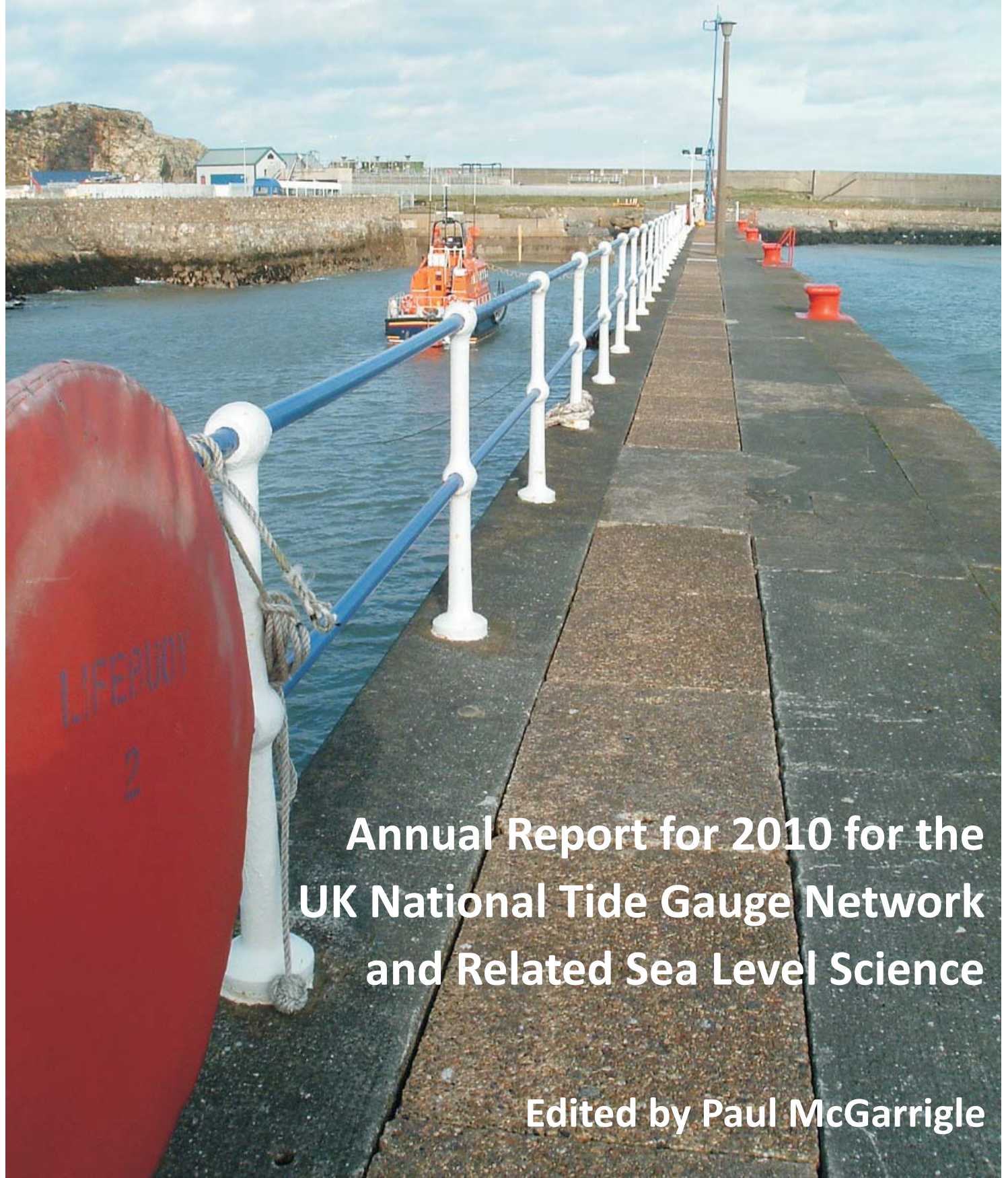


National Tidal and Sea Level Facility



Annual Report for 2010 for the UK National Tide Gauge Network and Related Sea Level Science

Edited by Paul McGarrigle

National Tidal and Sea Level Facility: Annual Report for 2010 for the UK National Tide Gauge Network and Related Sea Level Science

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Thanks also to all those involved in maintenance of the network, data retrieval, processing, quality control and delivery.

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Foreword

Rising sea levels and climate change have profound implications for coastal protection and marine management. Managing the risk and developing effective forecasting systems demands the best understanding of the science behind sea level rise, storm surges and coastal flooding. Based at the National Oceanography Centre in Liverpool, with research partners in UK universities and the Met Office, The National Tidal and Sea Level Facility (NTSLF) is the UK centre of excellence for sea level monitoring, coastal flood forecasting and the analysis of sea level extremes. Our work is of strategic importance to government, local authorities, the public and the scientific community. The NTSLF also provides annual input to the UK Marine Climate Change Impacts Partnership. This report contains a summary of NTSLF activity for 2010.

The NTSLF manages precision tide gauges at 44 sites around the UK. Sophisticated telemetry systems make the data available in real time for operational coastal flood warning. We are also responsible for monitoring sea level at sites in the south Atlantic as part of our contribution towards international climate change research.

NTSLF scientists and engineers are responsible for:

- Sea level monitoring around the UK and at key sites in the South Atlantic Ocean and the British Overseas Territories.
- Storm surge forecasting computer models.
- The calculation of extreme sea levels needed to design coastal defence options.
- Projections of extreme sea levels in future climate scenarios.
- Analysis of the tsunami risk to the UK.

You can download tide gauge data - both unprocessed and quality-controlled - free of charge from the British Oceanographic Data Centre (BODC) at https://www.bodc.ac.uk/data/online_delivery/ntslf/

You can see real-time data from all locations on our website at <http://www.pol.ac.uk/ntslf>

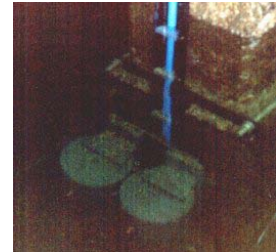
We would like to thank all those who contribute towards, and make use of, the NTSLF, as well as the Environment Agency, who own and fund the UK National Tide Gauge network.

Dr Kevin Horsburgh
Head of NTSLF

Tide Gauge Instruments

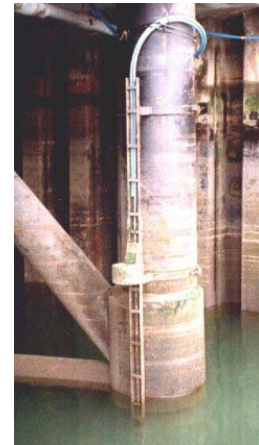
Full-tide Bubbler

The full tide bubbler system normally consists of two independent measuring systems. The pressure points are mounted approx 1m below Admiralty Chart Datum (ACD) so that negative surges can be recorded. The pressure points visible underwater in the photograph resemble an inverted bucket with a copper nozzle mounted on the side. This nozzle is the actual measuring point. A low flow of dry air (normally 7ml/min) is fed down an air tube to the top of the pressure point. When the air pressure in the tube equals the pressure exerted by the column of water above it, then the excess air is released as bubbles through the nozzle. This means the pressure in the air line is proportional to the weight of the water column.



Mid-tide Bubbler

The operation of the mid tide bubbler is similar to that of the full-tide system, except that the measuring point is mounted at the mid tide height. This means that the pressure point is only immersed for half of the tidal cycle. This is so that when the measuring point is exposed as in the photograph it can be levelled accurately into the geodetic network. Once this is accomplished the full tide pressure points can be fitted to match the tidal curve produced by the mid tide pressure point, thereby connecting them to the geodetic network.



Pressure Transducer

These are differential transducers contained in a watertight housing. The reference port is vented to atmosphere via the power supply and signal cable tube, while the measuring port of the transducer is connected to a copper outlet nozzle on the top of the transducer housing. The nozzle, transducer measuring port and connecting tube are filled with oil. The pressure is transmitted to the crystal element via the oil, keeping the transducer components free from the effects of the saltwater.



Munro Float Gauge

The Munro gauge measures sea level using a float in a stilling well. The float is about 45cm in diameter - the large diameter reduces inevitable errors in buoyancy due to friction of the gearing and small changes in the length of float wire. This wire is coiled round a drum on the end of the gauge. Another drum contains a counterbalance wire. The drum is geared to a slotted tape attached to a pen carriage, which traces the tide curve on the chart. A precision potentiometer is attached to the gauge to provide an input to the data logger.



Data Processing

The data are collected on demand each week at the National Oceanography Centre, Liverpool. The weekly files are then screened using our in-house visualisation package, Edserplo. Suspect values are flagged and short gaps are interpolated where the accuracy is deemed not to be affected.

The weekly files are then concatenated into monthly files, with the residual added. These are then edited so that all values fall on the quarter hour. Gaps are filled in with null values and marked with an 'N' flag. The files are uploaded to the web. BODC produce statistics monthly, again using Edserplo.

Finally, the monthly files are concatenated into yearly files and the metadata for the yearly files are banked in a database.

Calculating Statistics

Edserplo calculates four types of summary information

- a history of when the tide gauge has been in operation (“history”)
- monthly extremes (“extremes”)
- monthly extreme surges (“surges”)
- monthly and daily mean sea level (“MSL”)

Gaps greater than 4.1 hours in the primary channel are registered as gaps in the history.

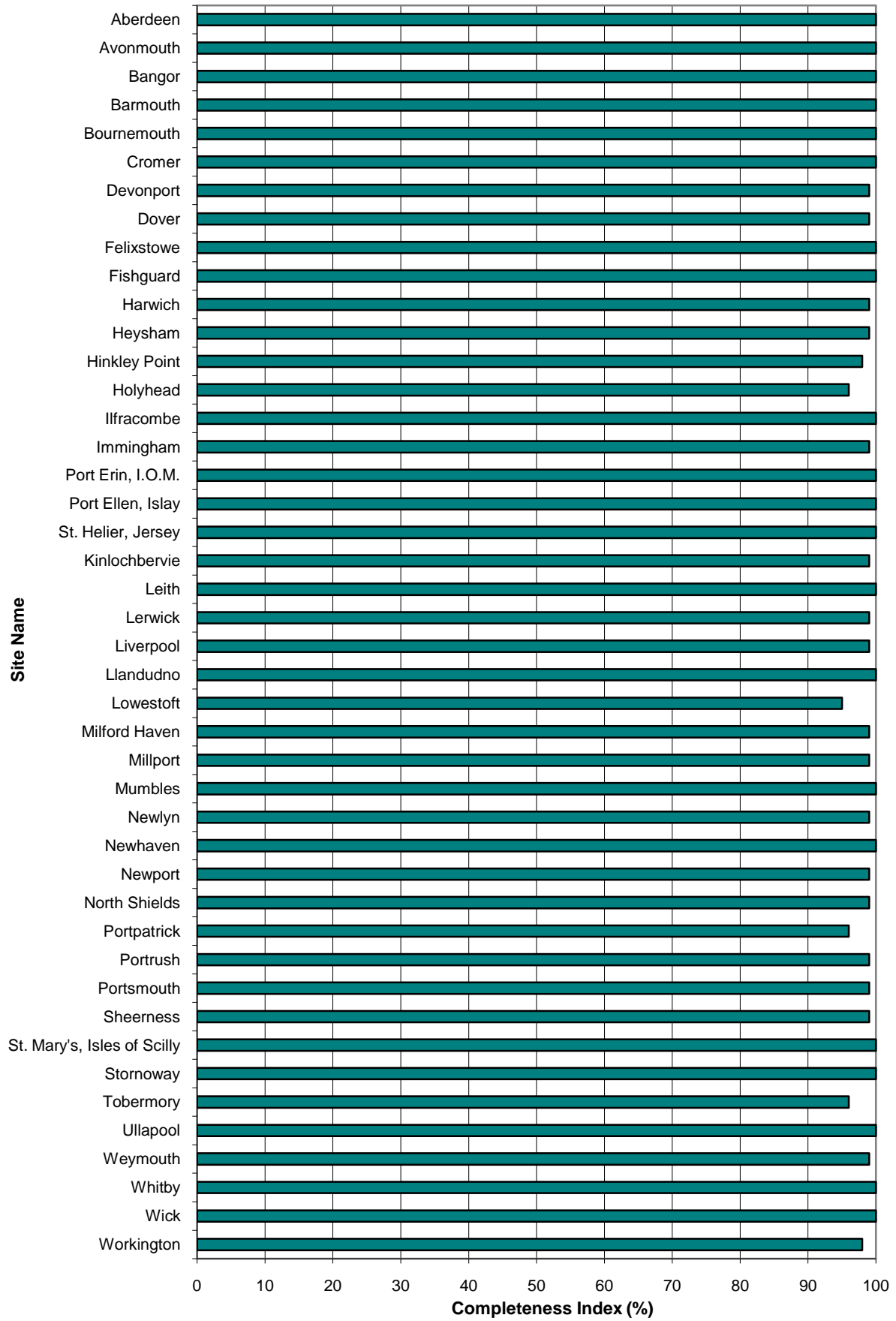
Extremes are the maximum and minimum calculated over all sampled data during the month. This excludes any interpolated data but may include rapidly sampled data. Extreme surges (residuals) are calculated in the same way from tidal residuals. Tidal residuals are defined to be the measured water level minus the predicted tide. The predictions derive from the database of tidal constants maintained by NOC’s Applications Group (as defined at the time of the calculation) for the ports of UK and elsewhere.

Mean Sea Level is calculated from a filter working on quarter-hourly values derived from one or more cubic splines applied to the raw data. The filter is a convolution of Vassie’s 03B filter which converts 15-minute data to hourly values and Doodson’s X0 filter. Splines are not applied across gaps as defined above. Short gaps can therefore lead to the loss of a day of output data (the half length of the filter is 91 and a day is 96 samples). Provided there are some daily (@12:00Z) values these are then averaged to provide the monthly value.

UK Tide Gauge Network Map



Completeness Index (%) for UK Tide Gauge sites



Aberdeen – Tide Gauge Information

Latitude 57° 08' 38.5" N **Longitude** 02° 04' 38.5" W **Grid Ref** NJ 9525 0591

Instrument Data acquisition system with two full tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** Waterloo Quay

Measuring Points The South West corner of Telford Dock

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	NJ 9525 0590	New bolt N side jetty Waterloo Quay
Aux1	NJ 9572 0593	Building NW side York Place SE face E angle
Aux2	NJ 9586 0571	Observatory Pocra Quay N face NW angle
Aux3	NJ 9524 0600	Building NE side Waterloo Quay SW face S angle

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 2.25m below Ordnance Datum Newlyn (ODN)

TGZ = 6.318m below TGBM

Levelling No levelling was carried out in 2010

Site visits

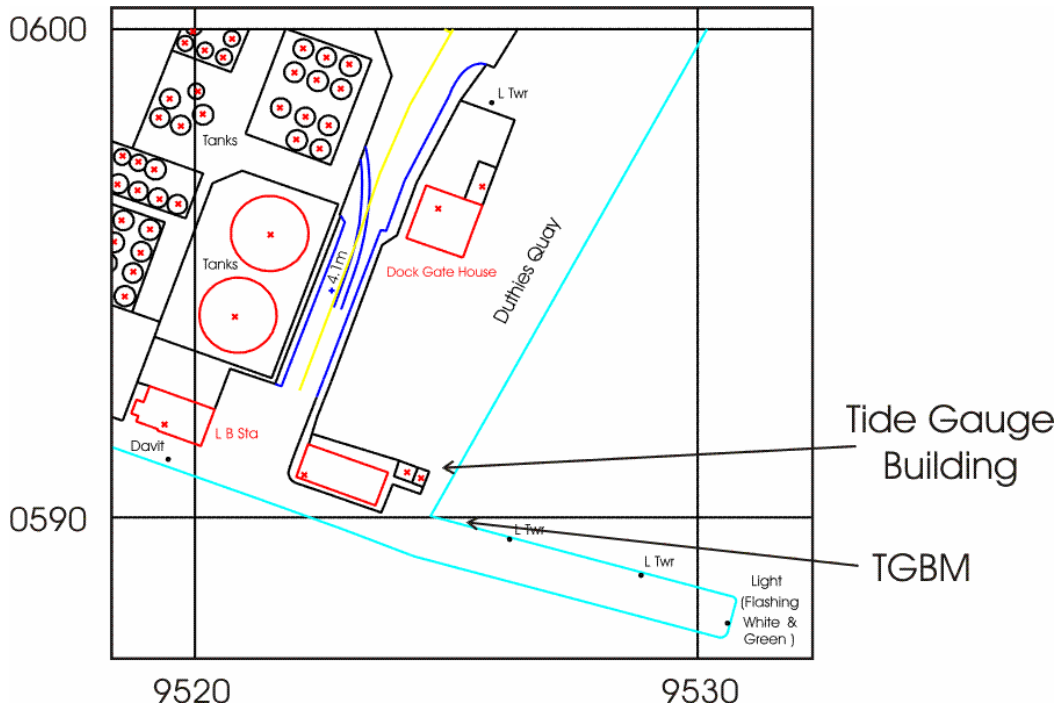
Day 027 Carried out general maintenance

Day 285 Replaced compressor

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	077-079,089-090,096-097,160-161,273,275-276,312-314,322-325,332,335-341,345-346,357-362

Aberdeen – Map & Images of Site



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Tide gauge location



Aerial view of site

Aberdeen – Statistics

Surge maxima	Value	Day	Time
January	0.265	17	07:15:00
February	0.217	28	07:00:00
March	0.665	19	20:00:00
April	0.299	29	08:45:00
May	0.146	1	07:30:00
June	0.137	12	04:00:00
July	0.395	5	02:45:00
August	0.363	21	06:45:00
September	0.283	14	17:00:00
October	0.504	29	21:00:00
November	0.636	12	00:30:00
December	0.271	16	05:00:00

