

BEACH MANAGEMENT PLAN REPORT

Dungeness Power Station

2011

BMP 138 - Annex
April 2013



Canterbury City Council
Strategic Monitoring
Military Road
Canterbury
Kent
CT1 1YW

Tel: 01227 862456
Fax: 01227 862537
e-mail: Strategic.Monitoring@canterbury.gov.uk
Web Site: www.se-coastalgroup.org.uk
www.channelcoast.org

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Author: **M.Dorling**

Checked By **J. Clarke**

Approved By: J. Clarke

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Beach Management Plan Site Report 2011 4cMU13 – Dungeness Power Station

Contents

Annex A: Explanatory Notes	3
Annex B: Digital Ground Models.....	6
Annex C: Rye Bay WaveRider Buoy.....	9

Annex A: Explanatory Notes

1. Summary of method of conducting topographic and hydrographic surveys (based on the Environment Agency's National Specification Sections XII and XIII)

Topographic cross-shore (profile) measurements are made at the intercept of the beach and a hard structure, at all changes of beach slope, at changes in surface sediment and at maximum defined intervals (every 5 metres). Each measurement is feature-coded with the type of surface material. Profiles are 100-500m apart, depending on management status. The seaward limit to be achieved is Mean Low Water Springs or 50 metres from the beach toe.

Topographic spot height (baseline) surveys are carried out annually at Beach Management Plan sites. Profiles are measured at 50m intervals, with the addition of spot heights at the toe of hard structures, the beach surface surrounding structures, all beach ridge crests, all other changes in slope and sediment changes, plus contour lines at a maximum spacing of 5m. All measurements are feature-coded with sediment type. Sufficient data points must be measured to generate a reliable Digital Terrain Model.

Hydrographic surveys are conducted with a single beam echo-sounder, with the position fixing requirement relaxed to DGPS. Soundings are taken along cross-shore profile lines 50m apart and extend 1km offshore. A minimum of 4 shore parallel tie lines are required (including one near the landward and seaward boundaries). The landward limit varies slightly across the region, due to the variation in tidal range, but in general is landward of Mean Sea Level, thus providing overlap with the topographic surveys. Tidal control may be by RTK GPS or by correction from tide gauges which are tied to the survey control network

2. Change in Cross-sectional Area (CSA)

The annual change in cross-sectional area is calculated as the difference in CSA between two surveys, expressed as a percentage change compared to the earlier CSA.

$$\frac{CSA_1 - CSA_2}{CSA_2} * 100 \quad \text{Eqn (1)}$$

where CSA_1 = most recent springtime survey and CSA_2 = spring survey previous year. Therefore an annual change of -14% represents erosion during the last year of 14% of the area of last year's survey.

3. Method of derivation of Digital Ground and difference models

The Digital Terrain Model is created by interpolating the points of a topographic baseline survey collected by using RTK GPS system. The interpolation method used to create the SECG DGMs is specified as

Triangulation with smoothing and is applied in MapInfo Vertical Mapper to create a 1 metre resolution grid.

Triangulation is a process of grid generation that is usually applied to data that requires no regional averaging, such as elevation readings. The surface created by triangulation passes through all of the original data points while generating some degree of "overshoot" above local high values and "undershoot" below local low values. Elevation is an example of point values that are best "surfaced" with a technique that predicts some degree of over- and under- estimation. In modelling a topographic surface from scattered elevation readings, it is not reasonable to assume that data points were collected at the absolute top or bottom of each local rise or depression in the land surface.

Triangulation involves a process whereby all the original data points are connected in space by a network of triangular faces, drawn as equilaterally as possible. This network of triangular faces is referred to as a Triangular Irregular Network (TIN). Points are connected based on the nearest neighbour relationship (the Delaunay criterion) which states that a circumcircle drawn around any triangle will not enclose the vertices of any other triangle.

