

## RED-ACT Report

### Real-time Earthquake Damage Assessment using City-scale Time-history analysis

#### May. 25, M5.8 New Zealand Earthquake

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#### Acknowledgments and Disclaimer

The authors are grateful for the data provided by **GeoNet**. This analysis is for research only. The actual damage resulting from the earthquake should be determined according to the site investigation.

Scientific background of this report can be found at: <http://www.luxinzheng.net/rr.htm>

#### 1. Introduction to the earthquake event

At 7:53 May. 25 2020 (Local Time, UTC +12), an **M 5.8** earthquake occurred in **New Zealand**. The epicenter was located at **-40.45 174.98**, with a depth of **37 km**.

#### 2. Recorded ground motions

**110** ground motions near to epicenter of this earthquake were analyzed. The names and locations of the stations can be found Table 1. The maximal recorded peak ground acceleration (PGA) is **147.3** cm/s/s. The waveform and corresponding response spectra in comparison with the design spectra specified in the Chinese Code for Seismic Design of Buildings are shown in Figure 1.

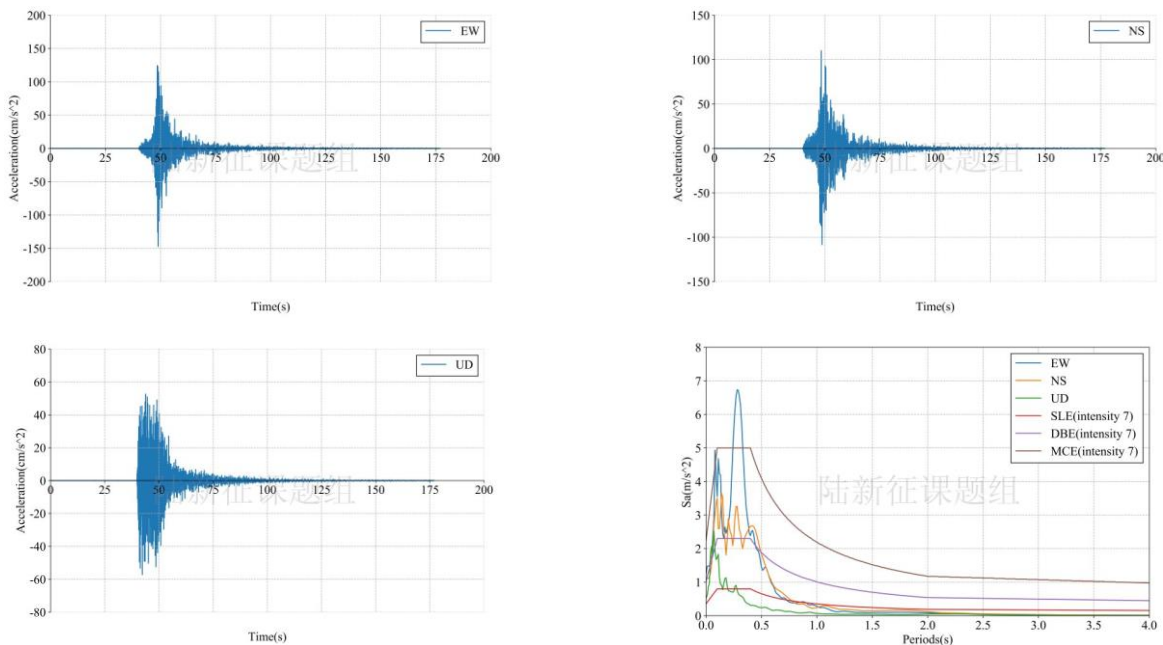


Figure 1 Waveform and response spectra of the recorded ground motions with maximal destructive capacity

### 3. Damage analysis of the target region subjected to the recorded ground motions

Using the real-time ground motions obtained from the strong motion networks and the **city-scale nonlinear time-history analysis**, the damage ratios of buildings located in different places can be obtained. The building damage distribution and the human feeling distribution near to different stations are shown in Figure 2 and Figure 3, respectively. These outcomes can provide a reference for post-earthquake rescue work