Surge minima	Value	Day	Time
January	-0.428	11	05:30:00
February	-0.35	7	05:45:00
March	-0.221	7	04:15:00
April	-0.252	16	09:00:00
May	-0.211	7	05:30:00
June	-0.222	15	15:45:00
July	-0.199	22	20:15:00
August	-0.234	14	04:15:00
September	-0.231	7	21:15:00
October	-0.198	16	15:15:00
November	-0.425	27	08:15:00
December	-0.299	24	21:45:00

Extreme maxima	Value	Day	Time
January	4.603	31	14:00:00
February	4.728	2	15:30:00
March	4.708	2	14:15:00
April	4.599	29	13:45:00
May	4.274	1	02:45:00
June	4.162	14	02:15:00
July	4.574	15	03:30:00
August	4.583	13	03:00:00
September	4.88	11	02:45:00
October	4.728	8	00:45:00
November	4.648	8	14:30:00
December	4.403	6	01:15:00

Extreme minima	Value	Day	Time
January	0.136	31	20:15:00
February	0.059	1	21:00:00
March	0.049	1	20:00:00
April	0.387	27	18:15:00
May	0.639	18	10:00:00
June	0.317	15	09:00:00
July	0.265	14	09:00:00
August	-0.013	12	08:45:00
September	0.047	10	08:15:00
October	0.208	8	07:15:00
November	0.524	6	06:45:00
December	0.382	24	21:45:00

Mean sea level	No days	MSL
January	31	2.501
February	28	2.53
March	25	2.505
April	26	2.444
May	31	2.432
June	27	2.467
July	31	2.551
August	31	2.56
September	29	2.581
October	27	2.668
November	19	2.637
December	16	2.546
	Sum	Avg
	321	2.535

Avonmouth – Tide Gauge Information

Latitude 51° 30' 27.6" N **Longitude** 02° 42' 45.9" W **Grid Ref** ST 5063 7899

Instrument Data acquisition system with dual underwater pressure transducers
Location **Tide Gauge Building** Between disused oil jetty and fuel storage depot
Measuring Points The seaward end of the oil jetty

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	ST 5057 7881	OSBM bolt at base of bollard
Aux1	ST 5072 7859	Rivet adjacent to transit shed NW face W angle
Aux2	ST 5063 7898	Rivet base building NW side S angle
Ref M	ST 5047 7934	Ref mark on seaward end of jetty

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)
 TGZ = 6.50 m below Ordnance Datum Newlyn (ODN)
 TGZ = 15.711 m below TGBM

Levelling No levelling was carried out in 2010

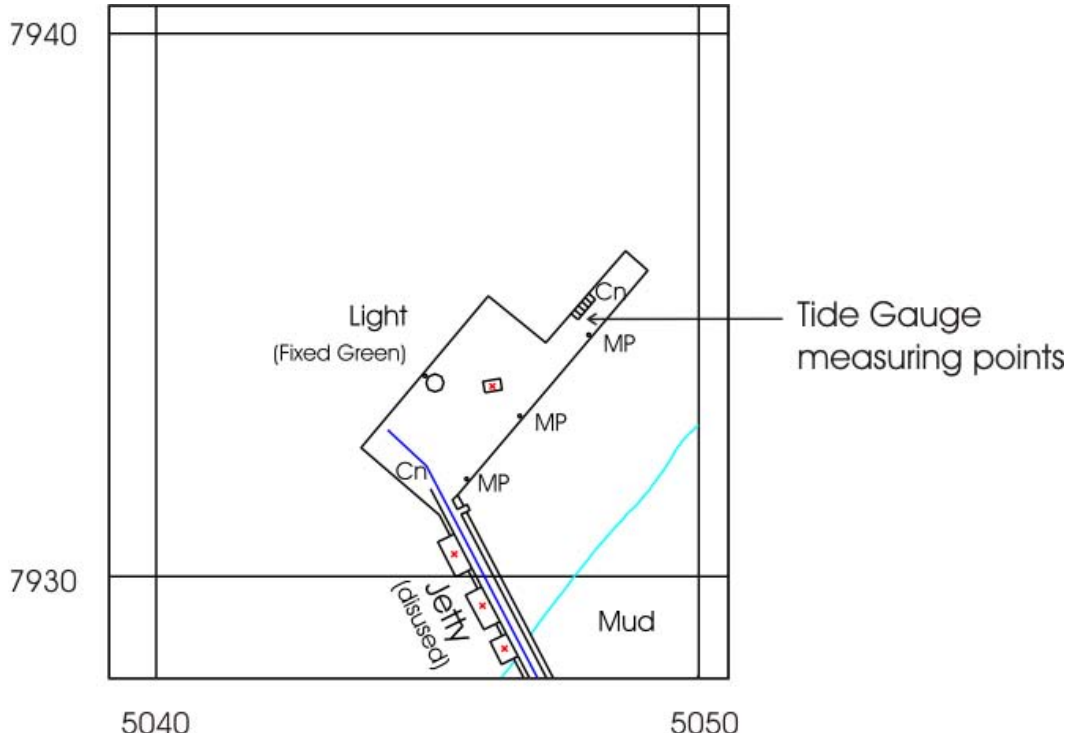
Site visits

None

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	097-098,106-109,133,138-141,264

Avonmouth – Map & Images of Site



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Avonmouth – Statistics

Surge maxima	Value	Day	Time
January	0.837	6	05:00:00
February	1.188	23	21:00:00
March	1.276	30	15:00:00
April	1.502	27	11:30:00
May	1.502	17	14:30:00
June	1.094	11	11:45:00
July	1.085	15	05:30:00
August	0.822	13	15:45:00
September	1.033	22	12:00:00
October	0.997	6	11:00:00
November	1.204	11	17:15:00
December	0.713	27	17:00:00

Surge minima	Value	Day	Time
January	-0.756	26	21:00:00
February	-0.666	14	15:00:00
March	-0.67	11	23:00:00
April	-0.849	9	22:00:00
May	-1.196	4	17:30:00
June	-0.81	2	17:30:00
July	-0.49	27	15:00:00
August	-0.529	31	19:30:00
September	-0.554	18	08:15:00
October	-0.714	10	16:15:00
November	-0.847	9	16:30:00
December	-0.846	16	21:15:00

Extreme maxima	Value	Day	Time
January	14.184	31	20:30:00
February	14.453	2	09:30:00
March	14.607	2	08:30:00
April	14.162	1	08:45:00
May	12.892	1	09:00:00
June	12.926	13	20:00:00
July	13.991	14	21:15:00
August	14.329	11	20:15:00
September	14.626	9	20:00:00
October	14.493	8	19:30:00
November	13.887	8	08:15:00
December	13.62	6	07:15:00

Extreme minima	Value	Day	Time
January	0.588	31	15:15:00
February	0.397	1	16:00:00
March	0.023	2	15:45:00
April	0.655	1	03:30:00
May	1.056	18	16:45:00
June	1.026	15	03:45:00
July	1.062	14	03:45:00
August	0.454	12	03:45:00
September	0.501	10	03:15:00
October	0.488	9	15:15:00
November	0.734	7	14:45:00
December	1.066	23	15:30:00

Mean sea level	No days	MSL
January	31	6.959
February	28	7.061
March	31	7.021
April	28	6.965
May	26	6.962
June	30	6.961
July	31	7.028
August	31	7.041
September	27	7.07
October	31	7.1
November	30	7.131
December	31	7.005
	Sum	Avg
	355	7.025

Bangor – Tide Gauge Information

Latitude 54° 39' 53.1" N **Longitude** 05° 40' 10.1" W **Grid Ref** NW 6340 3620

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** Central Pier at Bangor Marina
Measuring Points The seaward side of the open pier, directly beneath the tide gauge building

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	5043 8212 (Sheet 115)	S S Pin Tide gauge building Central Pier
Aux1	5038 8200 (Sheet 115)	Cut mark Clock tower

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)
 TGZ = 2.01m below Ordnance Datum Belfast (ODB)
 TGZ = 5.592m below TGBM

Levelling No levelling was carried out in 2010

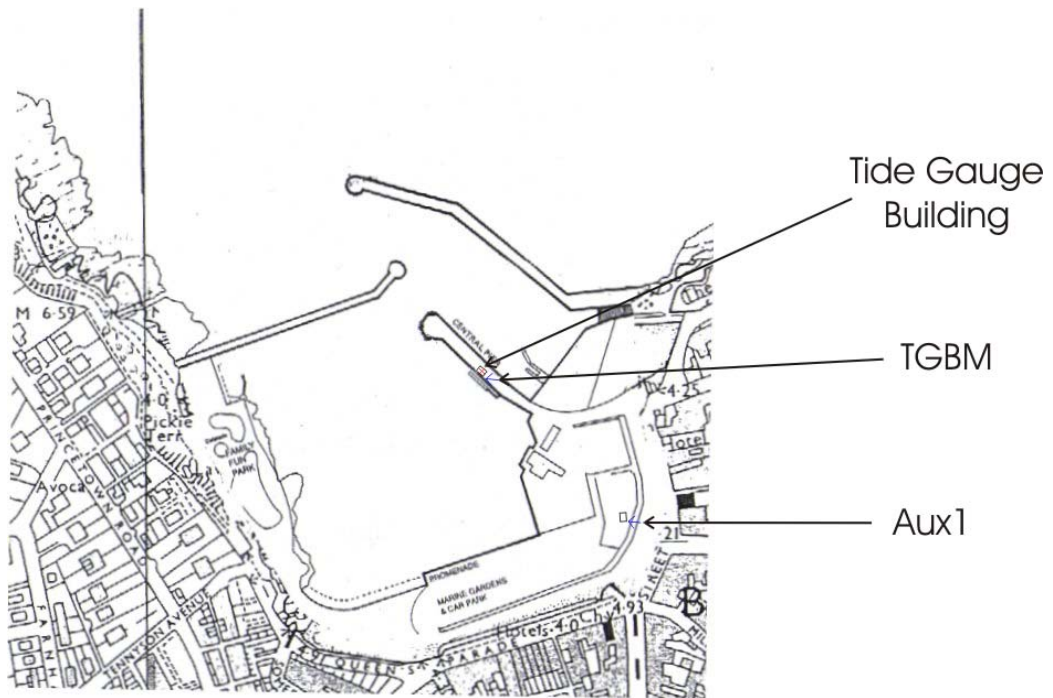
Site visits

Day 292 Replaced compressor

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	010-013,043-044,057-074,085-093,108-112,138-140,148-155,159,248-250,265-272,279-280,282-303,319-321,326-332,341,345,348-349,355-356,363,365

Bangor – Map & Images of Site



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Bangor – Statistics

Surge maxima	Value	Day	Time
January	0.66	16	08:30:00
February	0.413	24	04:00:00
March	0.51	19	01:30:00
April	0.42	5	22:45:00
May	0.116	13	23:45:00
June	0.122	27	13:15:00
July	0.455	4	17:00:00
August	0.37	20	14:30:00
September	0.358	13	18:15:00
October	0.49	4	19:30:00
November	0.928	11	20:45:00
December	0.402	26	23:45:00

Surge minima	Value	Day	Time
January	-0.377	10	06:15:00
February	-0.288	6	18:30:00
March	-0.245	10	16:30:00
April	-0.316	15	19:30:00
May	-0.287	5	22:30:00
June	-0.25	15	02:15:00
July	-0.214	22	17:15:00
August	-0.242	15	00:00:00
September	-0.15	12	13:45:00
October	-0.107	31	21:15:00
November	-0.376	9	08:30:00
December	-0.372	17	00:45:00

Extreme maxima	Value	Day	Time
January	3.949	16	11:30:00
February	3.92	2	13:15:00
March	3.801	30	10:45:00
April	3.7	28	10:30:00
May	3.484	1	00:30:00
June	3.487	28	00:00:00
July	3.951	15	01:15:00
August	3.687	12	00:00:00
September	3.909	11	00:30:00
October	3.892	8	23:15:00
November	4.322	11	14:30:00
December	3.866	27	15:15:00

Extreme minima	Value	Day	Time
January	0.149	31	17:45:00
February	0.207	1	18:30:00
March	0.263	31	17:30:00
April	0.335	15	17:30:00
May	0.397	17	06:45:00
June	0.192	15	06:45:00
July	0.332	14	06:30:00
August	0.046	13	06:45:00
September	0.257	9	05:00:00
October	0.385	8	04:30:00
November	0.331	9	19:00:00
December	0.285	25	19:45:00

Mean sea level	No days	MSL
January	26	2.012
February	25	2.066
March	8	2.162
April	21	1.941
May	23	1.894
June	24	1.945
July	31	2.038
August	31	2.019
September	17	2.09
October	5	2.306
November	19	2.203
December	28	2.047
	Sum	Avg
	258	2.06

Barmouth – Tide Gauge Information

Latitude 52° 43' 09.6" N **Longitude** 04° 02' 42.1" W **Grid Ref** SH 6197 1548

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** Toll booth on the north end of Barmouth railway bridge
Measuring Points Attached to the first leg of the railway bridge in the deep channel

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	SH 6197 1548	NBM rivet concrete 2.9M NE wall junction
Aux 1	SH 6173 1558	Rivet step NE side of road NW entrance path
Aux 2	SH 6186 1556	Rivet wall SE side road 17.6M E steps
Aux 3	SH 6196 1550	Rivet step E side lifeboat station

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 2.44m below ODN

TGZ = 10.363m below TGBM

Levelling No levelling was carried out in 2010

Site visits

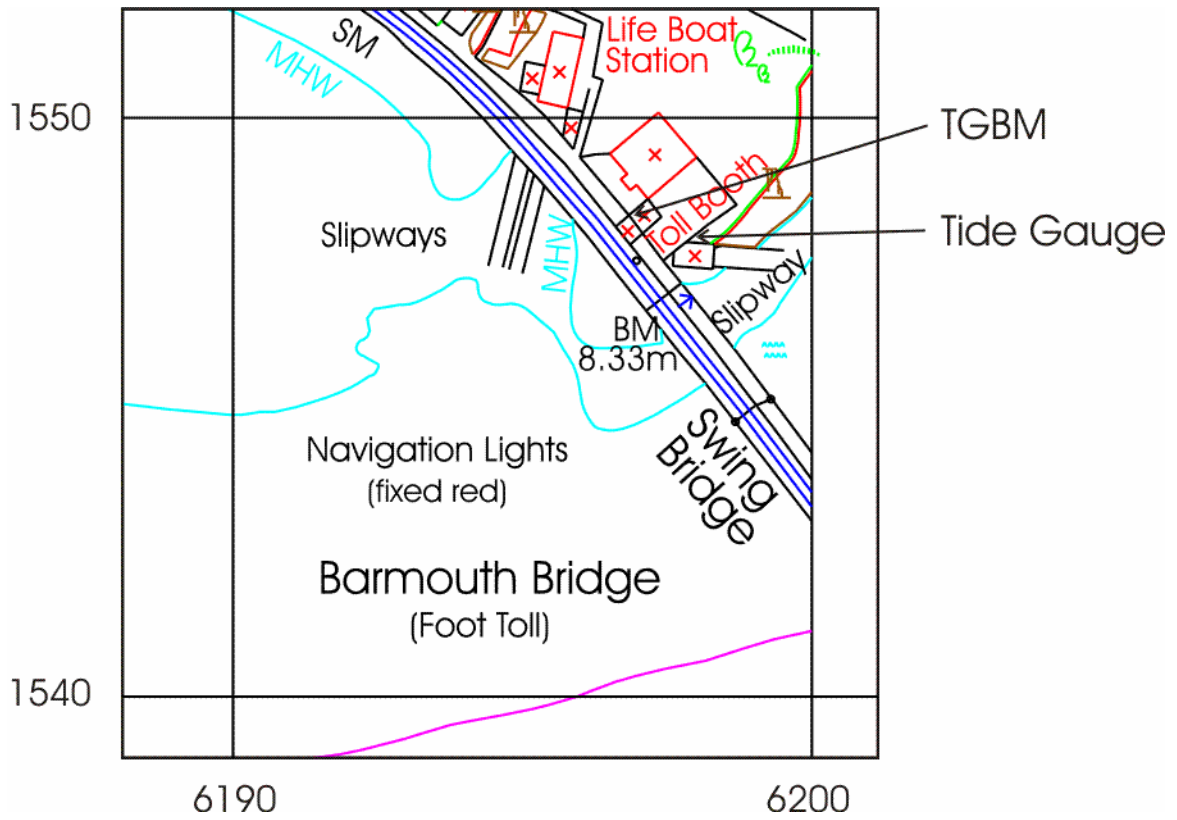
Day 037 Carried out general maintenance (earned 'Freedom of Toll Bridge'!)

