	58.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IG	408,566	5,075,990	64.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"

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Project:
AMR_WindPro final location 141204

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Calculated:
05/12/2014 11:16 AM/2.9.269

SHADOW - Main Result

Calculation: Amherst Community Shadow Flicker

...continued from previous page

UTM (north)-NAD83 (US+CA) Zone: 20

No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
IH	408,572	5,075,967	65.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
II	408,553	5,075,947	65.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IJ	408,424	5,075,815	63.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IK	408,401	5,075,793	63.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IL	408,389	5,075,769	62.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IM	408,453	5,075,840	64.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IN	408,437	5,075,832	63.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IO	408,864	5,076,443	61.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IP	408,708	5,076,635	55.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IQ	408,926	5,076,353	64.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IR	408,670	5,076,609	56.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IS	408,683	5,076,628	55.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IT	408,617	5,076,701	55.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IU	408,572	5,076,771	50.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IV	408,540	5,076,735	52.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IW	408,677	5,076,803	51.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IX	408,645	5,076,834	49.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IY	408,583	5,076,908	45.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IZ	408,971	5,076,639	60.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JA	409,016	5,076,651	63.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JB	408,928	5,076,992	56.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JC	410,435	5,078,635	40.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JD	411,332	5,078,365	33.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JE	411,342	5,078,397	34.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JF	413,544	5,075,493	40.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JG	413,205	5,075,446	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JH	410,460	5,073,823	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JI	410,234	5,073,606	30.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JJ	410,171	5,073,620	27.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JK	410,079	5,073,674	27.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JL	409,784	5,073,681	22.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JM	409,799	5,073,696	24.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JN	409,810	5,073,852	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JO	409,707	5,073,761	25.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JP	409,624	5,073,854	28.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JQ	409,638	5,073,866	30.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JR	409,477	5,073,946	32.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JS	409,397	5,073,956	31.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JT	409,033	5,074,316	45.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JU	409,241	5,076,446	70.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JV	410,583	5,077,810	53.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JW	410,806	5,077,700	60.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JX	410,799	5,077,727	58.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JY	410,836	5,077,708	61.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JZ	411,084	5,077,830	58.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KA	411,343	5,077,856	55.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KB	411,351	5,077,763	60.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KC	411,559	5,077,890	52.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KD	411,573	5,077,865	54.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KE	411,583	5,077,836	55.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KF	411,645	5,077,877	50.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KG	411,628	5,077,731	56.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KH	411,682	5,077,731	57.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KI	412,061	5,077,716	56.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KJ	412,836	5,077,338	71.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"

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SHADOW - Main Result

Calculation: Amherst Community Shadow Flicker

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UTM (north)-NAD83 (US+CA) Zone: 20

No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
KK	412,749	5,076,218	50.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KL	412,462	5,075,862	55.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KM	412,490	5,075,869	55.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KN	412,775	5,075,725	37.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KO	412,808	5,075,957	42.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KP	412,854	5,075,174	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KQ	412,847	5,075,131	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KR	412,833	5,075,144	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KS	411,782	5,074,810	49.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KT	412,319	5,075,502	51.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KU	411,597	5,074,808	47.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KV	411,500	5,074,910	54.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KW	411,473	5,074,877	53.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KX	411,438	5,074,808	49.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KY	411,474	5,074,807	49.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KZ	410,737	5,074,093	30.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LA	412,703	5,075,931	44.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LB	411,232	5,074,559	32.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"

Calculation Results

Shadow receptor

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
A	0:00	0	0:00
B	0:00	0	0:00
C	0:00	0	0:00
D	0:00	0	0:00
E	0:00	0	0:00
F	0:00	0	0:00
G	0:00	0	0:00
H	0:00	0	0:00
I	0:00	0	0:00
J	0:00	0	0:00
K	0:00	0	0:00
L	0:00	0	0:00
M	4:13	34	0:12
N	0:00	0	0:00
O	0:00	0	0:00
P	0:00	0	0:00
Q	0:00	0	0:00
R	0:00	0	0:00
S	0:00	0	0:00
T	0:00	0	0:00
U	0:00	0	0:00
V	0:00	0	0:00
W	0:00	0	0:00
X	0:00	0	0:00
Y	0:00	0	0:00
Z	0:00	0	0:00
AA	11:13	64	0:18
AB	0:00	0	0:00

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SHADOW - Main Result

Calculation: Amherst Community Shadow Flicker

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No.	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
AC	0:00	0	0:00
AD	2:28	19	0:12
AE	6:55	41	0:15
AF	0:00	0	0:00
AG	0:00	0	0:00
AH	0:00	0	0:00
AI	0:00	0	0:00
AJ	0:00	0	0:00
AK	0:00	0	0:00
AL	0:00	0	0:00
AM	0:00	0	0:00
AN	0:00	0	0:00
AO	0:00	0	0:00
AP	3:58	33	0:12
AQ	0:00	0	0:00
AR	0:00	0	0:00
AS	0:00	0	0:00
AT	4:12	32	0:13
AU	0:00	0	0:00
AV	0:00	0	0:00
AW	0:00	0	0:00
AX	0:00	0	0:00
AY	5:22	37	0:13
AZ	0:00	0	0:00
BA	0:00	0	0:00
BB	0:00	0	0:00
BC	0:00	0	0:00
BD	0:00	0	0:00
BE	0:00	0	0:00
BF	0:00	0	0:00
BG	0:00	0	0:00
BH	0:00	0	0:00
BI	12:44	42	0:26
BJ	2:48	21	0:10
BK	8:16	48	0:14
BL	0:00	0	0:00
BM	0:00	0	0:00
BN	0:00	0	0:00
BO	0:00	0	0:00
BP	0:00	0	0:00
BQ	0:00	0	0:00
BR	0:00	0	0:00
BS	0:00	0	0:00
BT	4:31	33	0:13
BU	0:00	0	0:00
BV	0:00	0	0:00
BW	0:00	0	0:00
BX	0:00	0	0:00
BY	0:00	0	0:00
BZ	0:00	0	0:00
CA	3:55	33	0:12
CB	0:00	0	0:00
CC	0:00	0	0:00
CD	0:00	0	0:00
CE	0:00	0	0:00

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SHADOW - Main Result

Calculation: Amherst Community Shadow Flicker

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No.	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
CF	0:00	0	0:00
CG	0:00	0	0:00
CH	0:00	0	0:00
CI	0:00	0	0:00
CJ	0:00	0	0:00
CK	0:00	0	0:00
CL	0:00	0	0:00
CM	0:00	0	0:00
CN	0:00	0	0:00
CO	0:00	0	0:00
CP	0:00	0	0:00
CQ	0:00	0	0:00
CR	0:00	0	0:00
CS	0:00	0	0:00
CT	0:00	0	0:00
CU	0:00	0	0:00
CV	0:00	0	0:00
CW	7:45	52	0:14
CX	5:06	37	0:13
CY	0:00	0	0:00
CZ	0:00	0	0:00
DA	0:00	0	0:00
DB	2:00	16	0:11
DC	0:00	0	0:00
DD	0:00	0	0:00
DE	0:00	0	0:00
DF	0:00	0	0:00
DG	0:00	0	0:00
DH	5:06	35	0:14
DI	0:00	0	0:00
DJ	0:00	0	0:00
DK	0:00	0	0:00
DL	0:00	0	0:00
DM	0:00	0	0:00
DN	0:00	0	0:00
DO	0:00	0	0:00
DP	0:00	0	0:00
DQ	0:00	0	0:00
DR	0:00	0	0:00
DS	0:00	0	0:00
DT	2:40	18	0:13
DU	0:00	0	0:00
DV	2:35	18	0:13
DW	6:44	41	0:15
DX	6:12	38	0:15
DY	5:21	36	0:14
DZ	0:00	0	0:00
EA	0:00	0	0:00
EB	0:00	0	0:00
EC	0:00	0	0:00
ED	0:00	0	0:00
EE	0:00	0	0:00
EF	0:00	0	0:00
EG	0:00	0	0:00
EH	0:00	0	0:00

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Project:
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SHADOW - Main Result

