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# Obstructions to OCS and VSS detected using UAV-based LiDAR: Approach to runway 31 at BIRK

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## Overview

The purpose of this project was to use a UAV (Unmanned Aerial Vehicle) fitted with a LiDAR sensor (Light Detection and Ranging) to detect and measure the height of obstructions to the OCS and VSS surface on the approach to runway 31 at BIRK (Reykjavík Domestic Airport) (Fig. 1). Obstructions that were within 1-5 m below OCS and 1-3m below VSS were also to be detected and measured.

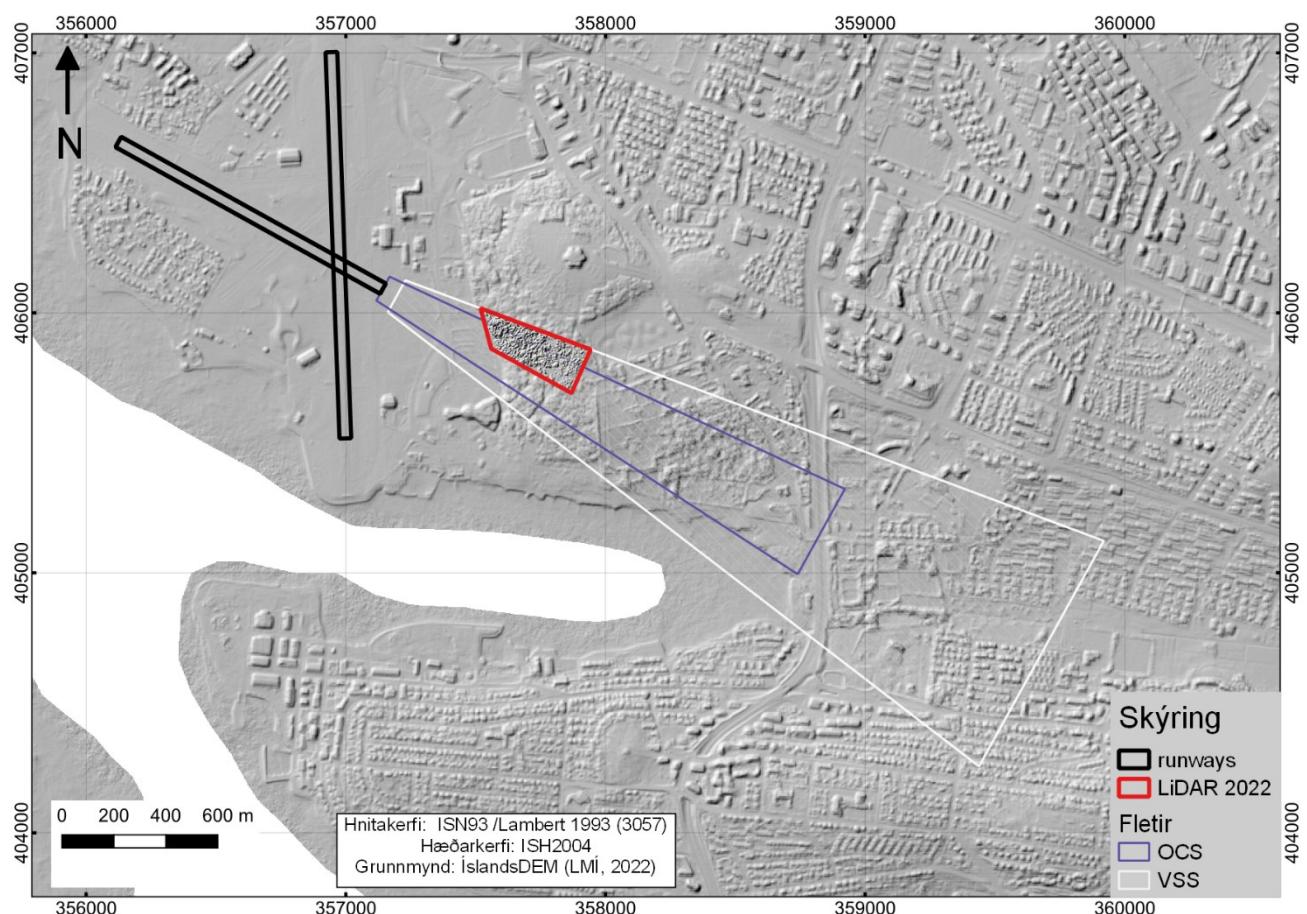


Figure 1. Overview map showing the VSS and OSS surfaces approaching runway 31 at BIRK. The hillshade (elevation model) circled in red was mapped with UAV LiDAR for this project and is the dataset used in this report to determine obstacles in OCS and VSS.

## Method

One 8-minute UAV LiDAR flight was performed on 3 April 2022 at approximately 14:00, covering an area of about 0.14 km<sup>2</sup>. From this data, a 3D pointcloud was created, where each point is precisely located with x, y and z coordinates in space. The point density of the resulting LiDAR pointcloud was about 115 pt/m<sup>2</sup>, or about 9 cm distance between points. This point density was sufficient enough to easily identify obstacles, classify the total of trees in the LiDAR point cloud and calculate the height above OCS and VSS within several cm accuracy. RGB imagery taken at the same time as the LiDAR imagery aided in object identification in the LiDAR pointcloud.

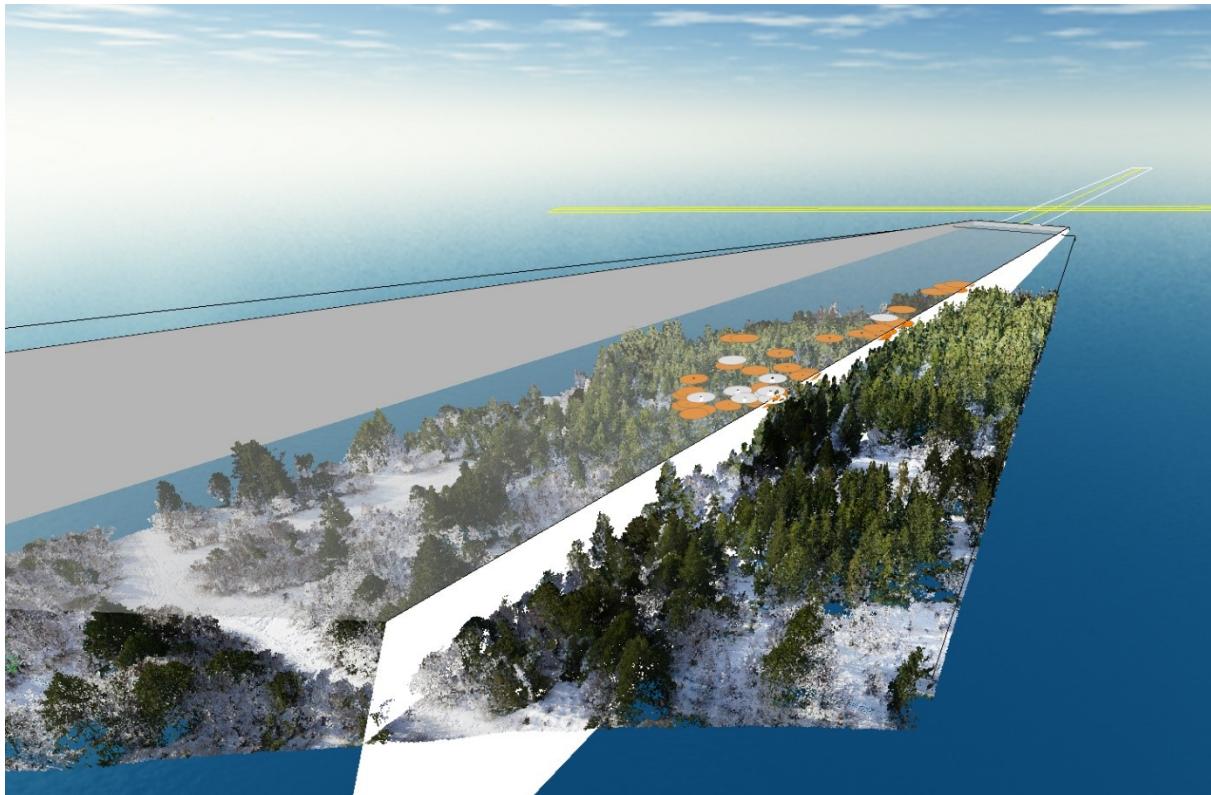


Figure 2. A 3d view of the LiDAR pointcloud (colored with imagery) taken looking towards runway 31 (looking West) shows the OCS (gray box in 3d), treetops obstructing OCS (white points), and treetops within 1m below the OCS (orange points). The runways at BIRK are shown in yellow lines in the distance.

The OCS surface is shown in Fig. 2 in more detail and is at a 3.45 degree angle extending east from runway 31 at BIRK. Using this surface, all points in the LiDAR pointcloud above this surface were identified, often in clusters of points. Each „cluster“ of points was analyzed with help from RGB imagery from the flight. The maximum point in every tree was taken as the height of the obstruction. Then, the height of the obstruction above OCS was determined by simply subtracting the OCS surface from the object height.

Next, objects within 5 m of the OCS (trees under 1m to 5m) were determined by subtracting the OCS surface from the treetop height (meaning that these objects have a negative value for height over OCS).

Once it was determined the obstructions above and under 1-5m OCS, the same methodology was used to obtain the obstruction above and under 3m the VSS. Fig.3 shows the VSS and the treetops obstructing VSS.

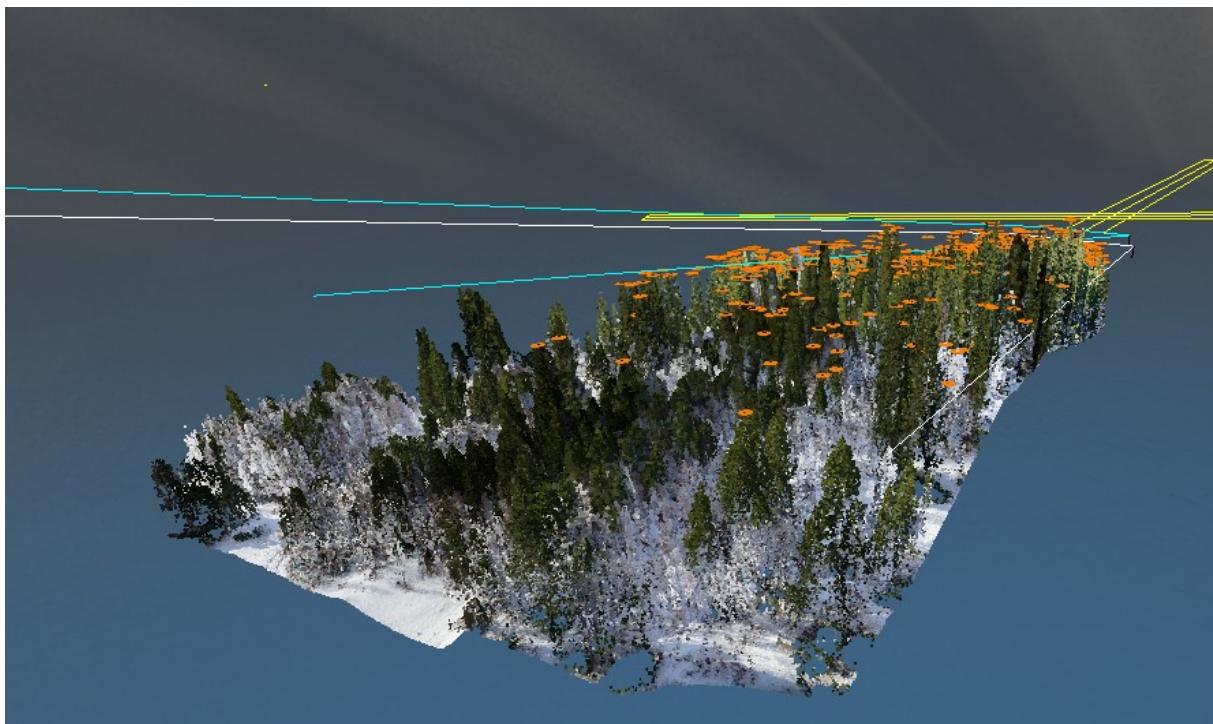


Figure 3. A 3d view of the LiDAR pointcloud (colored with imagery) taken looking towards runway 31 (looking West) shows the VSS in this case in white line, treetops obstructing VSS (orange points). The runways at BIRK are shown in yellow lines in the distance.

## Results: Obstructions to OCS

In the first place, a classification of the LiDAR pointcloud was needed to obtain the trees location in x,y and z with cm accuracy. A total of 3.331 trees were classified, of which 1863 trees are located in the OCS area. Fig.4 shows the tree classification of the LiDAR pointcloud.

7 obstructions (penetrating) OCS were identified in the LiDAR pointcloud, and RGB imagery suggests that they are all trees (Fig. 2). The maximum height of the trees is 1.575 m above the OCS, and the average of the 7 trees above the OCS is 0.89 m. Four of the trees were determined to be > 1 m above the OCS (Table 1).

