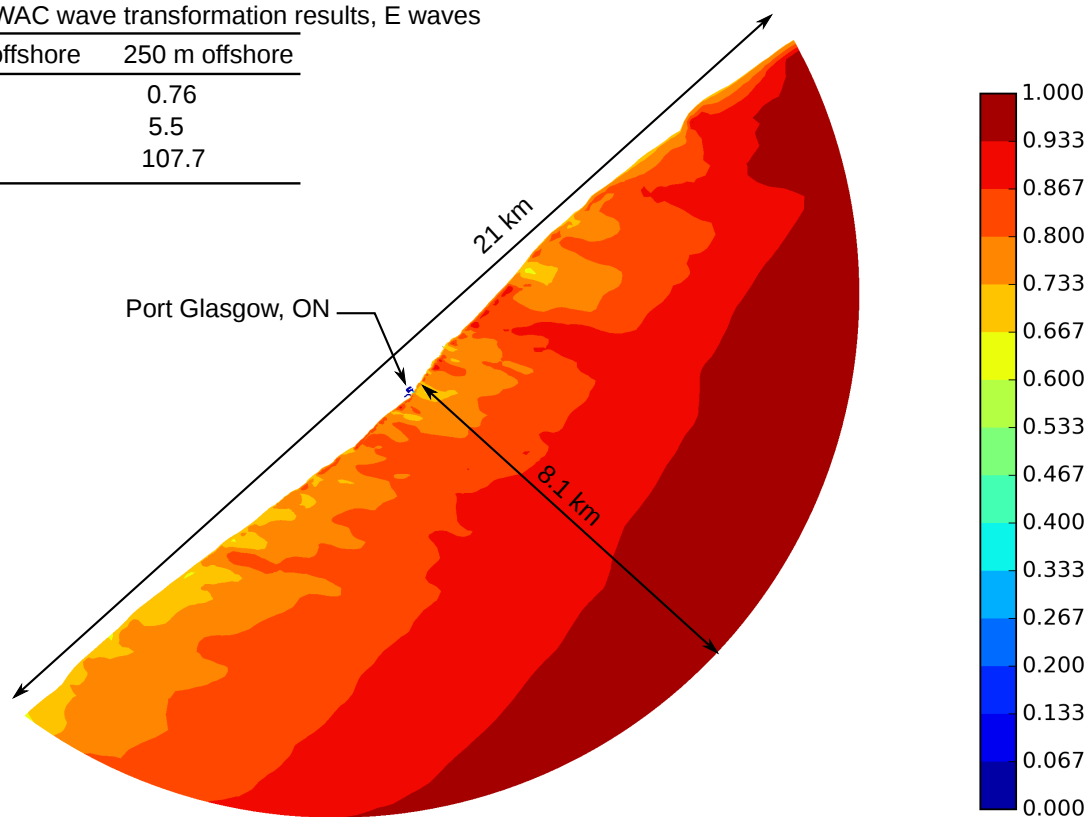


Table A1a: TOMAWAC wave transformation results, E waves

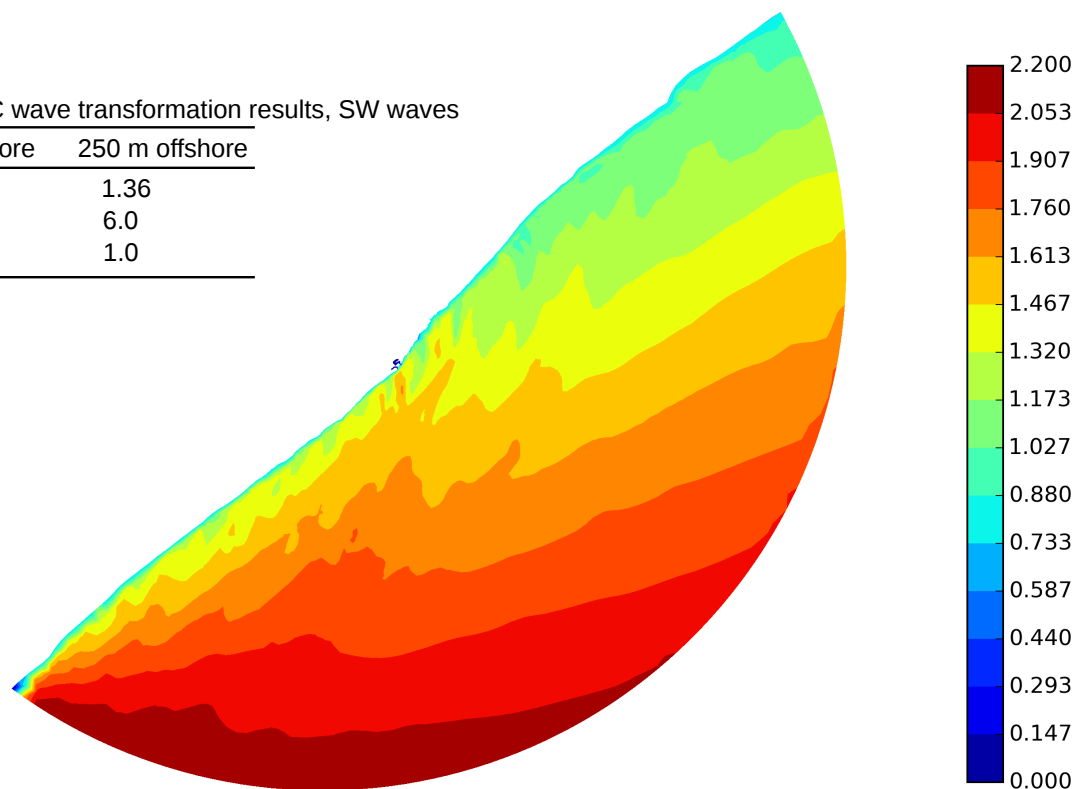
	8.1 km offshore	250 m offshore
Hm0 [m]	1.5	0.76
Tp [sec]	5.5	5.5
Dir [Az deg]	90	107.7



a) E offshore waves, 2-yr storm

Table A1b: TOMAWAC wave transformation results, SW waves

	8.1 km offshore	250 m offshore
Hm0 [m]	2.1	1.36
Tp [sec]	6.0	6.0
Dir [Az deg]	225.0	1.0