Calculation: Amherst Community Shadow Flicker

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No.	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
EI	0:00	0	0:00
EJ	0:00	0	0:00
EK	0:00	0	0:00
EL	0:00	0	0:00
EM	0:00	0	0:00
EN	0:00	0	0:00
EO	0:00	0	0:00
EP	0:00	0	0:00
EQ	0:00	0	0:00
ER	0:00	0	0:00
ES	0:00	0	0:00
ET	0:00	0	0:00
EU	0:00	0	0:00
EV	0:00	0	0:00
EW	0:00	0	0:00
EX	0:00	0	0:00
EY	0:00	0	0:00
EZ	0:00	0	0:00
FA	0:00	0	0:00
FB	0:00	0	0:00
FC	0:00	0	0:00
FD	0:00	0	0:00
FE	0:00	0	0:00
FF	0:00	0	0:00
FG	0:00	0	0:00
FH	0:00	0	0:00
FI	0:00	0	0:00
FJ	0:00	0	0:00
FK	0:00	0	0:00
FL	0:00	0	0:00
FM	0:00	0	0:00
FN	0:00	0	0:00
FO	0:00	0	0:00
FP	0:00	0	0:00
FQ	0:00	0	0:00
FR	0:00	0	0:00
FS	0:00	0	0:00
FT	0:00	0	0:00
FU	0:00	0	0:00
FV	0:00	0	0:00
FW	0:00	0	0:00
FX	0:00	0	0:00
FY	0:00	0	0:00
FZ	0:00	0	0:00
GA	0:00	0	0:00
GB	0:00	0	0:00
GC	0:00	0	0:00
GD	0:00	0	0:00
GE	0:00	0	0:00
GF	0:00	0	0:00
GG	0:00	0	0:00
GH	0:00	0	0:00
GI	0:00	0	0:00
GJ	0:00	0	0:00
GK	0:00	0	0:00

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SHADOW - Main Result

Calculation: Amherst Community Shadow Flicker

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No.	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
GL	0:00	0	0:00
GM	0:00	0	0:00
GN	0:00	0	0:00
GO	0:00	0	0:00
GP	0:00	0	0:00
GQ	0:00	0	0:00
GR	0:00	0	0:00
GS	0:00	0	0:00
GT	0:00	0	0:00
GU	0:00	0	0:00
GV	0:00	0	0:00
GW	0:00	0	0:00
GX	0:00	0	0:00
GY	0:00	0	0:00
GZ	0:00	0	0:00
HA	0:00	0	0:00
HB	0:00	0	0:00
HC	0:00	0	0:00
HD	0:00	0	0:00
HE	0:00	0	0:00
HF	0:00	0	0:00
HG	0:00	0	0:00
HH	1:50	17	0:11
HI	0:00	0	0:00
HJ	1:52	17	0:10
HK	0:00	0	0:00
HL	2:00	16	0:11
HM	2:06	17	0:11
HN	2:11	17	0:12
HO	4:02	33	0:12
HP	0:00	0	0:00
HQ	3:59	34	0:12
HR	0:00	0	0:00
HS	0:00	0	0:00
HT	2:08	16	0:12
HU	0:00	0	0:00
HV	6:57	36	0:14
HW	0:00	0	0:00
HX	0:00	0	0:00
HY	0:00	0	0:00
HZ	0:00	0	0:00
IA	0:00	0	0:00
IB	0:00	0	0:00
IC	0:00	0	0:00
ID	0:00	0	0:00
IE	0:00	0	0:00
IF	0:00	0	0:00
IG	0:00	0	0:00
IH	0:00	0	0:00
II	0:00	0	0:00
IJ	0:00	0	0:00
IK	0:00	0	0:00
IL	0:00	0	0:00
IM	0:00	0	0:00
IN	0:00	0	0:00

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SHADOW - Main Result

Calculation: Amherst Community Shadow Flicker

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No.	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
IO	0:00	0	0:00
IP	0:00	0	0:00
IQ	0:00	0	0:00
IR	0:00	0	0:00
IS	0:00	0	0:00
IT	0:00	0	0:00
IU	0:00	0	0:00
IV	0:00	0	0:00
IW	0:00	0	0:00
IX	0:00	0	0:00
IY	0:00	0	0:00
IZ	0:00	0	0:00
JA	0:00	0	0:00
JB	0:00	0	0:00
JC	0:00	0	0:00
JD	0:00	0	0:00
JE	0:00	0	0:00
JF	0:00	0	0:00
JG	0:00	0	0:00
JH	0:00	0	0:00
JI	0:00	0	0:00
JJ	0:00	0	0:00
JK	0:00	0	0:00
JL	0:00	0	0:00
JM	0:00	0	0:00
JN	0:00	0	0:00
JO	0:00	0	0:00
JP	0:00	0	0:00
JQ	0:00	0	0:00
JR	0:00	0	0:00
JS	0:00	0	0:00
JT	0:00	0	0:00
JU	2:05	16	0:12
JV	0:00	0	0:00
JW	0:00	0	0:00
JX	0:00	0	0:00
JY	0:00	0	0:00
JZ	0:00	0	0:00
KA	0:00	0	0:00
KB	0:00	0	0:00
KC	0:00	0	0:00
KD	0:00	0	0:00
KE	0:00	0	0:00
KF	0:00	0	0:00
KG	0:00	0	0:00
KH	0:00	0	0:00
KI	0:00	0	0:00
KJ	0:00	0	0:00
KK	2:13	16	0:12
KL	8:17	48	0:16
KM	7:44	44	0:16
KN	2:38	18	0:13
KO	0:00	0	0:00
KP	0:00	0	0:00
KQ	0:00	0	0:00

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SHADOW - Main Result

Calculation: Amherst Community Shadow Flicker

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No.	Shadow, worst case Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
KR	0:00	0	0:00
KS	0:00	0	0:00
KT	6:34	40	0:19
KU	0:00	0	0:00
KV	0:00	0	0:00
KW	0:00	0	0:00
KX	0:00	0	0:00
KY	0:00	0	0:00
KZ	0:00	0	0:00
LA	5:26	36	0:14
LB	0:00	0	0:00

Total amount of flickering on the shadow receptors caused by each WTG

No.	Name	Worst case [h/year]	Expected [h/year]
1	ENERCON E-92 2,3 MW 2300 92.0 !-! hub: 98.0 m (TOT: 144.0 m) (1)	45:31	
2	ENERCON E-92 2,3 MW 2300 92.0 !-! hub: 98.0 m (TOT: 144.0 m) (2)	43:19	
3	ENERCON E-92 2,3 MW 2300 92.0 !-! hub: 98.0 m (TOT: 144.0 m) (3)	21:33	

Appendix K:

Microwave Radio Links Impact Assessment

Natural Forces

IMPACT ASSESSMENT OF PROPOSED WIND TURBINES IN AMHERST, NS ON PERFORMANCE OF EXISTING MICROWAVE RADIO LINKS

REVISION: B02
NOVEMBER 13TH, 2014

MACNEIL Telecom Inc.

TABLE OF CONTENTS

Contents

LIST OF FIGURES

PURPOSE OF REPORT:

Natural Forces is proposing to construct 3 wind turbines in the Amherst, NS area. As part of the design phase of the project, MacNeil Telecom Inc. was contacted to examine the impact the proposed wind turbines may have on the performance of existing radio communication systems in the immediate area.

ANALYSIS METHODOLOGY:

1. Identify proposed location and size of wind turbines.
2. Obtain data for licensed radio systems within 35km of the wind farm from the radio spectrum licensing authority, Industry Canada (IC) – TAFL database.
3. Plot applicable radio links on a map to show their proximity wrt to the turbines.
4. Review the Industry Canada data records/map to produce a "short list" of radio systems that could potentially be impacted by the turbines.
5. Perform a site visit to verify the location of applicable radio towers and to verify the existence of the antennas identified on the "short list".
6. Tabulate a "verified inventory" of existing radio links that may be of concern and update maps with field verified data.
7. Calculate the recommended required clearance between the radio links of concern and the wind turbine: Fresnel zone and turbine radius.
8. Calculate the expected achievable clearance based on field verified radio site coordinates and specified turbine locations.
9. Assess the results and identify potential issues.
10. If required, recommend what steps can be taken to minimize the impact the turbines will have on existing radio links. The first approach will to work with Natural Forces to consider the possibility of relocating those wind turbines that infringe on existing radio links.

LIMITATIONS OF INDUSTRY CANADA DATA:

The data contained in the Industry Canada database, like any database is subject to certain limitations:

1. **Accuracy of Data**
   System parameters such as site locations (latitudes and longitudes), antenna heights and radio operating parameters are provided by the licensee (or their representative) and are sometimes prone to error. Other system parameters such as the operating frequencies assigned by Industry Canada are much less likely to suffer from serious errors. For the purpose of this report, the accuracy of physical parameters of the radio systems (i.e. site locations, elevations, antenna heights, etc.) are of highest importance, deeming it necessary to confirm the parameters by means of field survey.

