Table 7: Noise Sensitive Receptors – Coordinates

Point of Reception		Coordinates		Receptor Height (m)
ID	Description	UTM-X (m)	UTM-Y (m)	
V4020	Vacant Lot	598974	4751412	4.5
V4019	Vacant Lot	598503	4751686	4.5
V4016	Vacant Lot	598997	4751289	4.5
V4015	Vacant Lot	599398	4749414	4.5
V4014	Vacant Lot	598231	4750992	4.5
V4013	Vacant Lot	598570	4751710	4.5
V4012	Vacant Lot	598741	4751148	4.5
V4011	Vacant Lot	598893	4751285	4.5
V4003	Vacant Lot	597964	4747296	4.5
V4002	Vacant Lot	597642	4747443	4.5
V4001	Vacant Lot	597451	4747536	4.5
V3664	Vacant Lot	595963	4748368	4.5
V3658	Vacant Lot	595743	4750638	4.5
V3657	Vacant Lot	596284	4750543	4.5
V3656	Vacant Lot	596554	4750947	4.5
V3655	Vacant Lot	597416	4750900	4.5
V3654	Vacant Lot	597727	4751001	4.5
V3649	Vacant Lot	598552	4749102	4.5
V3646	Vacant Lot	598290	4751031	4.5
V3642	Vacant Lot	598741	4751245	4.5
V3634	Vacant Lot	598156	4751576	4.5
V3511	Vacant Lot	598503	4751793	4.5
V3510	Vacant Lot	598481	4751774	4.5
V3508	Vacant Lot	598386	4751724	4.5
V3507	Vacant Lot	598111	4751864	4.5
V3506	Vacant Lot	598078	4751851	4.5
V3505	Vacant Lot	598047	4751832	4.5
V3504	Vacant Lot	597990	4751785	4.5
V3503	Vacant Lot	597989	4751831	4.5
V3502	Vacant Lot	597954	4751831	4.5
V3501	Vacant Lot	597920	4751810	4.5
V3500	Vacant Lot	597450	4751798	4.5
V3499	Vacant Lot	597189	4751777	4.5
V3498	Vacant Lot	597145	4751757	4.5
V3497	Vacant Lot	597107	4751757	4.5
V3496	Vacant Lot	597077	4751747	4.5
V3495	Vacant Lot	597036	4751743	4.5
V3494	Vacant Lot	597003	4751733	4.5
V3493	Vacant Lot	596967	4751733	4.5
V3492	Vacant Lot	596937	4751733	4.5
V3491	Vacant Lot	596918	4751722	4.5
V3490	Vacant Lot	596829	4751733	4.5
V3489	Vacant Lot	596786	4751735	4.5
V3409	Vacant Lot	597181	4747262	4.5
V3349	Vacant Lot	594881	4748711	4.5
V3348	Vacant Lot	595413	4748227	4.5
V3347	Vacant Lot	595482	4748523	4.5
R675	Existing Potential Receptor	597056	4747096	4.5
R674	Existing Potential Receptor	597052	4747231	4.5
R673	Existing Potential Receptor	596720	4747093	4.5