Day 329 Carried out general maintenance and survey for EA

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	149-152,163-166,267-269,280-309,329-365

Barmouth – Map & Images of Site



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Barmouth – Statistics

Surge maxima	Value	Day	Time
January	0.655	16	04:30:00
February	0.509	24	07:30:00
March	0.465	30	15:45:00
April	0.4	5	10:15:00
May	0.197	27	23:15:00
June	0.21	8	03:45:00
July	0.86	16	00:45:00
August	0.47	24	11:15:00
September	0.478	10	11:00:00
October	0.438	4	22:45:00
November	1.122	11	17:45:00
December			

Surge minima	Value	Day	Time
January	-0.524	6	13:00:00
February	-0.36	12	19:00:00
March	-0.318	12	18:15:00
April	-0.365	13	23:00:00
May	-0.349	4	20:30:00
June	-0.245	16	01:00:00
July	-0.174	6	05:15:00
August	-0.303	29	20:45:00
September	-0.228	26	00:30:00
October	-0.045	4	07:45:00
November	-0.417	25	13:30:00
December			

Extreme maxima	Value	Day	Time
January	5.534	31	08:45:00
February	5.777	2	10:15:00
March	5.781	2	09:15:00
April	5.579	1	09:30:00
May	4.968	27	20:00:00
June	4.892	15	22:30:00
July	5.809	15	23:15:00
August	5.586	11	21:15:00
September	5.836	10	21:30:00
October	5.689	7	19:45:00
November	5.59	11	11:15:00
December			

Extreme minima	Value	Day	Time
January	0.697	30	16:15:00
February	0.704	1	18:00:00
March	0.673	4	06:15:00
April	0.73	16	04:30:00
May	0.862	15	04:00:00
June	0.767	16	06:30:00
July	0.832	13	04:45:00
August	0.742	13	18:15:00
September	0.802	12	18:15:00
October	0.86	7	03:00:00
November	0.693	7	16:15:00
December			

Mean sea level	No days	MSL
January	31	2.658
February	28	2.748
March	31	2.681
April	30	2.613
May	27	2.567
June	24	2.623
July	31	2.722
August	31	2.713
September	26	2.782
October	6	2.946
November	19	2.88
December	0	
	Sum	Avg
	284	2.721

Bournemouth – Tide Gauge Information

Latitude 50° 42' 51.6" N **Longitude** 01° 52' 29.5" W **Grid Ref** SZ 0893 9053

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge
Location **Tide Gauge Building** Electrical room at the west side of the South Pier
Measuring Points Directly below the electrical room, on a pier leg

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
Aux1	SZ 0869 9066	Cut mark Wall
Aux2	SZ 0893 9083	Cut mark Pillar
REF A	SZ 0893 9052	Steelwork clamp
REF B	SZ 0893 9052	Mid-tide pressure point nozzle

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)
 TGZ = 1.40m below ODN
 TGZ = 5.96m below Aux1

Levelling No levelling was carried out in 2010

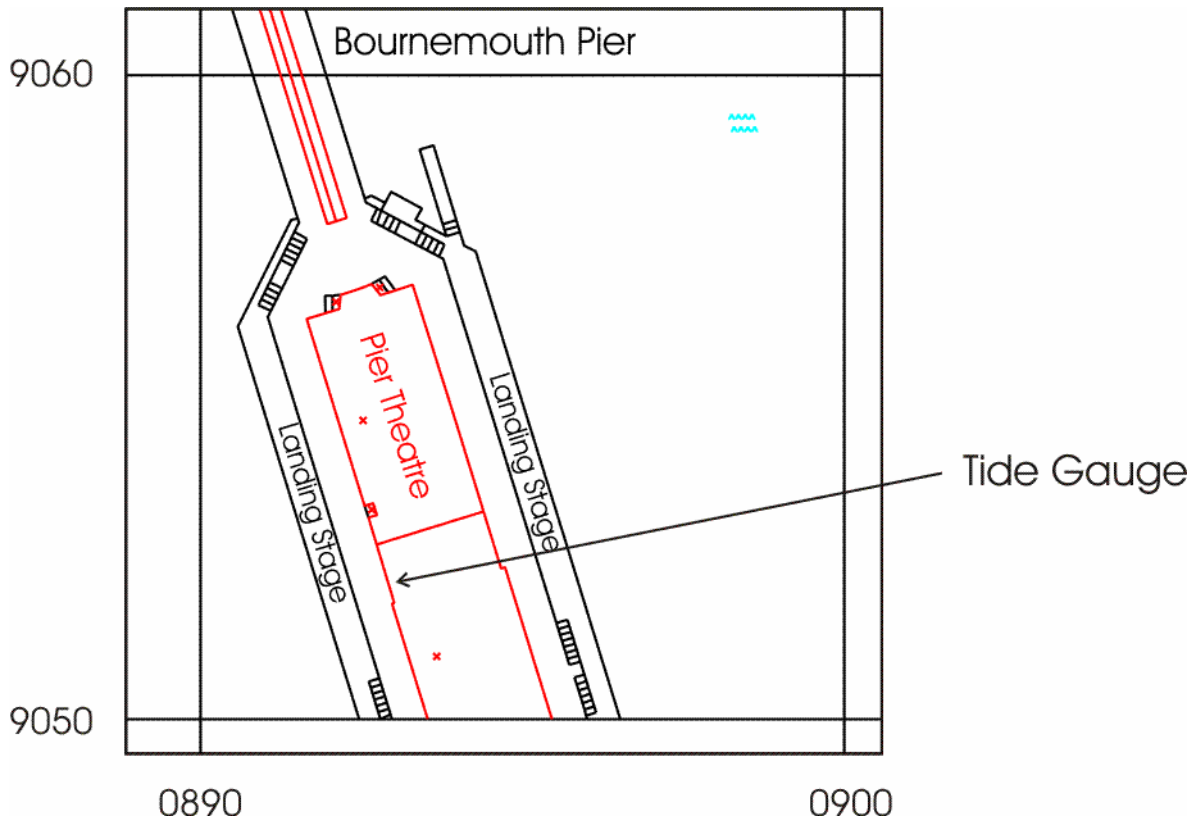
Site visits

None

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	None

Bournemouth – Map & Images of Site



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Bournemouth – Statistics

Surge maxima	Value	Day	Time
January	0.443	16	05:15:00
February	0.568	23	05:00:00
March	0.492	25	22:00:00
April	0.326	2	09:30:00
May	0.162	29	11:15:00
June	0.238	19	23:45:00
July	0.371	15	02:00:00
August	0.361	30	02:30:00
September	0.241	16	04:30:00
October	0.368	31	03:45:00
November	0.598	11	07:00:00
December	0.534	16	21:00:00

Surge minima	Value	Day	Time
January	-0.369	9	18:15:00
February	-0.237	11	15:45:00
March	-0.287	8	15:15:00
April	-0.326	12	10:15:00
May	-0.291	5	03:00:00
June	-0.247	16	06:30:00
July	-0.169	6	06:00:00
August	-0.156	29	15:30:00
September	-0.286	30	05:15:00
October	-0.263	2	06:15:00
November	-0.222	2	10:30:00
December	-0.303	15	10:15:00

Extreme maxima	Value	Day	Time
January	2.57	3	10:15:00
February	2.732	28	08:15:00
March	2.72	30	09:00:00
April	2.444	1	22:30:00
May	2.227	1	22:15:00
June	2.328	12	20:00:00
July	2.722	14	22:45:00
August	2.494	11	21:45:00
September	2.606	9	21:15:00
October	2.614	8	20:45:00
November	2.589	8	09:45:00
December	2.43	6	08:45:00

Extreme minima	Value	Day	Time
January	0.162	31	16:30:00
February	0.089	1	17:15:00
March	0.015	2	16:45:00
April	0.317	27	14:45:00
May	0.469	16	04:45:00
June	0.213	16	06:15:00
July	0.397	13	04:30:00
August	0.031	12	04:45:00
September	0.14	10	04:30:00
October	0.307	9	04:00:00
November	0.35	7	16:15:00
December	0.24	24	17:45:00

Mean sea level	No days	MSL
January	31	1.584
February	28	1.691
March	31	1.576
April	30	1.52
May	31	1.537
June	30	1.57
July	31	1.588
August	31	1.621
September	30	1.638
October	31	1.695
November	30	1.715
December	31	1.608
	Sum	Avg
	365	1.612

Cromer – Tide Gauge Information

Latitude 52° 56' 03.7" N **Longitude** 01° 18' 05.9" E **Grid Ref** TG 2198 4254

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** Within Cromer lifeboat station

Measuring Points Attached to a leg of the lifeboat slipway

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	TG 2193 4233	S Steel bolt on top of wall opposite E side of pier
Aux1	TG 2198 4253	Rivet on steps of catwalk NE angle of LB station
Aux2	TG 2195 4233	S Steel bolt bottom ramp S side at W corner

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 2.75m below Ordnance Datum Newlyn

TGZ = 10.117m below TGBM

Levelling No levelling was carried out in 2010

Site visits

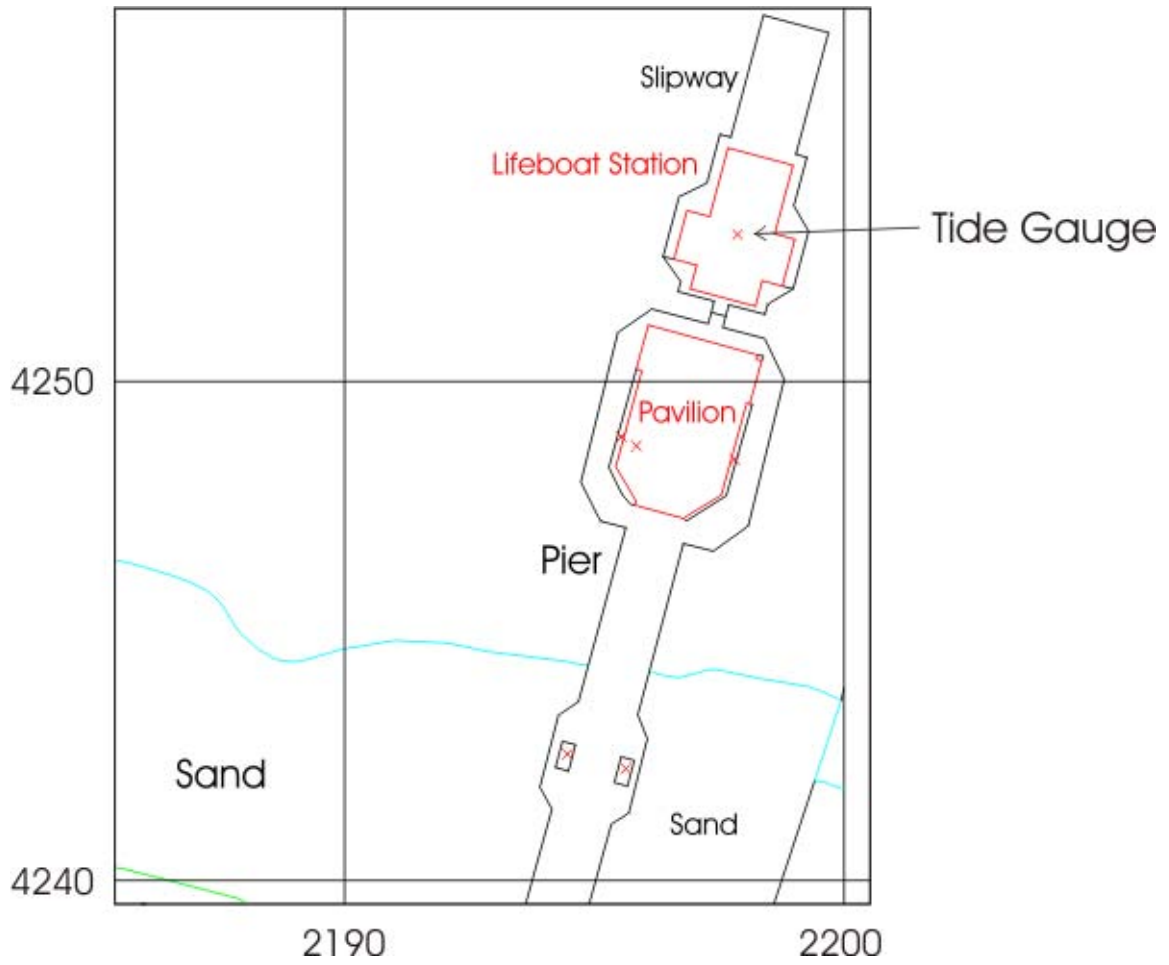
Day 020 Carried out general maintenance

Day 278 Carried out general maintenance

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	001-003,006-007,009-011,013-019,026,028-032,034,041-042,044,058-061,090,123-124,170-171,228,238-239,241-242,249-250,260,263-264,267-269,293,296-298,312-314,318-319,326,329-336,342-344,346,351,357-358

Cromer – Map & Images of Site



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Cromer – Statistics

Surge maxima	Value	Day	Time
January	1.096	28	00:45:00
February	0.535	28	15:00:00
March	0.652	20	00:15:00
April	0.472	20	18:15:00
May	0.569	30	18:15:00
June	0.671	19	18:30:00
July	0.556	5	08:45:00
August	0.613	29	15:15:00
September	0.653	24	11:30:00
October	0.699	24	02:15:00
November	0.987	12	06:45:00
December	1.043	16	11:15:00

Surge minima	Value	Day	Time
January	-0.927	16	11:30:00
February	-0.404	16	04:15:00
March	-0.28	22	18:15:00
April	-0.377	5	16:30:00
May	-0.254	22	09:15:00
June	-0.196	15	21:45:00
July	-0.431	16	10:15:00
August	-0.224	20	07:30:00
September	-0.515	29	20:15:00
October	-0.765	1	20:30:00
November	-1.012	11	13:00:00
December	-0.388	28	17:15:00

Extreme maxima	Value	Day	Time
January	5.342	4	21:00:00
February	5.727	2	20:30:00
March	5.598	2	19:15:00
April	5.337	29	19:00:00
May	5.075	1	08:00:00
June	5.001	15	08:00:00
July	5.241	14	07:45:00
August	5.499	13	08:15:00
September	5.581	11	08:00:00
October	5.59	9	06:45:00
November	5.428	6	05:45:00
December	5.21	5	17:45:00

Extreme minima	Value	Day	Time
January	0.467	3	02:30:00
February	0.049	2	03:15:00
March	0.322	2	02:00:00
April	0.241	1	02:30:00
May	0.83	18	16:00:00
June	0.607	15	15:15:00
July	0.243	15	16:15:00
August	0.336	12	14:45:00
September	0.072	10	14:30:00
October	0.395	8	13:15:00
November	0.61	8	02:00:00
December	0.658	25	03:30:00

Mean sea level	No days	MSL
January	7	2.781
February	18	2.925
March	30	2.935
April	30	2.873
May	28	2.891
June	26	2.91
July	31	2.921
August	23	2.978
September	20	2.943
October	25	3.037
November	18	3.009
December	15	2.969
	Sum	Avg
	271	2.931

Devonport – Tide Gauge Information

Latitude 50° 22' 06.2" N **Longitude** 04° 11' 06.9" W **Grid Ref** SX 4469 5434

Instrument Data acquisition system with two full-tide bubbler gauges
Location **Tide Gauge Building** No. 1 Jetty in Devonport Royal Naval base
Measuring Points Attached to the stilling well beneath the building

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	SX 4468 5434	Bolt on jetty wall. 6.6m NW angle T G building
Aux1	SX 4471 5433	Building N face NE angle
Aux2	SX 4487 5425	Bldg NW face W angle
Aux3	SX 4501 5454	Fl Br 11818 bldg W face NW angle

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 3.22m below ODN

TGZ = 7.631m below TGBM

Levelling No levelling was carried out in 2010

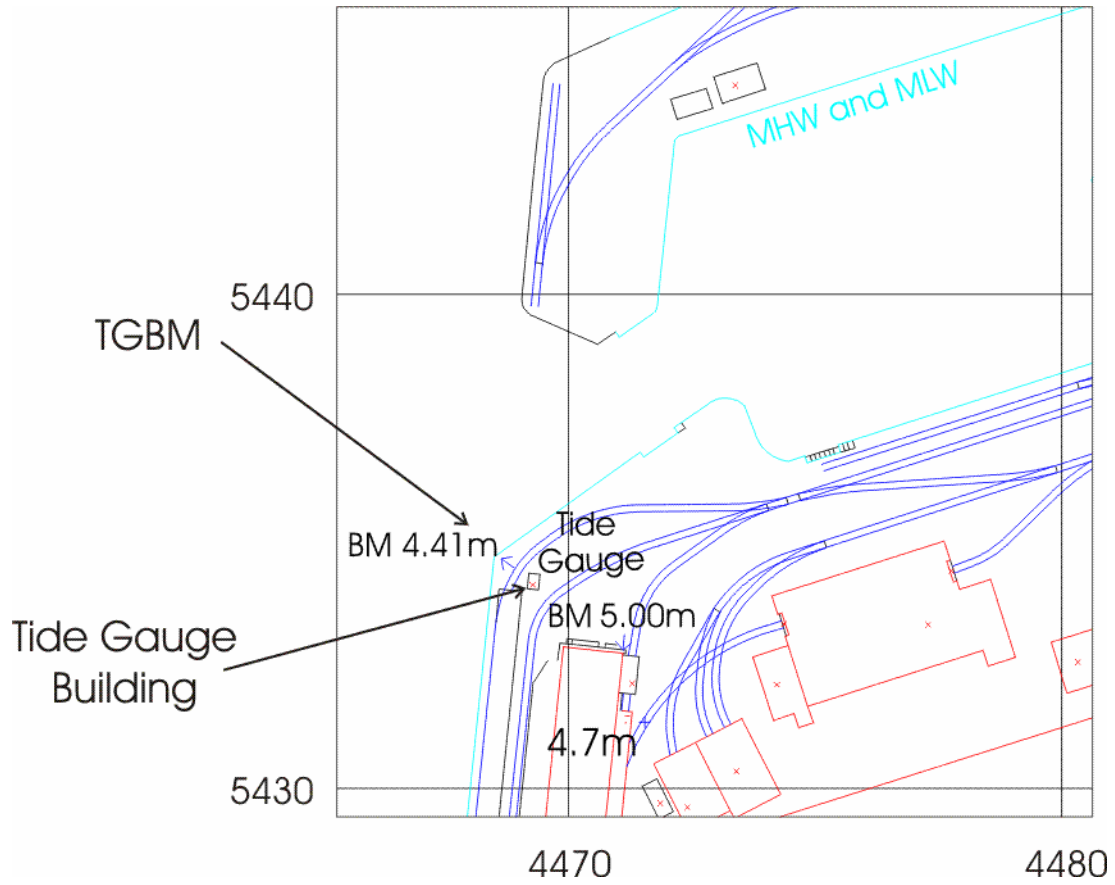
Site visits

None

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	125	016-017,027-028,032-037,039-041,057,060-072,115-119,137-140,144,231-239,357-363