Figure 2 Damage ratio distribution of the buildings near to different stations

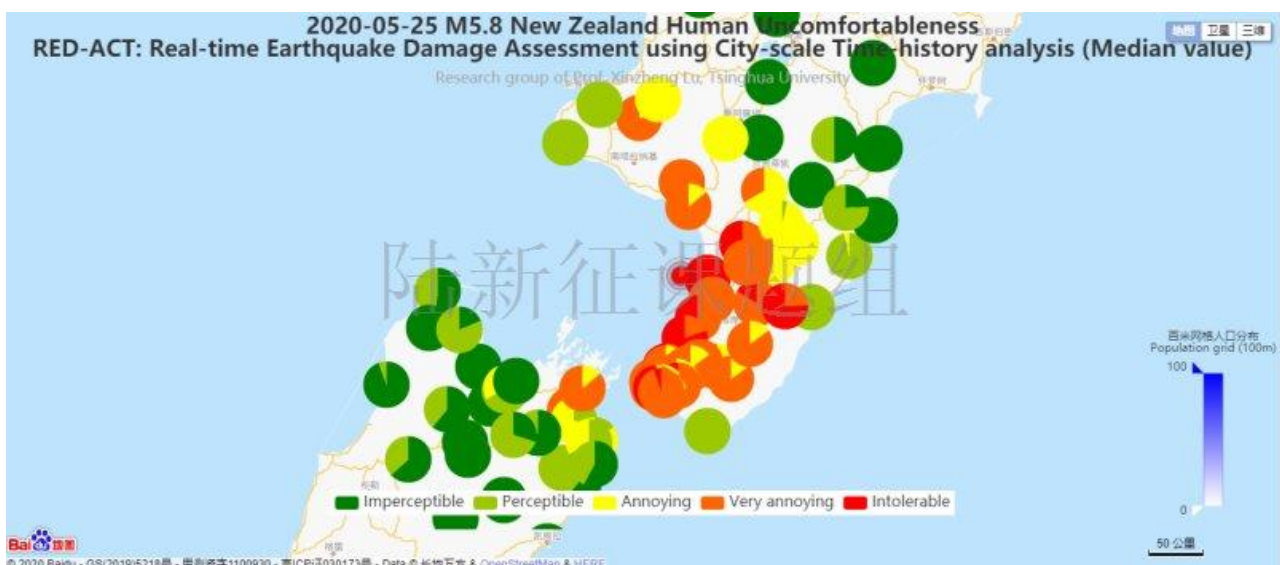


Figure 3 Human feeling distribution near to different stations

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Table 1 Names and locations of the strong motion stations

No.	Station Name	Longitude	Latitude
1	ARKS_20	174.94	-41.24

2	FXBS_20	175.23	-40.46
3	HOCS_20	175.28	-40.62
4	OTKS_20	175.14	-40.76
5	PAPS_20	175.01	-40.91
6	PNBS_20	175.61	-40.35
7	FAHS_20	175.57	-40.21
8	WCDS_20	175.05	-39.93
9	EKTS_20	175.71	-40.65
10	TMDS_20	175.16	-41.08
11	HIBS_20	175.04	-41.14
12	HSSS_20	174.98	-41.15
13	PFAS_20	174.85	-41.14
14	POKS_20	174.83	-41.13
15	PWES_20	174.83	-41.13
16	UHCS_20	175.04	-41.13
17	UHSS_20	175.07	-41.13
18	WAZ_20	174.99	-39.75
19	WDPS_20	175.87	-40.34
20	BMTS_20	174.93	-41.19
21	DAVS_20	174.95	-41.21
22	FTPS_20	175.33	-41.12
23	INSS_20	174.92	-41.23
24	LHBS_20	174.89	-41.20
25	LHRS_20	174.89	-41.20
26	LIRS_20	174.92	-41.23
27	NBSS_20	174.95	-41.20
28	NEWS_20	174.82	-41.23
29	PGMS_20	174.88	-41.22
30	PTOS_20	174.86	-41.22
31	TAIS_20	174.95	-41.18
32	TRMS_20	175.99	-40.67
33	WANS_20	174.93	-41.23
34	WRCS_20	175.65	-40.95
35	BOWS_20	174.78	-41.28
36	LRSS_20	174.90	-41.23
37	MKBS_20	174.70	-41.23
38	MKVS_20	174.71	-41.27
39	PHHS_20	174.90	-41.25
40	POTS_20	174.77	-41.27
41	PVCS_20	174.87	-41.22
42	SEVS_21	174.90	-41.25
43	SOMS_20	174.87	-41.26
44	TSZ_21	175.96	-40.06
45	VUWS_20	174.78	-41.28