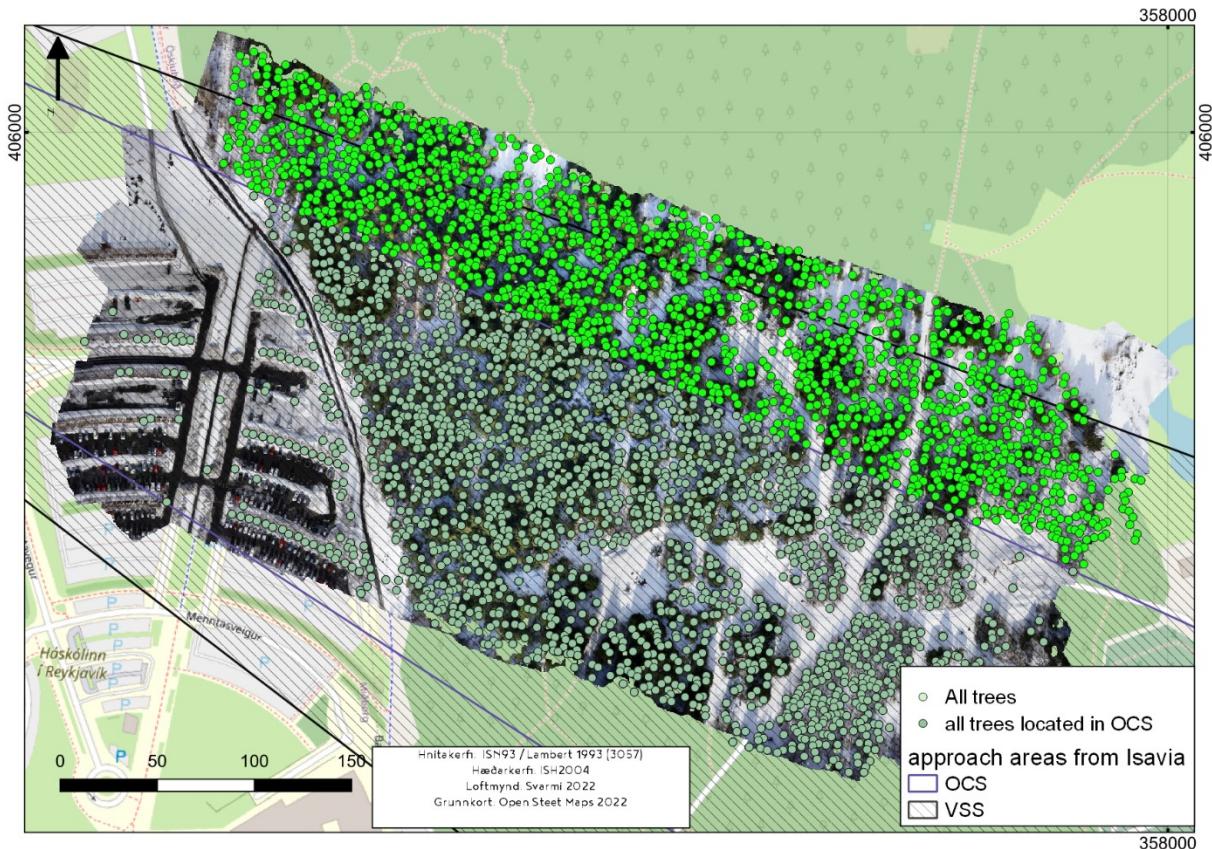


Fig. 4. Location of all trees classified with x,y and z coordinates and all trees located in OCS area. VSS is shown in black lines and OCS as blue. RGB imagery appears underneath.

Table 1. Results of obstructions to OCS found with the LiDAR pointcloud, along with height above OCS. Easting/Northing coordinates are in ISN93 / Lambert 1993. All objects listed here appear to be trees.

ID	Easting m	Northing m	Elevation m, ISH2004	OCS_Height m ISH2004	h_above_ocs m
282	357659.991	405899.102	44.828	44.45669556	0.371
283	357762.829	405860.409	52.586	51.0113678	1.575
284	357750.146	405859.99	51.411	50.3572998	1.054
285	357767.759	405853.885	52.445	51.46369934	0.981
286	357762.135	405851.323	52.264	51.24015808	1.024
287	357729.292	405845.853	49.702	49.66667175	0.035
288	357768.449	405842.61	52.877	51.82911682	1.048

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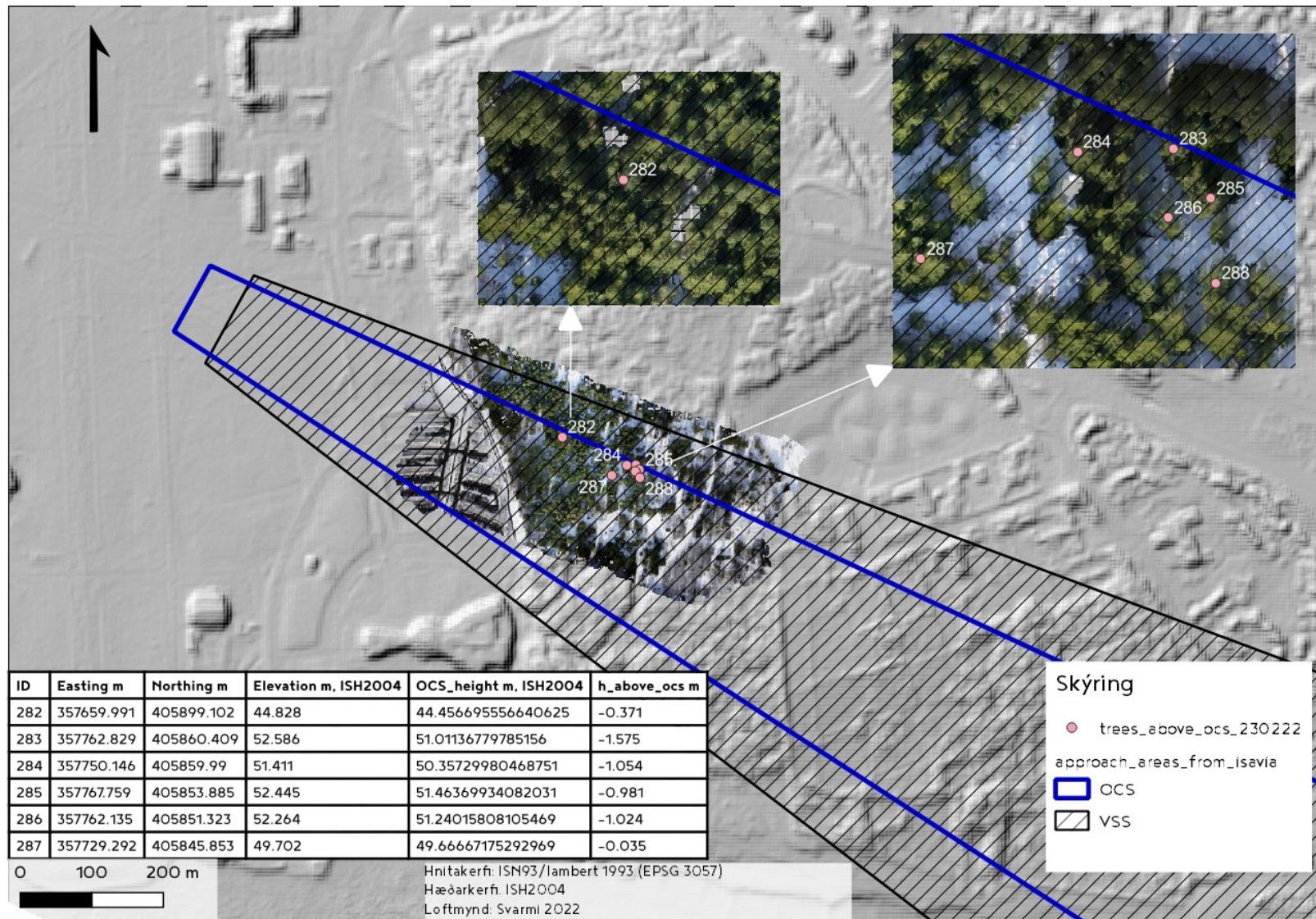


Figure 3. Summary of obstructions above OCS found in the LiDAR pointcloud. Background map is a hillshade of Reykjavík area (Landmælingar Íslands, 2022)

## Results: Obstructions within 5m of OCS

Obstructions of the trees below OCS was also classified and separated in 4 groups, height of trees lower than OCS by 1meter, 1 to 2 meters below OCS, 2 to 3 m below and 3 to 5 meters.

Trees within 1m of the OCS, 28 obstructions where classified and OCS surface were identified in the LiDAR pointcloud, and RGB imagery suggests that they are all trees (Fig. 4, Table 2). These trees do not include the ones identified to be penetrating OCS (9 trees described above. On average, the trees were about 0.50 m below OCS, with the closest tree being 0.93 cm below OCS.

In the case of 1m to 2m height distance below OCS, 46 trees were classified. On average, the trees were 1.55 m below OCS. 63 trees where located on the range of 2m to 3 m below and 144 trees in the case of 3m to 5m below OCS. Tables of these ranges can be seen in Appendix.

Table 2. Results of obstructions found within 1 m below OCS in the LiDAR pointcloud. Easting/Northing coordinates are in ISN93 / Lambert 1993. All objects listed here appear to be trees.

ID	Easting m	Northing m	Elevation m, ISH2004	OCS_Height m ISH2004	h_1m below_ocs m
254	357563.2	405947.5	37.079	37.93906	0.86
255	357584.2	405940.3	39.017	39.25983	0.243
256	357575.2	405939.3	38.74	38.81697	0.077
257	357591.2	405930.4	39.477	39.91811	0.441
258	357639.1	405908.5	42.85	43.08252	0.233
259	357665.4	405904.8	44.097	44.57507	0.478
260	357660.9	405902.7	43.874	44.40314	0.529
261	357669.4	405901.3	44.421	44.88971	0.469
262	357680.6	405896.8	45.152	45.61447	0.462
263	357674.3	405895.4	44.546	45.32306	0.777
264	357684.2	405894.2	44.945	45.87616	0.931
265	357687.7	405894	45.479	46.07071	0.592
266	357687	405888.6	46.049	46.18736	0.138
267	357693.3	405876.6	46.072	46.87267	0.801
268	357738	405869.2	48.816	49.44521	0.629
269	357733.2	405863.3	48.795	49.36694	0.572
270	357756.3	405862.1	49.737	50.61772	0.881
271	357718	405860.2	47.891	48.6543	0.763
272	357764	405856.5	50.792	51.18854	0.397
273	357756.9	405853.1	49.973	50.91333	0.94
274	357700.1	405846.6	47.935	48.10611	0.171
275	357774.1	405843.5	51.611	52.10083	0.49
276	357698	405842.5	47.28	48.11479	0.835
277	357768.7	405840	51.496	51.91676	0.421
278	357771.2	405839.1	51.764	52.07635	0.312
279	357760.2	405838.3	51.132	51.52217	0.39
280	357762.8	405838.2	51.511	51.66104	0.15
281	357749.7	405837.3	50.93	50.99374	0.064

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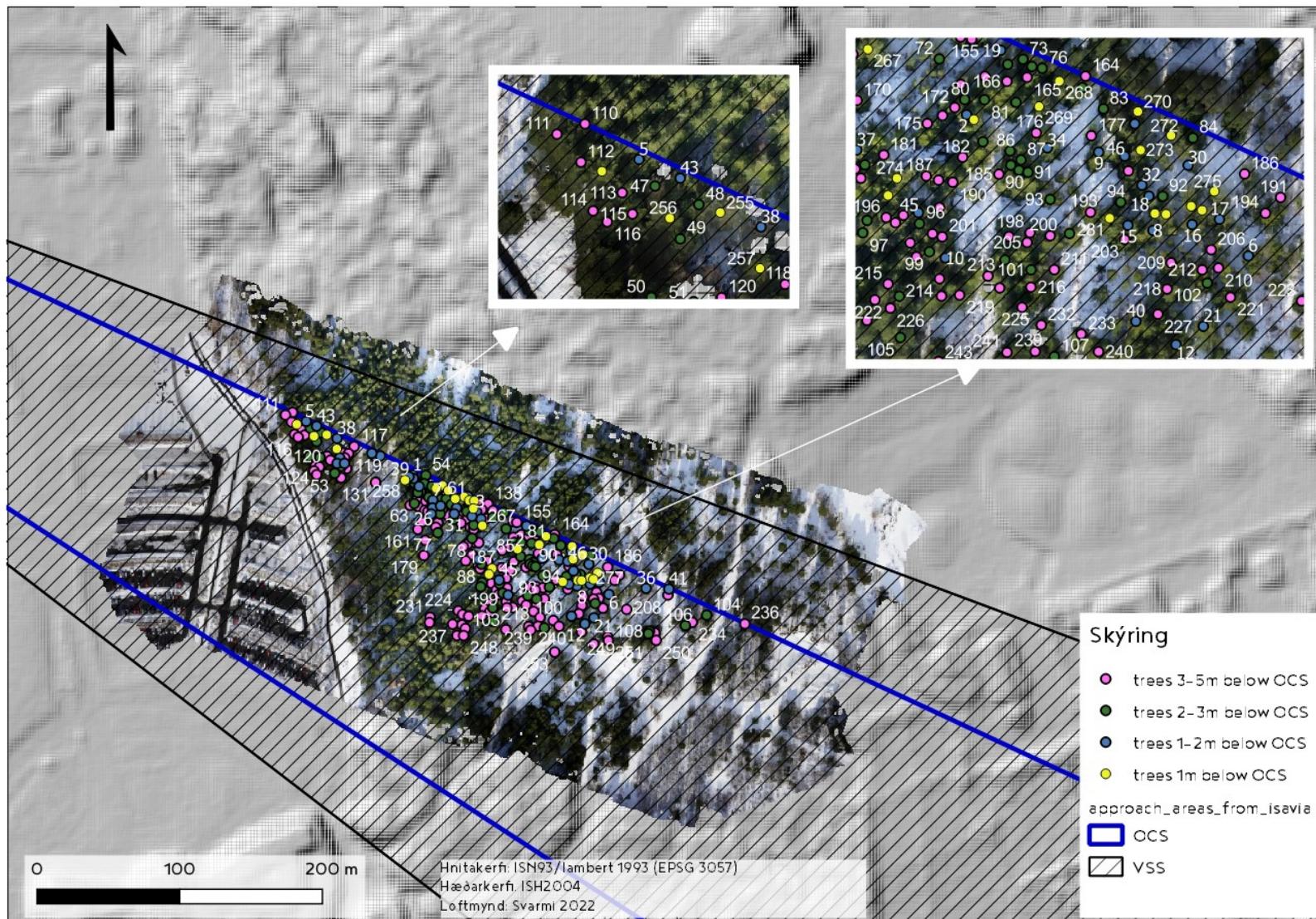


Figure 4. Summary of obstructions below OCS found in the LiDAR pointcloud. Background map is a hillshade of Reykjavík area (Landmælingar Íslands, 2021).