Devonport – Map & Images of Site



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Devonport – Statistics

Surge maxima	Value	Day	Time
January	0.501	16	05:00:00
February	0.642	23	06:45:00
March	0.437	30	02:45:00
April	0.357	2	05:15:00
May	0.188	29	06:30:00
June	0.245	7	21:30:00
July	0.361	15	20:15:00
August	0.271	25	16:45:00
September	0.244	6	23:45:00
October	0.403	3	07:15:00
November	0.463	11	08:00:00
December	0.286	16	22:30:00

Surge minima	Value	Day	Time
January	-0.358	27	02:30:00
February	-0.211	12	00:00:00
March	-0.224	14	21:15:00
April	-0.292	16	10:15:00
May	-0.324	5	03:45:00
June	-0.189	16	08:00:00
July	-0.196	6	04:00:00
August	-0.191	13	21:45:00
September	-0.187	14	05:00:00
October	-0.242	17	19:15:00
November	-0.219	6	11:45:00
December	-0.341	15	03:15:00

Extreme maxima	Value	Day	Time
January	5.963	3	07:30:00
February	6.096	28	05:15:00
March	6.154	30	05:45:00
April	5.828	2	07:45:00
May	5.509	1	19:30:00
June	5.532	13	18:15:00
July	6.111	15	20:15:00
August	5.906	11	18:45:00
September	6.079	10	19:00:00
October	6.116	8	18:00:00
November	5.982	8	06:45:00
December	5.747	6	05:45:00

Extreme minima	Value	Day	Time
January	0.445	31	12:45:00
February	0.348	1	13:15:00
March	0.38	31	12:45:00
April	0.459	1	01:00:00
May	0.882	1	01:15:00
June	0.761	16	02:30:00
July	0.773	13	00:30:00
August	0.227	12	01:15:00
September	0.281	10	00:45:00
October	0.521	9	00:30:00
November	0.609	7	12:15:00
December	0.953	23	00:45:00

Mean sea level	No days	MSL
January	25	3.42
February	19	3.54
March	17	3.454
April	25	3.317
May	25	3.347
June	30	3.358
July	31	3.369
August	21	3.355
September	30	3.429
October	31	3.503
November	30	3.535
December	23	3.45
	Sum	Avg
	307	3.423

Dover – Tide Gauge Information

Latitude 51° 06' 51.8" N **Longitude** 01° 19' 21.6" E **Grid Ref** TR 3265 4026

Instrument Data acquisition system with two full tide and a mid-tide bubbler gauge
Location **Tide Gauge Building** Prince of Wales Pier, Western Dock (just before the lighthouse)
Measuring Points Attached to the stilling well

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	TR 3193 4074	Fl Br G4868 building. East side of works entrance
Aux 1	TR 3195 4095	No 29 Waterloo Crescent SW face S angle
Aux 2	TR 3228 4053	Rivet pier wall NE side of pier F junction
Aux 3	TR 3265 4026	Rivet steps NE side P of W pier 1.0M SE W angle

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)
 TGZ = 3.67m below Ordnance Datum Newlyn (ODN)
 TGZ = 10.491m below TGBM

Levelling No levelling was carried out in 2010

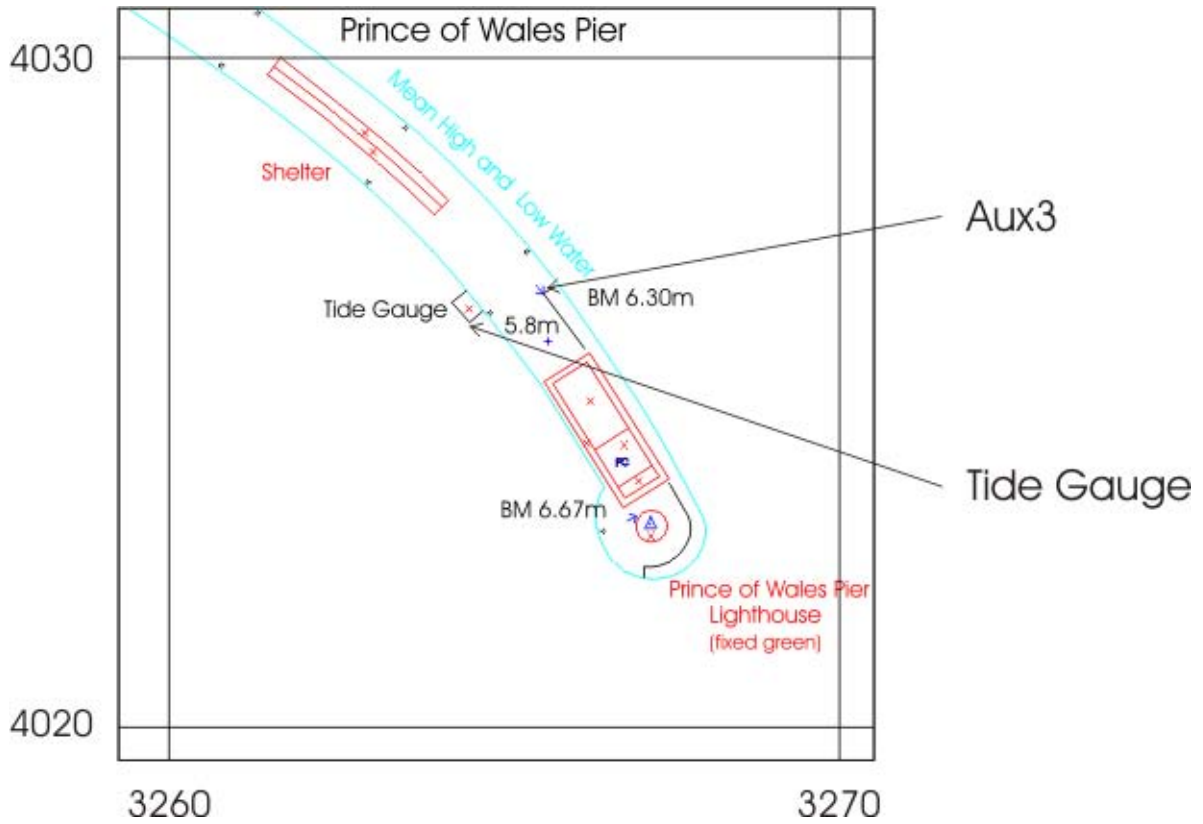
Site visits

Day 035 Carried out general maintenance
 Day 328 Carried out general maintenance

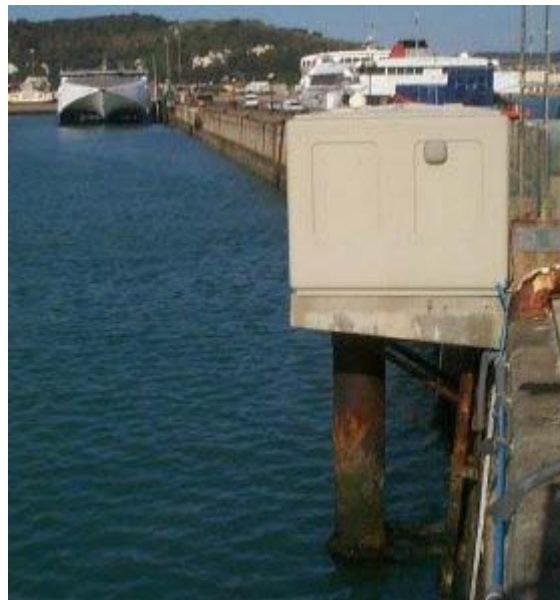
Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	001	335

Dover – Map & Images of Site



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Dover – Statistics

Surge maxima	Value	Day	Time
January	0.716	28	04:45:00
February	0.699	22	13:30:00
March	0.586	31	09:00:00
April	0.376	21	01:00:00
May	0.473	30	23:15:00
June	0.512	19	22:45:00
July	0.372	14	22:45:00
August	0.714	29	22:15:00
September	0.543	24	23:15:00
October	0.587	23	21:00:00
November	0.917	12	12:15:00
December	0.979	16	17:00:00

Surge minima	Value	Day	Time
January	-0.589	22	14:45:00
February	-0.372	11	19:45:00
March	-0.396	4	23:30:00
April	-0.338	12	07:15:00
May	-0.363	5	00:00:00
June	-0.286	16	11:30:00
July	-0.423	15	15:00:00
August	-0.252	14	11:45:00
September	-0.475	30	02:00:00
October	-0.513	2	03:30:00
November	-0.834	11	14:15:00
December	-0.389	1	03:45:00

Extreme maxima	Value	Day	Time
January	7.206	31	23:45:00
February	7.453	3	01:15:00
March	7.311	3	00:15:00
April	7.026	29	23:30:00
May	6.756	1	00:15:00
June	6.66	19	16:30:00
July	6.965	14	12:45:00
August	7.152	12	12:30:00
September	7.237	9	11:15:00
October	7.238	8	11:00:00
November	7.06	6	10:30:00
December	7.015	24	00:30:00

Extreme minima	Value	Day	Time
January	0.746	3	08:00:00
February	0.344	2	08:30:00
March	0.364	3	08:15:00
April	0.454	1	07:45:00
May	0.956	15	06:45:00
June	0.807	15	20:30:00
July	0.46	15	21:00:00
August	0.462	12	20:15:00
September	0.27	10	19:45:00
October	0.533	8	18:30:00
November	0.786	6	18:15:00
December	0.815	25	08:45:00

Mean sea level	No days	MSL
January	29	3.723
February	28	3.833
March	31	3.735
April	30	3.679
May	31	3.723
June	30	3.746
July	31	3.735
August	31	3.822
September	30	3.813
October	31	3.877
November	30	3.857
December	29	3.829
	Sum	Avg
	361	3.781

Felixstowe – Tide Gauge Information

Latitude 51° 57' 27.7" N **Longitude** 01° 20' 47.6" E **Grid Ref** TM 3003 3409

Instrument Data acquisition system with two full tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** Landward end of Felixstowe pier

Measuring Points Seaward end of Felixstowe pier

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	TM 3001 3414	Bolt on the SE side of prom NE face of arcade
Aux1	TM 2956 3393	Flush Bracket 2071 on No. 25 Langer Road W angle NW face
Aux3	TM 3003 3409	Rivet outside TG building

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 1.95m below ODN

TGZ = 5.69m below TGBM

Levelling No levelling was carried out in 2010

Site visits

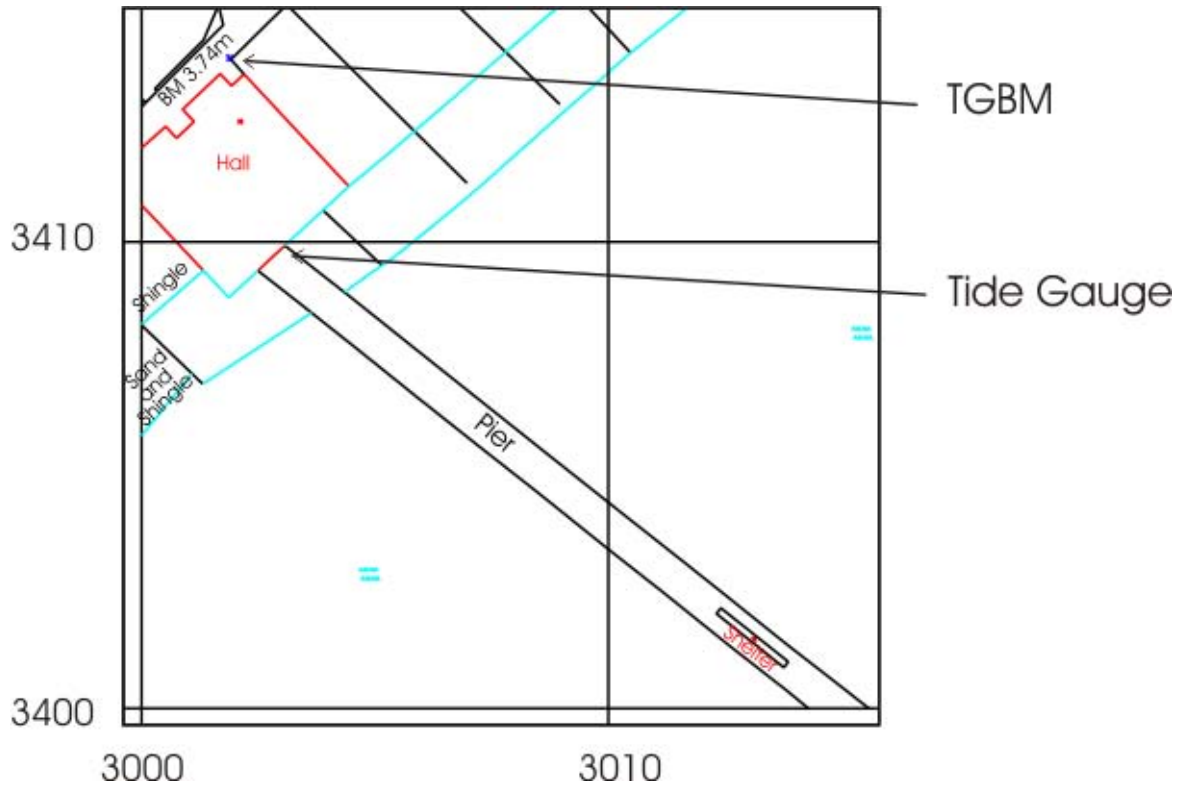
Day 127 Changed compressor

Day 276 Carried out general maintenance

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	001-023,026-032,034-036,038-070,072-074,076-077,079-080,082,089-090,092-095,097-098,100-104,115,122-145,149-151,184-185,276,346

Felixstowe – Map & Images of Site



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Felixstowe – Statistics

Surge maxima	Value	Day	Time
January	0.981	28	04:15:00
February	0.547	2	23:45:00
March	0.635	20	04:00:00
April	0.446	20	21:15:00
May	0.293	1	13:15:00
June	0.715	19	11:45:00
July	0.478	5	14:30:00
August	1.001	29	21:15:00
September	0.61	24	19:30:00
October	0.685	20	04:15:00
November	0.895	12	12:30:00
December	0.993	16	16:45:00

Surge minima	Value	Day	Time
January	-0.516	15	20:15:00
February	-0.207	2	00:45:00
March	-0.239	22	16:45:00
April	-0.381	5	17:30:00
May	-0.235	20	12:15:00
June	-0.192	16	13:30:00
July	-0.551	15	15:15:00
August	-0.283	20	16:00:00
September	-0.517	29	23:00:00
October	-0.859	2	00:15:00
November	-1.436	11	15:30:00
December	-0.59	1	05:45:00

Extreme maxima	Value	Day	Time
January	3.952	17	12:45:00
February	4.335	3	02:15:00
March	4.28	20	01:45:00
April	4.194	30	00:15:00
May	4.067	1	01:00:00
June	4.064	12	11:15:00
July	4.16	14	00:45:00
August	4.221	13	01:15:00
September	4.246	8	23:30:00
October	4.275	6	22:15:00
November	4.182	5	22:45:00
December	4.103	5	10:45:00

Extreme minima	Value	Day	Time
January	0.433	15	05:30:00
February	-0.099	2	07:15:00
March	0.194	30	05:15:00
April	0.07	1	06:30:00
May	0.407	23	00:45:00
June	0.206	15	19:30:00
July	-0.061	15	20:15:00
August	0.14	12	19:00:00
September	-0.034	10	18:45:00
October	0.237	8	17:30:00
November	0.314	8	06:00:00
December	0.198	25	08:00:00

Mean sea level	No days	MSL
January	0	
February	0	
March	5	2.134
April	16	2.052
May	3	2.075
June	30	2.102
July	28	2.078
August	31	2.164
September	30	2.133
October	28	2.202
November	30	2.116
December	31	2.124
	Sum	Avg
	232	2.118

Fishguard – Tide Gauge Information

Latitude 52° 00' 47.6" N **Longitude** 04° 59' 01.5" W **Grid Ref** SM 9534 3918

Instrument Data acquisition system with two full tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** On Fishguard Quay, adjacent to the RNLI station

Measuring Points Approximately 10m from the end of the quay

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	SM 9534 3918	OSBM bolt on quay 3.6M NE end of railings (1987)
Aux1	SM 9513 3874	OS bolt con base railings 6.4M NW angle TG hut
Aux2	SM 9489 3849	Rivet step top of Goodwick Quay
Aux3	SM 9455 3820	Fl Br 11518 blding SW side railway bridge SE Face