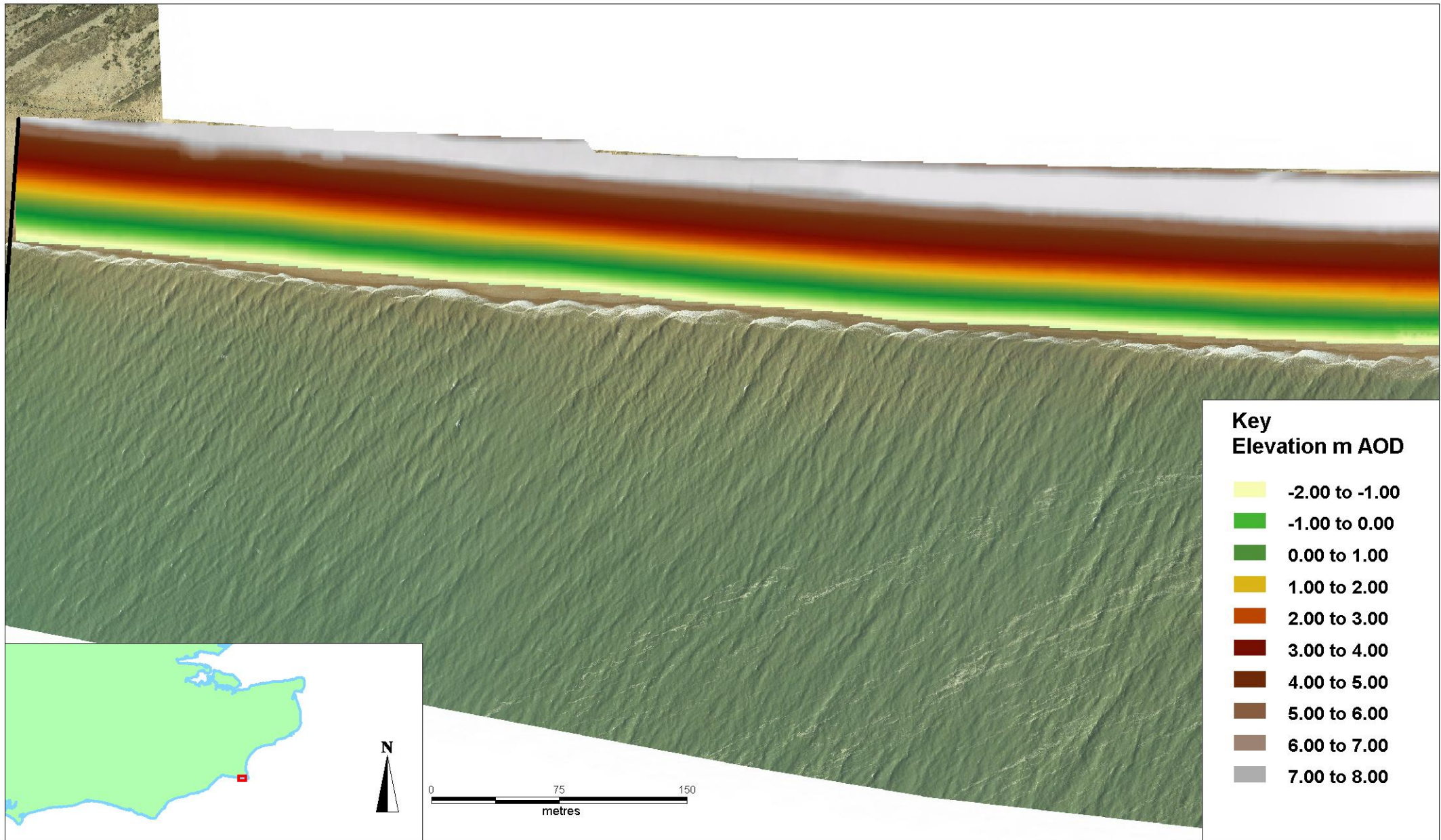
To visualise the resulting grid, the same colour scheme is applied, thus enabling comparison between grids of different geographic origin. The colour bands cover a elevation range between -4 to +12 metres OD with elevations lying between -2 and + 5 metres OD are shown in 0.5 metres intervals, the remaining elevation bands shown in 1 metre intervals.