Point of Reception		Coordinates		Receptor Height (m)
ID	Description	UTM-X (m)	UTM-Y (m)	
R672	Existing Potential Receptor	596662	4746973	1.5
R670	Existing Potential Receptor	596459	4747052	1.5
R668	Existing Potential Receptor	596310	4747047	4.5
R589	Existing Potential Receptor	599146	4749234	4.5
R588	Existing Potential Receptor	599042	4749252	4.5
R587	Existing Potential Receptor	598739	4749078	4.5
R585	Existing Potential Receptor	598242	4748987	4.5
R584	Existing Potential Receptor	598134	4748890	4.5
R582	Existing Potential Receptor	597849	4748787	1.5
R581	Existing Potential Receptor	597786	4748768	1.5
R579	Existing Potential Receptor	597644	4748802	1.5
R578	Existing Potential Receptor	597594	4748786	1.5
R577	Existing Potential Receptor	597145	4748655	4.5
R576	Existing Potential Receptor	596975	4748483	4.5
R575	Existing Potential Receptor	596772	4748529	4.5
R574	Existing Potential Receptor	596487	4748315	4.5
R573	Existing Potential Receptor	595790	4748278	4.5
R572	Existing Potential Receptor	595750	4748218	4.5
R571	Existing Potential Receptor	595663	4748268	1.5
R570	Existing Potential Receptor	595505	4748148	4.5
R569	Existing Potential Receptor	595494	4748236	4.5
R568	Existing Potential Receptor	595348	4748097	4.5
R567	Existing Potential Receptor	595233	4748095	4.5
R469	Existing Potential Receptor	598084	4747146	1.5
R468	Existing Potential Receptor	597960	4747051	4.5
R467	Existing Potential Receptor	597505	4747260	1.5
R466	Existing Potential Receptor	597329	4747592	4.5
R465	Existing Potential Receptor	597146	4747852	4.5
R464	Existing Potential Receptor	596434	4747858	1.5
R462	Existing Potential Receptor	596203	4748080	4.5
R461	Existing Potential Receptor	596099	4748107	1.5
R460	Existing Potential Receptor	596136	4748195	4.5
R457	Existing Potential Receptor	595844	4749286	4.5
R455	Existing Potential Receptor	595897	4749329	4.5
R396	Existing Potential Receptor	597867	4751171	1.5
R395	Existing Potential Receptor	597996	4750732	4.5
R393	Existing Potential Receptor	598184	4749987	4.5
R392	Existing Potential Receptor	598327	4749796	1.5
R391	Existing Potential Receptor	598331	4749557	4.5
R390	Existing Potential Receptor	598466	4749459	4.5
R389	Existing Potential Receptor	598453	4749195	4.5
R388	Existing Potential Receptor	598470	4748990	1.5
R387	Existing Potential Receptor	598518	4749012	1.5
R383	Existing Potential Receptor	597832	4747384	4.5
R381	Existing Potential Receptor	597542	4748329	1.5
R380	Existing Potential Receptor	597617	4748539	1.5
R378	Existing Potential Receptor	597392	4748712	1.5
R374	Existing Potential Receptor	598295	4751102	4.5
R373	Existing Potential Receptor	598103	4751260	1.5
R372	Existing Potential Receptor	598092	4751035	1.5
R371	Existing Potential Receptor	597528	4750821	4.5
R369	Existing Potential Receptor	597292	4750739	4.5
R368	Existing Potential Receptor	596945	4750609	4.5

Point of Reception		Coordinates		Receptor Height (m)
ID	Description	UTM-X (m)	UTM-Y (m)	
R367	Existing Potential Receptor	596650	4750552	4.5
R365	Existing Potential Receptor	596064	4750325	1.5
R364	Existing Potential Receptor	595795	4749735	7.5
R363	Church	595682	4749487	1.5
R362	Existing Potential Receptor	595748	4749453	1.5
R361	Existing Potential Receptor	595517	4749636	1.5
R360	Existing Potential Receptor	595216	4749628	1.5
R359	Existing Potential Receptor	595088	4750040	1.5
R358	Existing Potential Receptor	595252	4750428	4.5
R357	Existing Potential Receptor	595471	4750990	1.5
R356	Existing Potential Receptor	595320	4751040	1.5
R355	Existing Potential Receptor	595233	4750565	4.5
R354	Existing Potential Receptor	594938	4750947	4.5
R327	Existing Potential Receptor	598214	4751579	4.5
R325	Existing Potential Receptor	598346	4751705	1.5
R324	Existing Potential Receptor	598007	4751826	1.5
R323	Existing Potential Receptor	597545	4751666	4.5
R322	Existing Potential Receptor	597814	4751672	4.5
R321	Existing Potential Receptor	597631	4751809	1.5
R320	Existing Potential Receptor	597369	4751727	4.5
R319	Existing Potential Receptor	597182	4751744	1.5
R318	Existing Potential Receptor	596786	4751516	1.5
R317	Existing Potential Receptor	597005	4751565	1.5
R316	Existing Potential Receptor	596849	4751602	4.5
R314	Existing Potential Receptor	596578	4751446	4.5
R313	Existing Potential Receptor	596576	4750895	4.5
R312	Existing Potential Receptor	596533	4751025	1.5
R311	Existing Potential Receptor	596363	4751615	4.5
R310	Existing Potential Receptor	596240	4751667	4.5
R309	Existing Potential Receptor	596100	4751651	4.5
R308	Existing Potential Receptor	595830	4751457	1.5
R307	Existing Potential Receptor	596129	4748611	1.5
R306	Existing Potential Receptor	595426	4748513	4.5
R304	Existing Potential Receptor	595177	4748691	1.5
R1375	Existing Potential Receptor	595224	4750337	1.5
R1369	Existing Potential Receptor	597557	4748243	4.5
R1362	Existing Potential Receptor	596041	4748115	1.5
R1341	Existing Potential Receptor	595975	4751290	4.5
R1340	Existing Potential Receptor	596752	4751619	4.5
R1339	Existing Potential Receptor	597745	4751805	4.5
R1317	Existing Potential Receptor	596911	4748474	4.5
P580	Participating Receptor	597798	4748861	4.5
P459	Participating Receptor	595916	4749261	1.5
P394	Participating Receptor	597860	4750701	4.5
P377	Participating Receptor	597330	4748897	4.5
P376	Participating Receptor	596873	4750327	4.5
P370	Participating Receptor	597248	4750668	4.5
P366	Participating Receptor	596556	4750512	1.5