a) SW offshore waves, 2-yr storm

Figure A1

Nearshore wave transformation model results



Client

Port Glasgow Yacht Club

Scale

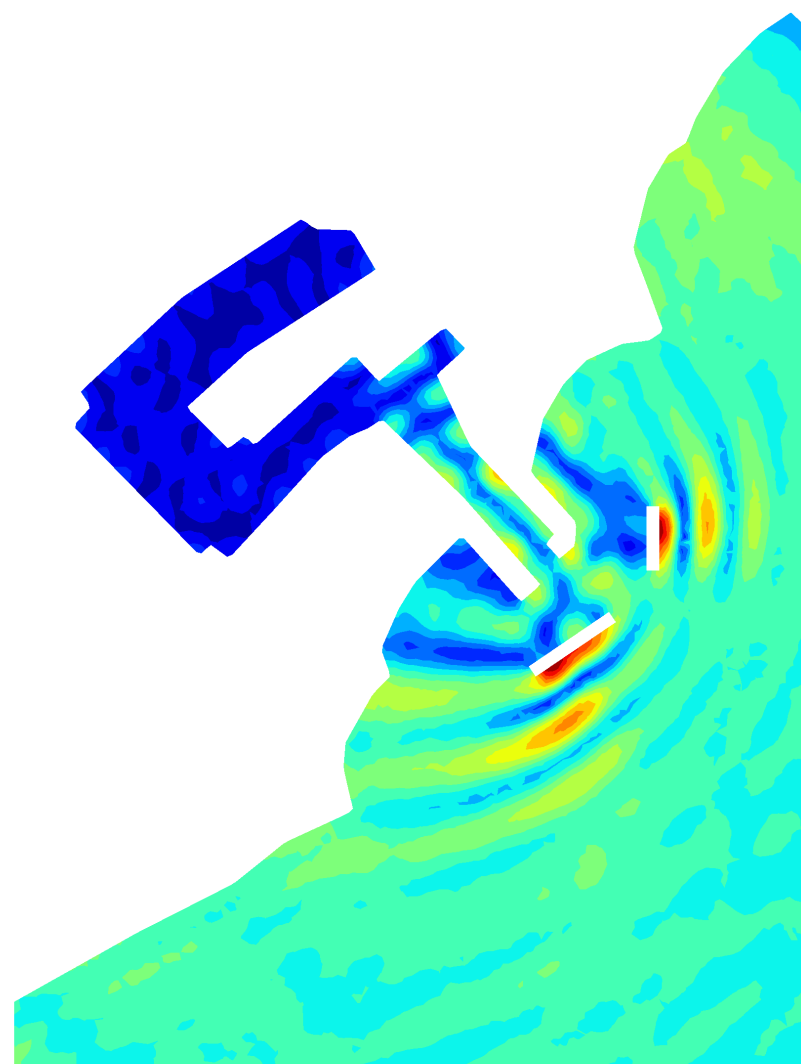
Varies

Date

August 2017



a) Existing conditions, E waves



b) Option 1, E waves

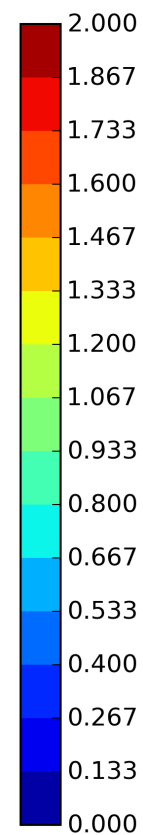


Figure B1

Harbour agitation at Port Glasgow, E waves



Client

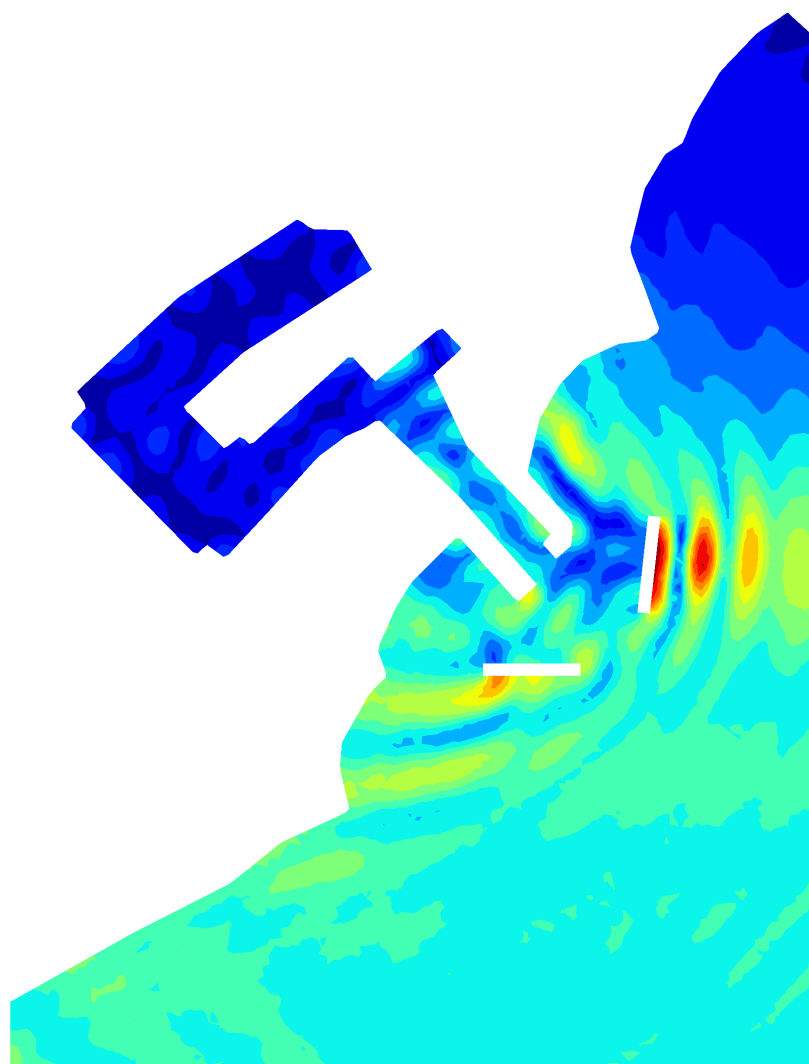