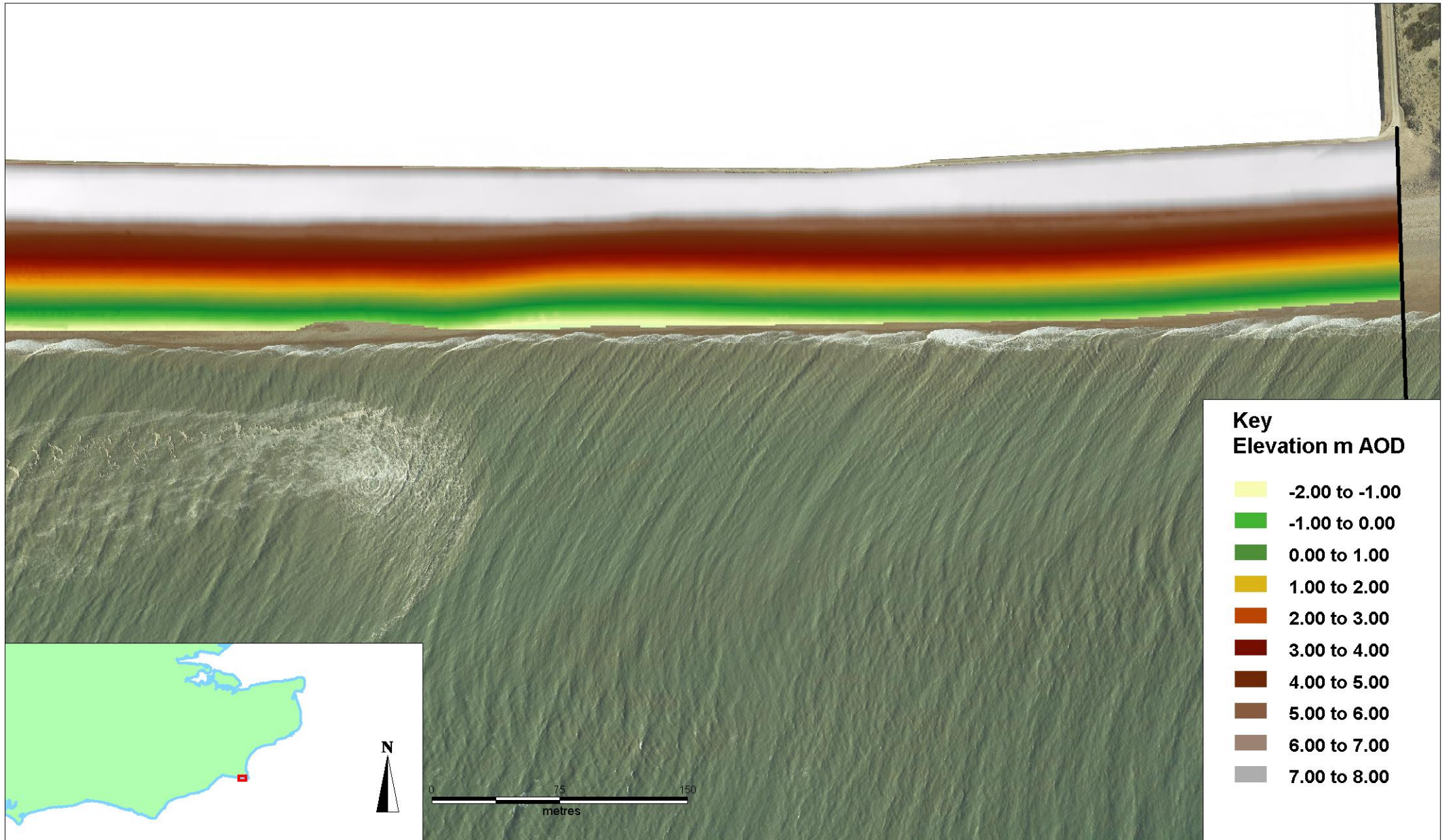
All difference models are created by using a grid calculator within the GIS system. For example the difference model of two baseline surveys is created by subtracting the earlier baseline grid from the most recent baseline grid:

$$Grid_1 - Grid_2 \qquad \text{Eqn (2)}$$

where $Grid_1$ = most recent baseline grid and $Grid_2$ = previous baseline grid. Therefore an annual change of $-14m^2$ represents erosion during the last year of $14m^2$, whilst positive values represent accretion over the period.