8. Procedure for Assessing Noise Impacts at Each Receptor

8.1 Method Selection Factors

The worst-case noise emission scenario at each receptor was modeled using the CADNA/A software program from DataKustik GmbH. The outdoor noise propagation model is based on ISO 9613, Part 1: Calculation of the absorption of sound by the atmosphere, 1993 and Part 2: General method of calculation (ISO-9613-2: 1996). The model is capable of incorporating various site-specific features such as elevation, berms, ground absorption and barriers to accurately predict noise levels at specific receptors, pertaining to noise emissions from a particular source(s). Modelling output from the CADNA/A program is presented in **Appendix B.** Graphical outputs generated by the CADNA/A noise model, showing the noise level contours are presented in **Figures 4** and **5** for 1.5m and 4.5m receptor heights, respectively.

8.2 Ambient Determination

No on-site measurements were made to assess the background ambient noise level at the noise-sensitive receptors. Therefore, the MOECC's default day and night-time criteria for a Class 3 area (rural) were used for this assessment.

8.3 Parameter / Assumptions for Calculations

Manufacturer-specified noise data and calculated noise levels were used in the CADNA/A software to model the noise impact at each Point of Reception (POR). Also incorporated in the modelling was the site layout for the project. The noise impact for each receptor was modelled assuming the worst-case noise emission scenario at the project site as well as the neighbouring wind farms. The dominant noise sources for the facility include:

- MV Stations (consisting of 2 x 800 MVA inverters within an enclosure with acoustic louvers and 1 x 1.6 MVA step-up transformer);
- Substation Transformers (1 x 108 MVA substation transformer for the GRS project and 1 x 1.66 MVA substation transformer for the GRW project) [Note: substation transformer for the SWEC project is located approximately 8 km west of the most western MV station and as such was not included in the analysis].
- DSTATCOM Inverter System (1 x 8.75 mVAR and 1 x 10 mVAR units, each consisting of four inverters and corresponding transformers).

- Line Reactor (1 x 3-phase 26 mVAR line reactor)
- Wind Turbines (51 x Siemens SWT-2.3-101 2.221 MW and 2 x Siemens SWT-2.3-101 2.126 MW)

Receptors – A receptor height of 4.5 metres representing a receiver in the plane of a second floor window (i.e., 2-storey dwelling) was assumed for all two storey dwellings as well as the vacant lot receptors. For single storey dwellings, a receptor height of 1.5m was used.

Reflections – Conservatively, sources were modeled assuming a third order reflection.

Ground Absorption – For the noise modelling, a ground absorption coefficient of 0.7 was used to represent the mostly absorptive, vegetated areas, between the onsite sources and receptors.