2. **Extent of Data**
   The report considers only system data included in the Industry Canada database as of April 17th, 2014.

3. **Licensed Radio Systems**
   The Industry Canada database only includes radio systems that require a license from Industry Canada to operate. Non-licensed radio systems (e.g. certain spread-spectrum radios) are not captured in the database and therefore cannot be identified.

4. **Status of Systems**
   It is assumed that all systems identified on the Industry Canada database are still in service (provided the antennas associated with that system was found to still exist during the field survey).

LIMITATIONS OF ANALYSIS:

1. **Point-to-point Radio Links**
   The report considers point-to-point (PTP) radio links employing narrow beamwidth (e.g parabolic) antennas operating above 900MHz. It does not consider lower frequency systems (i.e. below 900MHz) employing wide beam antennas (e.g. omni-direction or yagi antennas) as such systems are not expected to be significantly impacted by the proposed structures. Typically, lower frequency systems operating in the VHF and UHF band for example are much less susceptible to diffraction loss resulting from obstructions beyond the immediate proximity of its antennas. The dimensions and shape of the proposed wind turbines (i.e. tower and blades) are considered relatively narrow wrt the wavelength of such lower frequency systems and would therefore only be of concern (to cause significant performance degradation) if positioned in very close proximity to the antenna itself. The performance of cellular type radio systems operating in the 1900/2100 MHz bands that use sectorial antennas and operate in the near vicinity of the wind turbines are also given consideration.

2. **Accuracy of Field Measurements**
   Location and ground elevations of towers were measured using Magellan Explorist 310 GPS receiver. The expected accuracy of this unit is in the neighborhood of +/- 5m horizontal.

3. **Accuracy of Customer Data**
   The accuracy of the location of the proposed wind turbines is unknown. Revised coordinates for the turbines was provided on early November 2014.

INPUTS:

The location of the proposed wind turbines have been identified as:

Turbine 1	45° 50' 6.37"N	64° 8' 38.67"W
Turbine 2	45° 49' 47.48"N	64° 8' 35.92"W
Turbine 3	45° 49' 52.93"N	64° 8' 51.14"W

Initial indications are the proposed turbines will have a blade length of 46m wrt to center of turbine.

FINDINGS:

Table A in Appendix A outlines the active licensed non-protected PTP radio links operating in the vicinity (within 20km) of the proposed wind turbines as of April 17th, 2014. This data was sourced from Industry Canada's TAFL. This information is shown visually on a map in **Figure 1**. **Figure 2** shows a close up view of the area around the turbines and the links operating nearby.

Two existing licensed microwave radio links are of most concern and the focus of the study can be narrowed down to these two links. One radio link is owned by Rogers Communications and links their John Black Road site and their West Leicester site and operates in the 10.5GHz band. The second radio link is operated by Eastlink and links their Willow Street tower to their Truemanville tower. This link operates in the 18GHz band.

Consultation with the Province of Nova Scotia also determined that there are no protected public safety radio links on their nearby tower site in Salem that will be impacted by the proposed wind farm. Future radio links on the PNS Salem tower were also considered and are not expected to be impacted – Salem to Sugerloaf (PNS), Salem to Southampton (PNS), Salem to Mount Pleasant (NSP – 7GHz) and Salem to Church Street (NSP - 900MHz).

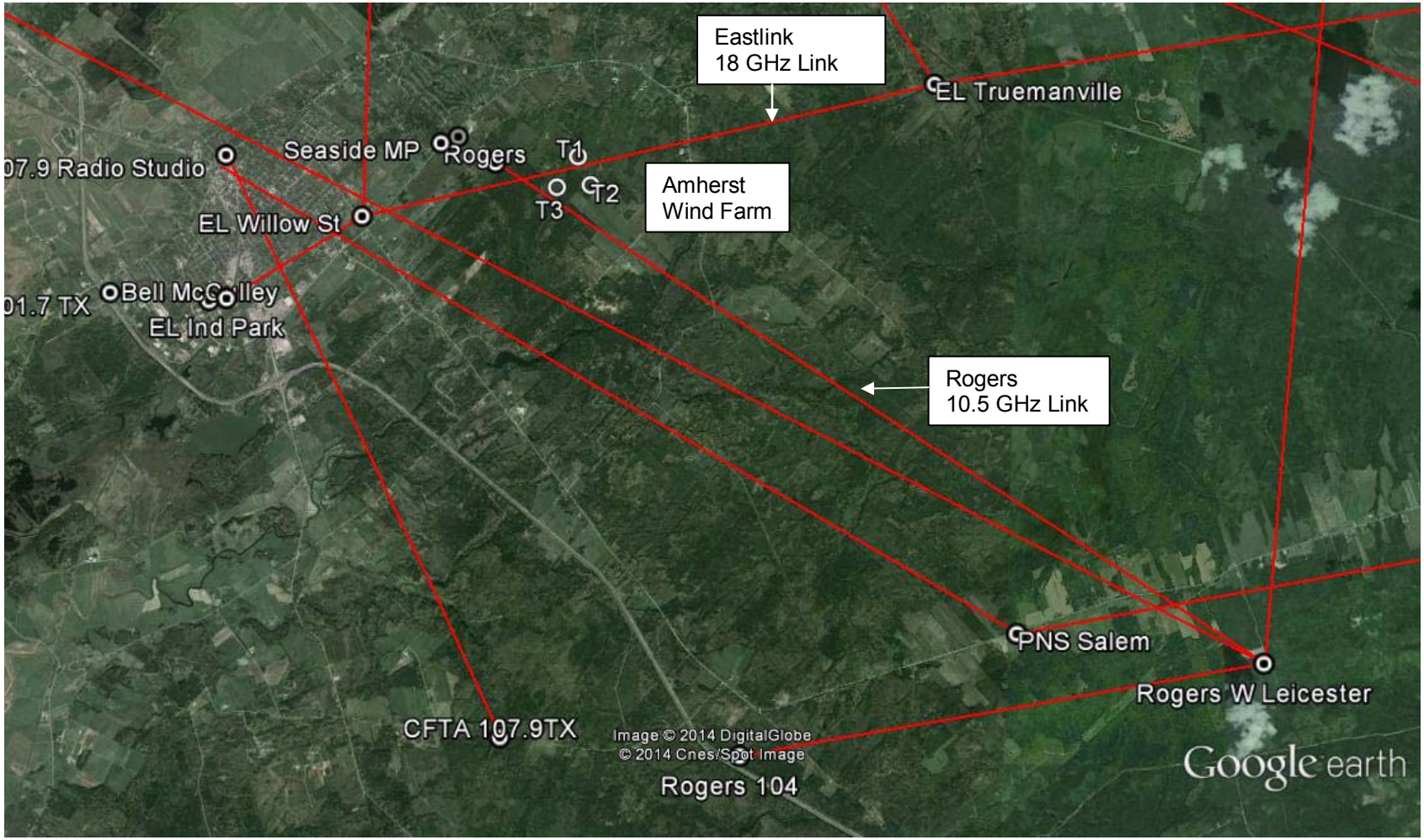

Figure 1 – Licensed PTP Radio Links wrt to \proposed Wind Farm (T1-3)