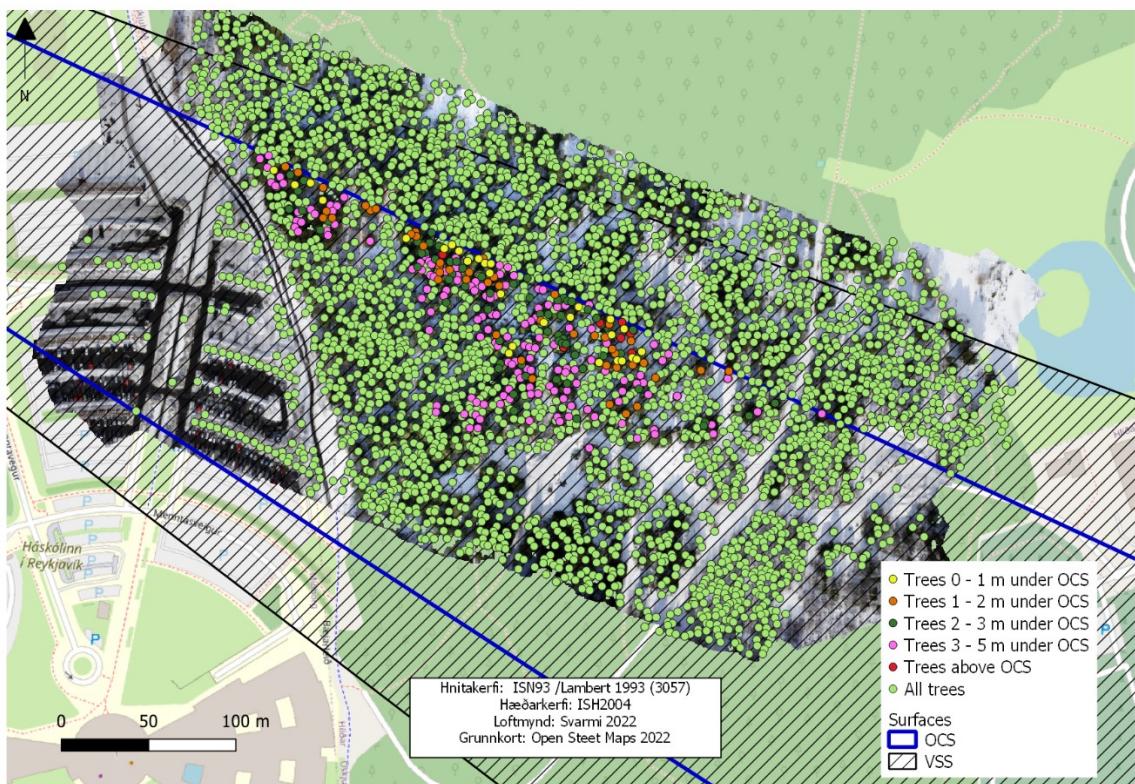


Fig 5. Results of all the trees classified using Svarmi Lidar point cloud, along the results of trees above and under OCS.

## Results: Obstructions to VSS

The approach area called VSS has different characteristics in width and height compared to OCS. VSS extends to a bigger area and has an approach to BIRK in a lower elevation. For this reason, the number of trees obstructing above VSS increases considerably to 800 trees from a total of 2899 trees classified covering VSS (Fig 6.).

368 obstructions (penetrating) VSS were identified in the LiDAR pointcloud within 3m above VSS, 296 trees are above VSS by 3 to 6m, 115 trees on the range of 6 to 9m and 20 trees are located above 9 to 11m from the VSS. The total average of the 800 trees obstructing VSS are 3.60m above VSS. (Tables of obstruction above VSS can be found in Annex).



Fig. 6. Location of all trees classified with x,y and z coordinates and all trees located in VSS area. VSS is shown in black lines and OCS as blue. RGB imagery appears underneath.

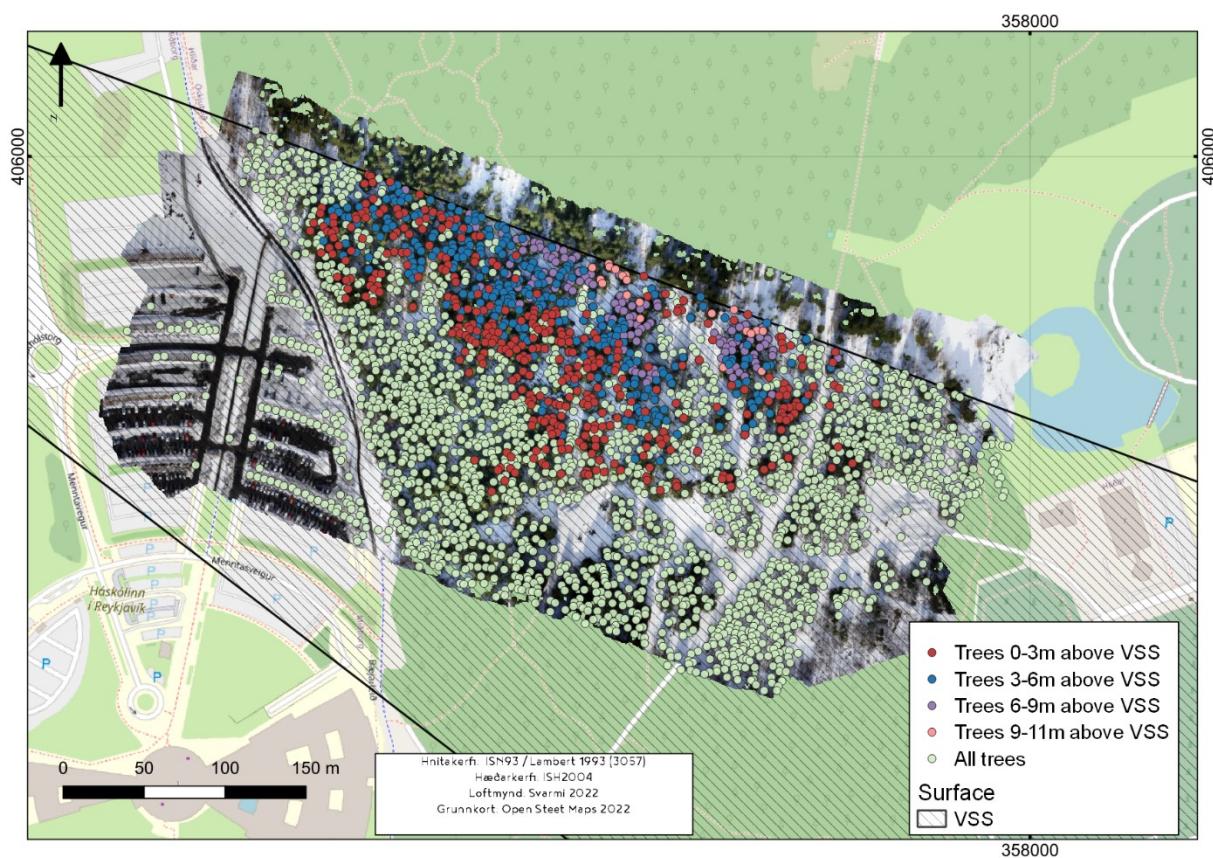


Fig 7. Results of all the trees classified using Svarmi Lidar point cloud, along the results of trees above VSS.

Table 3. Results of obstructions found within 9 to 11meters above VSS in the LiDAR pointcloud. Easting/Northing coordinates are in ISN93 / Lambert 1993. All objects listed here appear to be trees.

ID	Easting m	Northing m	Elevation m, ISH2004	OCS_Height m ISH2004	h_9 to 11m above_VSS m
331	357739.6	405933.7	52.408	42.89658	-9.51142
346	357740	405931.9	54.074	42.96907	-11.1049
347	357729.4	405931.3	51.668	42.44498	-9.22302
355	357743.8	405930.3	54.059	43.20365	-10.8554
384	357750.1	405926.7	53.211	43.62439	-9.58661
387	357748.1	405926.4	52.868	43.53386	-9.33414
408	357734.5	405924.1	52.756	42.90637	-9.84963
412	357750.8	405923.7	53.427	43.74739	-9.67961
425	357735.7	405921.6	52.062	43.0365	-9.0255
489	357750.9	405914.4	53.055	44.01456	-9.04044
524	357758.7	405910	53.921	44.53421	-9.38679
572	357817	405905.4	57.059	47.63556	-9.42344
595	357803.3	405903	56.383	47.00184	-9.38116
616	357759.1	405899.9	54.694	44.83921	-9.85479
700	357831.1	405892.4	59.105	48.71572	-10.3893
709	357824.8	405892.1	57.411	48.40347	-9.00753
710	357834.9	405892.1	58.033	48.92157	-9.11143
726	357827.6	405890.6	58.258	48.58969	-9.66831
981	357810.3	405869.7	57.451	48.30057	-9.15043
1014	357834.2	405867.3	59.29	49.58087	-9.70913

## Georeferencing and Accuracy of the data

The LiDAR pointcloud was georeferenced in the ISN93 / Lambert 1993 coordinate system and ISH2004 (Íslandshæð 2004) height system using PPK (post-processed kinematic) corrections from a Continuously Operating Base Station (CORS) stationed in Reykjavík (Landmælingar Íslands). The estimated precision for this method is generally  $\pm 1\text{-}3$  cm, but depends on the satellite connection at the time of flight.

To independently verify the error of the LiDAR pointcloud in elevation (z coordinate), 6 checkpoints were measured on flat surfaces with a GNSS receiver, with an RTK correction from a CORS base in Reykjavík (ÍSMAR) (Fig. 5). By computing the difference between these point measurements and the LiDAR pointcloud, it is possible to estimate the error of the elevations of the points (obstacle heights) (Elev\_diff, Table 3). The average error is less than 1 cm ( $\sigma = 2.8$  cm). Therefore it can be assumed that on average the overall height error of each tree measurement 3 cm or better.

Table 3. Summary of GNSS control point measurements compared to LiDAR pointcloud measurements (error estimate).

Point nr.	Easting m	Northing m	Lidar_elevation m, ISH2004	Elevation_GNSS m, ISH2004	Elev_diff m
220303_03	357559.462	405899.545	13.423	13.380	0.043
220303_10	357578.891	405844.627	13.570	13.603	-0.033
220303_05	357545.205	405933.554	13.508	13.478	0.030
220303_09	357567.943	405874.987	13.547	13.563	-0.016
220303_06	357532.491	405949.301	13.326	13.332	-0.006
220303_04	357553.293	405913.270	13.376	13.375	0.001

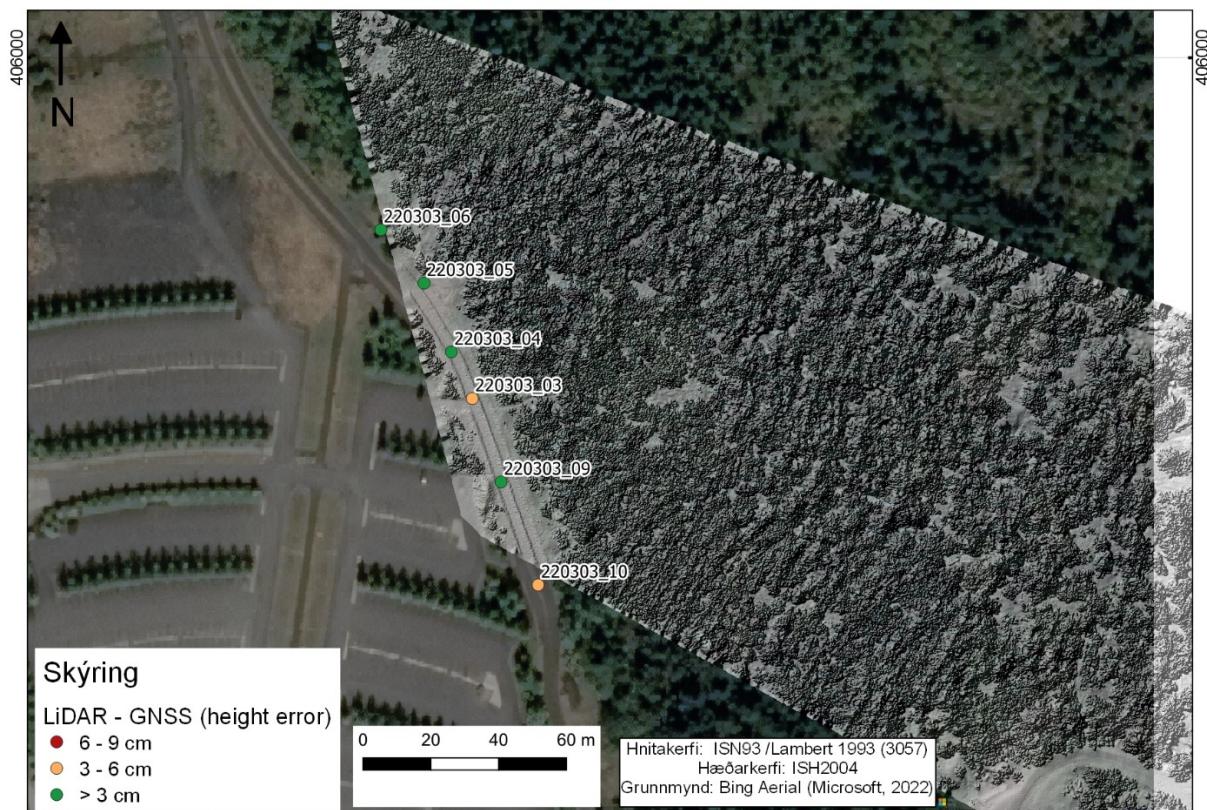


Figure. 5. GNSS checkpoints colored by LiDAR height error (measured height minus LiDAR height), overlaying a hillshade image (elevation model) of the LiDAR data.