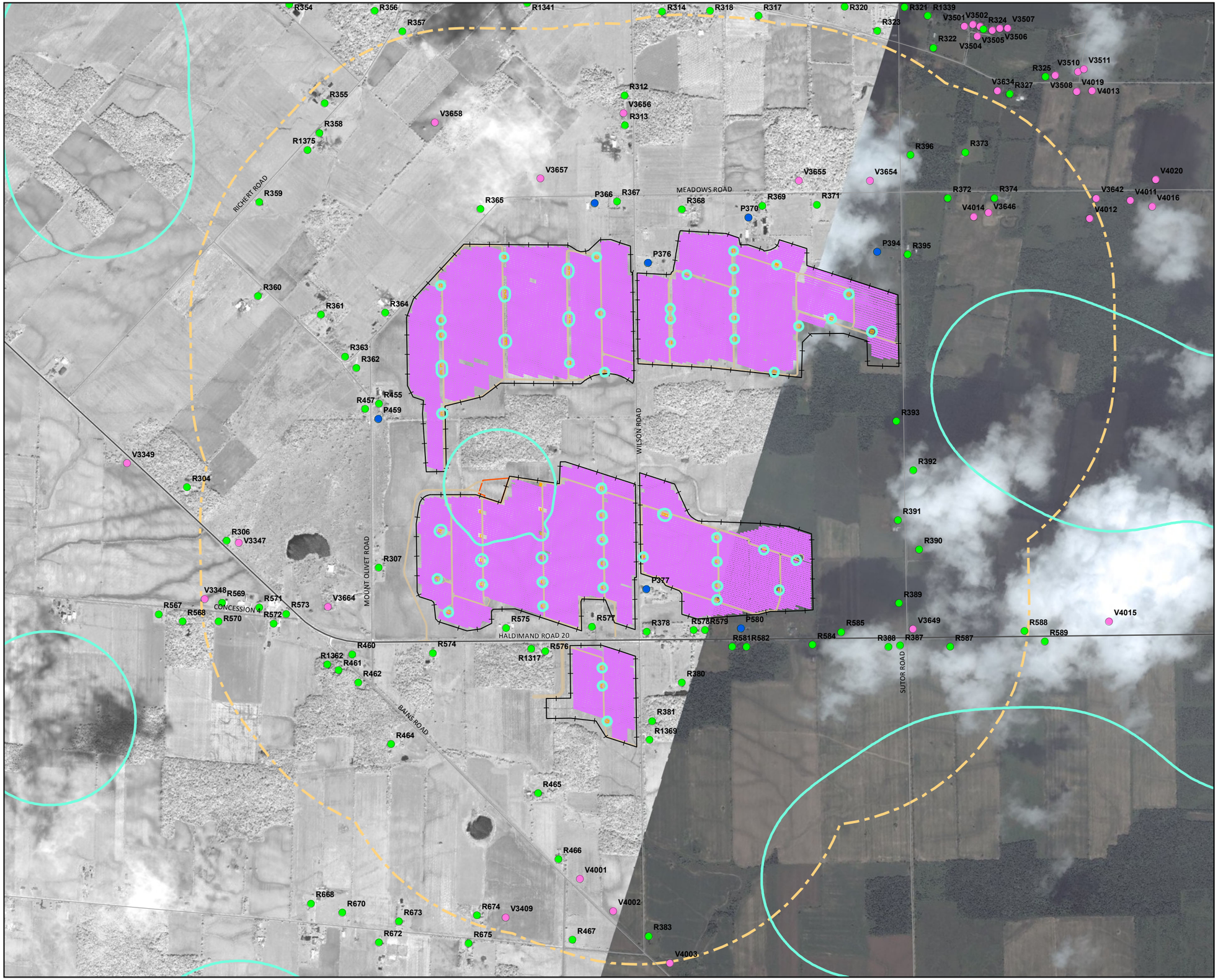
Topography – There are topographical features that extend beyond the property boundary of the project sites, and can reduce the noise impact from the project. However, conservatively, topography was not included in the noise modelling.

8.4 Point of Reception Noise Impact Table

Table 8 summarizes the partial noise levels (i.e., contribution from each of the onsite noise sources to the receptor noise levels) and corresponding source-receptor distance for selected nearest (most impacted) PORs. The sound level at the POR accounts for attenuation by divergence (distance), applicable barrier/screening effects, ground effects, foliage, and atmospheric absorption. This table gives the sum total of these attenuations for each source. Details of the noise modelling (CADNA output file) are provided in **Appendix B** – CADNA Model Output. Graphical outputs generated by the CADNA/A noise model, showing the noise level contours are presented in **Figures 4** and **5** for 1.5m and 4.5m receptor heights, respectively.

GRAND RENEWABLE SOLAR PROJECT

Figure 4
Predicted Noise Level Contours at 1.5 m Height



- Participating Noise Receptor
- Noise Receptor
- Vacant Lot Receptor
- 40 dBA Noise Contour at 1.5 m
- Highway
- Major Road
- Minor Road
- Fence
- Access Road
- Substation
- Solar Panel
- Inverter
- 1000 m Project Location Setback