Port Glasgow Yacht Club

Scale

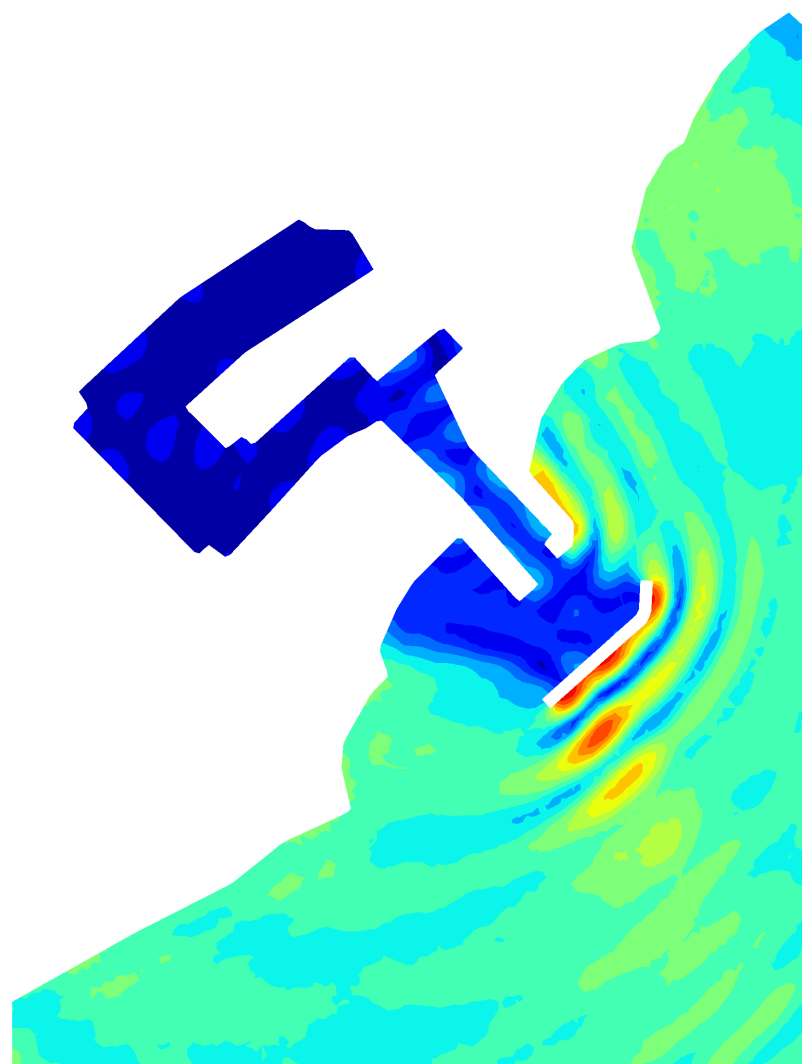
Varies

Date

August 2017



a) Option 2, E waves



b) Option 3, E waves

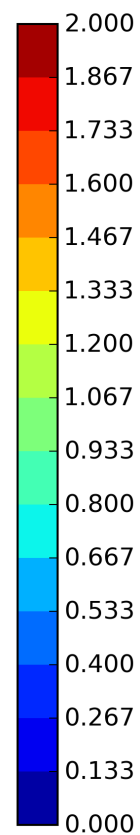


Figure B2

Harbour agitation at Port Glasgow, E waves

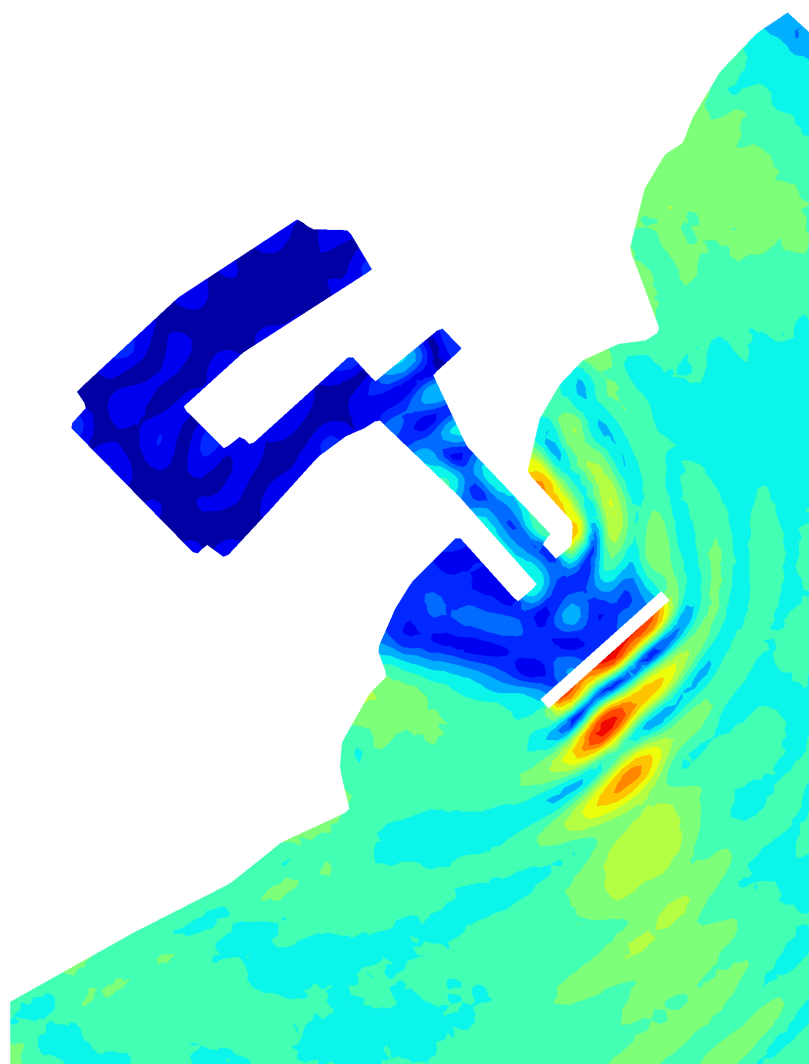


Client

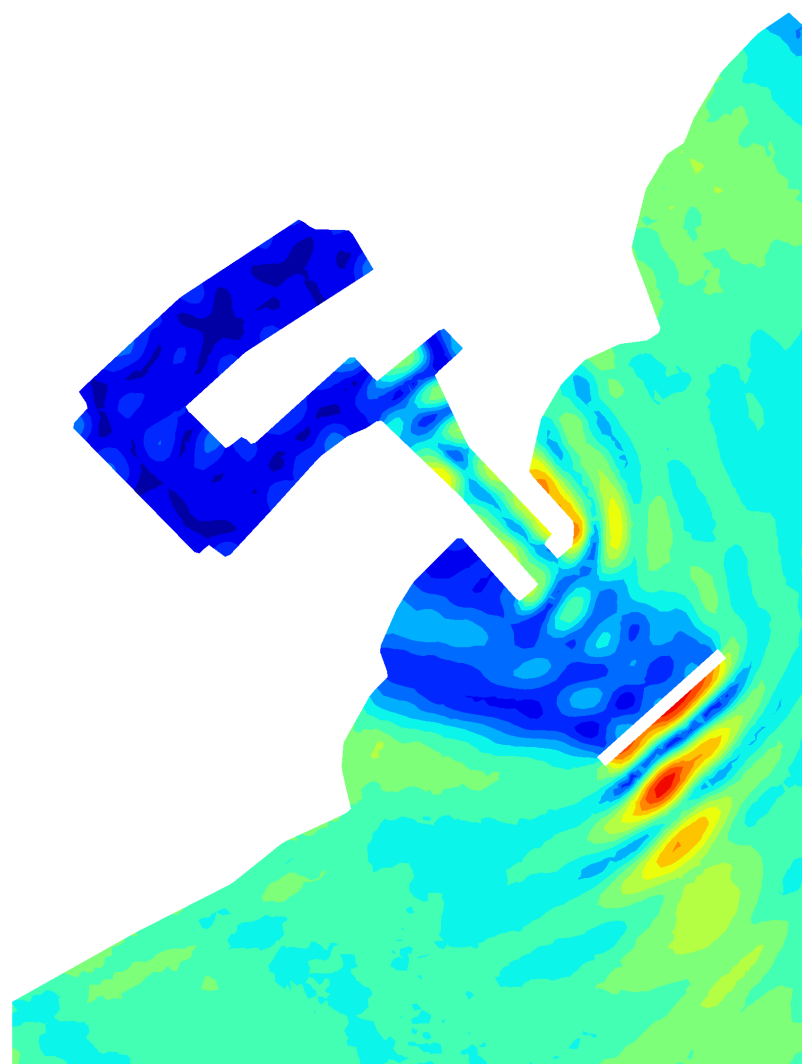
Port Glasgow Yacht Club

Scale
Varies

Date
August 2017



a) Option 3a, E waves