## Appendix

Table 4. Results of obstructions found within 1 to 2m below OCS in the LiDAR pointcloud. Easting/Northing coordinates are in ISN93 / Lambert 1993. All objects listed here appear to be trees.

ID	Easting m	Northing m	Elevation m, ISH2004	OCS_Height m ISH2004	h_1 to 2m below_OCS m
1	357644.5	405912.1	41.342	43.25958	1.918
2	357716.3	405861.4	47.22	48.53105	1.311
3	357689.4	405886.2	44.971	46.38402	1.413
4	357658.1	405892.3	42.802	44.55649	1.754
5	357569.8	405949.6	36.513	38.22321	1.71
6	357782	405828.5	51.172	52.95695	1.785
7	357658.6	405894.5	42.924	44.51862	1.595
8	357759.8	405834.4	49.951	51.6123	1.661
9	357747.1	405852.6	48.504	50.41104	1.907
10	357711.4	405828	47.535	49.24376	1.709
11	357593.3	405924	38.294	40.21281	1.919
12	357765.2	405807.8	50.906	52.67117	1.765
13	357692.4	405881.3	44.857	46.68796	1.831
14	357618.7	405924.6	40.199	41.53526	1.336
15	357753.9	405835.6	50.184	51.26608	1.082
16	357768.9	405835.8	50.954	52.05286	1.099
17	357775.3	405837	50.738	52.35129	1.613
18	357758.8	405842.4	49.714	51.33008	1.616
19	357724.3	405876.4	46.929	48.51239	1.583
20	357686	405883.2	44.429	46.29639	1.867
21	357771.5	405812.1	51.052	52.88202	1.83
22	357675.2	405889.1	44.349	45.55447	1.205
23	357755.5	405859.2	49.511	50.66138	1.15
24	357621.8	405925.4	39.726	41.67395	1.948
25	357683.2	405897.1	44.493	45.74283	1.25
26	357658.3	405889	43.005	44.66576	1.661
27	357648.9	405904.1	42.226	43.73198	1.506
28	357664	405890.5	43.217	44.92288	1.706
29	357645	405909.7	41.627	43.35748	1.73
30	357768	405849.6	50.577	51.60098	1.024
31	357673.6	405884.8	43.643	45.59273	1.95
32	357757.2	405844.9	49.856	51.16713	1.311
33	357657.4	405884.8	42.879	44.73975	1.861
34	357735.2	405853.6	48.502	49.75156	1.25
35	357615.8	405927.3	40.025	41.30611	1.281
36	357808.1	405832.7	53.053	54.20537	1.152
37	357690.7	405853.1	45.458	47.42171	1.964
38	357591.4	405937.7	38.488	39.7155	1.227

39	357641.9	405910.9	42.101	43.15894	1.058
40	357755.8	405813.2	50.33	52.02036	1.69
41	357824.1	405832.2	53.598	55.06796	1.47
42	357591.4	405920.2	38.735	40.22766	1.493
43	357577.1	405946.3	37.567	38.70605	1.139
44	357596.6	405920.2	38.774	40.49783	1.724
45	357705.1	405838.5	46.702	48.60342	1.901
46	357753.2	405851.7	49.331	50.75642	1.425

Table 5. Results of obstructions found within 2 to 3m below OCS in the LiDAR pointcloud. Easting/Northing coordinates are in ISN93 / Lambert 1993. All objects listed here appear to be trees.

ID	Easting m	Northing m	Elevation m, ISH2004	OCS_Height m ISH2004	h_2 to 3m below_OCS m
47	357572.6	405944.9	35.668	38.51077	2.843
48	357580.4	405941.7	36.701	39.01852	2.318
49	357577.1	405935.6	36.733	39.02258	2.29
50	357572	405925.2	36.604	39.0517	2.448
51	357579.5	405924.5	36.723	39.47327	2.75
52	357594.5	405918.2	37.795	40.44838	2.653
53	357589.8	405913.3	38.089	40.34357	2.255
54	357653.7	405911.9	40.867	43.75212	2.885
55	357645.6	405906.5	40.883	43.48521	2.602
56	357652.5	405906	41.179	43.8611	2.682
57	357657.9	405904.1	41.485	44.20403	2.719
58	357650.1	405900.4	40.999	43.89804	2.899
59	357648	405899.8	41.17	43.80597	2.636
60	357655.7	405896.5	41.43	44.30844	2.878
61	357664.4	405895.1	42.464	44.8082	2.344
62	357667.9	405895.2	42.627	44.98988	2.363
63	357645.7	405892.1	41.047	43.90685	2.86
64	357671.5	405891.4	42.701	45.29218	2.591
65	357665.4	405888.2	42.576	45.06387	2.488
66	357682.3	405886.5	43.974	46.00488	2.031
67	357708.6	405885.8	44.694	47.40984	2.716
68	357663.7	405884.8	42.829	45.07202	2.243
69	357700.6	405882.3	44.626	47.08862	2.463
70	357673	405880.9	43.158	45.67378	2.516
71	357687.2	405877	44.042	46.53925	2.497
72	357710	405874.3	45.343	47.81654	2.474
73	357729.5	405874.3	46.088	48.84796	2.76
74	357725.9	405873.1	46.553	48.69577	2.143
75	357731.6	405872.6	46.213	49.00836	2.795
76	357734	405872.2	46.98	49.14664	2.167
77	357662.1	405871.7	42.413	45.36897	2.956
78	357686.1	405867.7	43.779	46.75015	2.971

79	357743.3	405867.7	47.431	49.77118	2.34
80	357715.9	405864.9	45.477	48.40512	2.928
81	357720.5	405864.8	46.071	48.65184	2.581
82	357727.8	405864.2	46.486	49.05293	2.567
83	357748.2	405862.7	47.452	50.17416	2.722
84	357769.1	405855.9	49.175	51.47505	2.3
85	357720.1	405855.1	45.968	48.91544	2.947
86	357726.5	405852.9	47.307	49.31314	2.006
87	357729	405850.8	47.346	49.50894	2.163
88	357692.6	405849.7	44.661	47.62265	2.962
89	357726.6	405849.6	46.628	49.4174	2.789
90	357728.5	405848.4	46.669	49.55264	2.884
91	357730.6	405847.9	47.585	49.67654	2.092
92	357762.1	405842.4	48.858	51.49886	2.641
93	357735.8	405841.6	47.46	50.13623	2.676
94	357752.3	405841	48.87	51.02138	2.151
95	357693.1	405836.7	45.511	48.02716	2.516
96	357705.3	405836	46.289	48.69254	2.404
97	357692.1	405833.9	45.388	48.05763	2.67
98	357740.3	405833.7	48.301	50.60571	2.305
99	357707.7	405829.4	46.13	49.00772	2.878
100	357725.3	405827.5	47.413	49.99149	2.578
101	357731.3	405825.2	47.436	50.37892	2.943
102	357772.4	405822.1	49.867	52.63457	2.768
103	357700.6	405819.1	45.968	48.9381	2.97
104	357850.6	405814	54.618	56.99591	2.378
105	357700.9	405809.5	47.227	49.2316	2.005
106	357835.6	405806.7	54.099	56.42055	2.322
107	357736.8	405805	48.442	51.25502	2.813
108	357810.5	405802.7	52.566	55.20938	2.643
109	357809.7	405801	52.718	55.21947	2.501

Table 6. Results of obstructions found within 3 to 5m below OCS in the LiDAR pointcloud. Easting/Northing coordinates are in ISN93 / Lambert 1993. All objects listed here appear to be trees.

ID	Easting m	Northing m	Elevation m, ISH2004	OCS_Height m ISH2004	h_3 to 5m below_OCS m
110	357560.2	405955.9	32.873	37.53702	4.664
111	357555.3	405954.1	33.021	37.32849	4.307
112	357559.5	405949.2	32.854	37.69719	4.843
113	357566.8	405943.8	34.178	38.2399	4.062
114	357561.7	405940.5	34.551	38.06316	3.512
115	357568.6	405940	34.834	38.44579	3.612
116	357564.2	405938.6	33.699	38.25195	4.553

117	357603.4	405932.1	35.983	40.51193	4.529
118	357595.7	405927.5	36.848	40.23602	3.388
119	357599.4	405927.1	37.041	40.44814	3.407
120	357584.4	405925.2	35.828	39.71127	3.883
121	357596.8	405924.1	35.839	40.39742	4.558
122	357577.1	405923.5	35.009	39.37444	4.365
123	357586.8	405922.5	34.965	39.91406	4.949
124	357576.2	405918.4	34.671	39.47324	4.802
125	357579	405917.8	36.218	39.64253	3.425
126	357598	405916.5	37.607	40.68381	3.077
127	357575.3	405914.9	34.802	39.52797	4.726
128	357593.6	405913	35.68	40.55011	4.87
129	357577.1	405912.3	36.17	39.70146	3.531
130	357594.3	405910.2	36.68	40.66733	3.987
131	357618.4	405906.9	37.582	42.03891	4.457
132	357650.1	405898.2	40.834	43.9649	3.131
133	357667.5	405897.2	41.454	44.90628	3.452
134	357652.3	405895.4	40.615	44.16124	3.546
135	357647.3	405894.7	39.988	43.91942	3.931
136	357653.6	405893.5	40.847	44.28528	3.438
137	357692.6	405893	41.363	46.35689	4.994
138	357697.3	405891.9	43.179	46.63837	3.459
139	357667.5	405891.5	41.762	45.07828	3.316
140	357642.6	405890.9	40.642	43.78249	3.14
141	357648.1	405890.2	40.757	44.08891	3.332
142	357661.6	405889.5	40.469	44.82666	4.358
143	357692.9	405887.9	42.856	46.52307	3.667
144	357653	405887.4	41.029	44.42911	3.4
145	357668.5	405887.2	41.971	45.25394	3.283
146	357700.8	405887.2	42.228	46.96019	4.732
147	357655.1	405886.5	41.12	44.56761	3.448
148	357668.4	405884.4	41.807	45.33569	3.529
149	357678.8	405883.7	41.549	45.90204	4.353
150	357696.1	405881.6	43.2	46.87581	3.676
151	357676.2	405881.1	42.753	45.84082	3.088
152	357682.5	405880.9	42.805	46.18158	3.377
153	357714.9	405879.4	43.876	47.93018	4.054
154	357651.1	405879.2	41.249	44.56833	3.319
155	357717.5	405878.9	44.284	48.08044	3.796
156	357662.1	405878.7	42.086	45.16576	3.08
157	357678.3	405878.5	42.553	46.02486	3.472
158	357660.7	405875.5	41.341	45.18271	3.842
159	357684.9	405875.4	42.844	46.46466	3.621
160	357689.8	405875.4	43.379	46.72165	3.343
161	357648.1	405874	41.349	44.56049	3.211

162	357687.3	405874.1	43.568	46.62802	3.06
163	357720.6	405870.3	45.301	48.49652	3.196
164	357744.1	405870.3	46.73	49.73337	3.003
165	357730.4	405870.1	45.359	49.02071	3.662
166	357725.7	405869.1	44.999	48.80319	3.804
167	357715	405868.4	45.125	48.254	3.129
168	357653.2	405866.3	41.139	45.05695	3.918
169	357688.2	405864.9	42.111	46.94267	4.832
170	357690.8	405864.7	42.992	47.08563	4.094
171	357682.8	405863.5	43.679	46.69873	3.02
172	357713.6	405863	45.209	48.33783	3.129
173	357680	405861.9	42.916	46.59923	3.683
174	357710.7	405861.1	43.813	48.24153	4.429
175	357707.2	405859.3	43.676	48.10831	4.432
176	357732.6	405857.1	44.999	49.51224	4.513
177	357745.4	405856.5	45.554	50.20897	4.655
178	357686	405856.2	42.727	47.08476	4.358
179	357652.3	405855.8	40.349	45.31898	4.97
180	357681.6	405852	43.369	46.97533	3.606
181	357697	405852	43.832	47.78757	3.956
182	357715.4	405851.5	44.714	48.77266	4.059
183	357690.3	405848.7	43.538	47.52908	3.991
184	357754.1	405848.3	47.578	50.90463	3.327
185	357723.9	405847.5	45.633	49.33368	3.701
186	357781.2	405847.6	48.579	52.35443	3.775
187	357706.9	405847.1	43.977	48.4528	4.476
188	357691.7	405846.6	44.318	47.66307	3.345
189	357709.8	405846.1	45.578	48.63086	3.053
190	357713.1	405845.6	45.08	48.82216	3.742
191	357789.5	405842.1	48.031	52.95396	4.923
192	357710	405839.8	45.02	48.82947	3.809
193	357745.2	405838.6	46.524	50.71962	4.196
194	357786	405838.4	48.402	52.8774	4.475
195	357701.6	405837.9	44.017	48.43781	4.421
196	357697.6	405837.4	44.351	48.24142	3.89
197	357699.7	405836.2	45.342	48.38986	3.048
198	357731.1	405833.9	47.102	50.11462	3.013
199	357708.4	405833.6	45.336	48.92201	3.586
200	357735.8	405833.2	46.754	50.38297	3.629
201	357710.6	405832.9	45.461	49.06113	3.6
202	357726.2	405833	46.605	49.88246	3.277
203	357753.2	405832.3	47.26	51.32698	4.067
204	357703.2	405831.5	44.86	48.70908	3.849
205	357730.4	405831.6	46.572	50.1434	3.571
206	357773.4	405829.9	47.725	52.45837	4.733