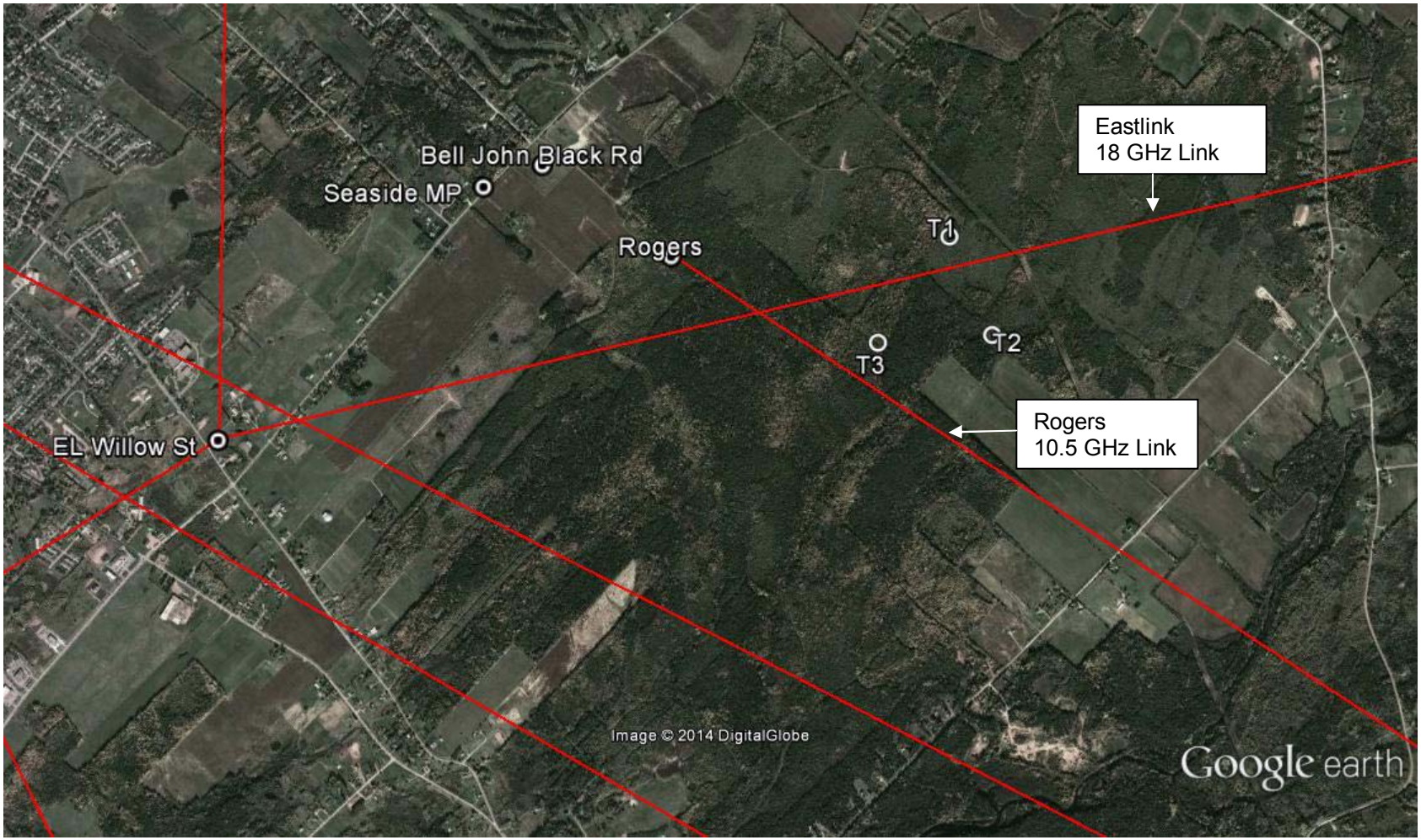

Figure 2 – Amherst Radio Links wrtWind Farm (T1-3) - Close Up

Figure 3 – Bell John Black Road Tower

Figure 4 – Eastlink Willow Street Tower

Figure 5 - Eastlink Truemanville Tower

Figure 6- Rogers John Black Road

Figure 7 - Rogers West Leicester

Figure 8 - Province Nova Scotia - Salem Site

Figure 9 - Seaside John Black Road Tower

ANALYSIS:

The required clearance around a given radio link to avoid diffraction loss is inversely proportional to its frequency (i.e. the higher the frequency, the narrower the clearance area - aka the Fresnel zone).

The absolute minimum clearance required for a given radio link to avoid diffraction loss is 60% of the first fresnel zone (0.6 F1) at the obstruction. However to account for limitations of field measurements and inaccuracies of the actual positioning of turbines, we recommend a minimum clearance of 30m + F1.

Eastlink Willow Street => Truemanville

Eastlink's PTP link between Willow Street and Truemanville operates in the 18GHz band.

TABLE 1.1 – MEASURED RADIO SITE DATA

Site	Description	UTM Northing (m)	UTM Easting (m)	Site Elev. (m)
1	EL Willow Street	5075580	407944	66
2	EL Truemanville	5077404	416304	93

TABLE 1.2 – FRESNEL ZONE CALCULATION

Freq (GHz)	Wave Length	D (km) Link Length	d1 (km)	F1 (m)	F1 + 30m (m)	Rotor Radius (m)	Recommended Minimum Clearance (m)
18	2 cm	8.6	3.2	6.0	36	46m	82m

TABLE 1.3 – SPECIFIED TURBINE LOCATIONS AND CALCULATED OFFSET WRT LINK

Site	UTM Northing (m)	UTM Easting (m)	Calculated Offset (m)	Rec. Min Clearance (m)	Difference (m)	Status
T1	5076363	411149	82	82	+0m	OK
T2	5075779	411200	500	82	+418m	OK
T3	5075952	410874	260	82	+178m	OK

Rogers' John Black Rd => West Leicester

Rogers' PTP link between John Black Rd and West Leicester operates in the 10.5GHz band.

TABLE 2.1 – MEASURED RADIO SITE DATA

Site	Description	UTM Northing (m)	UTM Easting (m)	Site Elev. (m)
1	Rogers John Black Rd	5076332	409889	98
2	Rogers West Leicester	5068980	420734	161

TABLE 2.2 – FRESNEL ZONE CALCULATION

Freq (GHz)	Wave Length	D (km) Link Length	d1 (km)	F1 (m)	F1 + 30m (m)	Rotor Radius (m)	Recommended Minimum Clearance (m)
10.5	3 cm	13.1	1.2	5.5	36	46m	82m

TABLE 2.3 – SPECIFIED TURBINE LOCATIONS AND CALCULATED OFFSET WRT LINK

Site	UTM Northing (m)	UTM Easting (m)	Calculated Offset (m)	Rec. Min Clearance (m)	Difference (m)	Status
T1	5076363	411149	730	82	+648m	OK
T2	5075779	411200	280	82	+198m	OK
T3	5075952	410874	240	82	+158m	OK

Cellular Telephone Systems

It is noted that there are cellular type systems operating in the Amherst area, however these are 1 km (or more) away from the wind farm. Handheld units operating on higher frequency cellular systems (e.g. 1900HSPA and 2100-2600LTE) may potentially experience interference (i.e. noise/reduced data rates) in localized areas in the immediate vicinity of the wind farm and in areas east of the turbines (Bell and Rogers only, as Eastlink's Truemanville site provides coverage/protection in this area). The level of degradation and the number of subscribers potentially affected is difficult to predict, however given the remote location of the turbines (in relation to residents and highways), the wide beamwidth of the antennas employed, and the light population of the area in question (rural Amherst) the potential impact is expected to be minimal.

CONCLUSIONS/RECOMMENDATIONS:

Based on the results of our findings, the proposed wind turbines in Amherst are not expected to cause significant performance degradations on the identified existing radio systems in the area.

Point To Point Systems:
The proposed wind turbines are not expected to significantly impact the performance of licensed PTP radio systems operating in the area. It is noted that other non-licensed radios systems (not identified in the Industry Canada database) have not been identified or assessed unless mentioned in this report.

Fixed Mobile Radio Systems:
Lower frequency fixed systems (below 900MHz) utilizing non-directional antennas (i.e. omni-direction or sector type antennas) that operate close to the turbines are not expected to be negatively impacted with the possible exception being high EMI or local signal scatter that could negatively impacting mobile radio units operating very near the wind turbines.

HSPA/LTE Cellular Systems:
There are cellular type systems (800/1900/2100/2600 MHz bands) operating at Bell's John Black Road site, Rogers' John Black Road and Eastlink's Willow Street and Truemanville sites. The turbines are not expected to significantly impact the operation of these systems with the possible exception being reduced coverage/performance for subscribers operating in close proximity to the wind farm.