Annex B: Digital Ground Models





Annex C: Rye Bay WaveRider Buoy

July 2010 – June 2011

Rye Bay Directional Waverider Buoy

Location

OS: 596521E 109474N
WGS84: Latitude: 50° 51.083' N Longitude: 00° 47.433' E

Water Depth

Approx 10m CD

Instrument Type

Datawell Directional Waverider Buoy Mk III

Data Quality

C1 (%)	Sample interval
100	30 minutes

Monthly Means

All

times GMT

Rye Bay April 2010 to March 2011						
Month	H _s	T _p	T _z	Direction	SST	No. of days
	(m)	(s)	(s)	(°)	(°C)	
April	0.60	5.3	3.4	162	8.4	30
May	0.54	5.2	3.3	154	10.6	31
June	0.47	5.9	3.3	170	14.0	30
July	0.57	5.4	3.5	222	16.8	31
August	0.77	4.9	3.4	209	17.6	31
September	0.71	4.8	3.3	201	17.1	30
October	0.93	5.2	3.6	180	15.1	31
November	1.04	5.7	3.8	187	12.9	30
December	0.75	5.0	3.4	180	7.6	31
January	0.96	5.3	3.6	169	6.9	31
February	1.02	5.8	3.9	201	7.0	28
March	0.60	4.8	3.2	138	7.2	31

Tables and plots of these values, together with the minimum and maximum values and the standard deviation are available on the website

Highest events in 2010/11									
Date/Time	H _s	T _p	T _z	Dir.	Water level elevation* (OD)	Tidal stage (hrs re: HW)	Tidal range (m)	Tidal surge* (m)	Max. surge* (m)
12-Nov-2010 01:00	4.35	10.0	6.7	219	1.68	HW -2	3.60	0.10	0.52
23-Oct-2010 09:00	3.60	7.7	5.9	225	1.08	HW -2	4.98	0.05	0.22
08-Nov-2010 13:00	3.58	7.7	6.0	170	2.68	HW	5.48	-0.45	-0.45
04-Dec-2010 09:00	3.51	7.7	5.9	212	2.33	HW -1	5.10	-0.03	-0.32
11-Jan-2011 04:00	3.34	7.1	5.7	181	1.83	HW +1	4.13	-0.25	-0.34

* Tidal information is obtained from the nearest recording tide gauge (the National Network gauge at Dover). The surge shown is the residual at the time of the highest H_s. The maximum tidal surge is the largest positive surge during the storm event.

Distribution plots

The distribution of wave parameters is shown in the accompanying graphs of:

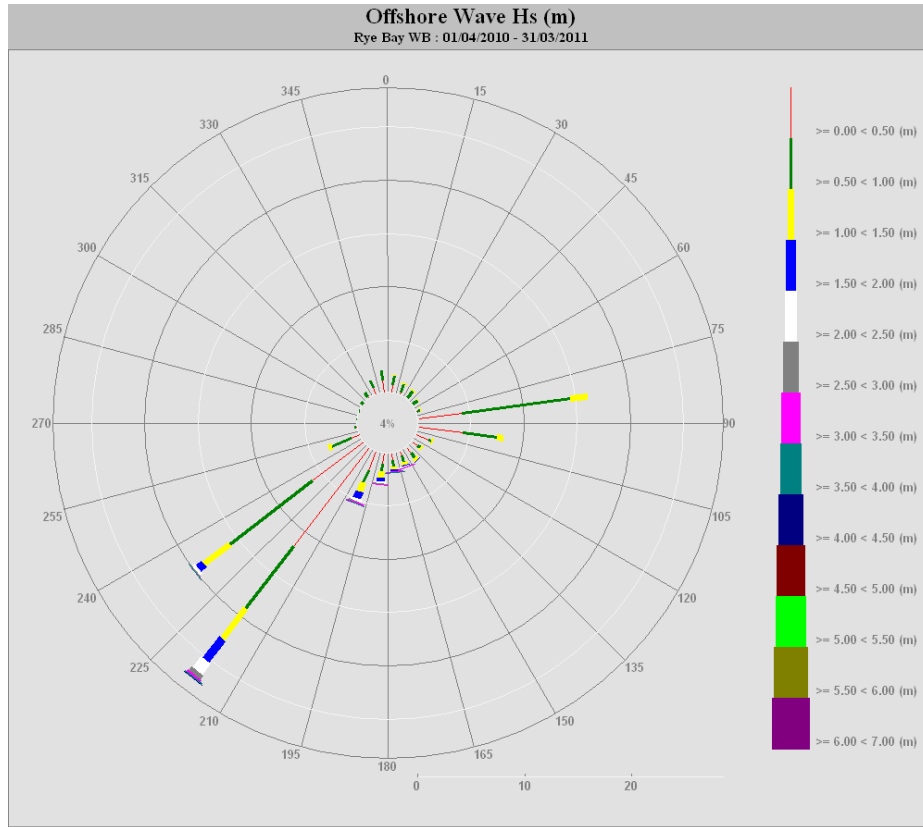
- Wave rose (Direction vs. H_s) from August 2010 to March 2011
- Percentage of occurrence of H_s , T_p , T_z and Direction from April 2009 to March 2010
- Monthly time series of significant wave height (the red line is the storm threshold)
- Incidence of storms during the reporting period. Storms are defined using the Peaks-over-Threshold method. The highest H_s of each storm is shown.