b) Option 3a modified, E waves

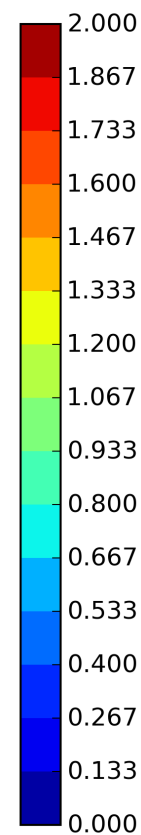
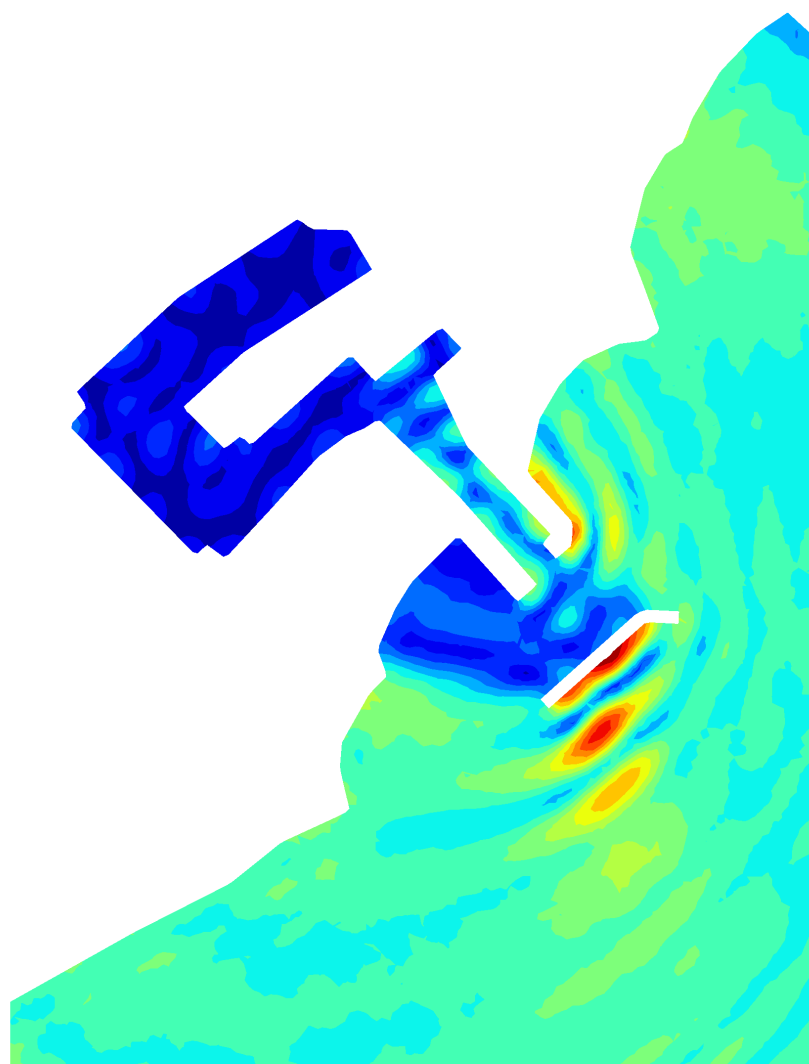
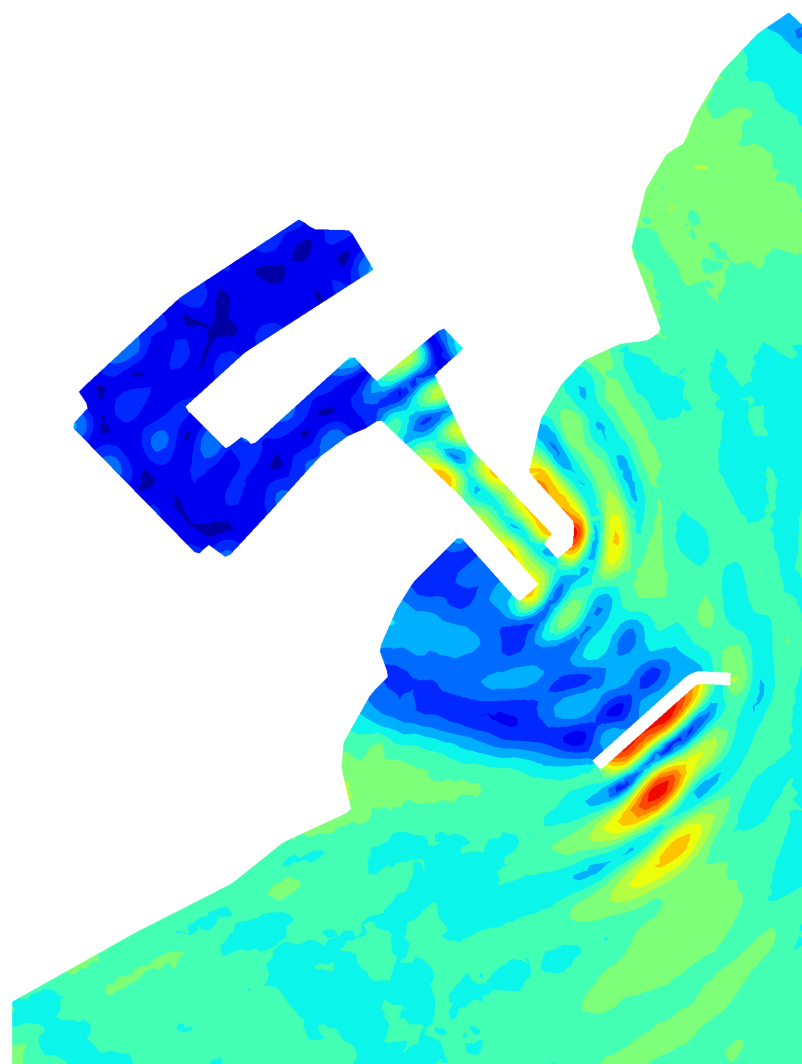


Figure B3 Harbour agitation at Port Glasgow, E waves		
Client Port Glasgow Yacht Club		
Scale Varies	Date August 2017	



a) Option 3b, E waves



b) Option 3b modified, E waves

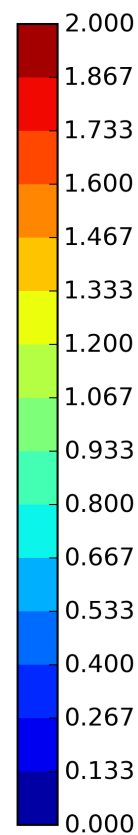
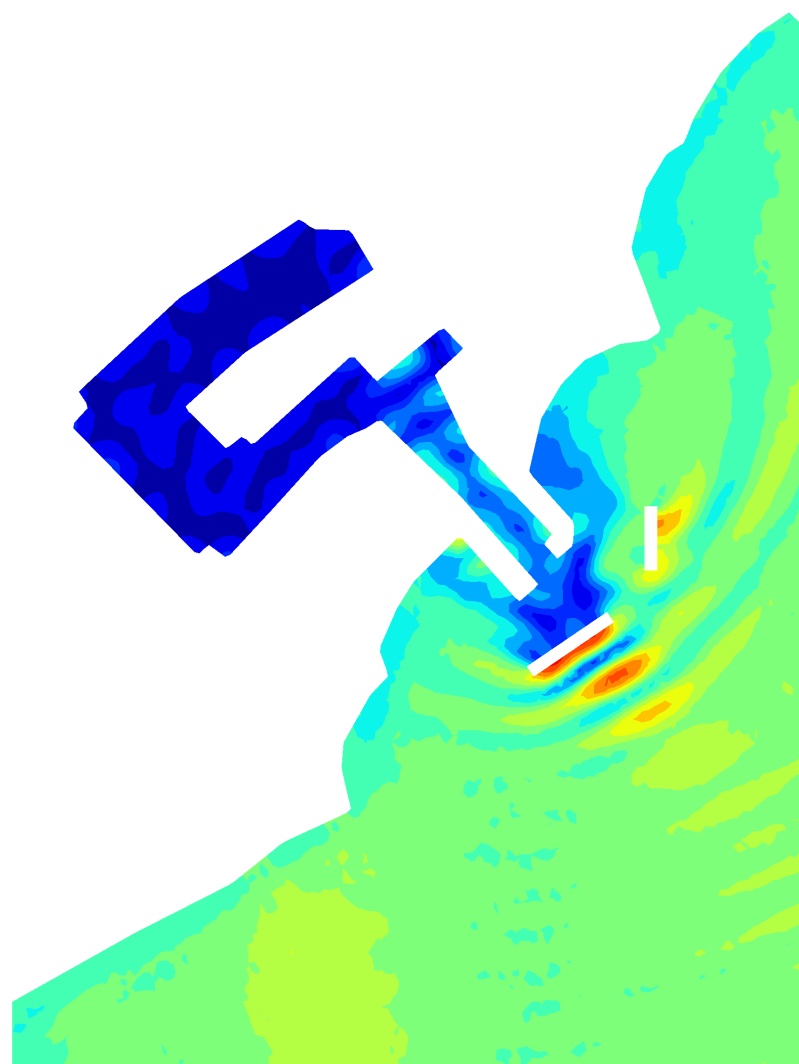