APPENDIX A – TAFL DATA (APRIL 17TH, 2014) – 20KM RADIUS AMHERST WIND FARM

Tx Frequency (MHz)	Rx Frequency (MHz)	Latitude (ddmmss)	Longitude (dddmmss)	Station Location	Tx Antenna Azimuth (deg)	Link Station Location	Azimuth (deg)	Distance (km)	Licensee Name
931.6125		454642	640241	WEST LEICESTER N.S.	0		127.93	9.64	Rogers Communications Inc. (Paging) Wilson Tam, Mgr. Radio Engineering
931.6875		454642	640241	WEST LEICESTER N.S.	0		127.93	9.64	Rogers Communications Inc. (Paging) Wilson Tam, Mgr. Radio Engineering
931.7375		454044	635857	CLAREMONT NS	0		143.74	21.05	Bell Mobility Inc Attn: Meyang Yunga: PEIN 6026826
931.7375		455017	641002	AMHERST, NS	0		290.57	2.02	Bell Mobility Inc Attn: Meyang Yunga: PEIN 6026826
931.7375		455430	642306	SACKVILLE, NB	35		294.53	20.6	Bell Mobility Inc Attn: Meyang Yunga: PEIN 6026826
931.9375		454642	640241	WEST LEICESTER N.S.	0		127.93	9.64	Rogers Communications Inc. (Paging) Wilson Tam, Mgr. Radio Engineering
942.2	933.2	454005	640221	SPRINGHILL, NS	45.9	MOUNT PLEASANT	156.12	19.89	NOVA SCOTIA POWER ATTN: CUSTOMER OPERATIONS - RAL
952.93125		454948	641220	AMHERST, NS -WATER METER READING	0		267.84	4.87	TOWN OF AMHERST WORKS
952.94375		455400	642157	SACKVILLE, NB-METER READING SYSTEM	0		293.83	18.87	TOWN OF SACKVILLE
958		455009	641240	AMHERST, NS - CFTA STUDIO	154	CUMBERLAND COUNTY	275.03	5.31	TANTRAMAR COUMMUNTIY RADIO SOCIETY ATT'N: RON BICKLE
1930	1850	454404	635322	A0345-1853, BLACK RIVER RD OXFORD	0		118.73	22.42	FIDO SOLUTIONS INC Ron Murphy, Dir. Radio Engineering
1930	1850	454530	640653	A0365-667, OLD HALIFAX ROAD SALEM	0		165.05	8.44	FIDO SOLUTIONS INC Ron Murphy, Dir. Radio Engineering
1930	1850	454611	640109	A0011-1149, MAPLE LANE WEST LEICES	120		125.66	11.8	FIDO SOLUTIONS INC Ron Murphy, Dir. Radio Engineering
1930	1850	455004	640936	A0194-200 ROBERT ANGUS DR AMHERST	0		283.04	1.37	FIDO SOLUTIONS INC Ron Murphy, Dir. Radio Engineering
1930	1850	455430	642308	A0374-39 HESLER DRIVE SACKVILLE	0		294.48	20.64	FIDO SOLUTIONS INC Ron Murphy, Dir. Radio Engineering
1957.5	1877.5	454859	641248	J0665-10 McCully	10		252.76	5.73	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1957.5	1877.5	454859	641248	J0665-10 McCully	120		252.76	5.73	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1957.5	1877.5	454859	641248	J0665-10 McCully	255		252.76	5.73	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1957.5	1877.5	455017	641002	J0460-366 John Black Road	70		290.57	2.02	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1957.5	1877.5	455017	641002	J0460-366 John Black Road	160		290.57	2.02	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1957.5	1877.5	455017	641002	J0460-366 John Black Road	265		290.57	2.02	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1958	1878	454859	641248	J0665-10 McCully Street	10		252.76	5.73	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1958	1878	454859	641248	J0665-10 McCully Street	120		252.76	5.73	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1958	1878	454859	641248	J0665-10 McCully Street	255		252.76	5.73	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826

Tx Frequency (MHz)	Rx Frequency (MHz)	Latitude (ddmmss)	Longitude (dddmmss)	Station Location	Tx Antenna Azimuth (deg)	Link Station Location	Azimuth (deg)	Distance (km)	Licensee Name
1958	1878	455017	641002	J0460-366 John Black Road	70		290.57	2.02	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1958	1878	455017	641002	J0460-366 John Black Road	160		290.57	2.02	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1958	1878	455017	641002	J0460-366 John Black Road	265		290.57	2.02	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1958	1878	455431	642308	J0387-39 Hesler Drive	60		294.56	20.65	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1958	1878	455431	642308	J0387-39 Hesler Drive	160		294.56	20.65	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1958	1878	455431	642308	J0387-39 Hesler Drive	320		294.56	20.65	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1962.5	1882.5	454859	641248	J0665-10 McCully	10		252.76	5.73	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1962.5	1882.5	454859	641248	J0665-10 McCully	120		252.76	5.73	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1962.5	1882.5	454859	641248	J0665-10 McCully	255		252.76	5.73	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1962.5	1882.5	455017	641002	J0460-366 John Black Road	70		290.57	2.02	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1962.5	1882.5	455017	641002	J0460-366 John Black Road	160		290.57	2.02	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1962.5	1882.5	455017	641002	J0460-366 John Black Road	265		290.57	2.02	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1962.5	1882.5	455431	642308	J0387-39 Hesler Drive	60		294.56	20.65	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1962.5	1882.5	455431	642308	J0387-39 Hesler Drive	160		294.56	20.65	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1962.5	1882.5	455431	642308	J0387-39 Hesler Drive	320		294.56	20.65	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1963	1883	454859	641248	J0665-10 McCully Street	10		252.76	5.73	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1963	1883	454859	641248	J0665-10 McCully Street	120		252.76	5.73	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1963	1883	454859	641248	J0665-10 McCully Street	255		252.76	5.73	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1963	1883	455017	641002	J0460-366 John Black Road	70		290.57	2.02	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1963	1883	455017	641002	J0460-366 John Black Road	160		290.57	2.02	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1963	1883	455017	641002	J0460-366 John Black Road	265		290.57	2.02	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1967.5	1887.5	454859	641248	J0665-10 McCully	10		252.76	5.73	Bell Mobility Inc. Attn: Meyang Yunga; PEIN 6026826
1967.5	1887.5	454859	641248	J0665-10 McCully	120		252.76	5.73	Bell Mobility Inc. Attn: Meyang Yunga; PEIN 6026826

Tx Frequency (MHz)	Rx Frequency (MHz)	Latitude (ddmmss)	Longitude (dddmmss)	Station Location	Tx Antenna Azimuth (deg)	Link Station Location	Azimuth (deg)	Distance (km)	Licensee Name
1967.5	1887.5	454859	641248	J0665-10 McCully	255		252.76	5.73	Bell Mobility Inc. Attn: Meyang Yunga; PEIN 6026826
1967.5	1887.5	455017	641002	J0460-366 John Black Road	70		290.57	2.02	Bell Mobility Inc. Attn: Meyang Yunga; PEIN 6026826
1967.5	1887.5	455017	641002	J0460-366 John Black Road	160		290.57	2.02	Bell Mobility Inc. Attn: Meyang Yunga; PEIN 6026826
1967.5	1887.5	455017	641002	J0460-366 John Black Road	265		290.57	2.02	Bell Mobility Inc. Attn: Meyang Yunga; PEIN 6026826
1970.4	1890.4	454530	640653	A0365-667, OLD HALIFAX ROAD SALEM	0		165.05	8.44	Rogers Communications Partnership Ron Murphy, Dir. Radio Engineering
1970.8	1890.8	455004	640936	A0194-200 ROBERT ANGUS DR AMHERST	0		283.04	1.37	Rogers Communications Partnership Ron Murphy, Dir. Radio Engineering
1971	1891	454404	635322	A0345-1853, BLACK RIVER RD OXFORD	0		118.73	22.42	Rogers Communications Partnership Ron Murphy, Dir. Radio Engineering
1971.8	1891.8	454611	640109	A0011-1149, MAPLE LANE WEST LEICES	120		125.66	11.8	Rogers Communications Partnership Ron Murphy, Dir. Radio Engineering
1973.4	1893.4	455430	642308	A0374-39 HESLER DRIVE SACKVILLE	0		294.48	20.64	Rogers Communications Partnership Ron Murphy, Dir. Radio Engineering
1983	1903	455431	642308	J0387-39 Hesler Drive	60		294.56	20.65	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1983	1903	455431	642308	J0387-39 Hesler Drive	160		294.56	20.65	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1983	1903	455431	642308	J0387-39 Hesler Drive	320		294.56	20.65	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1987.5	1907.5	455431	642308	J0387-39 Hesler Drive	60		294.56	20.65	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1987.5	1907.5	455431	642308	J0387-39 Hesler Drive	160		294.56	20.65	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
1987.5	1907.5	455431	642308	J0387-39 Hesler Drive	320		294.56	20.65	BELL MOBILITY INC. Attn: Meyang Yunga; PEIN 6026826
2115	1715	454859	641248	J0665-10 McCully Street	10		252.76	5.73	Bell Mobility Inc. Attn: Meyang Yunga; PEIN 6026826
2115	1715	454859	641248	J0665-10 McCully Street	120		252.76	5.73	Bell Mobility Inc. Attn: Meyang Yunga; PEIN 6026826
2115	1715	454859	641248	J0665-10 McCully Street	255		252.76	5.73	Bell Mobility Inc. Attn: Meyang Yunga; PEIN 6026826
2125	1725	454047	635827	NSD118 Clairmont Road, Springhill	90		142.19	21.37	Bragg Communications Inc. c/o Eastlink
2125	1725	454047	635827	NSD118 Clairmont Road, Springhill	90		142.19	21.37	Bragg Communications Inc. c/o Eastlink
2125	1725	454047	635827	NSD118 Clairmont Road, Springhill	210		142.19	21.37	Bragg Communications Inc. c/o Eastlink
2125	1725	454047	635827	NSD118 Clairmont Road, Springhill	210		142.19	21.37	Bragg Communications Inc. c/o Eastlink
2125	1725	454047	635827	NSD118 Clairmont Road, Springhill	320		142.19	21.37	Bragg Communications Inc. c/o Eastlink
2125	1725	454047	635827	NSD118 Clairmont Road, Springhill	320		142.19	21.37	Bragg Communications Inc. c/o Eastlink
2125	1725	454334	635349	NSD103 Black River Road, Oxford	30		121.53	22.39	Bragg Communications Inc. c/o Eastlink
2125	1725	454334	635349	NSD103 Black River Road, Oxford	30		121.53	22.39	Bragg Communications Inc. c/o Eastlink
2125	1725	454334	635349	NSD103 Black River Road, Oxford	130		121.53	22.39	Bragg Communications Inc. c/o Eastlink
2125	1725	454334	635349	NSD103 Black River Road, Oxford	130		121.53	22.39	Bragg Communications Inc. c/o Eastlink
2125	1725	454334	635349	NSD103 Black River Road, Oxford	240		121.53	22.39	Bragg Communications Inc. c/o Eastlink