46	WDAS_20	174.95	-41.26
47	WEL_20	174.77	-41.28
48	WEMS_20	174.78	-41.27
49	WNHS_20	174.78	-41.30
50	WNKS_20	174.74	-41.28
51	DVHS_20	176.10	-40.20
52	MAVS_20	175.46	-41.21
53	MISS_20	174.82	-41.32
54	MNGS_20	175.79	-39.81
55	PIPS_20	174.79	-41.27
56	TEPS_20	174.78	-41.29
57	TFSS_20	174.78	-41.28
58	TRTS_20	174.77	-41.30
59	WNAS_20	174.81	-41.33
60	WTYS_20	174.78	-41.30
61	BFZ_20	176.25	-40.68
62	ORCS_20	175.41	-39.42
63	QCCS_20	174.02	-41.28
64	WAKS_20	176.25	-39.77
65	HUKS_20	174.57	-39.26
66	BWRS_20	173.91	-41.44
67	NWFS_20	175.23	-41.59
68	PGFS_20	176.61	-40.30
69	MGCS_20	173.94	-41.51
70	OPSS_20	173.86	-39.45
71	VRZ_21	174.76	-39.12
72	WPWS_20	176.58	-39.94
73	SEDS_20	174.08	-41.67
74	INHS_21	174.19	-39.16
75	NNZ_21	173.38	-41.22
76	FKPS_20	174.78	-41.29
77	NCBS_20	173.28	-41.27
78	NELS_20	173.27	-41.29
79	WDFS_20	174.14	-41.83
80	WRAS_20	173.59	-41.60
81	KFHS_20	176.47	-39.43
82	NLMS_20	173.28	-41.27
83	TTHS_20	175.82	-38.99
84	KEKS_20	173.98	-41.96
85	MOTS_20	173.01	-41.12
86	TSFS_20	172.82	-40.85
87	BTWS_20	173.13	-41.39
88	KHLS_20	172.61	-40.56
89	WVFS_20	173.35	-41.62

90	NGHS_20	176.92	-39.49
91	QRZ_21	172.53	-40.83
92	GLOS_20	173.82	-41.86
93	PWZ_21	176.86	-40.03
94	KLDS_20	172.88	-41.67
95	MATS_20	172.70	-41.43
96	MOLS_20	173.26	-42.09
97	MTHZ_20	176.84	-38.85
98	THZ_21	172.91	-41.76
99	TIRS_20	175.91	-38.47
100	TKHS_20	175.16	-38.33
101	KIKS_20	173.68	-42.43
102	KARS_20	172.12	-41.25
103	TENS_20	172.79	-42.22
104	CECS_20	173.28	-42.81
105	HSES_20	172.83	-42.52
106	NCDS_20	176.88	-39.50
107	SDNS_20	174.14	-41.66
108	MCAS_20	172.33	-41.80
109	WTMC_20	173.05	-42.62
110	MWDS_21	175.75	-39.41