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 2.44m below ODN

TGZ = 7.88m below TGBM

Levelling No levelling was carried out in 2010

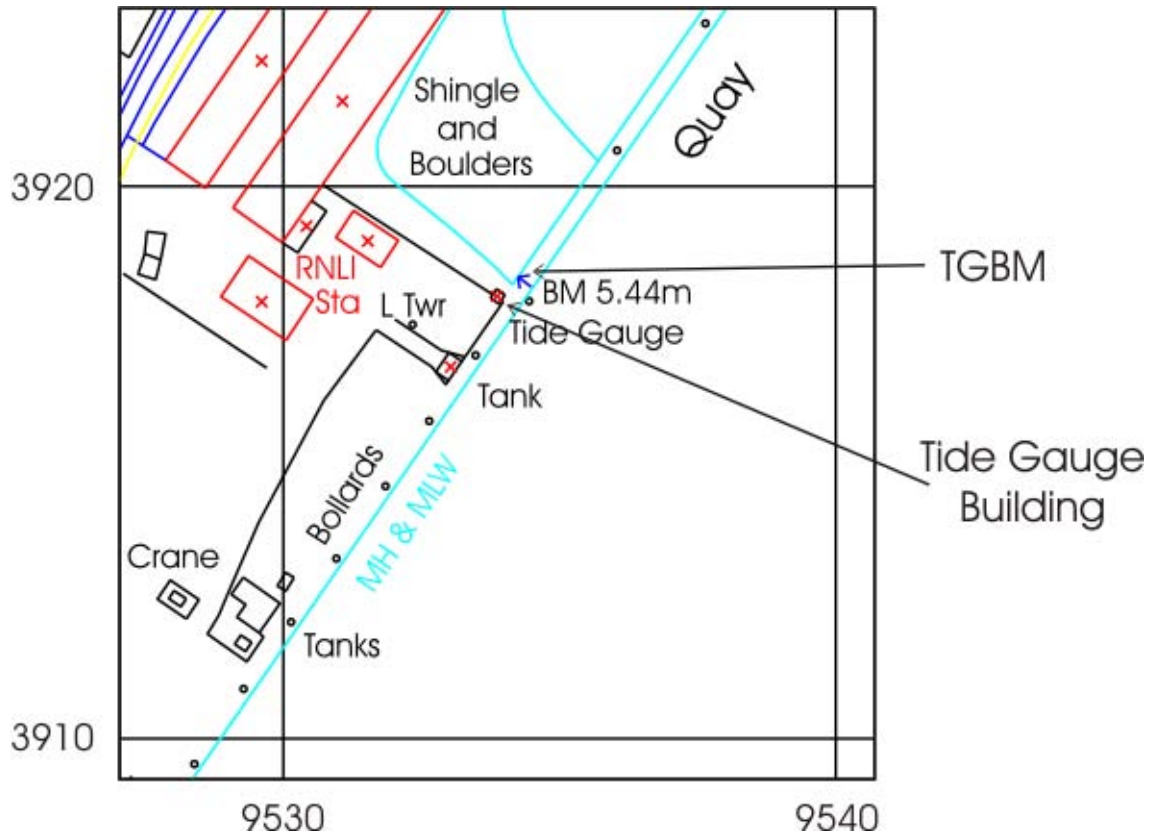
Site visits

None

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	090,161-165,253-278,319-321

Fishguard – Map & Images of Site



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Fishguard – Statistics

Surge maxima	Value	Day	Time
January	0.541	16	05:15:00
February	0.537	24	07:15:00
March	0.411	26	09:00:00
April	0.306	2	04:45:00
May	0.218	29	07:15:00
June	0.206	8	11:00:00
July	0.34	15	18:30:00
August	0.232	20	03:30:00
September	0.222	6	14:00:00
October	0.367	29	12:00:00
November	0.651	11	08:00:00
December	0.372	27	04:45:00

Surge minima	Value	Day	Time
January	-0.436	27	03:30:00
February	-0.235	12	18:00:00
March	-0.235	14	19:45:00
April	-0.291	15	23:30:00
May	-0.304	5	04:00:00
June	-0.206	14	21:30:00
July	-0.183	5	13:30:00
August	-0.221	29	21:00:00
September	-0.168	24	15:15:00
October	-0.222	16	05:45:00
November	-0.3	25	15:30:00
December	-0.496	16	19:45:00

Extreme maxima	Value	Day	Time
January	5.225	3	08:45:00
February	5.362	2	09:15:00
March	5.457	2	08:15:00
April	5.188	1	08:30:00
May	4.722	29	20:15:00
June	4.695	13	19:45:00
July	5.324	15	22:00:00
August	5.257	11	20:15:00
September	5.479	9	19:45:00
October	5.497	8	19:30:00
November	5.201	8	08:00:00
December	5.01	6	07:15:00

Extreme minima	Value	Day	Time
January	0.469	31	14:45:00
February	0.348	1	15:30:00
March	0.312	2	15:00:00
April	0.428	1	03:00:00
May	0.94	1	03:00:00
June	0.766	15	03:30:00
July	0.803	13	02:30:00
August	0.277	12	03:00:00
September	0.449	10	02:30:00
October	0.647	9	14:15:00
November	0.575	7	14:00:00
December	0.747	24	15:45:00

Mean sea level	No days	MSL
January	31	2.692
February	28	2.782
March	29	2.672
April	30	2.616
May	31	2.602
June	25	2.641
July	31	2.694
August	31	2.691
September	30	2.752
October	31	2.831
November	27	2.836
December	31	2.735
	Sum	Avg
	355	2.712

Harwich – Tide Gauge Information

Latitude 51° 56' 52.8" N **Longitude** 01° 17' 31.7" E **Grid Ref** TM 2634 3284

Instrument Data acquisition system with two full tide and a mid-tide bubbler gauge
Location **Tide Gauge Building** Seaward end of Harwich Haven Authority jetty
Measuring Points On the jetty, directly below the tide gauge cabinet

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	TM 2634 3284	Bolt at base of flag staff
Aux1	TM 2617 3277	Cut mark quay edge
Aux2	TM 2608 3271	Cut mark NW face of Bank building
Aux3	TM 2610 3258	Cut mark N side of ent St Nicholas's church

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 2.02m below ODN

TGZ = 6.17m below TGBM

Levelling No levelling was carried out in 2010

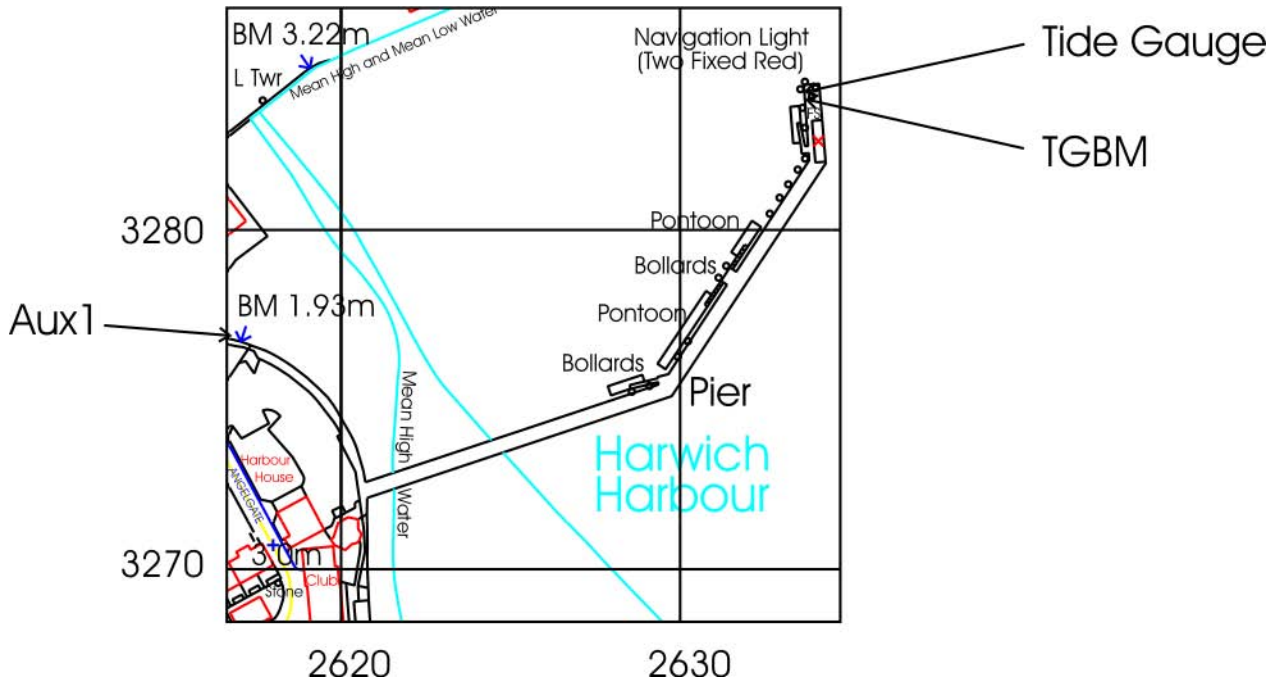
Site visits

Day 055 Rebooted logger
 Day 064 Carried out general maintenance and to replace battery in the heater thermostat
 Day 276 Carried out general maintenance

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	006,055	055

Harwich – Map & Images of Site



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Harwich – Statistics

Surge maxima	Value	Day	Time
January	0.977	28	04:15:00
February	0.576	22	16:00:00
March	0.617	20	04:15:00
April	0.431	20	21:00:00
May	0.449	30	20:45:00
June	0.683	20	01:15:00
July	0.445	5	12:15:00
August	1.02	29	20:45:00
September	0.697	25	20:00:00
October	0.688	20	04:45:00
November	0.81	12	13:30:00
December	0.989	16	15:30:00

Surge minima	Value	Day	Time
January	-0.948	16	20:15:00
February	-0.398	16	14:15:00
March	-0.411	31	13:30:00
April	-0.394	5	17:30:00
May	-0.284	4	20:30:00
June	-0.258	16	13:45:00
July	-0.566	15	15:30:00
August	-0.285	20	16:15:00
September	-0.585	29	22:45:00
October	-0.831	2	00:15:00
November	-1.501	11	15:30:00
December	-0.471	28	18:30:00

Extreme maxima	Value	Day	Time
January	4.421	31	12:30:00
February	4.52	28	11:30:00
March	4.566	1	12:15:00
April	4.326	30	00:30:00
May	4.261	31	01:30:00
June	4.206	12	11:30:00
July	4.348	14	01:00:00
August	4.422	30	02:30:00
September	4.432	8	23:30:00
October	4.467	24	00:00:00
November	4.375	7	12:00:00
December	4.264	6	11:45:00

Extreme minima	Value	Day	Time
January	0.126	16	18:15:00
February	-0.098	2	07:30:00
March	0.093	3	07:15:00
April	0.037	1	06:45:00
May	0.376	18	20:30:00
June	0.191	15	19:45:00
July	-0.083	15	20:15:00
August	0.099	12	19:15:00
September	-0.078	10	18:45:00
October	0.204	8	17:45:00
November	0.342	8	06:15:00
December	0.235	25	07:45:00

Mean sea level	No days	MSL
January	31	2.119
February	27	2.194
March	31	2.157
April	30	2.087
May	31	2.132
June	30	2.159
July	31	2.145
August	31	2.233
September	30	2.211
October	31	2.285
November	30	2.22
December	31	2.234
	Sum	Avg
	364	2.181

Heysham – Tide Gauge Information

Latitude 54° 01' 54.6" N **Longitude** 02° 55' 12.9" W **Grid Ref** SD 3982 5993

Instrument Data acquisition system with two full tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** South side of the entrance to Heysham harbour

Measuring Points Heysham harbour

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	SD 4030 6012	OSBM bolt on south quay 40.8m SW from SE angle of dock
Aux1	SD 4141 6005	Bridge parapet, E side of road
Aux2	SD 4026 6033	Pivot pin harbour wall 6.1M SW N angle of harbour
Aux3	SD 4026 6033	Rivet harbour wall 5.7M SW of N angle of Harbour
Aux4	SD 3982 5992	Brass bolt quay edge

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 4.90m below Ordnance Datum Newlyn (ODN)

TGZ = 12.098m below TGBM

Levelling No levelling was carried out in 2010

Site visits

Day 008 Rebooted logger

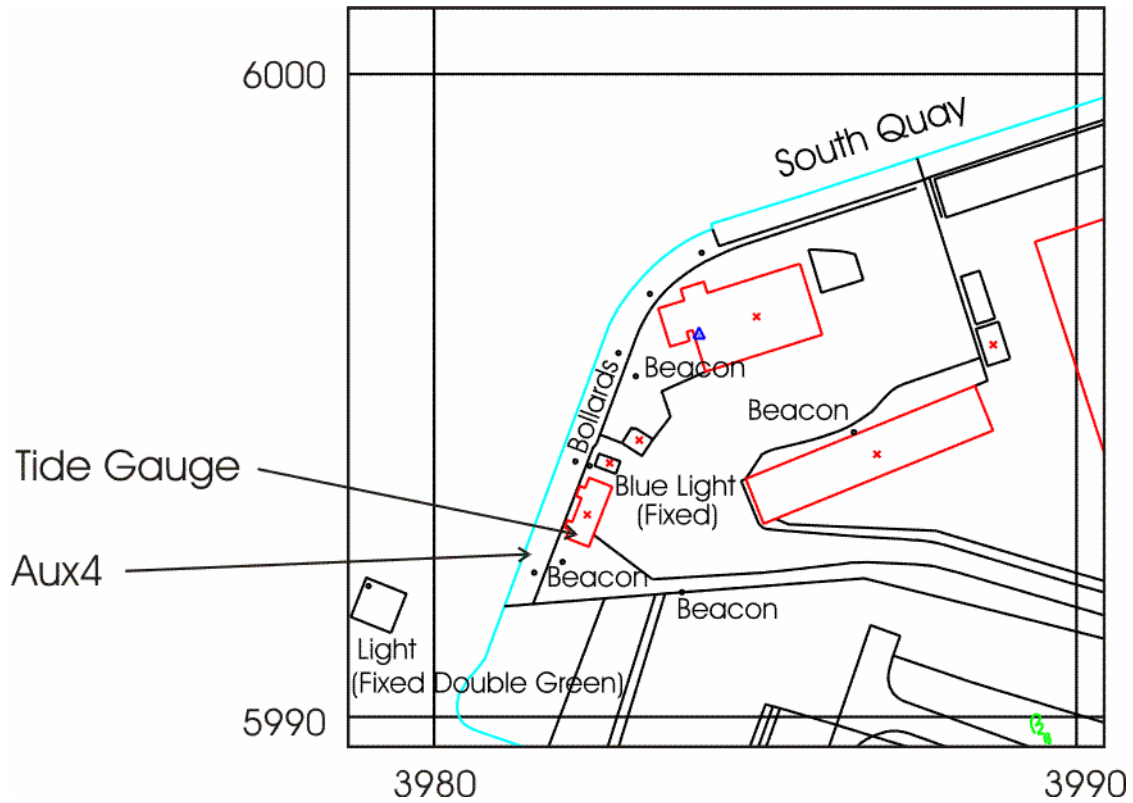
Day 253 Fixed silted up pressure points

Day 307 Carried out general maintenance and survey for EA

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	006-008	001-010,017-033,090-091,137,146-326

Heysham – Map & Images of Site



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Heysham – Statistics

Surge maxima	Value	Day	Time
January	0.651	16	08:15:00
February	0.451	27	20:30:00
March	0.579	26	05:15:00
April	0.57	5	12:30:00
May	0.192	14	00:45:00
June			
July			
August			
September			
October			
November	0.054	23	09:45:00
December	0.382	27	01:00:00

Surge minima	Value	Day	Time
January	-0.575	10	04:00:00
February	-0.425	12	16:15:00
March	-0.356	10	03:30:00
April	-0.411	15	15:45:00
May	-0.319	4	10:30:00
June			
July			
August			
September			
October			
November	-0.491	27	06:30:00
December	-0.622	16	21:15:00

Extreme maxima	Value	Day	Time
January	9.531	16	12:00:00
February	10.237	28	23:15:00
March	10.59	2	12:15:00
April	10.304	1	12:30:00
May	9.699	1	00:30:00
June			
July			
August			
September			
October			
November	9.405	23	11:45:00
December	9.804	6	11:15:00

Extreme minima	Value	Day	Time
January	1.832	16	18:30:00
February	0.52	2	20:15:00
March	0.214	2	19:00:00
April	0.817	1	07:00:00
May	1.272	1	07:15:00
June			
July			
August			
September			
October			
November	1.388	25	20:00:00
December	0.971	23	19:15:00

Mean sea level	No days	MSL
January	5	5.2
February	25	5.187
March	29	5.119
April	29	5.084
May	22	5.023
June	0	
July	0	
August	0	
September	0	
October	0	
November	7	5.052
December	31	5.135
	Sum	Avg
	148	5.114

Hinkley Point – Tide Gauge Information

Latitude 51° 12' 38.2" N **Longitude** 03° 07' 52.8" W **Grid Ref** ST 2107 4632

Instrument Dataring system with dual underwater pressure transducers

Location **Tide Gauge Building** Hinkley Point "A" power station

Measuring Points Underwater vented chambers suspended from a steel pole attached to a water intake tower (400m offshore)

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	ST 2104 4634	Bolt on wall 0.962m NE of SE corner of steps
Aux1	ST 2078 4626	Rivet on sea wall 41.28m SW of corner of outfall
Aux2	ST 2094 4631	Bolt on sea wall 31.245m SW of end of railings
Aux3	ST 2123 4634	Bolt sea defence wall

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 5.80m below Ordnance Datum Newlyn (ODN)