207	357704.6	405828.3	45.502	48.88045	3.378
208	357823.4	405828.1	51.178	55.15222	3.974
209	357764	405826.9	47.357	52.05429	4.697
210	357775.1	405825.7	49.24	52.67215	3.432
211	357736.8	405825.3	46.518	50.66374	4.146
212	357771.3	405825.2	48.481	52.48486	4.004
213	357721.3	405823.8	46.526	49.89265	3.367
214	357710	405823.1	45.233	49.31418	4.081
215	357698	405821.9	44.024	48.71774	4.694
216	357731.3	405821.2	46.214	50.49454	4.281
217	357724.1	405821	46.962	50.118	3.156
218	357763.1	405820.8	48.978	52.1823	3.204
219	357714.7	405819.3	45.801	49.67038	3.869
220	357710.5	405819.1	44.654	49.45616	4.802
221	357777.9	405818.9	49.438	53.01837	3.58
222	357694.9	405818.2	44.572	48.66228	4.09
223	357794.4	405818	49.491	53.9202	4.429
224	357676.5	405817	43.562	47.7242	4.162
225	357729.2	405816.5	46.306	50.52365	4.218
226	357698.5	405816.3	43.938	48.90764	4.97
227	357760.9	405814.9	47.823	52.24234	4.419
228	357679.5	405814.4	43.433	47.95834	4.525
229	357693.1	405813.4	43.965	48.7034	4.738
230	357683.7	405813.2	43.504	48.21754	4.714
231	357656.7	405812.5	42.173	46.81128	4.638
232	357733.7	405812.4	46.512	50.88217	4.37
233	357743.1	405810.3	47.509	51.43402	3.925
234	357840.5	405809	51.862	56.61183	4.75
235	357656.2	405808.8	41.971	46.89557	4.925
236	357877.4	405807.8	54.451	58.58902	4.138
237	357672.4	405807.6	44.211	47.7836	3.573
238	357679	405807.2	43.831	48.1463	4.315
239	357732.3	405806.2	47.032	50.98528	3.953
240	357747.1	405806.2	47.277	51.76733	4.49
241	357725.7	405806	46.799	50.64565	3.847
242	357681.4	405804.6	45.187	48.34735	3.16
243	357709.8	405803.9	45.951	49.86307	3.912
244	357727.2	405803.4	46.33	50.79541	4.465
245	357762.8	405802.2	49.059	52.71484	3.656
246	357814.3	405801.5	52.279	55.44339	3.164
247	357675.5	405799.7	44.577	48.18069	3.604
248	357680.2	405799.7	43.607	48.42595	4.819
249	357781.2	405798.7	49.995	53.78226	3.787
250	357815.2	405796.3	52.159	55.64415	3.485
251	357781.6	405796.1	50.68	53.88045	3.2

252	357771.5	405793.7	48.78	53.41782	4.638
253	357744	405788.2	47.162	52.12943	4.967

Table 6. Results of obstructions found within 3m above VSS in the LiDAR pointcloud. Easting/Northing coordinates are in ISN93 / Lambert 1993. All objects listed here appear to be trees.

ID	Easting m	Northing m	Elevation m, ISH2004	VSS_Height m ISH2004	h_0 to 3m above_VSS m
45	357591	405988.6	35.647	33.78241	-1.86459
48	357592.5	405987.8	36.008	33.88272	-2.12528
61	357604.6	405984.3	36.938	34.5959	-2.3421
63	357593.6	405983.9	34.612	34.04976	-0.56224
68	357588.7	405983.2	36.265	33.81496	-2.45004
96	357622.8	405976.6	36.453	35.74332	-0.70968
104	357594.1	405973.8	34.542	34.3573	-0.1847
120	357589.4	405970.8	36.707	34.20655	-2.50045
126	357562.1	405968.3	35.822	32.88589	-2.93611
130	357600.7	405967.5	35.783	34.8694	-0.9136
131	357608.8	405967.6	36.899	35.28146	-1.61754
133	357626	405967.2	38.794	36.16603	-2.62797
137	357589.4	405966.1	34.902	34.33645	-0.56555
139	357631	405965.6	37.762	36.46678	-1.29522
140	357613.2	405965.3	36.1	35.57053	-0.52947
142	357561.3	405964.8	35.294	32.94379	-2.35021
143	357586.8	405964.8	34.884	34.23537	-0.64863
144	357597.9	405964.9	37.727	34.8041	-2.9229
147	357610	405964.1	36.469	35.44145	-1.02755
148	357635.7	405964.1	37.86	36.74689	-1.11311
153	357583.1	405963.4	35.765	34.09184	-1.67316
159	357569.5	405962.7	35.329	33.41926	-1.90974
162	357589.4	405962.2	35.265	34.44891	-0.81609
164	357636.4	405962.2	39.441	36.84143	-2.59957
167	357626.7	405961.8	39.159	36.35893	-2.80007
168	357583.6	405961.4	36.89	34.17225	-2.71775
169	357645.5	405961.4	39.69	37.32326	-2.36674
173	357641.5	405960.6	39.944	37.14332	-2.80068
176	357622.5	405959.8	37.777	36.19754	-1.57946
179	357557.2	405959.1	34.45	32.89458	-1.55542
181	357569.5	405958.7	35.699	33.53058	-2.16842
188	357640.8	405957.9	38.189	37.18123	-1.00777
193	357563.3	405956.8	34.686	33.27246	-1.41354
195	357580.4	405956.3	36.696	34.15421	-2.54179
199	357613.2	405955.9	38.027	35.83544	-2.19156
201	357636.5	405955.6	38.833	37.02857	-1.80443
202	357649.7	405955.6	40.644	37.70051	-2.94349

203	357624.4	405955.1	37.808	36.42785	-1.38015
207	357570.4	405954.4	35.83	33.69502	-2.13498
208	357555.2	405954	33.044	32.93254	-0.11146
210	357565.7	405953.6	34.338	33.48086	-0.85714
213	357608.5	405953.2	38.636	35.67086	-2.96514
215	357568.4	405952.9	35.954	33.63944	-2.31456
219	357616.3	405952.1	36.633	36.10033	-0.53267
223	357606.6	405950.8	38.198	35.64178	-2.55622
224	357657.1	405950.8	40.623	38.21248	-2.41052
225	357660.2	405950.9	40.53	38.36747	-2.16253
231	357569.5	405949.7	36.247	33.78675	-2.46025
233	357648.5	405949.8	38.972	37.80683	-1.16517
235	357587.5	405949.3	35.191	34.70922	-0.48178
259	357572.7	405945	34.72	34.07956	-0.64044
261	357628.7	405945.1	38.454	36.92882	-1.52518
270	357566.9	405943.5	33.951	33.82658	-0.12442
284	357580.4	405941.7	36.711	34.56847	-2.14253
288	357607	405941.1	38.049	35.9355	-2.1135
290	357612	405940.7	39.072	36.2013	-2.8707
291	357615.1	405940.7	38.213	36.35656	-1.85644
294	357561.8	405940.5	34.529	33.65546	-0.87354
296	357602.6	405940	36.879	35.74648	-1.13252
297	357568.9	405939.7	34.295	34.03548	-0.25952
304	357682.3	405938.8	42.783	39.83741	-2.94559
307	357636.1	405938.5	38.782	37.49152	-1.29048
310	357657.5	405938.1	40.08	38.59074	-1.48926
316	357639.1	405937.2	40.538	37.682	-2.856
322	357577	405935.7	36.722	34.56053	-2.16147
324	357656.8	405934.9	40.221	38.64275	-1.57825
325	357667.6	405935	42.116	39.19225	-2.92375
336	357615.1	405933	38.361	36.5761	-1.7849
337	357640.3	405933	39.71	37.86145	-1.84855
340	357670.7	405932.6	41.375	39.41768	-1.95732
352	357636.5	405930.7	38.412	37.73028	-0.68172
358	357638.8	405929.6	38.021	37.87977	-0.14123
373	357595.6	405927.5	36.633	35.73959	-0.89341
374	357599.2	405927.5	36.704	35.92171	-0.78229
391	357761.4	405926.1	47.075	44.21935	-2.85565
392	357571.9	405925.5	36.428	34.58582	-1.84218
393	357621.8	405925.6	39.709	37.12711	-2.58189
395	357644.3	405925.6	38.51	38.27247	-0.23753
402	357580	405924.4	36.655	35.03028	-1.62472
404	357682	405924.5	41.752	40.22118	-1.53082
406	357593.4	405924	38.231	35.72509	-2.50591
410	357577.3	405923.7	35.002	34.91539	-0.08661

420	357645.1	405922.5	39.323	38.39801	-0.92499
436	357592.2	405920.1	38.565	35.77391	-2.79109
437	357596.8	405920.1	38.76	36.00949	-2.75051
451	357578.5	405918.2	36.071	35.13147	-0.93953
452	357594.4	405918.2	37.791	35.93945	-1.85155
454	357665.6	405918.3	42.026	39.56501	-2.46099
465	357598	405916.3	37.527	36.17625	-1.35075
476	357658.7	405915	39.838	39.30282	-0.53518
477	357695.2	405915.1	44.076	41.15944	-2.91656
478	357774.6	405915.1	45.558	45.20242	-0.35558
493	357589.4	405913.5	37.966	35.81993	-2.14607
495	357763.7	405913.6	47.602	44.68728	-2.91472
496	357640.3	405913.3	39.909	38.41548	-1.49352
503	357577	405912.4	36.153	35.21857	-0.93443
508	357644.2	405912.1	41.295	38.65038	-2.64462
520	357785.8	405910.9	46.356	45.89233	-0.46367
521	357594.1	405910.3	36.583	36.14681	-0.43619
528	357645.1	405909.6	41.637	38.76269	-2.87431
549	357666.3	405907.7	42.129	39.89796	-2.23104
555	357618.6	405907	37.598	37.49093	-0.10707
556	357645.5	405907	40.829	38.85773	-1.97127
562	357782.8	405906.2	47.075	45.86697	-1.20803
564	357652.4	405905.8	41.185	39.24534	-1.93966
571	357693.7	405905.4	43.443	41.35898	-2.08402
574	357662.2	405905	42.664	39.76675	-2.89725
575	357675.7	405904.9	41.28	40.45396	-0.82604
577	357706.5	405905	44.192	42.01929	-2.17271
578	357784.6	405905	47	45.99469	-1.00531
583	357657.9	405904.2	41.443	39.56786	-1.87514
584	357782.1	405904.2	47.508	45.88488	-1.62312
591	357693.2	405903.1	44.031	41.39693	-2.63407
592	357701.4	405903.1	43.89	41.81577	-2.07423
594	357775.5	405903.1	48.033	45.58527	-2.44773
597	357707.2	405902.6	43.489	42.12115	-1.36785
598	357726	405902.6	44.931	43.07703	-1.85397
599	357704.6	405902.4	44.532	41.99584	-2.53616
601	357825.5	405902.4	49.9	48.15279	-1.74721
604	357689.9	405901.5	42.57	41.2715	-1.2985
607	357700.4	405900.7	42.764	41.82854	-0.93546
610	357647.8	405900.3	41.147	39.16222	-1.98478
615	357692.9	405900	41.797	41.46648	-0.33052
627	357817	405898.8	48.886	47.82155	-1.06445
629	357685.5	405898.4	43.509	41.13742	-2.37158
636	357704.2	405897.5	43.652	42.11075	-1.54125
638	357667.5	405897.3	41.418	40.25354	-1.16446

645	357692.5	405896.8	43.526	41.5363	-1.9897
648	357801.1	405896.9	48.579	47.06062	-1.51838
650	357655.5	405896.4	41.337	39.66409	-1.67291
658	357652.4	405895.2	40.628	39.54152	-1.08648
659	357667.9	405895.2	42.625	40.33167	-2.29333
665	357664.9	405894.8	41.964	40.18769	-1.77631
666	357694.8	405895	43.207	41.70806	-1.49894
668	357647	405894.5	39.789	39.2824	-0.5066
687	357653.9	405893.4	40.985	39.6686	-1.3164
688	357699.1	405893.3	42.147	41.97091	-0.17609
692	357696.1	405892.9	43.073	41.82946	-1.24354
696	357703	405892.6	43.756	42.19057	-1.56543
705	357645.5	405892.1	41.037	39.27227	-1.76473
706	357658.2	405892.2	42.775	39.92385	-2.85115
707	357710	405892.1	45.041	42.55959	-2.48141
712	357667.6	405891.5	41.781	40.41954	-1.36146
713	357671.5	405891.3	42.627	40.62484	-2.00216
714	357715.5	405891.3	43.053	42.86465	-0.18835
717	357642.8	405890.9	40.668	39.174	-1.494
718	357700.3	405890.9	44.169	42.09708	-2.07192
723	357647.8	405890.6	40.638	39.43699	-1.20101
724	357663.7	405890.6	42.969	40.24751	-2.72149
725	357730.7	405890.6	46.614	43.65814	-2.95586
731	357710.7	405889.8	44.532	42.66259	-1.86941
733	357651.3	405889.5	40.201	39.64615	-0.55485
743	357665.7	405888.2	42.496	40.41441	-2.08159
747	357845	405888.3	49.993	49.54139	-0.45161
748	357846.5	405888.2	50.121	49.62056	-0.50044
752	357692.9	405887.8	42.867	41.81143	-1.05557
754	357653.2	405887.5	40.994	39.79782	-1.19618
755	357724.5	405887.5	45.012	43.4313	-1.5807
756	357732.2	405887.4	45.23	43.82213	-1.40787
760	357668.8	405887.1	41.597	40.60067	-0.99633
762	357714.3	405887.2	44.286	42.91798	-1.36802
769	357655.1	405886.7	41.114	39.92104	-1.19296
770	357681.6	405886.7	43.782	41.26607	-2.51593
772	357803.9	405886.7	48.296	47.4906	-0.8054
778	357708.5	405885.9	44.693	42.65937	-2.03363
787	357715.2	405885.5	44.427	43.0117	-1.4153
792	357663.3	405885.2	42.761	40.37678	-2.38422
793	357710.4	405885.1	44.904	42.77581	-2.12819
796	357657.5	405884.8	42.871	40.0928	-2.7782
797	357667.6	405884.8	41.514	40.6044	-0.9096
798	357673.4	405884.8	43.618	40.90219	-2.71581
803	357846.6	405884.7	49.767	49.72429	-0.04271