Figure B4		
Harbour agitation at Port Glasgow, E waves		
Client		
Port Glasgow Yacht Club		
Scale		Date
Varies		August 2017



a) Existing conditions, SW waves



b) Option 1, SW waves

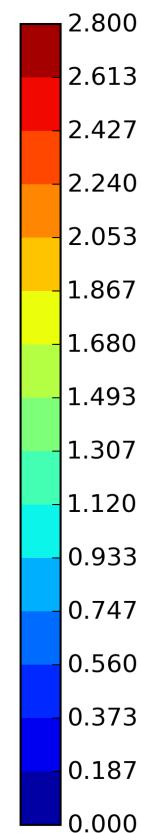
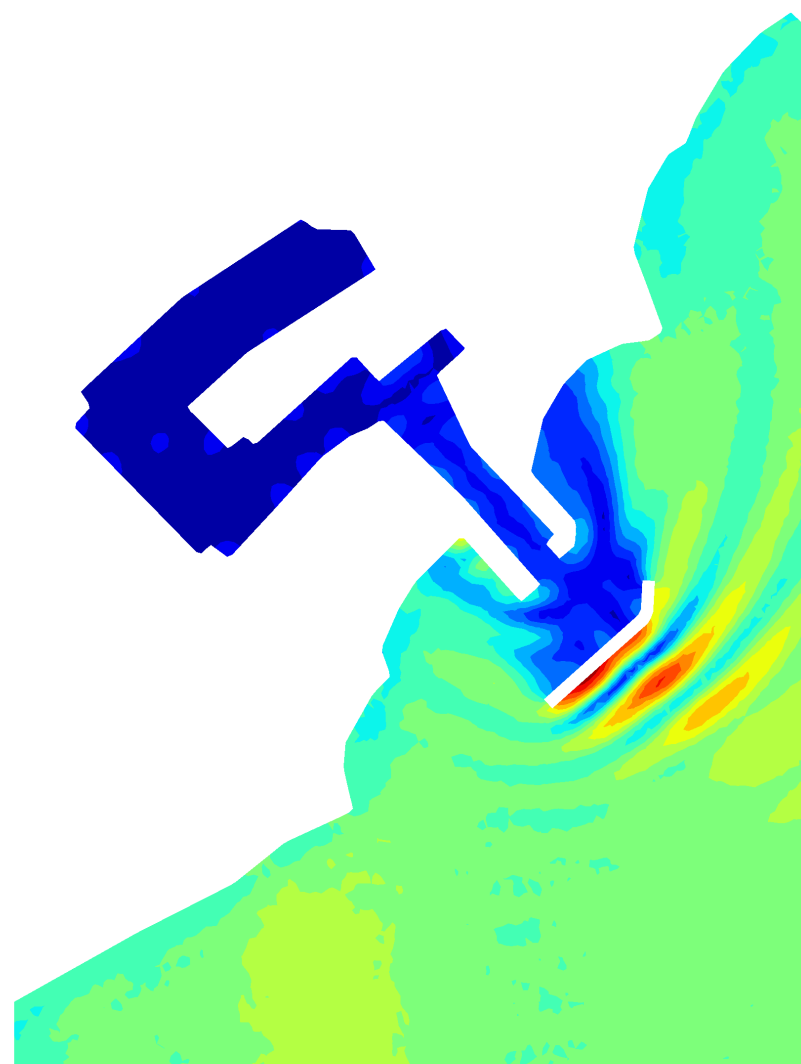


Figure B5	
Harbour agitation at Port Glasgow, SW waves	
	
Client	
Port Glasgow Yacht Club	
Scale	Date
Varies	August 2017



a) Option 2, SW waves



b) Option 3, SW waves

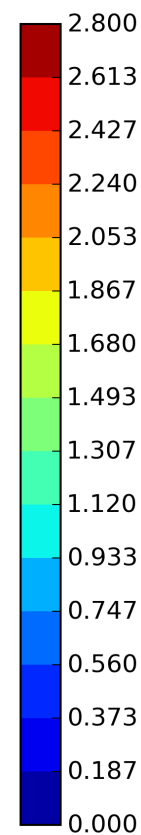
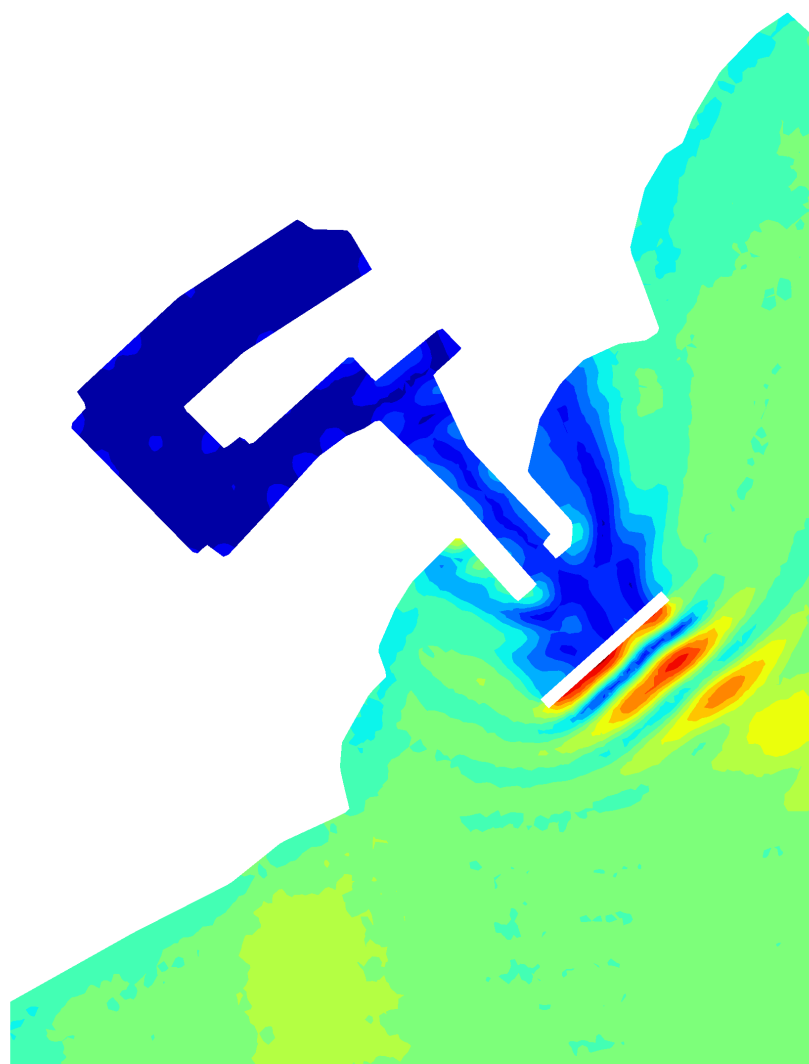
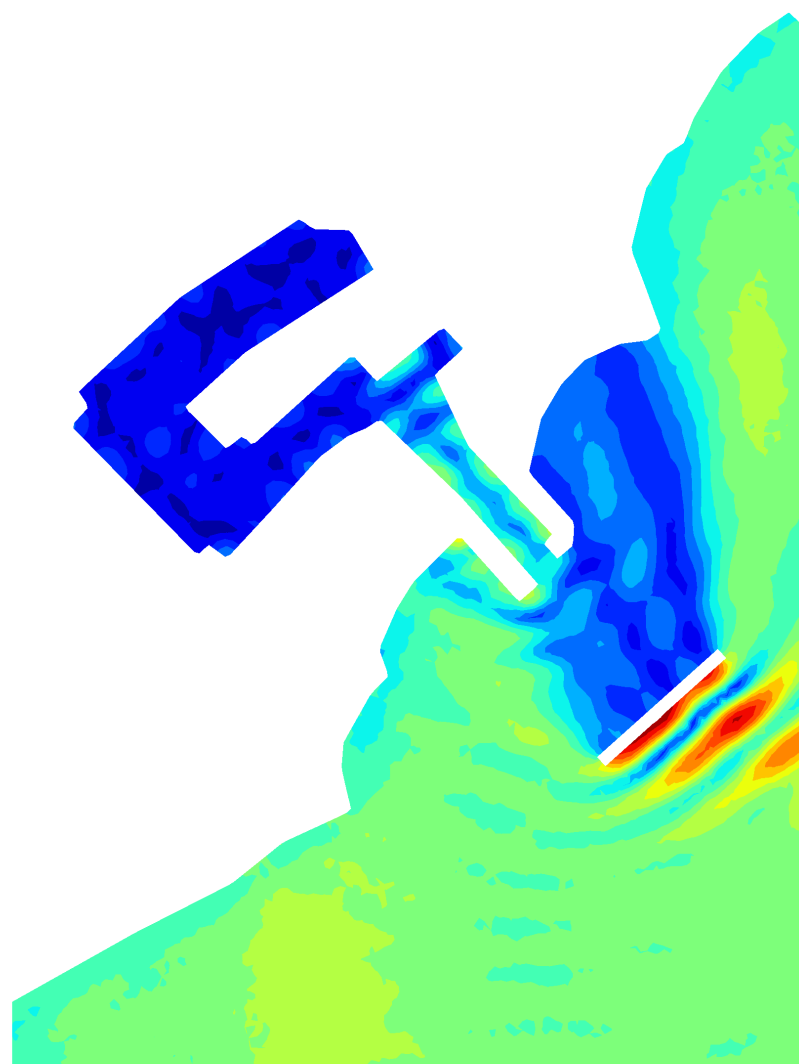