Tx Frequency (MHz)	Rx Frequency (MHz)	Latitude (ddmmss)	Longitude (dddmmss)	Station Location	Tx Antenna Azimuth (deg)	Link Station Location	Azimuth (deg)	Distance (km)	Licensee Name
2125	1725	454334	635349	NSD103 Black River Road, Oxford	240		121.53	22.39	Bragg Communications Inc. c/o Eastlink
2125	1725	454530	640653	NSD104 HWY 104 Salem	50		165.05	8.44	Bragg Communications Inc. c/o Eastlink
2125	1725	454530	640653	NSD104 HWY 104 Salem	50		165.05	8.44	Bragg Communications Inc. c/o Eastlink
2125	1725	454530	640653	NSD104 HWY 104 Salem	130		165.05	8.44	Bragg Communications Inc. c/o Eastlink
2125	1725	454530	640653	NSD104 HWY 104 Salem	130		165.05	8.44	Bragg Communications Inc. c/o Eastlink
2125	1725	454530	640653	NSD104 HWY 104 Salem	290		165.05	8.44	Bragg Communications Inc. c/o Eastlink
2125	1725	454530	640653	NSD104 HWY 104 Salem	290		165.05	8.44	Bragg Communications Inc. c/o Eastlink
2125	1725	454939	641107	NSD105 Willow Street, Amherst	0		262.01	3.33	Bragg Communications Inc. c/o Eastlink
2125	1725	454939	641107	NSD105 Willow Street, Amherst	0		262.01	3.33	Bragg Communications Inc. c/o Eastlink
2125	1725	454939	641107	NSD105 Willow Street, Amherst	170		262.01	3.33	Bragg Communications Inc. c/o Eastlink
2125	1725	454939	641107	NSD105 Willow Street, Amherst	170		262.01	3.33	Bragg Communications Inc. c/o Eastlink
2125	1725	454939	641107	NSD105 Willow Street, Amherst	260		262.01	3.33	Bragg Communications Inc. c/o Eastlink
2125	1725	454939	641107	NSD105 Willow Street, Amherst	260		262.01	3.33	Bragg Communications Inc. c/o Eastlink
2125	1725	455042	640440	NSD111 Truemanville	55		73.57	5.25	Bragg Communications Inc. c/o Eastlink
2125	1725	455042	640440	NSD111 Truemanville	55		73.57	5.25	Bragg Communications Inc. c/o Eastlink
2125	1725	455042	640440	NSD111 Truemanville	180		73.57	5.25	Bragg Communications Inc. c/o Eastlink
2125	1725	455042	640440	NSD111 Truemanville	180		73.57	5.25	Bragg Communications Inc. c/o Eastlink
2125	1725	455042	640440	NSD111 Truemanville	280		73.57	5.25	Bragg Communications Inc. c/o Eastlink
2125	1725	455042	640440	NSD111 Truemanville	280		73.57	5.25	Bragg Communications Inc. c/o Eastlink
2125	1725	455218	641606	NBA010 Green Hill Road, Aulac	50		294.62	10.69	Bragg Communications Inc. c/o Eastlink
2125	1725	455218	641606	NBA010 Green Hill Road, Aulac	50		294.62	10.69	Bragg Communications Inc. c/o Eastlink
2125	1725	455218	641606	NBA010 Green Hill Road, Aulac	170		294.62	10.69	Bragg Communications Inc. c/o Eastlink
2125	1725	455218	641606	NBA010 Green Hill Road, Aulac	170		294.62	10.69	Bragg Communications Inc. c/o Eastlink
2125	1725	455218	641606	NBA010 Green Hill Road, Aulac	290		294.62	10.69	Bragg Communications Inc. c/o Eastlink
2125	1725	455218	641606	NBA010 Green Hill Road, Aulac	290		294.62	10.69	Bragg Communications Inc. c/o Eastlink
2125	1725	455430	642308	NBA009 93 King Street, Sackville	50		294.48	20.64	Bragg Communications Inc. c/o Eastlink
2125	1725	455430	642308	NBA009 93 King Street, Sackville	50		294.48	20.64	Bragg Communications Inc. c/o Eastlink
2125	1725	455430	642308	NBA009 93 King Street, Sackville	170		294.48	20.64	Bragg Communications Inc. c/o Eastlink
2125	1725	455430	642308	NBA009 93 King Street, Sackville	170		294.48	20.64	Bragg Communications Inc. c/o Eastlink
2125	1725	455430	642308	NBA009 93 King Street, Sackville	290		294.48	20.64	Bragg Communications Inc. c/o Eastlink
2125	1725	455430	642308	NBA009 93 King Street, Sackville	290		294.48	20.64	Bragg Communications Inc. c/o Eastlink
2125	1725	455755	641101	NBA021 Jolicure, NB	50		348.01	15.19	Bragg Communications Inc. c/o Eastlink
2125	1725	455755	641101	NBA021 Jolicure, NB	50		348.01	15.19	Bragg Communications Inc. c/o Eastlink
2125	1725	455755	641101	NBA021 Jolicure, NB	210		348.01	15.19	Bragg Communications Inc. c/o Eastlink
2125	1725	455755	641101	NBA021 Jolicure, NB	210		348.01	15.19	Bragg Communications Inc. c/o Eastlink
2125	1725	455755	641101	NBA021 Jolicure, NB	320		348.01	15.19	Bragg Communications Inc. c/o Eastlink
2125	1725	455755	641101	NBA021 Jolicure, NB	320		348.01	15.19	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454047	635827	NSD118 Clairmont Road, Springhill	90		142.19	21.37	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454047	635827	NSD118 Clairmont Road, Springhill	90		142.19	21.37	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454047	635827	NSD118 Clairmont Road, Springhill	210		142.19	21.37	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454047	635827	NSD118 Clairmont Road, Springhill	210		142.19	21.37	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454047	635827	NSD118 Clairmont Road, Springhill	320		142.19	21.37	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454047	635827	NSD118 Clairmont Road, Springhill	320		142.19	21.37	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454334	635349	NSD103 Black River Road, Oxford	30		121.53	22.39	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454334	635349	NSD103 Black River Road, Oxford	30		121.53	22.39	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454334	635349	NSD103 Black River Road, Oxford	130		121.53	22.39	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454334	635349	NSD103 Black River Road, Oxford	130		121.53	22.39	Bragg Communications Inc. c/o Eastlink