Summary

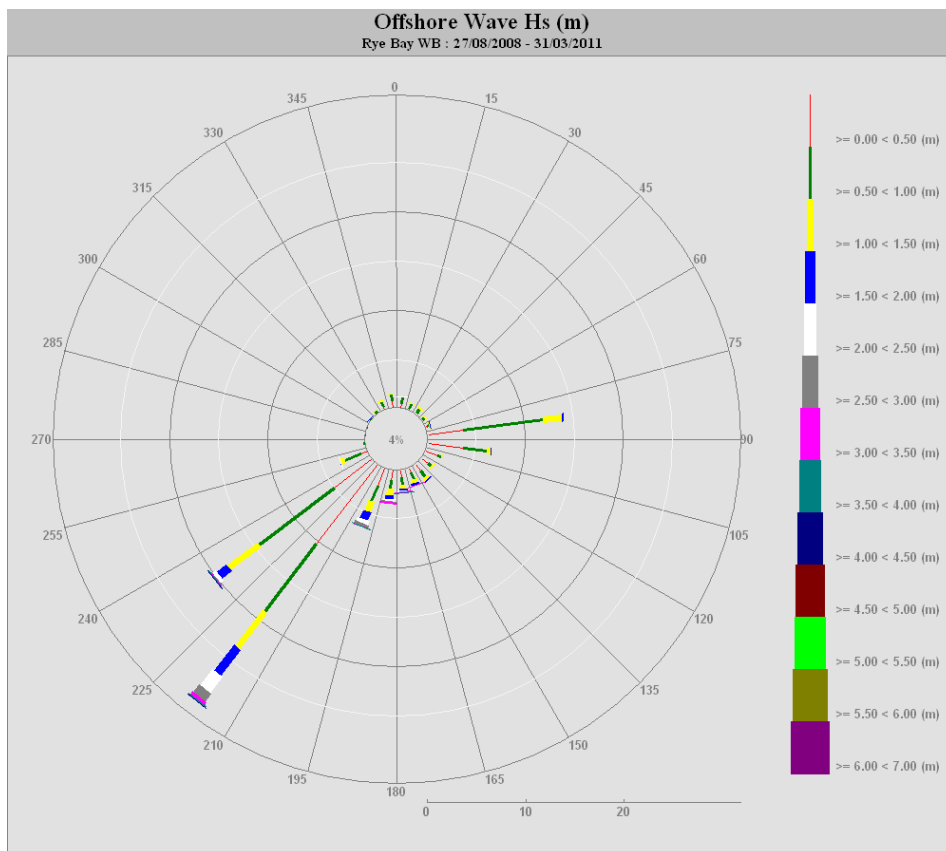
This reporting year had a similar frequency and magnitude of storms as the previous year, with November, December and January being the stormiest months. The largest storm of the year peaked at 4.35m H_s . This was the second highest significant wave height recorded since deployment of the buoy in August 2008.

Acknowledgements

Tidal data were supplied by the British Oceanographic Data Centre as part of the function of the National Tidal and Sea Level Facility, hosted by the Proudman Oceanographic Laboratory and funded by DEFRA and the Natural Environment Research Council.



Percentage of occurrence of direction vs. H_s for April 2010 to March 2011 (this reporting year)



Percentage of occurrence of direction vs. H_s for August 2008 to March 2011 (all measured data)

Rye Bay Apr 2010 to Mar 2011