Figure B6 Harbour agitation at Port Glasgow, SW waves		
Client Port Glasgow Yacht Club		
Scale Varies	Date August 2017	



a) Option 3a, SW waves



b) Option 3a modified, SW waves

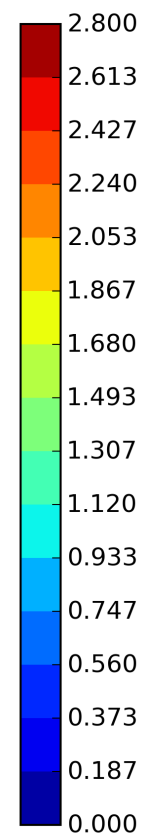


Figure B7

Harbour agitation at Port Glasgow, SW waves

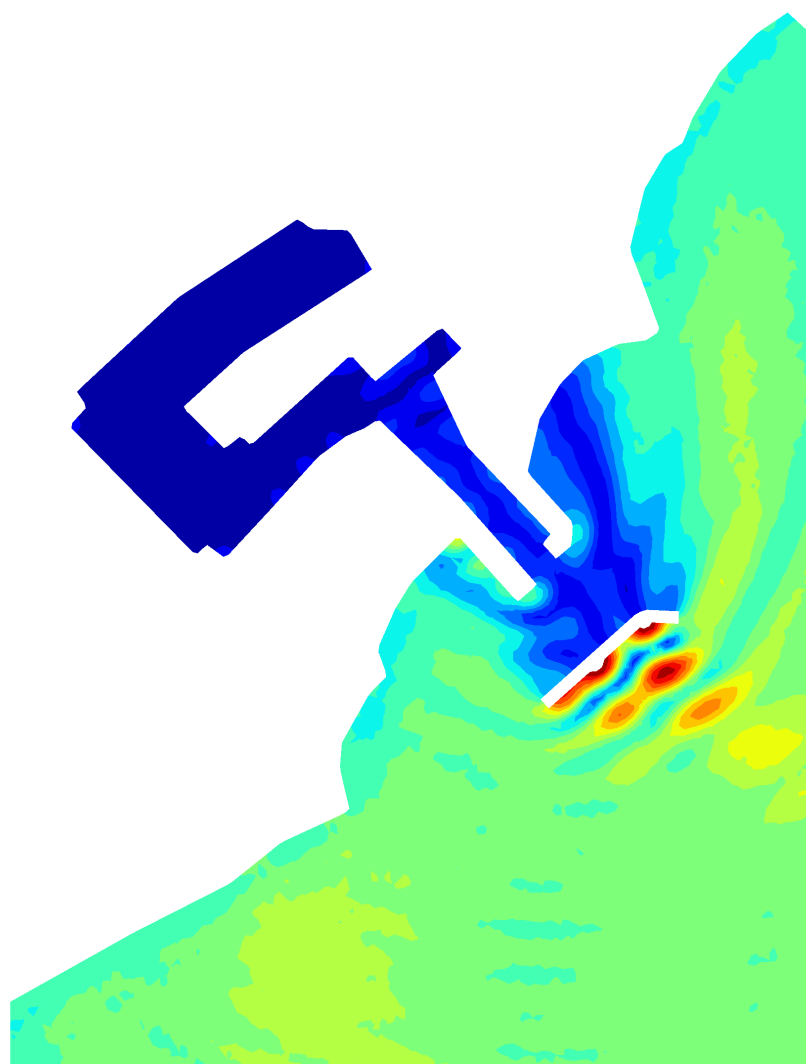


Client

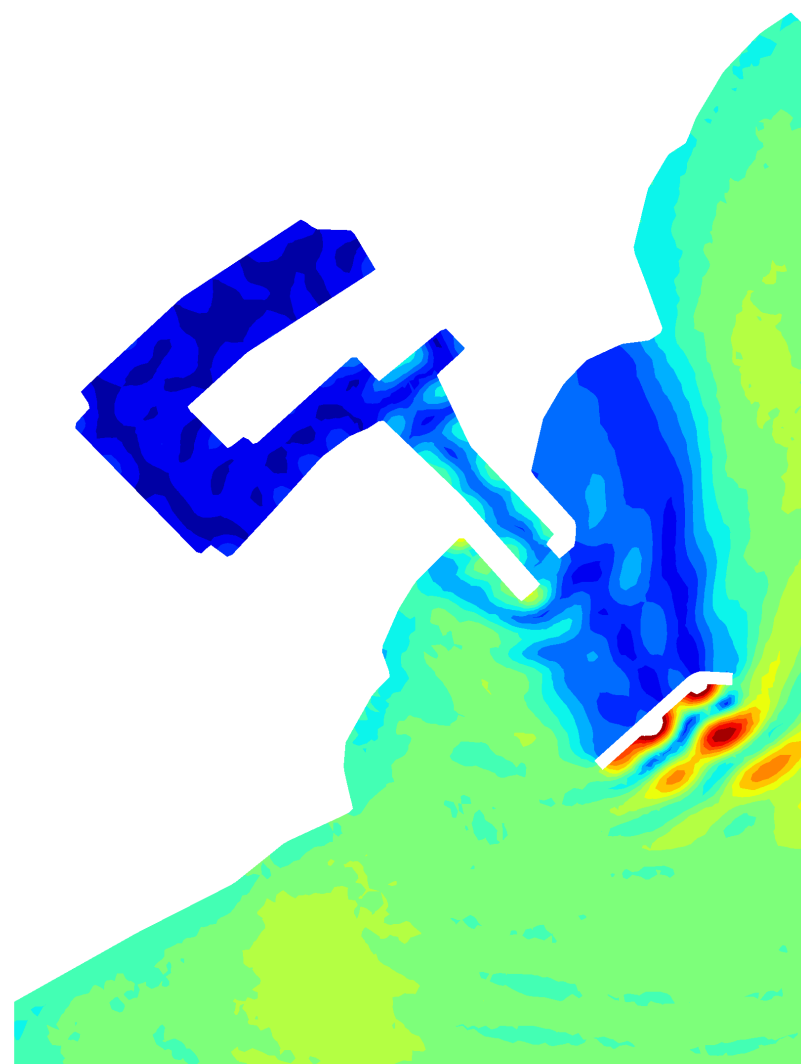
Port Glasgow Yacht Club

Scale
Varies

Date
August 2017