806	357745.7	405884.5	45.76	44.59502	-1.16498
812	357678.9	405883.5	41.513	41.21881	-0.29419
813	357679.2	405883.6	41.491	41.23267	-0.25833
818	357685.9	405883.3	44.362	41.58473	-2.77727
820	357852.1	405883.2	50.377	50.04399	-0.33301
832	357695.6	405881.8	43.161	42.11824	-1.04276
838	357692.5	405881.2	44.501	41.97338	-2.52762
839	357700	405881.3	44.455	42.3549	-2.1001
841	357673.1	405880.9	42.991	40.99824	-1.99276
842	357676.1	405880.9	42.775	41.1535	-1.6215
844	357682.7	405880.9	42.838	41.48693	-1.35107
845	357847.3	405880.9	50.351	49.8656	-0.4854
855	357738.8	405880.2	46.199	44.35987	-1.83913
858	357745.4	405879.7	47.368	44.70712	-2.66088
862	357650.8	405879.3	41.204	39.90533	-1.29867
863	357715	405879.4	43.798	43.17597	-0.62203
866	357879.7	405879.2	51.803	51.56028	-0.24272
869	357717.4	405879	44.283	43.30687	-0.97613
874	357662.5	405878.6	42.396	40.52205	-1.87395
875	357678.1	405878.6	42.403	41.31758	-1.08542
879	357728.7	405878.1	44.043	43.90209	-0.14091
889	357687	405876.9	44.009	41.81713	-2.19187
904	357744.9	405875.9	47.079	44.79525	-2.28375
910	357660.6	405875.5	41.337	40.5141	-0.8229
911	357684.7	405875.5	42.853	41.73696	-1.11604
912	357689.7	405875.5	43.303	41.99798	-1.30502
919	357734.1	405875.1	46.311	44.26943	-2.04157
923	357859	405875.1	51.37	50.62605	-0.74395
927	357709.2	405874.7	45.177	43.00808	-2.16892
929	357647.4	405874.3	41.257	39.87852	-1.37848
930	357729.5	405874.2	46.037	44.05668	-1.98032
932	357795.6	405874.3	49.041	47.41867	-1.62233
935	357687.5	405873.9	43.276	41.92967	-1.34633
945	357726.3	405872.7	46.683	43.9386	-2.7444
947	357878.1	405872.8	54.303	51.66201	-2.64099
950	357731.4	405872.3	46.154	44.20694	-1.94706
951	357734.1	405872.3	46.71	44.34325	-2.36675
955	357661.8	405871.9	41.988	40.67523	-1.31277
963	357785.1	405870.9	48.196	46.9814	-1.2146
965	357720.4	405870.4	45.298	43.70308	-1.59492
966	357744.2	405870.5	46.718	44.90812	-1.80988
970	357859.4	405870.5	53.586	50.77491	-2.81109
973	357730.2	405870	45.358	44.21067	-1.14733
974	357764.1	405870	47.378	45.93635	-1.44165
986	357726.3	405869.3	45.123	44.03582	-1.08718

992	357714.6	405868.8	45.016	43.45037	-1.56563
1008	357743.5	405867.7	47.419	44.95253	-2.46647
1013	357686.7	405867.3	43.699	42.07495	-1.62405
1019	357653.2	405866.5	41.118	40.39359	-0.72441
1038	357690.6	405864.9	43.009	42.33997	-0.66903
1039	357715.9	405865	45.499	43.62251	-1.87649
1040	357720.4	405864.9	46.071	43.85807	-2.21293
1047	357728.3	405863.9	46.2	44.28981	-1.91019
1050	357682.8	405863.4	43.688	41.98378	-1.70422
1055	357838.8	405863.4	51.933	49.92494	-2.00806
1064	357713.5	405863	44.94	43.55783	-1.38217
1069	357718.6	405862.6	44.771	43.83013	-0.94087
1070	357748.1	405862.6	47.414	45.33296	-2.08104
1079	357680.1	405861.9	42.446	41.88747	-0.55853
1089	357710.8	405861.1	43.814	43.47139	-0.34261
1112	357848.2	405859.5	52.235	50.51081	-1.72419
1124	357815.5	405858.7	51.149	48.87131	-2.27769
1126	357878.9	405858.8	52.632	52.09586	-0.53614
1136	357866.1	405857.9	52.179	51.46964	-0.70936
1142	357732.6	405857.1	44.999	44.69893	-0.30007
1147	357745	405856.7	45.439	45.33747	-0.10153
1148	357881.9	405856.7	52.628	52.3089	-0.3191
1153	357850.5	405856.4	51.416	50.71921	-0.69679
1156	357686	405856	42.691	42.35662	-0.33438
1157	357769.1	405855.9	49.137	46.58823	-2.54877
1160	357823.6	405856	52.08	49.36114	-2.71886
1165	357847.4	405855.6	51.94	50.58395	-1.35605
1169	357720.1	405855.3	45.712	44.11221	-1.59979
1194	357691	405852.8	45.481	42.70247	-2.77853
1195	357726.3	405852.9	47.312	44.49659	-2.81541
1200	357863	405852.8	52.144	51.45556	-0.68844
1207	357746.9	405852.6	48.497	45.55368	-2.94332
1211	357849.7	405852.5	51.958	50.78698	-1.17102
1214	357681.6	405852.1	43.334	42.24509	-1.08891
1215	357697.2	405852.1	43.83	43.03526	-0.79474
1217	357844.9	405852.2	51.146	50.55505	-0.59095
1228	357715.4	405851.3	44.702	43.98427	-0.71773
1232	357729.1	405850.9	47.339	44.69548	-2.64352
1244	357692.5	405849.8	44.654	42.85968	-1.79432
1245	357726.4	405849.7	46.629	44.58931	-2.03969
1259	357838.4	405848.9	53.27	50.31716	-2.95284
1264	357690.3	405848.6	43.102	42.78406	-0.31794
1265	357702.3	405848.6	45.63	43.39491	-2.23509
1267	357753.6	405848.6	47.51	46.00493	-1.50507
1272	357730.6	405848.1	47.585	44.85216	-2.73284

1273	357855.6	405848.2	52.319	51.21245	-1.10655
1281	357723.9	405847.4	45.621	44.52942	-1.09158
1282	357781.2	405847.5	48.573	47.44231	-1.13069
1284	357905	405847.5	53.836	53.74293	-0.09307
1287	357706.9	405847	43.979	43.67531	-0.30369
1291	357691.7	405846.6	44.318	42.91028	-1.40772
1299	357709.5	405846.2	45.521	43.8302	-1.6908
1300	357726.8	405846.3	46.622	44.70549	-1.91651
1302	357876.2	405846.3	52.615	52.31069	-0.30431
1308	357854.4	405845.9	53.998	51.21364	-2.78436
1313	357713.2	405845.5	45.032	44.03687	-0.99513
1314	357857.5	405845.5	54.003	51.38272	-2.62028
1324	357806.5	405845.2	49.028	48.79502	-0.23298
1325	357851.2	405845	51.872	51.07215	-0.79985
1330	357847.7	405844.7	51.274	50.90753	-0.36647
1365	357762	405842.4	48.692	46.61121	-2.08079
1379	357735.7	405841.7	47.443	45.28704	-2.15596
1381	357846.6	405841.6	52.696	50.9389	-1.7571
1384	357751.7	405841.3	48.851	46.11534	-2.73566
1388	357854.4	405841.2	52.042	51.34609	-0.69591
1393	357825.2	405840.8	52.07	49.87067	-2.19933
1405	357710.3	405839.7	45.815	44.0541	-1.7609
1413	357847.7	405839.3	53.253	51.05857	-2.19443
1417	357851.6	405838.9	53.82	51.26697	-2.55303
1423	357704.9	405838.5	46.699	43.81163	-2.88737
1424	357745	405838.5	46.524	45.85319	-0.67081
1425	357785.9	405838.5	48.267	47.93379	-0.33321
1430	357701.5	405838.1	43.949	43.64869	-0.30031
1439	357845.1	405837.8	52.574	50.96849	-1.60551
1442	357697.6	405837.3	44.334	43.47666	-0.85734
1451	357692.9	405836.9	45.318	43.24472	-2.07328
1454	357849.3	405837	53.938	51.20598	-2.73202
1464	357699.9	405836.1	45.365	43.6236	-1.7414
1465	357705.3	405836.1	46.261	43.89962	-2.36138
1489	357692.1	405833.8	45.21	43.28881	-1.92119
1490	357708.6	405833.7	45.366	44.13411	-1.23189
1491	357731.1	405833.8	47.094	45.27411	-1.81989
1492	357740.4	405833.8	48.327	45.75007	-2.57693
1505	357710.4	405832.9	45.461	44.24942	-1.21158
1506	357726.3	405833	47.009	45.0574	-1.9516
1507	357735.7	405833.1	46.546	45.53195	-1.01405
1524	357753.2	405832.3	47.233	46.44533	-0.78767
1532	357703.4	405831.5	44.857	43.93536	-0.92164
1533	357730.7	405831.4	46.584	45.32251	-1.26149
1537	357846.2	405831.1	52.646	51.21444	-1.43156

1558	357773.5	405829.9	47.719	47.54633	-0.17267
1561	357707.8	405829.4	46.129	44.21457	-1.91443
1582	357704.6	405828.4	45.495	44.08126	-1.41374
1587	357823.7	405828.1	51.174	50.15248	-1.02152
1592	357725.1	405827.6	47.409	45.1499	-2.2591
1602	357764.2	405826.7	47.36	47.16169	-0.19831
1623	357774.9	405825.6	49.223	47.73851	-1.48449
1629	357731.4	405825.3	47.129	45.53146	-1.59754
1630	357737	405825.2	46.464	45.81935	-0.64465
1631	357771.1	405825.2	48.464	47.55407	-0.90993
1659	357721.4	405823.7	46.222	45.06891	-1.15309
1666	357710	405823.3	45.245	44.49987	-0.74513
1684	357772.2	405822.2	49.88	47.69829	-2.18171
1706	357724	405821	46.701	45.2799	-1.4211
1707	357731.5	405821	45.963	45.65773	-0.30527
1713	357763	405820.6	48.802	47.27392	-1.52808
1714	357881.3	405820.6	53.374	53.29597	-0.07803
1728	357714.6	405819.4	45.805	44.84649	-0.95851
1734	357700.7	405819	46.001	44.14509	-1.85591
1735	357710.5	405819	44.654	44.64905	-0.00495
1745	357777.8	405818.7	49.402	48.07945	-1.32255
1748	357694.9	405818.2	44.537	43.87352	-0.66348
1756	357794.4	405817.9	49.479	48.95097	-0.52803
1767	357676.6	405817.1	43.6	42.97691	-0.62309
1782	357729.2	405816.4	46.255	45.67028	-0.58472
1793	357761	405815.1	47.823	47.32711	-0.49589
1800	357679.3	405814.4	43.402	43.1879	-0.2141
1810	357850.6	405813.9	54.61	51.922	-2.688
1815	357693.3	405813.5	43.986	43.92452	-0.06148
1832	357656.7	405812.4	42.155	42.0924	-0.0626
1834	357733.8	405812.4	46.501	46.02113	-0.47987
1858	357698.7	405810.5	44.962	44.28395	-0.67805
1860	357890.2	405810.5	55.626	54.0362	-1.5898
1864	357743.1	405810.2	47.508	46.55654	-0.95146
1873	357700.7	405809.3	46.956	44.41704	-2.53896
1879	357840.4	405808.9	51.862	51.54368	-0.31832
1891	357672.6	405807.8	44.203	43.03538	-1.16762
1893	357764.9	405807.8	50.671	47.72854	-2.94246
1894	357877.4	405807.7	54.445	53.46098	-0.98402
1898	357678.9	405807.3	43.537	43.36763	-0.16937
1904	357835.7	405806.6	54.097	51.36784	-2.72916
1910	357671.1	405806.2	43.774	43.0013	-0.7727
1911	357731.9	405806.2	46.805	46.09404	-0.71096
1912	357747	405806.1	47.222	46.86666	-0.35534
1916	357726	405805.8	46.812	45.80471	-1.00729

1927	357736.8	405805	48.443	46.37702	-2.06598
1935	357681.7	405804.7	45.185	43.58089	-1.60411
1942	357710.1	405803.9	45.932	45.05168	-0.88032
1943	357724.9	405803.9	46.123	45.80366	-0.31934
1948	357727.2	405803.4	46.249	45.93483	-0.31417
1957	357810.4	405803.1	52.572	50.17857	-2.39343
1966	357763	405802.2	49.065	47.79105	-1.27395
1977	357814.2	405801.6	52.239	50.41824	-1.82076
1987	357809.7	405800.8	52.713	50.20776	-2.50524
1997	357763.3	405800	48.446	47.86972	-0.57628
2004	357675.4	405799.7	44.541	43.40364	-1.13736
2022	357781.2	405798.5	49.965	48.82574	-1.13926
2060	357781.7	405796.1	50.462	48.91628	-1.54572
2062	357815.1	405796.1	52.138	50.61764	-1.52036
2091	357771.5	405793.8	48.771	48.46442	-0.30658
2099	357667.2	405793	43.406	43.17758	-0.22842

Table 6. Results of obstructions found within 3m to 6m above VSS in the LiDAR pointcloud. Easting/Northing coordinates are in ISN93 / Lambert 1993. All objects listed here appear to be trees.