TGZ = 14.639m below TGBM

Levelling No levelling was carried out in 2010

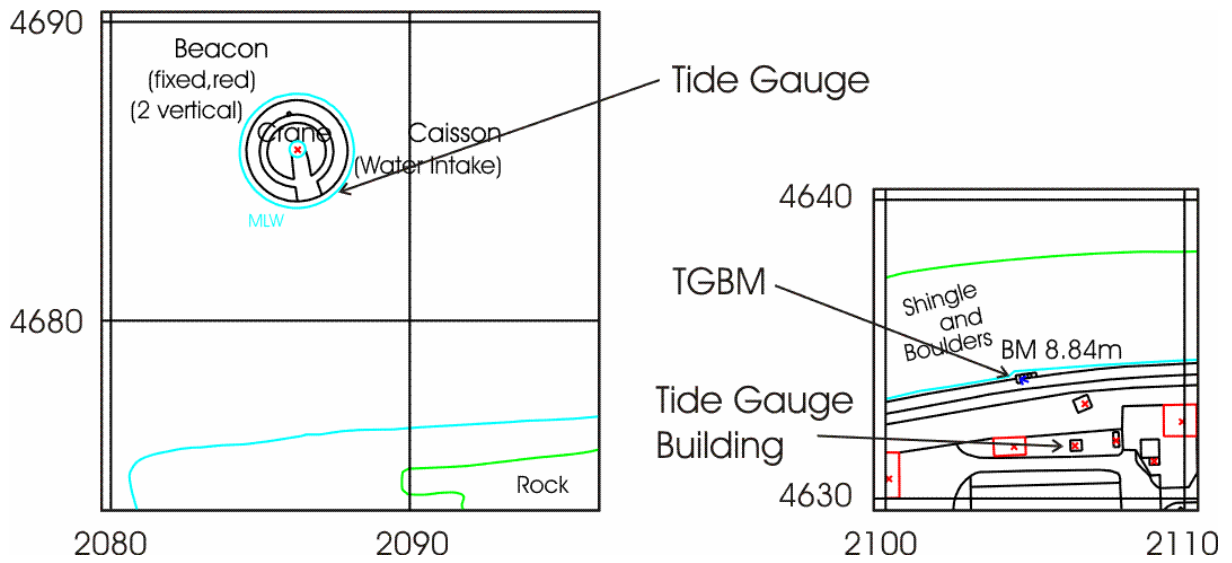
Site visits

None

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
98	15 minutes	055-059,258,264	252,258-264,329-336

Hinkley Point – Map & Images of Site



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Hinkley Point – Statistics

Surge maxima	Value	Day	Time
January	0.453	15	05:15:00
February	0.875	23	20:30:00
March	0.632	31	01:00:00
April	0.441	2	16:00:00
May	0.316	29	21:45:00
June	0.391	11	12:30:00
July	0.568	15	05:00:00
August	0.408	23	14:00:00
September	0.35	7	00:15:00
October	0.627	29	15:30:00
November	1.061	11	15:15:00
December	0.429	27	05:45:00

Surge minima	Value	Day	Time
January	-0.627	26	03:30:00
February	-0.393	10	09:30:00
March	-0.393	11	21:15:00
April	-0.529	9	20:15:00
May	-0.473	4	16:00:00
June	-0.387	2	15:45:00
July	-0.364	27	13:45:00
August	-0.327	5	14:30:00
September	-0.364	3	13:45:00
October	-0.321	17	19:45:00
November	-0.467	9	16:15:00
December	-0.591	16	19:30:00

Extreme maxima	Value	Day	Time
January	12.585	31	07:30:00
February	12.874	1	08:15:00
March	13.045	2	07:45:00
April	12.688	1	08:15:00
May	11.581	1	08:15:00
June	11.624	13	19:15:00
July	12.508	14	20:45:00
August	12.758	11	19:45:00
September	13.013	9	19:30:00
October	12.891	8	19:00:00
November	12.359	8	07:45:00
December	11.963	6	06:45:00

Extreme minima	Value	Day	Time
January	0.424	31	13:45:00
February	0.168	1	14:45:00
March	-0.089	3	02:45:00
April	0.327	1	02:15:00
May	1.063	1	02:15:00
June	0.925	15	02:30:00
July	0.784	13	14:00:00
August	0.14	12	02:15:00
September	0.118	10	02:00:00
October	0.23	9	13:45:00
November	0.492	7	13:30:00
December	0.962	25	03:15:00

Mean sea level	No days	MSL
January	31	6.205
February	22	6.263
March	31	6.224
April	30	6.154
May	31	6.149
June	30	6.18
July	31	6.233
August	31	6.259
September	20	6.273
October	31	6.331
November	23	6.418
December	29	6.263
	Sum	Avg
	340	6.246

Holyhead – Tide Gauge Information

Latitude 53° 18' 50.2" N **Longitude** 04° 37' 13.6" W **Grid Ref** SH 2553 8287

Instrument Data acquisition system with a full-tide and a mid-tide bubbler gauge, with a back-up Munro float gauge

Location **Tide Gauge Building** Salt Island jetty, close to the old harbour lighthouse
Measuring Points As above

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	SH 2553 8287	Bolt on concrete foundation, north side of tide gauge building
Aux1	SH 2556 8289	Cut mark lighthouse
Aux3	SH 2506 8292	Bolt Salt Island bridge

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)
 TGZ = 3.05m below Ordnance Datum Newlyn (ODN)
 TGZ = 7.436m below TGBM

Levelling No levelling was carried out in 2010

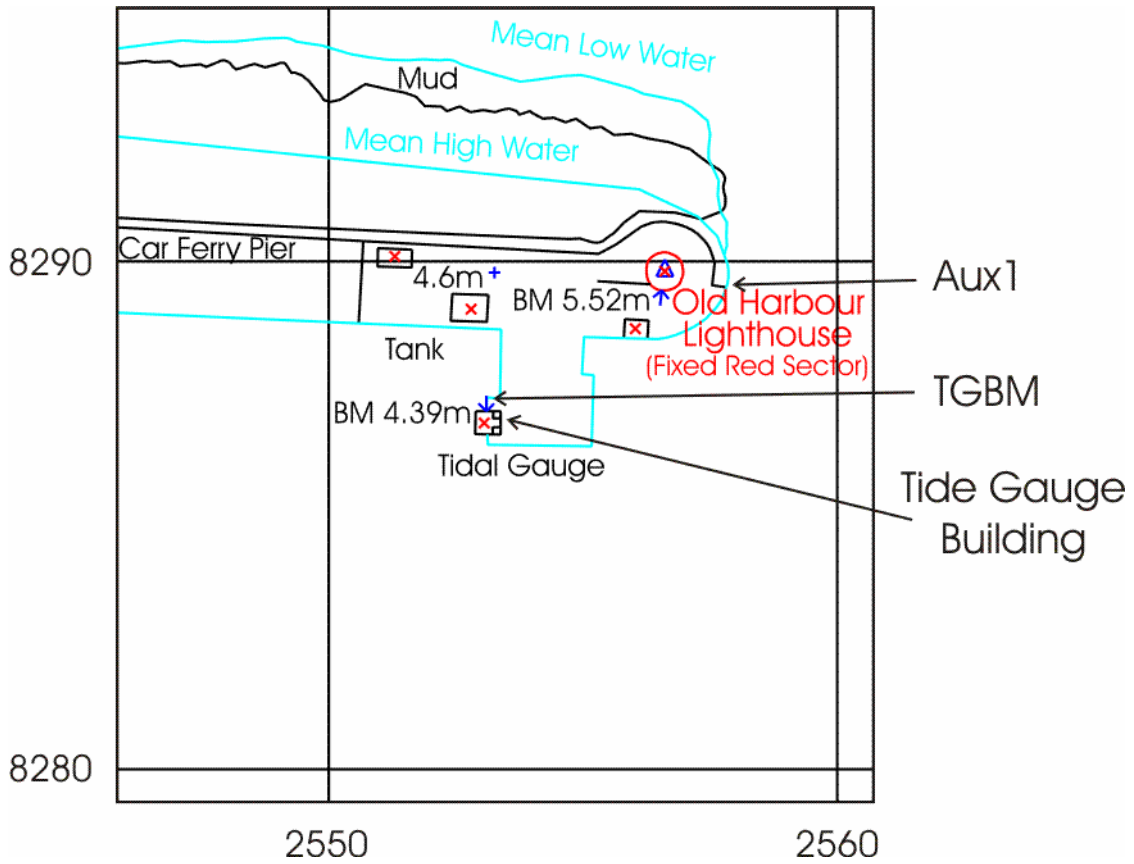
Site visits

Day 181-193 Divers fitted new pressure points and tubing, reset levels having been adjusted (over a period of time) to align with each other
 Day 266 Site inspection by EA and electrical contractors
 Day 328 General maintenance and refurbishment survey

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
96	15 minutes	055,144-145,160-161,238-239,239-244	015,044-045,106-160,161-194,239,243,300-365

Holyhead – Map & Images of Site



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Holyhead – Statistics

Surge maxima	Value	Day	Time
January	0.658	16	05:30:00
February	0.463	24	01:15:00
March	0.457	26	07:00:00
April	0.377	5	23:45:00
May			
June			
July	0.479	16	09:15:00
August	0.372	20	13:00:00
September	0.377	10	12:45:00
October	0.578	29	12:15:00
November	0.914	11	09:45:00
December	0.437	27	08:45:00

Surge minima	Value	Day	Time
January	-0.429	29	15:00:00
February	-0.31	12	17:15:00
March	-0.272	12	17:15:00
April	-0.266	15	19:15:00
May			
June			
July	-0.068	26	06:45:00
August	-0.139	15	00:45:00
September	-0.17	24	12:15:00
October	-0.179	20	03:45:00
November	-0.283	25	17:15:00
December	-0.441	16	22:15:00

Extreme maxima	Value	Day	Time
January	6.075	31	11:00:00
February	6.259	2	12:15:00
March	6.297	1	10:30:00
April	6.013	1	11:45:00
May			
June			
July	6.242	15	00:15:00
August	6.168	11	23:15:00
September	6.359	9	23:00:00
October	6.373	8	22:30:00
November	6.001	8	11:15:00
December	5.969	6	10:15:00

Extreme minima	Value	Day	Time
January	0.193	31	17:15:00
February	0.123	1	17:45:00
March	0.028	2	17:30:00
April	0.351	1	05:00:00
May			
June			
July	0.647	14	05:45:00
August	0.109	12	05:30:00
September	0.284	9	04:30:00
October	0.44	9	04:45:00
November	0.495	7	04:30:00
December	0.618	24	18:15:00

Mean sea level	No days	MSL
January	28	3.224
February	25	3.352
March	31	3.234
April	15	3.165
May	0	
June	0	
July	18	3.319
August	25	3.328
September	29	3.38
October	31	3.46
November	30	3.464
December	30	3.347
	Sum	Avg
	262	3.327

Ilfracombe – Tide Gauge Information

Latitude 51° 12' 40.1" N **Longitude** 04° 06' 44.6" W **Grid Ref** SS 5255 4789

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** North west corner of the car park, east of Lantern Hill
Measuring Points Seaward side of Ilfracombe pier at the harbour entrance

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	SS 5263 4791	OSBM Bolt on concrete pier, south angle of tide gauge hut
Aux1	SS 5245 4782	Pier Hotel, The Quay
Aux2	SS 5251 4789	St Nicholas chapel N face 6.1m from NW angle

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 4.80m below Ordnance Datum Newlyn (ODN)

TGZ = 12.379m below TGBM

TGZ = 10.76m below Aux1

TGZ = 32.541m below Aux2

Levelling No levelling was carried out in 2010

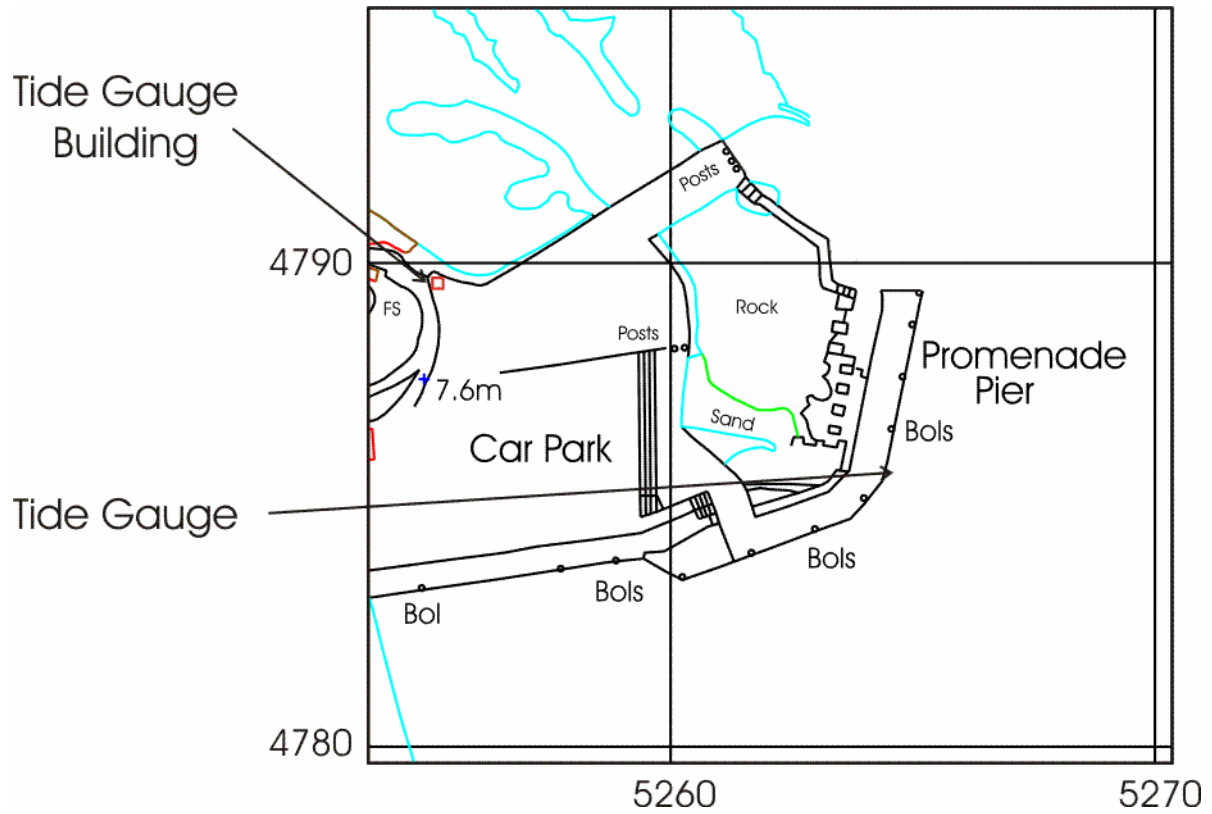
Site visits

Day 314 Carried out general maintenance and survey for EA

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	006-007,089-091,313,325-328,349

Ilfracombe – Map & Images of Site



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Ilfracombe – Statistics

Surge maxima	Value	Day	Time
January	0.559	16	03:15:00
February	0.702	23	20:15:00
March	0.511	25	22:45:00
April	0.495	2	15:30:00
May	0.239	29	06:45:00
June	0.316	8	11:45:00
July	0.474	15	03:45:00
August	0.306	20	01:30:00
September	0.342	6	23:00:00
October	0.487	29	14:15:00
November	0.804	11	14:00:00
December	0.42	27	04:30:00

Surge minima	Value	Day	Time
January	-0.365	27	04:45:00
February	-0.197	11	21:15:00
March	-0.249	10	10:30:00
April	-0.287	11	20:15:00
May	-0.308	5	05:00:00
June	-0.227	16	20:45:00
July	-0.18	6	04:00:00
August	-0.181	13	21:15:00
September	-0.177	2	12:30:00
October	-0.208	16	03:30:00
November	-0.226	7	12:00:00
December	-0.434	16	18:00:00

Extreme maxima	Value	Day	Time
January	9.83	31	06:30:00
February	10.005	1	07:15:00
March	10.208	2	07:00:00
April	9.668	1	19:30:00
May	9.038	29	19:00:00
June	9.062	13	18:30:00
July	9.894	15	20:45:00
August	9.954	11	18:45:00
September	10.216	10	19:15:00
October	10.164	8	18:15:00
November	9.669	8	06:45:00
December	9.421	6	06:00:00

Extreme minima	Value	Day	Time
January	0.474	31	12:45:00
February	0.259	1	13:30:00
March	0.126	3	01:15:00
April	0.713	1	13:15:00
May	1.112	1	01:15:00
June	0.981	15	01:30:00
July	0.905	14	01:15:00
August	0.207	12	13:15:00
September	0.244	10	00:45:00
October	0.367	9	12:30:00
November	0.57	7	12:15:00
December	1.013	24	01:15:00

Mean sea level	No days	MSL
January	29	4.986
February	28	5.09
March	29	4.962
April	29	4.907
May	31	4.908
June	30	4.943
July	31	4.99
August	31	5.002
September	30	5.04
October	31	5.111
November	23	5.151
December	31	5.029
	Sum	Avg
	353	5.01

Immingham – Tide Gauge Information

Latitude 53° 37' 48.8" N **Longitude** 00° 11' 14.7" W **Grid Ref** TA 1996 1638

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** Entrance to Immingham Docks, east of the lock gates

Measuring Points Fixed to a leg of the lead-in jetty on the east side of the dock entrance

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	TA 1989 1630	Docks office, north angle, north east face
Aux1	TA 2005 1631	Customs house, east angle, north east face
Aux2	TA 1994 1640	Bolt on concrete base of tide gauge building
Aux3	TA 2000 1648	Stud in camera tower