a) Option 3b, SW waves



b) Option 3b modified, SW waves

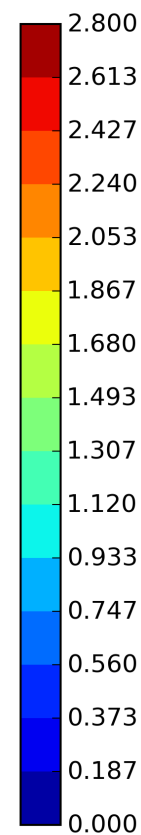


Figure B8	
Harbour agitation at Port Glasgow, SW waves	
Client Port Glasgow Yacht Club	
Scale Varies	Date August 2017

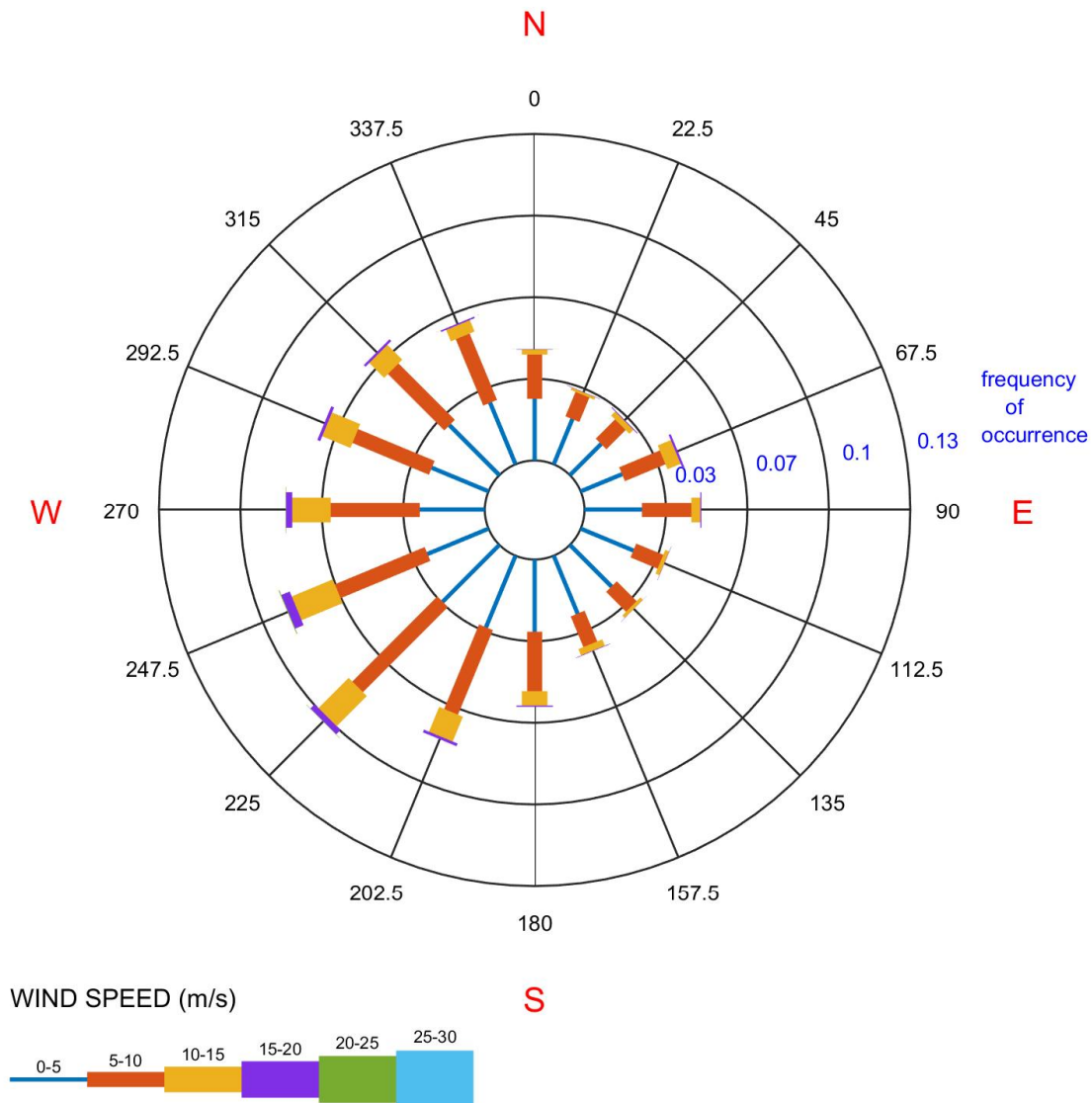


Offshore breakwaters wave agitation analysis
Port Glasgow, Ontario



Lake Erie WIS Station 92163
01-Jan-1979 thru 31-Dec-2014
Long: -81.52° Lat: 42.48° Depth: 17 m
Total Obs : 315573