Tx Frequency (MHz)	Rx Frequency (MHz)	Latitude (ddmmss)	Longitude (dddmmss)	Station Location	Tx Antenna Azimuth (deg)	Link Station Location	Azimuth (deg)	Distance (km)	Licensee Name
2132.5	1732.5	454334	635349	NSD103 Black River Road, Oxford	240		121.53	22.39	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454334	635349	NSD103 Black River Road, Oxford	240		121.53	22.39	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454530	640653	NSD104 HWY 104 Salem	50		165.05	8.44	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454530	640653	NSD104 HWY 104 Salem	50		165.05	8.44	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454530	640653	NSD104 HWY 104 Salem	130		165.05	8.44	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454530	640653	NSD104 HWY 104 Salem	130		165.05	8.44	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454530	640653	NSD104 HWY 104 Salem	290		165.05	8.44	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454530	640653	NSD104 HWY 104 Salem	290		165.05	8.44	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454939	641107	NSD105 Willow Street, Amherst	0		262.01	3.33	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454939	641107	NSD105 Willow Street, Amherst	0		262.01	3.33	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454939	641107	NSD105 Willow Street, Amherst	170		262.01	3.33	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454939	641107	NSD105 Willow Street, Amherst	170		262.01	3.33	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454939	641107	NSD105 Willow Street, Amherst	260		262.01	3.33	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	454939	641107	NSD105 Willow Street, Amherst	260		262.01	3.33	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	455042	640440	NSD111 Truemanville	55		73.57	5.25	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	455042	640440	NSD111 Truemanville	55		73.57	5.25	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	455042	640440	NSD111 Truemanville	180		73.57	5.25	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	455042	640440	NSD111 Truemanville	180		73.57	5.25	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	455042	640440	NSD111 Truemanville	280		73.57	5.25	Bragg Communications Inc. c/o Eastlink
2132.5	1732.5	455042	640440	NSD111 Truemanville	280		73.57	5.25	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455218	641606	NBA010 Green Hill Road, Aulac	50		294.62	10.69	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455218	641606	NBA010 Green Hill Road, Aulac	50		294.62	10.69	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455218	641606	NBA010 Green Hill Road, Aulac	170		294.62	10.69	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455218	641606	NBA010 Green Hill Road, Aulac	170		294.62	10.69	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455218	641606	NBA010 Green Hill Road, Aulac	290		294.62	10.69	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455218	641606	NBA010 Green Hill Road, Aulac	290		294.62	10.69	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455430	642308	NBA009 93 King Street, Sackville	50		294.48	20.64	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455430	642308	NBA009 93 King Street, Sackville	50		294.48	20.64	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455430	642308	NBA009 93 King Street, Sackville	170		294.48	20.64	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455430	642308	NBA009 93 King Street, Sackville	170		294.48	20.64	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455430	642308	NBA009 93 King Street, Sackville	290		294.48	20.64	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455430	642308	NBA009 93 King Street, Sackville	290		294.48	20.64	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455755	641101	NBA021 Jolicure, NB	50		348.01	15.19	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455755	641101	NBA021 Jolicure, NB	50		348.01	15.19	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455755	641101	NBA021 Jolicure, NB	210		348.01	15.19	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455755	641101	NBA021 Jolicure, NB	210		348.01	15.19	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455755	641101	NBA021 Jolicure, NB	320		348.01	15.19	Bragg Communications Inc. c/o Eastlink
2137.5	1737.5	455755	641101	NBA021 Jolicure, NB	320		348.01	15.19	Bragg Communications Inc. c/o Eastlink
2393	2293	454612	640101	WEST LEICESTER, NS	112.2	LOWER GREENVILLE	125.06	11.92	ROGERS COMMUNICATIONS PARTNERSHIP ATTN: M VUJOSEVIC, TRANSMISSION ENG
2411	2311	454612	640101	WEST LEICESTER, NS	297.4	FAIRFIELD	125.06	11.92	ROGERS COMMUNICATIONS PARTNERSHIP ATTN: M VUJOSEVIC, TRANSMISSION ENG
3555.5	3555.5	455739	641135	HALLS HILLS, NB (35 JOLICURE ROAD)	60		344.86	14.88	Xplornet Broadband Inc. VP, Engineering and Operations

Tx Frequency (MHz)	Rx Frequency (MHz)	Latitude (ddmmss)	Longitude (dddmmss)	Station Location	Tx Antenna Azimuth (deg)	Link Station Location	Azimuth (deg)	Distance (km)	Licensee Name
3555.5	3555.5	455739	641135	HALLS HILLS, NB (35 JOLICURE ROAD)	210		344.86	14.88	Xplornet Broadband Inc. VP, Engineering and Operations
3562.5	3562.5	455739	641135	HALLS HILLS, NB (35 JOLICURE ROAD)	150		344.86	14.88	Xplornet Broadband Inc. VP, Engineering and Operations
3569.5	3569.5	455739	641135	HALLS HILLS, NB (35 JOLICURE ROAD)	300		344.86	14.88	Xplornet Broadband Inc. VP, Engineering and Operations
5878.875	5912.375	454612	640101	WEST LEICESTER, NS	6.8	MELROSE	125.06	11.92	ROGERS COMMUNICATIONS PARTNERSHIP ATTN: M VUJOSEVIC, TRANSMISSION ENG
5912.375	5878.875	454404	635321	OXFORD, NS	143.9	WESTCHESTER, NS	118.71	22.44	ROGERS COMMUNICATIONS PARTNERSHIP ATTN: M VUJOSEVIC, TRANSMISSION ENG
10552.5	10617.5	455004	640937	AMHERST, NS	122.8	WEST LEICESTER, NS	282.84	1.39	ROGERS COMMUNICATIONS PARTNERSHIP ATTN: M VUJOSEVIC, TRANSMISSION ENG
10617.5	10552.5	454612	640101	WEST LEICESTER, NS	302.9	AMHERST, NS	125.06	11.92	ROGERS COMMUNICATIONS PARTNERSHIP ATTN: M VUJOSEVIC, TRANSMISSION ENG
10725	11215	454530	640653	AMHERST, NS (HWY 104)	157.4	SPRINGHILL, NS	165.05	8.44	ROGERS COMMUNICATIONS PARTNERSHIP ATTN: M VUJOSEVIC, TRANSMISSION ENG
14200	11904	455456	635854	AMHERST, NS - BEECHAM RD	249		53.15	15.58	RigNet (Ca), Inc. Attention: James Crenshaw
14471	12171	455657	640330	MLV 231 (***), NS	230.4		26.54	14.61	RIGNET (CA) INC. Attn: James Crenshaw
14630	15105	454530	640653	AMHERST, NS (HWY 104)	80.3	WEST LEICESTER	165.05	8.44	ROGERS COMMUNICATIONS PARTNERSHIP ATTN: M VUJOSEVIC, TRANSMISSION ENG
15105	14630	454612	640101	WEST LEICESTER, NS	260.3	AMHERST	125.06	11.92	ROGERS COMMUNICATIONS PARTNERSHIP ATTN: M VUJOSEVIC, TRANSMISSION ENG
15347.5	14872.5	455218	641605	AULAC NB	293.3	FAIRFIELD	294.67	10.67	ROGERS COMMUNICATIONS PARTNERSHIP ATTN: M VUJOSEVIC, TRANSMISSION ENG
17960	19520	454900	641237	AMHERST INDUSTRIAL PARK, NS	58.1	AMHERST, NS	252.34	5.49	Bragg Communications Inc. Attention: William Gooding
17960	19520	454047	635827	SALT SPRINGS, NS (EL-NSD118)	49.3	OXFORD	142.19	21.37	Bragg Communications Inc. Attention: William Gooding
17960	19520	455042	640440	TRUEMANVILLE, NS	81	WEST LINDEN, NS	73.57	5.25	Bragg Communications Inc. Attention: William Gooding
17960	19520	455042	640440	TRUEMANVILLE, NS	256.9	AMHERST, NS	73.57	5.25	Bragg Communications Inc. Attention: William Gooding
17960	19520	455754	641101	JOLICURE RIDGE, NB (EL-NBA021)	180.5	AMHERST	347.98	15.16	Bragg Communications Inc. Attention: William Gooding
19461.25	17901.25	455431	642306	SACKVILLE, NB (TOWN)	291.2	FAIRFIELD, NB	294.61	20.61	ROGERS COMMUNICATIONS PARTNERSHIP ATTN: M VUJOSEVIC, TRANSMISSION ENG