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 3.90m below ODN

TGZ = 9.131m below TGBM

Levelling No levelling was carried out in 2010

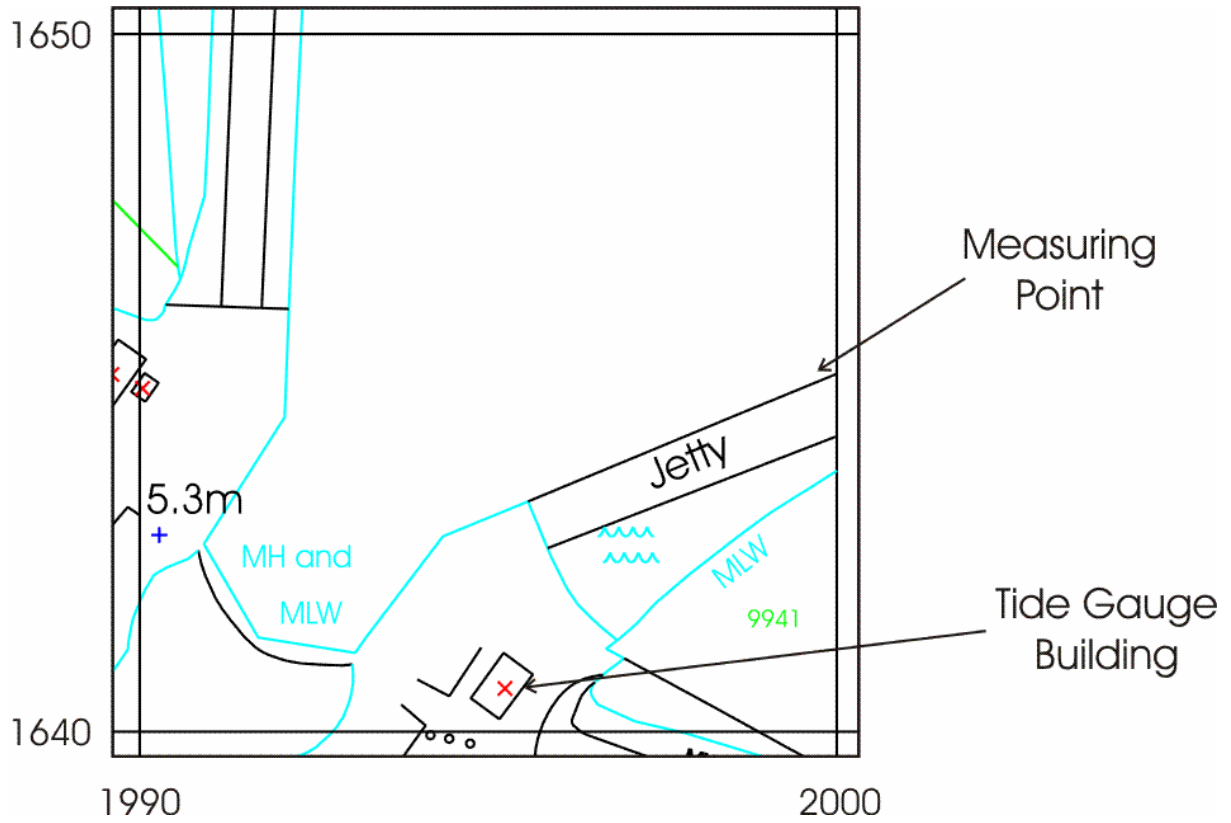
Site visits

None

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	055	002-005,030-034,059-063,088-091,093,132,224-225,252-254,310-311,339-341,358-359

Immingham – Map & Images of Site



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Immingham – Statistics

Surge maxima	Value	Day	Time
January	0.947	27	23:15:00
February	0.544	22	17:45:00
March	0.694	20	03:15:00
April	0.462	20	16:15:00
May	0.378	30	22:15:00
June	0.589	19	17:00:00
July	0.535	5	07:30:00
August	0.625	29	18:00:00
September	0.677	24	13:30:00
October	0.564	19	23:15:00
November	0.634	12	06:30:00
December	0.966	16	11:00:00

Surge minima	Value	Day	Time
January	-0.776	16	13:45:00
February	-0.262	15	23:15:00
March	-0.284	31	18:15:00
April	-0.362	5	13:45:00
May	-0.236	4	16:30:00
June	-0.235	15	20:00:00
July	-0.43	16	08:45:00
August	-0.196	3	02:00:00
September	-0.406	15	10:15:00
October	-0.561	1	20:15:00
November	-0.84	11	12:30:00
December	-0.295	28	22:45:00

Extreme maxima	Value	Day	Time
January	7.65	31	18:45:00
February	7.898	2	20:15:00
March	7.895	2	19:15:00
April	7.541	29	18:30:00
May	7.184	1	07:15:00
June	7.145	14	06:45:00
July	7.437	14	07:30:00
August	7.702	13	07:45:00
September	7.938	11	07:30:00
October	7.84	9	06:30:00
November	7.563	8	19:00:00
December	7.246	23	19:15:00

Extreme minima	Value	Day	Time
January	0.747	4	02:30:00
February	0.158	2	02:15:00
March	0.39	2	01:15:00
April	0.316	1	01:30:00
May	1.225	17	14:15:00
June	0.845	15	14:30:00
July	0.558	15	15:00:00
August	0.396	12	14:00:00
September	0.145	10	13:45:00
October	0.588	8	12:30:00
November	0.906	8	01:00:00
December	0.934	25	02:45:00

Mean sea level	No days	MSL
January	31	4.183
February	28	4.239
March	31	4.21
April	29	4.132
May	28	4.167
June	30	4.203
July	31	4.21
August	31	4.265
September	30	4.276
October	31	4.343
November	30	4.28
December	31	4.272
	Sum	Avg
	361	4.232

Port Erin (Isle Of Man) – Tide Gauge Information

Latitude 54° 05' 07.4" N **Longitude** 04° 46' 05.0" W **Grid Ref** SC 1904 6904

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge
Location **Tide Gauge Building** Port Erin lifeboat station
Measuring Points Close to the end of the lifeboat slipway (the mid-tide pressure point is attached to a concrete leg of the boathouse)

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	SC 1904 6901	Bolt SE corner of the RNLI boathouse
Aux 2		Bolt on seawall NW of Marine labs
Aux 3	SC 1928 6903	Bolt base of light tower Raglan pier

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)
 TGZ = 2.75m below Ordnance Datum Local (ODL)
 TGZ = 9.288m below TGBM

Levelling No levelling was carried out in 2010

Site visits

None

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	090

Port Erin (Isle Of Man) – Map & Images of Site



Image: Isle of Man Government ©Google 2010



Port Erin (Isle Of Man) – Statistics

Surge maxima	Value	Day	Time
January	0.712	16	06:30:00
February	0.47	24	04:45:00
March	0.505	26	06:30:00
April	0.454	6	00:30:00
May	0.176	29	11:45:00
June	0.151	8	06:30:00
July	0.386	16	10:45:00
August	0.35	20	13:15:00
September	0.308	10	11:45:00
October	0.615	29	13:15:00
November	0.897	11	21:15:00
December	0.467	27	00:00:00

Surge minima	Value	Day	Time
January	-0.402	29	15:30:00
February	-0.283	12	19:15:00
March	-0.373	31	10:45:00
April	-0.306	15	20:15:00
May	-0.291	5	00:30:00
June	-0.221	14	11:15:00
July	-0.157	6	10:15:00
August	-0.262	29	22:15:00
September	-0.279	24	11:45:00
October	-0.239	20	04:30:00
November	-0.336	25	17:45:00
December	-0.457	16	22:15:00

Extreme maxima	Value	Day	Time
January	5.674	2	12:00:00
February	5.879	2	13:15:00
March	5.885	1	11:30:00
April	5.686	1	12:30:00
May	5.336	1	00:30:00
June	5.186	13	23:45:00
July	5.871	16	02:00:00
August	5.693	12	00:00:00
September	5.928	9	23:45:00
October	5.897	8	23:30:00
November	5.791	8	00:00:00
December	5.563	6	11:15:00

Extreme minima	Value	Day	Time
January	-0.064	31	18:00:00
February	-0.069	1	18:45:00
March	-0.173	2	18:30:00
April	0.129	1	06:15:00
May	0.471	17	07:00:00
June	0.194	15	07:00:00
July	0.247	14	06:45:00
August	-0.214	13	07:15:00
September	-0.015	9	05:15:00
October	0.125	8	05:00:00
November	0.159	7	05:15:00
December	0.228	24	19:15:00

Mean sea level	No days	MSL
January	31	2.879
February	28	2.951
March	29	2.874
April	30	2.818
May	31	2.78
June	30	2.822
July	31	2.91
August	31	2.889
September	30	2.945
October	31	3.029
November	30	3.034
December	31	2.914
	Sum	Avg
	363	2.904

Port Ellen (Isle of Islay) – Tide Gauge Information

Latitude 55° 37' 39.3" N **Longitude** 06° 11' 23.7" W **Grid Ref** NR 3636 4508

Instrument Data acquisition system with two full-tide bubbler gauges

Location **Tide Gauge Building** Caledonian MacBrayne storeroom next to Port Ellen ferry terminal

Measuring Points South west of the ferry terminal offices

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	NR 3635 4507	Bolt SE side Booking Office
Aux1	NR 3642 4515	Rivet angle wall NW side entrance to pier
Aux2	NR 3651 4526	Police Station SE side of road SW face W angle
Aux3	NR 3635 4521	Sea Farm C gable NW face W angle

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 0.19m below Ordnance Datum Newlyn (ODN)

TGZ = 2.839m below TGBM

Levelling No levelling was carried out in 2010

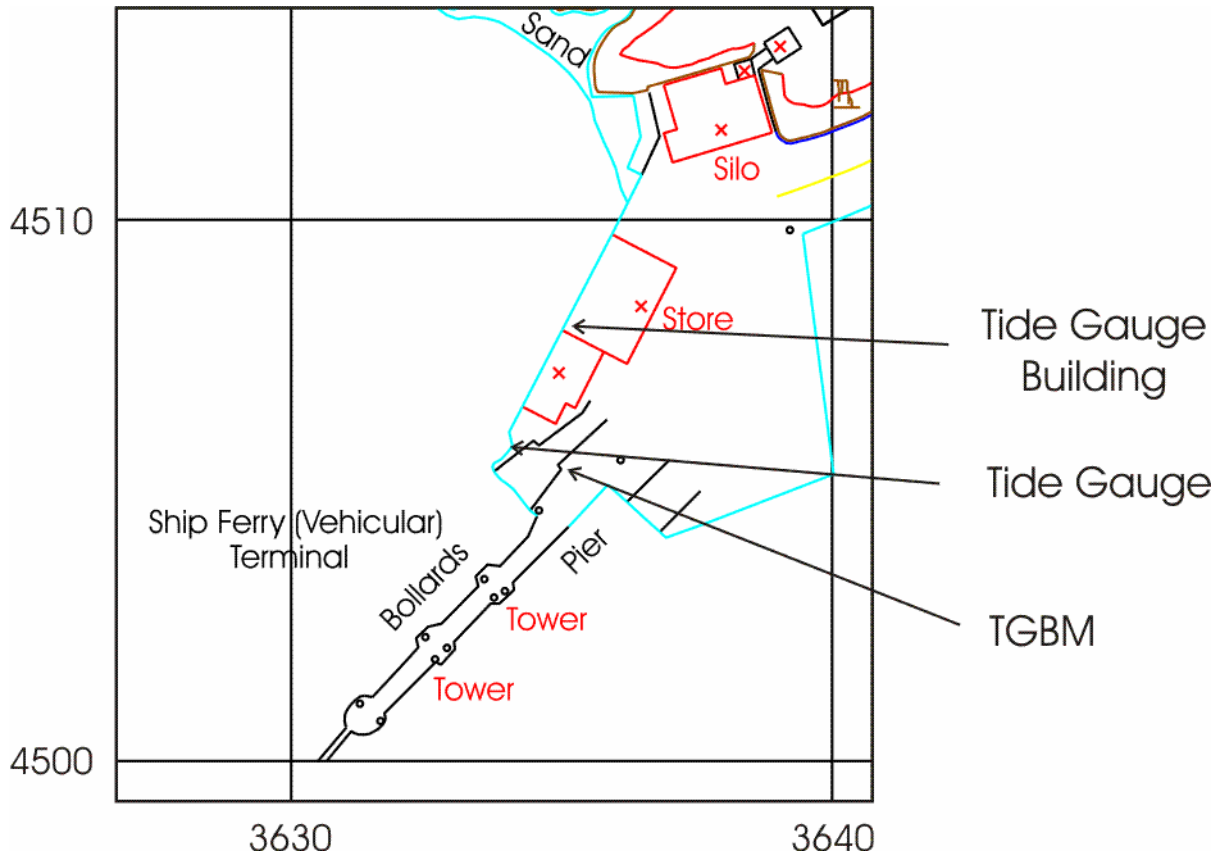
Site visits

Day 305 Met with contactor regarding redevelopment of pier

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	None

Port Ellen (Isle of Islay) – Map & Images of Site



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Port Ellen (Isle of Islay) – Statistics

Surge maxima	Value	Day	Time
January	0.861	16	08:45:00
February	0.45	5	01:00:00
March	0.66	19	00:30:00
April	0.566	5	18:45:00
May	0.225	29	10:30:00
June	0.244	30	23:45:00
July	0.598	4	16:30:00
August	0.521	20	13:45:00
September	0.458	13	16:45:00
October	0.669	29	02:45:00
November	1.181	11	15:30:00
December	0.486	27	01:30:00

Surge minima	Value	Day	Time
January	-0.4	29	14:00:00
February	-0.25	12	19:30:00
March	-0.372	31	12:30:00
April	-0.222	15	20:15:00
May	-0.187	3	13:30:00
June	-0.166	14	21:00:00
July	-0.097	22	21:45:00
August	-0.18	29	21:30:00
September	-0.213	24	12:30:00
October	-0.215	20	04:00:00
November	-0.353	9	08:00:00
December	-0.449	17	01:45:00

Extreme maxima	Value	Day	Time
January	1.619	16	06:45:00
February	1.147	28	05:00:00
March	1.155	18	16:15:00
April	1.17	5	18:15:00
May	0.93	29	18:30:00
June	0.975	27	18:00:00
July	1.138	14	19:00:00
August	1.097	20	15:00:00
September	1.219	10	18:15:00
October	1.401	29	06:15:00
November	1.989	11	16:45:00
December	1.277	27	06:30:00

Extreme minima	Value	Day	Time
January	-0.232	29	22:15:00
February	-0.224	1	00:00:00
March	-0.251	30	23:15:00
April	-0.194	1	00:00:00
May	-0.134	3	11:15:00
June	-0.161	14	12:00:00
July	-0.012	29	12:00:00
August	-0.381	13	12:45:00
September	-0.083	9	11:15:00
October	0.043	9	11:30:00
November	-0.07	27	02:15:00
December	-0.173	24	00:15:00

Mean sea level	No days	MSL
January	31	0.515
February	28	0.565
March	31	0.501
April	30	0.449
May	31	0.396
June	30	0.442
July	31	0.548
August	31	0.509
September	30	0.578
October	31	0.665
November	30	0.649
December	31	0.52
	Sum	Avg
	365	0.528

St Helier (Jersey) – Tide Gauge Information

Latitude 49° 10' 34" N **Longitude** 02° 06' 51 " W **Grid Ref** 13/11 6466 4763

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge
Location **Tide Gauge Building** Victoria Pier, adjacent to the Port Control building
Measuring Points inside wall of the pier, 2m from the tide gauge building

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	13/11 6465 4764	Pin bollard Victoria Pier
Aux1	13/11 6516 4764	Cut mark wall N side of road Mount Bingham
Aux2	13/11 6509 4780	"J" stone E face wall car park South Hill
Aux3	13/11 6507 4779	Cut mark S face wall car park South Hill
Aux4	13/11 6506 4784	Cut mark E face wall E side Commercial Rd

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 5.88m below Ordnance Datum Local (ODL)