1:17,000

0 50100 200 300 400 m

MAP CREATED BY: GM
MAP CHECKED BY: MB
MAP PROJECTION: NAD 1983 UTM Zone 17N

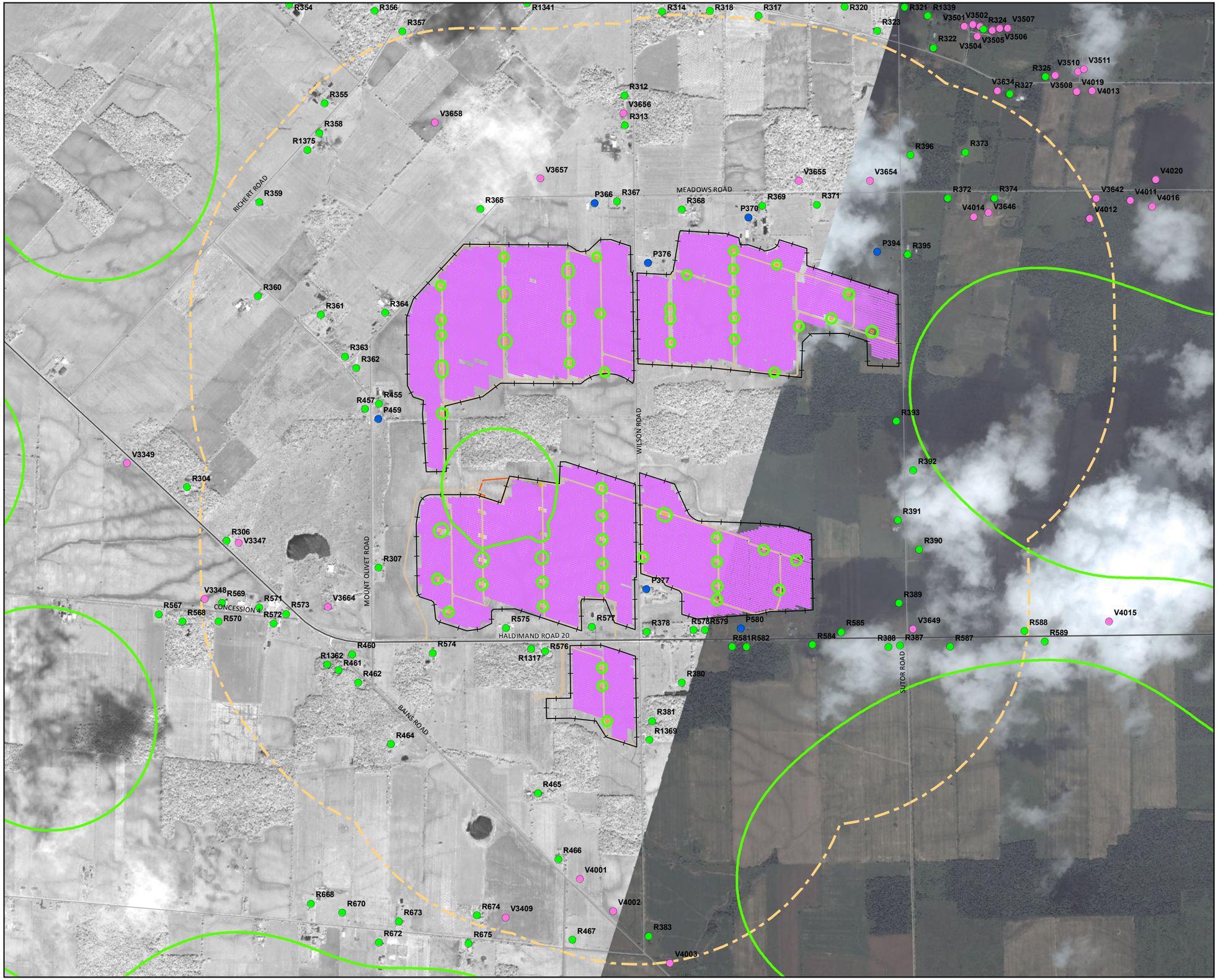
FILE LOCATION: I:\GIS\137911 - Grand Renewable Solar\Mapping

DILLON CONSULTING

PROJECT: 137911
STATUS: DRAFT
DATE: 8/15/2014

GRAND RENEWABLE SOLAR PROJECT

Figure 5
Predicted Noise Level Contours at 4.5 m Height



- Participating Noise Receptor
- Noise Receptor
- Vacant Lot Receptor
- 40 dBA Noise Contour at 4.5 m
- Highway
- Major Road
- Minor Road
- Fence
- Access Road
- Substation
- Solar Panel
- Inverter
- 1000 m Project Location Setback

1:17,000

0 50100 200 300 400 m

MAP CREATED BY: GM
MAP CHECKED BY: MB
MAP PROJECTION: NAD 1983 UTM Zone 17N

FILE LOCATION: I:\GIS\137911 - Grand Renewable Solar\Mapping

DILLON CONSULTING

PROJECT: 137911
STATUS: DRAFT
DATE: 8/15/2014