Tx Frequency (MHz)	Rx Frequency (MHz)	Latitude (ddmmss)	Longitude (dddmmss)	Station Location	Tx Antenna Azimuth (deg)	Link Station Location	Azimuth (deg)	Distance (km)	Licensee Name
19520	17960	454939	641107	AMHERST, NS	238.1	AMHERST IND PARK, NS	262.01	3.33	Bragg Communications Inc. Attention: William Gooding
19520	17960	454334	635349	OXFORD, NS (EL-NSD103)	229.3	SALT SPRINGS	121.53	22.39	Bragg Communications Inc. Attention: William Gooding
19520	17960	454939	641107	AMHERST, NS	0.5	JOLICURE RIDGE	262.01	3.33	Bragg Communications Inc. Attention: William Gooding
19520	17960	454939	641107	AMHERST, NS	76.8	TRUEMANVILLE, NS	262.01	3.33	Bragg Communications Inc. Attention: William Gooding
19600	18040	455739	641135	HALLS HILLS, NB (35 JOLICURE ROAD)	37.7	PORT ELGIN	344.86	14.88	Xplornet Broadband Inc. VP, Engineering and Operations
	958	454540	640933	CUMBERLAND COUNTY, NS - CFTA TXTR		AMHERST, NS	189.21	7.95	TANTRAMAR COUMMUNTIY RADIO SOCIETY ATT'N: RON BICKLE

Appendix L:

Complaint Resolution Plan

Formal complaints procedure for Mi'kmaq Wind4All Communities LP Amherst Community Wind Farm

Mi'kmaq Wind4All Communities L.P. is committed to addressing any public concerns regarding the Amherst Community Wind Farm near Amherst, Nova Scotia. The intention is that this policy can inform the public on the ways that they can communicate their concerns to Mi'kmaq Wind4All., and how complaints will be addressed.

1.0 PURPOSE

The purpose of this policy is to ensure all public complaints are dealt with consistently and effectively. Mi'kmaq Wind4All Communities L.P. aims to:

- Manage complaints openly, promptly and properly;
- Try to resolve complaints as soon as possible; and
- Learn from complaints and improve our services.

2.0 SCOPE

This policy will address any complaint; written or spoken expression of dissatisfaction.

3.0 PROCEDURE

All complaints of the Amherst Community Wind Farm will be directed to the Community Liaison Officer, Amy Pellerin:

Amy Pellerin | Development Engineer
Natural Forces Wind Inc.
1801 Hollis Street | Suite 1205 | Halifax | NS | B3J 3N4
Tel: +1 902 422 9663 x 211
Fax: +1 902 425 7840
For more information please refer to Natural Forces Wind Inc. website
www.naturalforces.ca

Complainant will be notified upon receipt of the complaint. The Community Liaison Officer will investigate complaints within 20 days of receiving the complaint; upon which complainant will be notified of how the concern was or will be addressed.

3.1 Noise

Complaints dealing with noise will be assessed on whether noise monitoring is necessary.

If there are several complaints regarding noise from the Amherst Community Wind Farm, then a noise monitoring program may be implemented.

Ways on reducing noise will be discussed with the wind farm operators.

Complainant(s) will be informed of noise mitigation strategies and will be contacted within a year of implemented noise reduction strategies on the success of the noise reduction strategy. This will help address any noise issues that may arise from the Amherst Community Wind Farm.

3.2 Construction and Operation

Complaints regarding operation and construction activities will be discussed with workers or contractors involved.

Solutions to the complaints will be established with worker(s) and contractor(s). Complainant will be informed of how issue was addressed.

If complaints persist, then worker(s) and contractor(s) may be dismissed.

4.0 CLOSURE

If the complainant is not satisfied with the initial response, the complaint will be referred to a higher authority within the company to further resolve the issue.

Appendix M:

Stakeholder Consultation

FIRST NATIONS CONSULTATION				
Date	**Person Contacted**	**Band/Organization**	**Method of Communication**	**Content**
December 2011	KMK Representative	KMK	Meeting	Amherst project introduction
September 2012	KMK Assembly	KMK	Presentation	Project introduction & partnership opportunity
September 2012	Members of Membertou	Membertou	Presentation	Proponent introduction
October 2012	Chief & Council	Chapel Island	Meeting	Project introduction & partnership opportunity
October 2012	Chief & Council	Paq'tnkek	Meeting	Project introduction & partnership opportunity
November 2012	Chief & Council	MIllbrook	Meeting	Project introduction & partnership opportunity
November 2012	Chief & Council	Bear River	Meeting	Project introduction & partnership opportunity
November 2012	Chief & Council	Pictou Landing	Meeting	Project introduction & partnership opportunity
April 2013	KMK Representative	KMK	Meeting	Amherst site details presentation
December 2014	Office of Aboriginal Affairs Representative	Office of Aboriginal Affairs	Letter	Update on Environmental Assessment
December 2014	KMK Representative	KMK	Letter	Update on Environmental Assessment
December 2014	Chief and President Grace Conrad	Native Council of Nova Scotia	Email	Update on Project and Environmental Assessment

MUNICIPAL CONSULTATION				
Date	**Person Contacted**	**Department / Agency**	**Method of Communication**	**Content**
May 2014	Warden Keith Hunter	Municipality of Cumberland County	Email	Introduction to Natural Forces and change of project site location from Comfit Application Invitation to meet
May 2014	Councillor Emery	Municipality of Cumberland County	Email	Introduction to Natural Forces and change of project site location from Comfit Application Invitation to meet
May 2014	Councillor Smith	Municipality of Cumberland County	Email	Introduction to Natural Forces and change of project site location from Comfit Application Invitation to meet
May 2014	Councillor Kellegrew	Municipality of Cumberland County	Email	Introduction to Natural Forces and change of project site location from Comfit Application Invitation to meet
June 2014	Warden Keith Hunter	Municipality of Cumberland County	In person meeting	Personal introductions and introduction of the project
June 2014	Councillor Smith	Municipality of Cumberland County	In person meeting	Personal introductions and introduction of the project
June 2014	Rennie Bugley	Municipality of Cumberland County	In person meeting	Personal introductions and introduction of the project
June 2014	Planner	Municipality of Cumberland County	In person meeting	Personal introductions and introduction of the project
June 2014	Mayor Small	Town of Amherst	Letter	Invitation to attend public meeting

MUNICIPAL CONSULTATION				
Date	**Person Contacted**	**Department / Agency**	**Method of Communication**	**Content**
June 2014	MLA Terry Farrel	Nova Scotia Liberal Party	Letter	Introduction to Natural Forces and project Invitation to meet
June 2014	All town councillors	Town of Amherst	Letter	Invitation to public meeting
June 2014	All county councillors	Municipality of Cumberland County	Letter	Invitation to public meeting
July 2014	Councillor Smith	Municipality of Cumberland County	Calls	Update on the project and invitation to the public meeting
July 2014	Warden Hunter	Municipality of Cumberland County	Calls	Update on the project and invitation to the public meeting
August 2014	Councillor Smith	Municipality of Cumberland County	Calls	Update on the project Discuss concerns of the community
August 2014	Warden Hunter	Municipality of Cumberland County	Calls	Update on the project Discuss concerns of the community
August 2014	Cumberland Renewable Energy Authority	Municipality of Cumberland County	Presentation	Introduction of Natural Forces and to the project. Explained to the board of members the benefits this project will have to the County and local residents
September 2014	Warden Keith Hunter	Municipality of Cumberland County	Call	Update on the project and invitation to the public meeting Discuss the concerns in the community

MUNICIPAL CONSULTATION				
Date	**Person Contacted**	**Department / Agency**	**Method of Communication**	**Content**
September 2014	Councillor Smith	Municipality of Cumberland County	Call	Update on the project and invitation to the public meeting Discuss the concerns in the community
September 2014	Rennie Bugley	Municipality of Cumberland County	Call	Update on the project Invitation to the public meeting
September 2014	Mayor Small			Invitation to the public meeting
September 2014	All town councillors	Town of Amherst	Email	Invitation to the public meeting
September 2014	All county councillors	Municipality of Cumberland County	Email	Invitation to the public meeting
October 2014	Warden Hunter	Municipality of Cumberland County	Call	Update on the project and invitation to the public meeting
October 2014	Councillor Smith	Municipality of Cumberland County	Call	Update on the project and invitation to the public meeting
October 2014	Rennie Bugley	Municipality of Cumberland County	Call	Update on the project
November 2014	Amherst Division	Ducks Unlimited	Letter	Intention to submit an Environmental Assessment in the coming weeks