ID	Easting m	Northing m	Elevation m, ISH2004	VSS_Height m ISH2004	h_3m to 6m_above_VSS m
74	357608.9	405982.3	38.638	34.87115	-3.76685
77	357605.7	405981.3	38.224	34.73785	-3.48615
94	357610	405977.8	40.091	35.05791	-5.03309
100	357612.8	405975	38.296	35.27681	-3.01919
102	357606.1	405974.3	40.658	34.95802	-5.69998
103	357615.9	405974.3	40.669	35.4518	-5.2172
105	357602.2	405973.8	40.085	34.76963	-5.31537
109	357629.5	405973.1	41.697	36.17906	-5.51794
113	357607.7	405972.3	40.86	35.09442	-5.76558
114	357611.1	405972.2	39.339	35.27032	-4.06868
124	357642.4	405969.2	41.845	36.94705	-4.89795
125	357585.5	405968.8	37.989	34.06297	-3.92603
127	357571.1	405968.4	36.789	33.34121	-3.44779
128	357578.1	405968.4	37.761	33.69895	-4.06205
129	357594.1	405967.6	39.644	34.53202	-5.11198
135	357568.4	405966.5	37.825	33.25872	-4.56628
136	357647	405966.4	42.036	37.26012	-4.77588
138	357572.7	405965.6	37.14	33.50298	-3.63702
141	357621.7	405965.2	39.844	36.00323	-3.84077
146	357657	405964.5	41.204	37.82526	-3.37874
150	357595.2	405963.7	37.99	34.70047	-3.28953
151	357622.9	405963.8	40.426	36.10658	-4.31942
152	357641.5	405963.7	40.781	37.05482	-3.72618

154	357619.7	405963.3	39.934	35.96032	-3.97368
155	357629.9	405963.3	39.741	36.4756	-3.2654
157	357638.4	405963	40.881	36.91929	-3.96171
158	357657.5	405962.9	42.207	37.89185	-4.31515
160	357576.6	405962.6	38.297	33.78209	-4.51491
161	357579.2	405962.5	38.457	33.91981	-4.53719
163	357614.4	405962.2	39.914	35.71758	-4.19642
165	357661	405962.3	41.253	38.08833	-3.16467
166	357602.6	405961.8	39.931	35.13071	-4.80029
171	357652.8	405961	43.491	37.71009	-5.78091
174	357657	405960.3	42.212	37.94362	-4.26838
175	357566.1	405959.9	37.135	33.32255	-3.81245
180	357603.3	405959.1	38.747	35.24384	-3.50316
182	357584	405958.6	37.432	34.27547	-3.15653
184	357645.8	405958.7	40.682	37.41716	-3.26484
186	357643.9	405958.2	40.765	37.33199	-3.43301
190	357606.1	405957.1	38.702	35.43879	-3.26321
191	357671.5	405957.1	44.05	38.76938	-5.28062
192	357674.2	405957.1	43.434	38.90682	-4.52718
196	357644.2	405956.3	41.01	37.40477	-3.60523
198	357595.7	405956	40.174	34.94178	-5.23222
200	357601.9	405955.6	39.293	35.26867	-4.02433
204	357653.2	405955.3	43.179	37.88855	-5.29045
205	357675.9	405955.2	43.357	39.0469	-4.3101
206	357665.6	405954.8	42.088	38.53499	-3.55301
214	357648.5	405953.1	41.904	37.70847	-4.19553
217	357631.8	405952.5	41.014	36.87668	-4.13732
220	357662.5	405952.1	41.765	38.45073	-3.31427
226	357666	405950.9	42.499	38.66526	-3.83374
228	357598.4	405950.5	39.98	35.23027	-4.74973
229	357677	405950.5	44.288	39.2314	-5.0566
230	357630.7	405950.1	40.118	36.88832	-3.22968
236	357686.3	405949.4	45.146	39.73977	-5.40623
241	357674.2	405948.2	43.573	39.15622	-4.41678
242	357563.3	405947.8	37.083	33.5261	-3.5569
243	357648.9	405947.8	42.951	37.8796	-5.0714
244	357652.8	405947.8	43.097	38.07558	-5.02142
245	357676.1	405947.8	43.963	39.26421	-4.69879
247	357619.7	405947.3	40.691	36.41122	-4.27978
255	357577	405946.2	37.547	34.26463	-3.28237
257	357643	405945.9	41.672	37.63535	-4.03665
258	357673.9	405945.8	43.488	39.20745	-4.28055
262	357653.9	405945.1	43.351	38.21417	-5.13683
263	357660.2	405945.1	42.669	38.53487	-4.13413
264	357679.2	405945.1	44.95	39.50066	-5.44934

265	357621.7	405944.6	40.437	36.58772	-3.84928
266	357613.9	405944.3	40.08	36.20052	-3.87948
268	357704.5	405943.8	46.404	40.82264	-5.58136
271	357643.5	405943.5	41.548	37.72449	-3.82351
275	357639.2	405942.4	41.848	37.54196	-4.30604
276	357650.8	405942.3	41.886	38.13387	-3.75213
277	357660.2	405942.4	42.494	38.60701	-3.88699
278	357671.5	405942.4	43.114	39.18478	-3.92922
280	357617	405942	40.574	36.41919	-4.15481
281	357648.9	405942	41.741	38.04305	-3.69795
285	357623.6	405941.6	40.621	36.76784	-3.85316
286	357632.9	405941.6	42.968	37.24239	-5.72561
289	357583.5	405940.8	38.606	34.7491	-3.8569
292	357642.2	405940.8	42.603	37.73835	-4.86465
295	357652.3	405940.5	42.991	38.26236	-4.72864
298	357660.6	405939.7	42.808	38.70487	-4.10313
299	357673.8	405939.6	43.668	39.37822	-4.28978
303	357575.5	405938.8	38.557	34.39681	-4.16019
305	357617.1	405938.4	40.184	36.52319	-3.66081
306	357630.6	405938.5	40.902	37.21408	-3.68792
312	357591.4	405937.7	38.46	35.24116	-3.21884
314	357646.1	405937.7	42.063	38.02565	-4.03735
315	357649.6	405937.7	43.415	38.20382	-5.21118
317	357680.5	405937.3	44.551	39.78296	-4.76804
320	357683.6	405936.7	43.408	39.95741	-3.45059
323	357623.9	405935.3	40.236	36.96179	-3.27421
327	357618.6	405934.6	41.533	36.70918	-4.82382
328	357665.3	405934.6	42.65	39.08784	-3.56216
329	357692.8	405934.6	43.933	40.48773	-3.44527
333	357643.9	405933.4	41.892	38.03343	-3.85857
335	357715.4	405933.4	46.44	41.67313	-4.76687
341	357687.8	405932.7	45.176	40.28534	-4.89066
344	357713.9	405932.3	45.431	41.62409	-3.80691
348	357618.9	405931.2	42	36.82422	-5.17578
349	357643.4	405931.1	41.245	38.0728	-3.1722
350	357691.3	405931.1	44.164	40.50859	-3.65541
351	357623.3	405930.6	40.684	37.06511	-3.61889
353	357591.3	405930.3	39.147	35.4432	-3.7038
354	357713.5	405930.3	46.068	41.66378	-4.40422
356	357663.3	405929.9	43.71	39.11312	-4.59688
359	357695.9	405929.4	45.567	40.79181	-4.77519
360	357724.1	405929.4	46.646	42.22759	-4.41841
362	357711.1	405928.7	47.369	41.58274	-5.78626
367	357675	405928.3	43.508	39.76171	-3.74629
370	357619.3	405928	40.057	36.93081	-3.12619

375	357615.9	405927.6	39.975	36.77041	-3.20459
381	357696	405927.1	44.708	40.86312	-3.84488
386	357698.3	405926.4	46.534	40.99738	-5.53662
390	357709.3	405926	46.234	41.57002	-4.66398
396	357659.8	405925.6	42.588	39.06263	-3.52537
399	357717.1	405925.3	46.743	41.98426	-4.75874
403	357618.5	405924.5	40.221	36.99126	-3.22974
411	357684.4	405923.7	44.982	40.3659	-4.6161
423	357682.7	405921.7	44.013	40.33572	-3.67728
424	357699.1	405921.7	45.384	41.17056	-4.21344
426	357671.8	405921.3	44.71	39.79608	-4.91392
427	357696	405921.3	45.159	41.02798	-4.13102
428	357707.3	405921.3	46.355	41.6018	-4.7532
430	357680.4	405921	44.03	40.23837	-3.79163
435	357677.3	405920.6	44.498	40.09324	-4.40476
441	357667.6	405919.4	43.718	39.63187	-4.08613
447	357671.9	405918.5	43.419	39.87754	-3.54146
453	357657.5	405918.2	43.322	39.15155	-4.17045
455	357689.7	405918.3	44.851	40.79041	-4.06059
456	357766.1	405918.2	48.002	44.68378	-3.31822
457	357667.6	405917.5	42.914	39.68542	-3.22858
458	357678	405917.4	46.068	40.21906	-5.84894
464	357663.8	405916.7	43.662	39.51593	-4.14607
467	357674.5	405916.1	45.876	40.07725	-5.79875
468	357687.8	405916.2	46.02	40.75147	-5.26853
469	357669.5	405916	44.425	39.82582	-4.59918
475	357649.7	405915.2	41.88	38.84044	-3.03956
482	357679.8	405914.7	45.509	40.38282	-5.12618
483	357690.5	405914.7	46.898	40.93259	-5.96541
485	357767.9	405914.7	48.314	44.87404	-3.43996
487	357654.7	405914.4	43.084	39.12006	-3.96394
488	357729.1	405914.3	48.81	42.90625	-5.90375
491	357664	405913.9	43.577	39.60616	-3.97084
494	357701	405913.6	46.309	41.49809	-4.81091
497	357668	405913.1	44.936	39.83232	-5.10368
498	357796.4	405913.2	51.184	46.36315	-4.82085
500	357679.6	405912.8	45.741	40.43013	-5.31087
501	357694.8	405912.8	44.658	41.20248	-3.45552
502	357705	405912.7	46.657	41.72339	-4.93361
509	357675	405912.1	43.269	40.21824	-3.05076
510	357677.4	405912.1	44.53	40.33787	-4.19213
511	357697.5	405912	47.266	41.36502	-5.90098
519	357641.9	405910.9	41.919	38.56457	-3.35443
522	357677.4	405910.1	44.144	40.39678	-3.74722
523	357712.7	405910.1	47.326	42.19372	-5.13228

529	357660.2	405909.6	43.251	39.5339	-3.7171
530	357709.6	405909.7	45.708	42.04437	-3.66363
531	357717	405909.7	48.183	42.41993	-5.76307
535	357671.8	405909.3	44.702	40.13171	-4.57029
539	357679.6	405908.9	46.236	40.53864	-5.69736
542	357639.2	405908.5	42.846	38.49476	-4.35124
545	357696.3	405908.2	44.617	41.40847	-3.20853
546	357698.7	405908.2	44.585	41.53205	-3.05295
551	357730	405907.2	47.574	43.15215	-4.42185
553	357797.9	405907.4	50.616	46.6055	-4.0105
560	357669.1	405906.1	44.925	40.08699	-4.83801
561	357696.3	405906.2	45.791	41.46879	-4.32221
565	357671.8	405905.8	45.257	40.23148	-5.02552
570	357664.8	405905.3	43.554	39.89065	-3.66335
576	357684.2	405905.1	45.795	40.88129	-4.91371
580	357648.6	405904.5	42.146	39.08712	-3.05888
590	357660.1	405903.1	43.722	39.71198	-4.01002
606	357669.1	405901.1	44.173	40.22508	-3.94792
612	357790.1	405900.3	50.762	46.40853	-4.35347
613	357811.5	405900.4	50.793	47.49649	-3.29651
621	357734.6	405899.5	47.194	43.60472	-3.58928
623	357660.2	405899.1	44.524	39.82726	-4.69674
625	357712.3	405898.8	46.726	42.49181	-4.23419
626	357724.1	405898.7	46.215	43.09135	-3.12365
630	357747.7	405898.4	49.808	44.30511	-5.50289
631	357708.8	405898	46.86	42.33478	-4.52522
639	357675.5	405897.3	44.262	40.65569	-3.60631
640	357683.1	405897.3	44.578	41.04511	-3.53289
642	357837.3	405897.2	52.395	48.89606	-3.49894
644	357680.4	405896.9	45.152	40.91753	-4.23447
646	357741.5	405896.8	49.71	44.02923	-5.68077
653	357749.3	405896.1	49.812	44.44883	-5.36317
660	357674.2	405895.2	44.575	40.64983	-3.92517
661	357735.7	405895.2	49.148	43.78048	-5.36752
669	357658.6	405894.5	42.924	39.87544	-3.04856
675	357684.3	405894.1	44.962	41.19497	-3.76703
676	357687.8	405894.2	45.454	41.37173	-4.08227
678	357744.2	405894.2	47.586	44.24276	-3.34324
679	357745.8	405894.1	48.308	44.32703	-3.98097
681	357748.9	405893.7	49.047	44.49215	-4.55485
698	357745.1	405892.6	50.256	44.33226	-5.92374
708	357732.2	405892.1	48.711	43.69222	-5.01878
734	357657.6	405889.4	43.077	39.96685	-3.11015
735	357674.6	405889.3	44.303	40.8376	-3.4654
739	357741.1	405889.1	47.78	44.22728	-3.55272