WIND ROSE



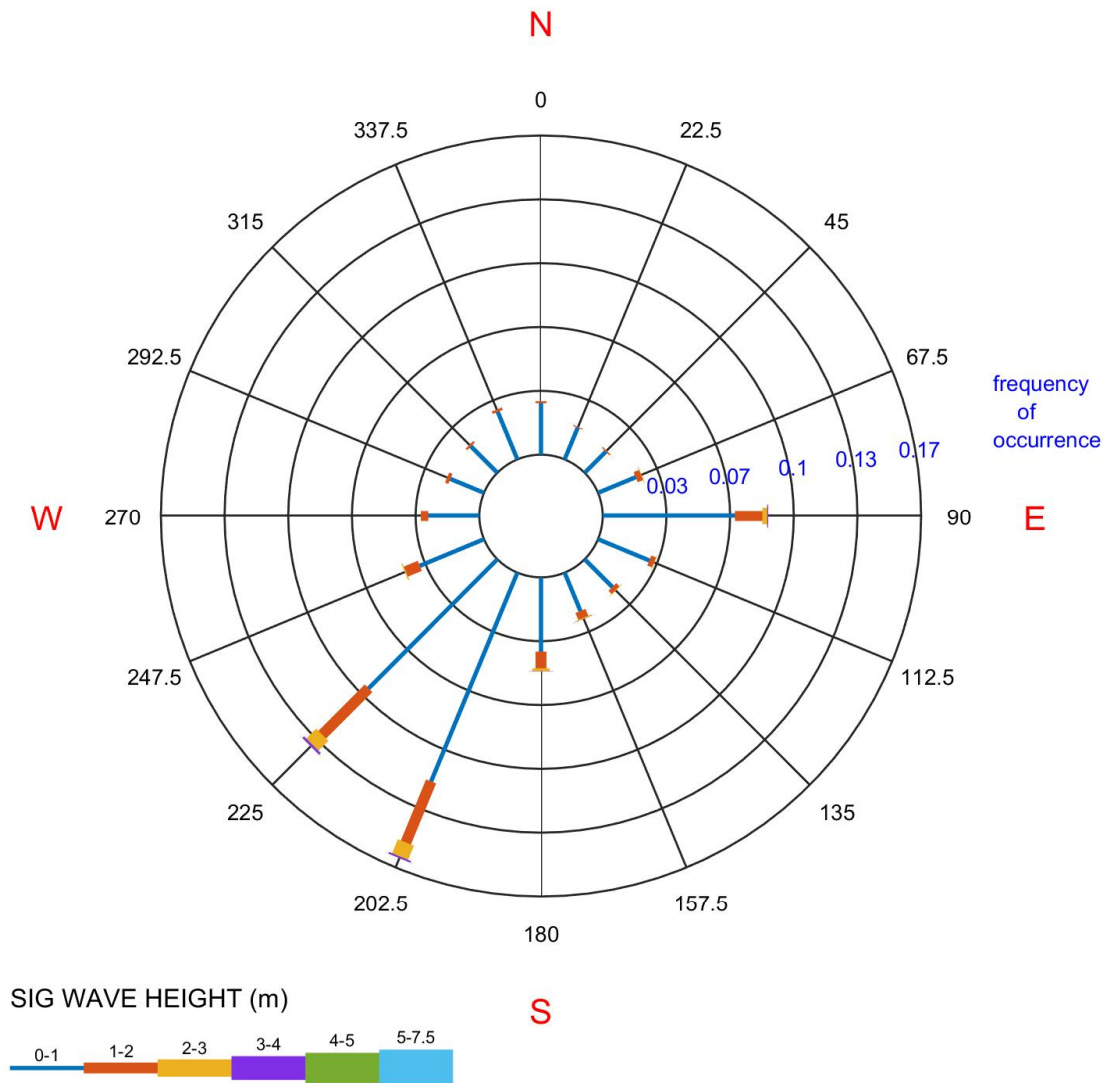
US Army Engineer Research & Development Center

ST92163_v01



Lake Erie WIS Station 92163
01-Jan-1979 thru 31-Dec-2014
Long: -81.52° Lat: 42.48° Depth: 17 m
Total Obs / Total Ice : 315573 / 27294

WAVE ROSE



US Army Engineer Research & Development Center

ST92163_v01

Offshore breakwaters wave agitation analysis
Port Glasgow, Ontario

Table 1: US Army Corps of Engineers WIS Station ST93163 wave magnitudes, all year

	Wave dir	Wave dir	Significant Wave Height, Hm0 [m] return period					
	[-]	(Az deg)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
1	N	0	1.38	1.73	1.96	2.26	2.48	2.69
2	NNE	22.5	1.19	1.62	1.90	2.26	2.52	2.78
3	NE	45	1.40	1.85	2.14	2.51	2.79	3.06
4	ENE	67.5	1.97	2.52	2.88	3.34	3.68	4.01
5	E	90	3.08	3.70	4.10	4.61	4.99	5.37
6	ESE	112.5	2.15	2.73	3.12	3.61	3.97	4.33
7	SE	135	2.18	2.65	2.97	3.37	3.67	3.96
8	SSE	157.5	2.48	2.96	3.28	3.67	3.97	4.26
9	S	180	2.81	3.25	3.53	3.89	4.16	4.42
10	SSW	202.5	3.53	4.18	4.62	5.16	5.56	5.96
11	SW	225	3.68	4.21	4.56	5.01	5.34	5.66
12	WSW	247.5	2.29	2.64	2.88	3.17	3.39	3.61
13	W	270	1.74	2.01	2.19	2.41	2.58	2.74
14	WNW	292.5	1.46	1.72	1.90	2.11	2.27	2.43
15	NW	315	1.40	1.65	1.81	2.02	2.17	2.32
16	NNW	337.5	1.38	1.67	1.86	2.10	2.28	2.45

Table 2: US Army Corps of Engineers WIS Station ST93163 wave magnitudes, May 15-Oct 15

	Wave dir	Wave dir	Significant Wave Height, Hm0 [m] return period					
	[-]	(Az deg)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
1	N	0	0.78	0.96	1.07	1.22	1.32	1.43
2	NNE	22.5	0.68	0.85	0.96	1.10	1.21	1.31
3	NE	45	0.81	1.10	1.29	1.52	1.70	1.88
4	ENE	67.5	1.13	1.55	1.83	2.18	2.44	2.69
5	E	90	1.70	2.32	2.73	3.25	3.63	4.01
6	ESE	112.5	1.04	1.40	1.63	1.93	2.15	2.37
7	SE	135	1.03	1.43	1.69	2.02	2.26	2.50
8	SSE	157.5	1.33	1.76	2.05	2.41	2.68	2.95
9	S	180	1.86	2.26	2.53	2.86	3.11	3.36
10	SSW	202.5	2.32	2.84	3.18	3.62	3.94	4.26
11	SW	225	2.13	2.67	3.03	3.48	3.81	4.15
12	WSW	247.5	1.30	1.56	1.73	1.95	2.11	2.27
13	W	270	1.01	1.28	1.46	1.69	1.86	2.03
14	WNW	292.5	0.89	1.12	1.27	1.45	1.59	1.73
15	NW	315	0.81	1.00	1.13	1.30	1.42	1.54
16	NNW	337.5	0.81	1.02	1.16	1.34	1.47	1.60

Offshore breakwaters wave agitation analysis
Port Glasgow, Ontario

Table 3: WIS Station ST93163 directional stats, all year

	Wave dir	Wave dir	Count	Perc
	[-]	(Az deg)	[hrs]	[%]
1	N	0	10130	3.51
2	NNE	22.5	8329	2.89
3	NE	45	9130	3.17
4	ENE	67.5	11782	4.09
5	E	90	36976	12.83
6	ESE	112.5	12516	4.34
7	SE	135	8785	3.05
8	SSE	157.5	9552	3.31
9	S	180	17850	6.19
10	SSW	202.5	59587	20.67
11	SW	225	53699	18.63
12	WSW	247.5	15870	5.51
13	W	270	10332	3.58
14	WNW	292.5	7059	2.45
15	NW	315	7045	2.44
16	NNW	337.5	9637	3.34

Table 4: WIS Station ST93163 directional stats, May 15-Oct 15

	Wave dir	Wave dir	Count	Perc
	[-]	(Az deg)	[hrs]	[%]
1	N	0	4756	3.57
2	NNE	22.5	4131	3.10
3	NE	45	4891	3.68
4	ENE	67.5	5624	4.23
5	E	90	18829	14.15
6	ESE	112.5	6961	5.23
7	SE	135	4662	3.50
8	SSE	157.5	4898	3.68
9	S	180	9208	6.92
10	SSW	202.5	32380	24.34
11	SW	225	21461	16.13
12	WSW	247.5	4291	3.22
13	W	270	2598	1.95
14	WNW	292.5	2067	1.55
15	NW	315	2405	1.81
16	NNW	337.5	3894	2.93