740	357744.3	405889	47.665	44.39158	-3.27342
742	357687	405888.6	46.042	41.48741	-4.55459
745	357819.8	405888.3	53.839	48.25744	-5.58156
753	357736.8	405888	47.807	44.04079	-3.76621
766	357861.8	405887.1	55.362	50.42672	-4.93528
775	357689.3	405886.3	44.945	41.67326	-3.27174
779	357719.6	405886	46.903	43.22272	-3.68028
780	357739.9	405886	47.768	44.25751	-3.51049
788	357736.4	405885.6	47.373	44.09061	-3.28239
794	357742.8	405885.1	48.228	44.42795	-3.80005
795	357748.8	405885.2	49.237	44.73029	-4.50671
799	357726.4	405884.7	47.996	43.60551	-4.39049
800	357730.2	405884.8	48.148	43.79359	-4.35441
814	357825.2	405883.6	54.55	48.66733	-5.88267
819	357733.7	405883.4	47.591	44.01517	-3.57583
821	357737.6	405882.9	48.152	44.22383	-3.92817
833	357764.9	405881.7	50.624	45.64876	-4.97524
876	357752.8	405878.6	49.34	45.12272	-4.21728
896	357693.3	405876.6	46.041	42.15024	-3.89076
900	357724.4	405876.2	46.953	43.7407	-3.2123
905	357785.5	405875.9	50.048	46.86085	-3.18715
914	357826.4	405875.4	54.908	48.95695	-5.95105
920	357741.5	405875.1	48.904	44.64217	-4.26183
921	357815.8	405875.1	53.259	48.42582	-4.83318
928	357824.1	405874.7	53.955	48.8596	-5.0954
931	357750.8	405874.2	49.753	45.14491	-4.60809
933	357812.3	405874.3	53.99	48.2702	-5.7198
939	357757	405873.5	50.176	45.48024	-4.69576
943	357815.5	405873.1	53.912	48.4655	-5.4465
952	357852.5	405872.4	54.571	50.37012	-4.20088
956	357752.4	405871.9	50.478	45.28722	-5.19078
957	357813.9	405871.7	54.024	48.42237	-5.60163
960	357823.6	405871.1	54.363	48.93165	-5.43135
961	357839.5	405871.1	55.68	49.74613	-5.93387
967	357780.8	405870.4	51.733	46.77914	-4.95386
969	357837.2	405870.4	55.114	49.64622	-5.46778
980	357749.6	405869.5	49.692	45.21486	-4.47714
983	357876.9	405869.6	56.867	51.69365	-5.17335
987	357737.6	405869.2	48.504	44.60992	-3.89408
1000	357740.3	405868.1	48.391	44.77949	-3.61151
1001	357772.5	405868	52.093	46.42286	-5.67014
1026	357773.4	405866	52.405	46.52249	-5.88251
1052	357732.9	405863.4	48.566	44.53666	-4.02934
1053	357777	405863.5	51.364	46.77761	-4.58639
1075	357755.8	405862.2	49.61	45.7362	-3.8738

1080	357769.1	405861.8	51.093	46.42337	-4.66963
1084	357715.8	405861.4	47.144	43.71859	-3.42541
1092	357824.8	405861	54.574	49.27991	-5.29409
1101	357718.6	405860	48.395	43.89944	-4.49556
1102	357778.5	405859.8	51.849	46.95937	-4.88963
1108	357750.5	405859.6	51.025	45.53599	-5.48901
1109	357755.5	405859.4	49.472	45.7987	-3.6733
1110	357819.4	405859.6	53.117	49.04589	-4.07111
1152	357764.1	405856.3	50.714	46.32357	-4.39043
1176	357767.6	405854	52.428	46.56542	-5.86258
1182	357735.2	405853.7	48.195	44.92596	-3.26904
1188	357756.8	405853.2	49.974	46.0396	-3.9344
1189	357818.6	405853.3	53.678	49.18129	-4.49671
1197	357831.4	405852.9	54.504	49.8481	-4.6559
1198	357834.9	405852.9	54.646	50.02232	-4.62368
1209	357755.1	405852.5	49.091	45.97138	-3.11962
1216	357752.8	405852.1	49.052	45.86698	-3.18502
1224	357761.8	405851.7	52.089	46.3364	-5.7526
1246	357767.9	405849.8	50.437	46.703	-3.734
1254	357832.3	405849.3	55.797	49.99282	-5.80418
1255	357861	405849.4	56.02	51.45353	-4.56647
1283	357827.9	405847.5	55.088	49.81562	-5.27238
1292	357699.9	405846.7	47.854	43.32374	-4.53026
1307	357729.1	405845.9	49.627	44.83385	-4.79315
1328	357757.2	405844.9	49.853	46.29387	-3.55913
1329	357829	405844.7	54.982	49.95561	-5.02639
1348	357773.9	405843.6	51.351	47.18061	-4.17039
1356	357698.3	405842.8	46.796	43.35729	-3.43871
1358	357768.3	405842.8	52.881	46.91923	-5.96177
1364	357758.7	405842.4	49.715	46.44322	-3.27178
1366	357808.4	405842.5	54.901	48.97038	-5.93062
1387	357839.2	405841.2	56.174	50.57093	-5.60307
1402	357768.7	405840	51.479	47.0185	-4.4605
1411	357770.8	405839.3	51.665	47.14653	-4.51847
1431	357760.6	405838.1	50.985	46.65971	-4.32529
1432	357762.9	405838.1	51.516	46.77284	-4.74316
1452	357750.1	405837	50.85	46.15366	-4.69634
1453	357775.3	405836.9	50.74	47.43929	-3.30071
1468	357754	405835.7	50.169	46.39137	-3.77763
1469	357769.2	405835.7	50.94	47.16145	-3.77855
1473	357828.7	405835	54.306	50.21002	-4.09598
1479	357759.8	405834.5	49.941	46.71535	-3.22565
1508	357808.1	405833.1	53.02	49.22001	-3.79999
1525	357824	405832.3	53.552	50.0494	-3.5026
1583	357782.1	405828.4	51.167	48.02384	-3.14316

1585	357711.1	405828	47.484	44.42455	-3.05945
1821	357755.9	405813.2	50.339	47.12104	-3.21796
1842	357771.4	405812	51.019	47.94247	-3.07653

Table 6. Results of obstructions found within 6m to 9m above VSS in the LiDAR pointcloud. Easting/Northing coordinates are in ISN93 / Lambert 1993. All objects listed here appear to be trees.

ID	Easting m	Northing m	Elevation m, ISH2004	VSS_Height m ISH2004	h_6m to 9m_above_VSS m
86	357613.9	405979.3	41.296	35.21022	-6.08578
145	357653.6	405964.5	43.797	37.64823	-6.14877
189	357655.9	405958	44.129	37.95244	-6.17656
197	357657.5	405956.4	44.543	38.07898	-6.46402
218	357673.8	405952.5	45.334	39.01609	-6.31791
239	357682.7	405948.9	45.951	39.57033	-6.38067
240	357688.6	405949	46.046	39.86671	-6.17929
249	357687.4	405947.1	46.011	39.86312	-6.14788
250	357693.7	405947	46.384	40.18664	-6.19736
256	357696.8	405946.3	46.71	40.35767	-6.35233
267	357697.2	405944	47.037	40.44681	-6.59019
272	357707.2	405943.5	47.727	40.96995	-6.75705
273	357693.3	405943.2	48.179	40.27082	-7.90818
282	357686.6	405942	46.286	39.96358	-6.32242
283	357711.6	405941.9	49.338	41.23902	-8.09898
287	357701	405941.5	48.239	40.71183	-7.52717
302	357706.2	405939.2	48.767	41.04022	-7.72678
308	357719.7	405938.4	49.52	41.75112	-7.76888
311	357701.8	405938.1	47.407	40.84583	-6.56117
318	357704.6	405937.2	49.296	41.01373	-8.28227
319	357712.3	405937.3	50.251	41.40542	-8.84558
321	357717	405936.5	50.61	41.66467	-8.94533
326	357706.9	405934.9	49.988	41.19308	-8.79492
334	357678.5	405933.4	46.047	39.79361	-6.25339
363	357721.3	405928.6	48.462	42.10365	-6.35835
368	357699.4	405928.3	47.065	41.00238	-6.06262
369	357705.2	405928.3	47.579	41.29903	-6.27997
376	357677	405927.5	46.333	39.88352	-6.44948
382	357728.6	405927.1	49.818	42.52262	-7.29538
383	357746.2	405927.1	52.353	43.41855	-8.93445
397	357725.2	405925.6	49.036	42.39322	-6.64278
401	357694	405924.8	46.871	40.82613	-6.04487
414	357702.6	405923.4	48.416	41.30477	-7.11123
416	357721.8	405922.8	49.514	42.29256	-7.22144
421	357716.2	405922.5	49.115	42.02244	-7.09256

422	357727.5	405922.5	49.547	42.59371	-6.95329
431	357691.6	405921	47.413	40.81105	-6.60195
432	357729.9	405920.9	50.631	42.76352	-7.86748
440	357660.2	405919.5	46.372	39.2549	-7.1171
443	357683.6	405919	46.688	40.45508	-6.23292
444	357714.3	405919	49.993	42.01786	-7.97514
448	357706.5	405918.6	48.775	41.63717	-7.13783
460	357717.4	405917.1	49.154	42.23316	-6.92084
492	357746.6	405913.9	51.709	43.80949	-7.89951
504	357690.9	405912.5	49.029	41.01636	-8.01264
512	357750	405912	53.015	44.03498	-8.98002
532	357747.7	405909.7	52.042	43.98526	-8.05674
533	357769.6	405909.7	51.66	45.09639	-6.56361
536	357743.4	405909.4	50.152	43.77623	-6.37577
540	357681.5	405909	47.182	40.63649	-6.54551
541	357684.7	405908.9	47.655	40.79825	-6.85675
543	357762.6	405908.5	52.355	44.77501	-7.57999
550	357754	405907.7	51.774	44.35978	-7.41422
552	357769.9	405907.3	52.522	45.18439	-7.33761
566	357745.8	405905.8	51.561	43.99335	-7.56765
567	357759.1	405905.8	52.837	44.67294	-8.16406
581	357748.9	405904.6	52.382	44.18893	-8.19307
605	357754.7	405901.5	53.146	44.57268	-8.57332
608	357752.4	405900.7	52.792	44.47815	-8.31385
611	357739.2	405900.2	50.003	43.81774	-6.18526
622	357742.2	405899.6	51.057	43.98991	-7.06709
641	357765.3	405897.2	51.659	45.23345	-6.42555
647	357752.8	405896.9	53.413	44.60446	-8.80854
654	357757.1	405896	51.252	44.84985	-6.40215
655	357824.2	405896	54.373	48.26188	-6.11112
662	357763.3	405895.3	52.234	45.1815	-7.0525
670	357820.5	405894.5	54.866	48.11694	-6.74906
680	357834.6	405894.1	57.521	48.84739	-8.67361
682	357759.7	405893.6	51.836	45.04984	-6.78616
699	357815.7	405892.4	56.4	47.93292	-8.46708
715	357757.9	405891.4	53.53	45.01907	-8.51093
719	357804.9	405891	53.6	47.42542	-6.17458
732	357753.2	405889.8	52.968	44.82745	-8.14055
736	357748.9	405889.4	51.744	44.61983	-7.12417
746	357833	405888.3	55.982	48.92939	-7.05261
757	357807.7	405887.4	54.314	47.66545	-6.64855
765	357838	405887.1	55.666	49.21378	-6.45222
776	357827.1	405886.3	55.931	48.68401	-7.24699
781	357756.8	405885.9	51.294	45.11666	-6.17734
783	357810.4	405885.9	55.605	47.84658	-7.75842

784	357818.6	405885.8	55.039	48.2654	-6.7736
789	357815	405885.6	56.295	48.09032	-8.20468
802	357808.4	405884.6	55.4	47.78254	-7.61746
810	357815.9	405883.9	57.033	48.1815	-8.8515
811	357836.1	405883.9	57.432	49.20979	-8.22221
823	357822.8	405882.4	54.858	48.57756	-6.28044
828	357812.3	405882.1	55.864	48.05152	-7.81248
829	357833	405882	55.588	49.10157	-6.48643
848	357748.9	405880.5	52.155	44.86415	-7.29085
856	357815.8	405880.2	55.064	48.28323	-6.78077
857	357841.1	405880.1	57.081	49.57394	-7.50706
859	357823.6	405879.8	55.051	48.69297	-6.35803
865	357811.6	405879.2	55.117	48.09366	-7.02334
883	357829.5	405877.8	55.565	49.04712	-6.51788
891	357840.8	405877	56.54	49.64349	-6.89651
913	357809.3	405875.5	54.242	48.08225	-6.15975
915	357881.2	405875.5	57.787	51.74372	-6.04328
922	357829.1	405875.1	56.047	49.0989	-6.9481
946	357830.2	405872.8	56.136	49.22621	-6.90979
962	357754.7	405870.9	51.622	45.43389	-6.18811
975	357818.1	405870	54.862	48.68521	-6.17679
982	357831.1	405869.6	55.533	49.35571	-6.17729
998	357767.6	405868.5	52.409	46.15565	-6.25335
1009	357754	405867.7	51.767	45.48703	-6.27997
1010	357814.3	405867.7	57.496	48.55405	-8.94195
1016	357756.4	405866.8	51.921	45.63597	-6.28503
1020	357820.2	405866.6	57.676	48.89188	-8.78412
1025	357765.7	405866.1	53.135	46.12912	-7.00588
1030	357760.2	405865.7	52.193	45.86155	-6.33145
1034	357768.8	405865.4	53.527	46.30524	-7.22176
1045	357823.7	405864.1	56.562	49.13769	-7.42431
1054	357816.3	405863.4	55.669	48.77958	-6.88942
1076	357764.5	405862.2	53.351	46.17794	-7.17306
1098	357763	405860.2	52.605	46.15512	-6.44988
1199	357840.4	405852.9	58.156	50.30484	-7.85116