TGZ = 13.658m below TGBM

Levelling No levelling was carried out in 2010

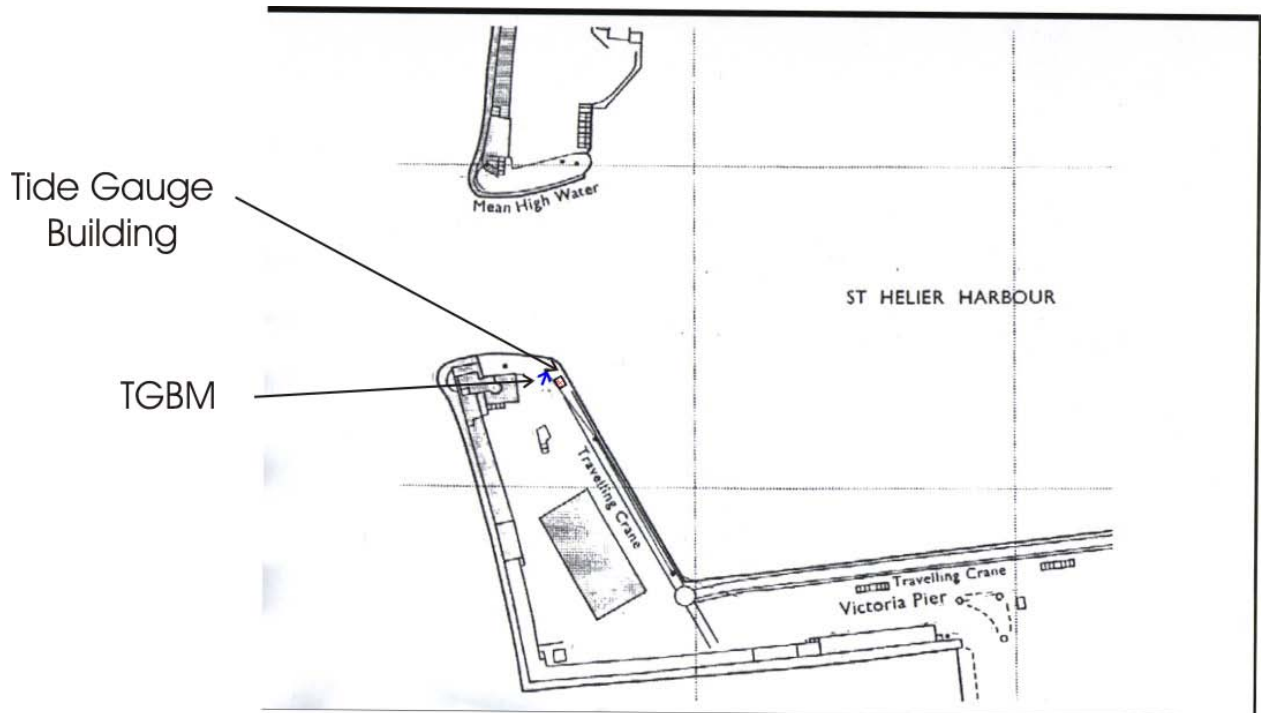
Site visits

Day 270 Changed compressor and carried out maintenance

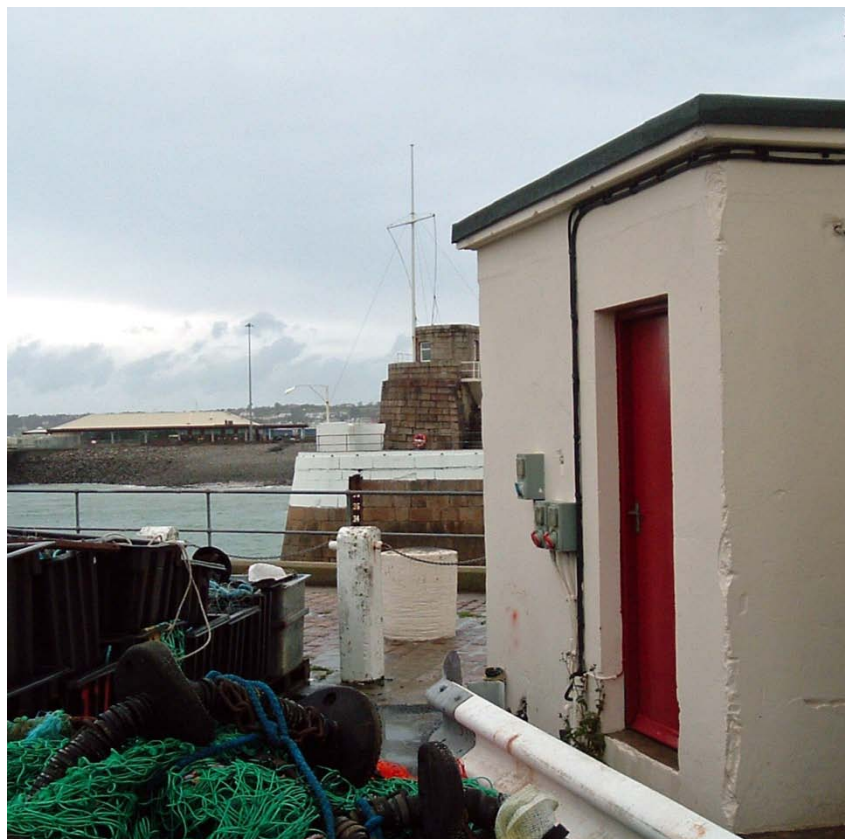
Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	270

St Helier (Jersey) – Map & Images of Site



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St Helier (Jersey) – Statistics

Surge maxima	Value	Day	Time
January	0.435	1	02:45:00
February	0.748	25	23:45:00
March	0.601	31	02:45:00
April	0.366	2	16:30:00
May	0.195	29	17:15:00
June	0.292	8	12:00:00
July	0.443	15	03:00:00
August	0.313	23	02:30:00
September	0.335	6	22:15:00
October	0.42	3	09:00:00
November	0.697	11	07:15:00
December	0.456	6	16:45:00

Surge minima	Value	Day	Time
January	-0.537	27	02:45:00
February	-0.284	11	14:00:00
March	-0.358	8	11:30:00
April	-0.417	16	11:15:00
May	-0.432	4	18:00:00
June	-0.257	2	17:00:00
July	-0.264	8	15:30:00
August	-0.288	13	06:30:00
September	-0.282	18	08:15:00
October	-0.31	17	19:45:00
November	-0.262	7	14:00:00
December	-0.472	15	03:30:00

Extreme maxima	Value	Day	Time
January	11.669	31	07:00:00
February	11.985	2	08:30:00
March	12.134	2	07:30:00
April	11.692	1	07:45:00
May	10.694	1	08:00:00
June	10.808	14	19:45:00
July	11.653	14	20:30:00
August	11.861	12	20:15:00
September	12.127	10	19:45:00
October	11.995	8	18:45:00
November	11.577	8	07:15:00
December	10.987	7	07:00:00

Extreme minima	Value	Day	Time
January	0.67	31	14:00:00
February	0.434	1	14:45:00
March	0.218	2	14:15:00
April	0.766	1	02:15:00
May	1.48	1	02:30:00
June	1.36	16	03:30:00
July	1.109	14	02:30:00
August	0.427	12	02:15:00
September	0.373	10	02:00:00
October	0.681	9	01:30:00
November	0.986	6	12:45:00
December	1.276	24	15:00:00

Mean sea level	No days	MSL
January	31	6.03
February	28	6.141
March	31	5.981
April	30	5.937
May	31	5.958
June	30	5.993
July	31	6.003
August	31	6.033
September	30	6.058
October	31	6.122
November	30	6.186
December	31	6.057
	Sum	Avg
	365	6.042

Kinlochbervie – Tide Gauge Information

Latitude 58° 27' 23.8" N **Longitude** 05° 03' 01.3" W **Grid Ref** NC 2213 5608

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** In the ice plant, on the pier

Measuring Points On a leg of the jetty beneath the ice plant

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	NC 2206 5613	Bolt S side harbour 19.5M SE angle of building
Aux1	NC 2210 5612	Rivet iceplant 7.45M from S angle of building
Aux2	NC 2210 5614	Rivet inside iceplant 3.5M E door
Aux3	NC 2203 5626	Rivet 12.3M SE N angle of building
Aux4	NC 2213 5621	Rivet 2.5M NW inside corner NE steps

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 2.50m below Ordnance Datum Newlyn (ODN)

TGZ = 7.213m below TGBM

Levelling No levelling was carried out in 2010

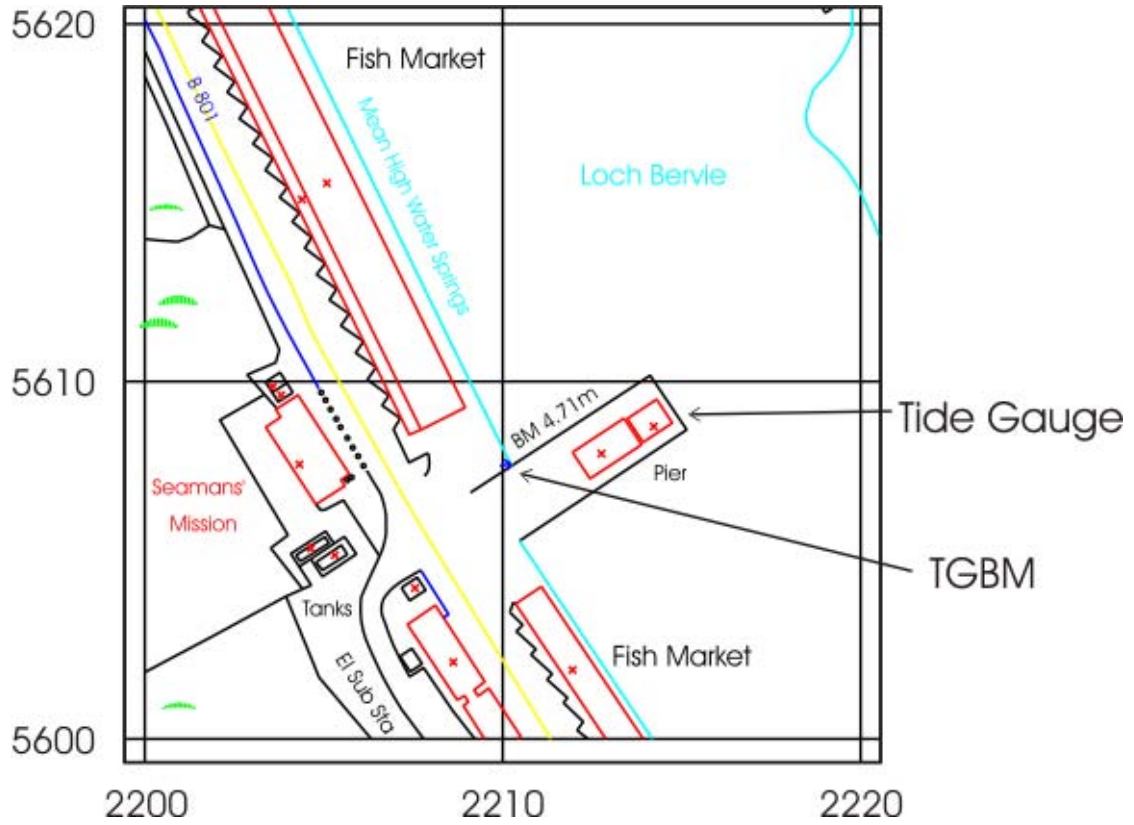
Site visits

Day 026 Carried out general maintenance

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	004-005	None

Kinlochbervie – Map & Images of Site



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Kinlochbervie – Statistics

Surge maxima	Value	Day	Time
January	0.629	16	14:45:00
February	0.2	23	19:15:00
March	0.762	19	08:30:00
April	0.522	5	21:30:00
May	0.194	13	08:30:00
June	0.191	28	04:30:00
July	0.584	4	18:00:00
August	0.674	21	01:15:00
September	0.336	14	06:45:00
October	0.761	29	13:00:00
November	0.835	11	17:30:00
December	0.263	27	07:15:00

Surge minima	Value	Day	Time
January	-0.52	10	22:45:00
February	-0.364	6	16:00:00
March	-0.29	31	15:15:00
April	-0.27	15	21:30:00
May	-0.283	3	03:45:00
June	-0.234	14	22:00:00
July	-0.205	22	08:00:00
August	-0.278	13	22:30:00
September	-0.295	23	21:15:00
October	-0.268	24	14:00:00
November	-0.573	26	23:45:00
December	-0.394	17	05:00:00

Extreme maxima	Value	Day	Time
January	5.224	16	07:45:00
February	5.336	2	09:15:00
March	5.39	2	08:00:00
April	5.214	28	19:00:00
May	4.779	28	19:30:00
June	4.78	27	20:00:00
July	5.079	15	22:00:00
August	5.234	11	20:00:00
September	5.555	10	20:30:00
October	5.4	7	18:30:00
November	5.468	8	08:00:00
December	5.048	6	07:15:00

Extreme minima	Value	Day	Time
January	0.07	31	14:30:00
February	0.068	1	15:00:00
March	-0.07	31	14:30:00
April	0.243	1	02:15:00
May	0.766	1	02:45:00
June	0.408	15	03:15:00
July	0.335	14	03:00:00
August	-0.061	13	03:15:00
September	0.046	10	02:15:00
October	0.215	8	01:00:00
November	0.404	6	00:45:00
December	0.507	23	14:45:00

Mean sea level	No days	MSL
January	28	2.852
February	28	2.827
March	31	2.84
April	30	2.782
May	31	2.719
June	30	2.76
July	31	2.886
August	31	2.845
September	30	2.893
October	31	3.016
November	30	2.952
December	31	2.852
	Sum	Avg
	362	2.852

Leith – Tide Gauge Information

Latitude 55° 59' 23.4"N **Longitude** 03° 10' 54.1"W **Grid Ref** NT 2638 7806

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** Lead-in jetty, east of the entrance to Leith docks
Measuring Points As above

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	NT 2643 7797	OSBM Bolt SE end of TG pier 0.9m N angle of pier
Aux1	NT 2648 7797	Rivet on top step SW side of road 1.6m S angle of building
Aux2	NT 2653 7789	Rivet top step SW side of road 11.9M W angle of building

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)
 TGZ = 2.90m below Ordnance Datum Newlyn (ODN)
 TGZ = 7.84mm below TGBM

Levelling No levelling was carried out in 2010

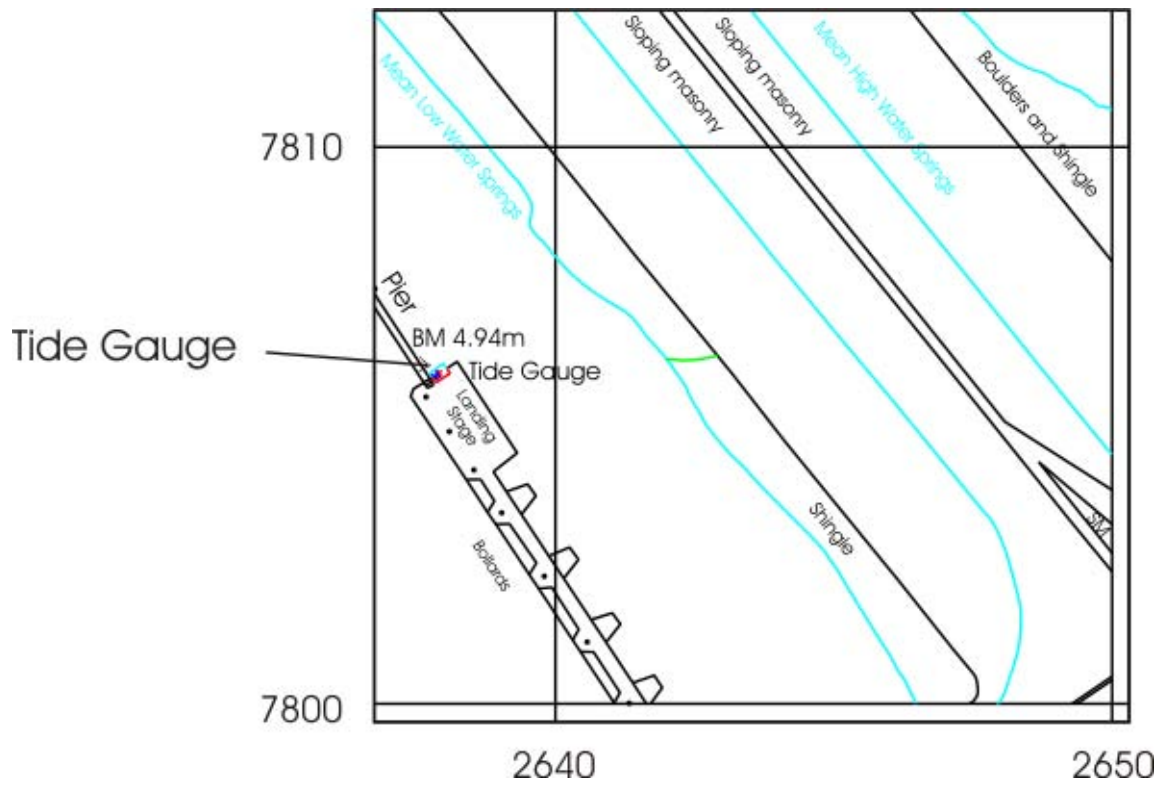
Site visits

Day 286 Installed new heater in TG building

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	None

Leith – Map & Images of Site



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Leith – Statistics

Surge maxima	Value	Day	Time
January	0.445	27	19:45:00
February	0.36	24	09:30:00
March	0.693	19	19:15:00
April	0.329	29	12:00:00
May	0.232	1	00:15:00
June	0.222	19	09:00:00
July	0.47	5	04:00:00
August	0.385	21	16:45:00
September	0.349	16	19:15:00
October	0.479	30	11:30:00
November	0.652	12	02:30:00
December	0.587	16	05:45:00

Surge minima	Value	Day	Time
January	-0.487	16	12:45:00
February	-0.343	7	12:45:00
March	-0.281	31	20:45:00
April	-0.324	9	21:00:00
May	-0.282	4	13:00:00
June	-0.254	15	15:45:00
July	-0.547	11	13:15:00
August	-0.214	14	04:15:00
September	-0.27	29	18:15:00
October	-0.276	21	05:45:00
November	-0.416	27	09:30:00
December	-0.336	12	16:15:00

Extreme maxima	Value	Day	Time
January	5.973	31	15:15:00
February	6.111	28	14:15:00
March	6.366	30	14:30:00
April	5.917	29	15:00:00
May	5.605	1	04:00:00
June	5.55	14	03:30:00
July	5.906	14	16:30:00
August	6.032	13	04:30:00
September	6.332	11	04:00:00
October	6.159	8	02:15:00
November	6	8	15:30:00
December	5.716	6	14:45:00

Extreme minima	Value	Day	Time
January	0.119	31	21:45:00
February	-0.03	1	22:15:00
March	-0.037	31	21:30:00
April	0.298	1	09:45:00
May	0.77	15	09:00:00
June	0.405	15	10:30:00
July	0.299	16	12:00:00
August	-0.056	12	10:00:00
September	-0.027	9	09:00:00
October	0.27	8	08:30:00
November	0.638	6	08:00:00
December	0.481	24	22:45:00

Mean sea level	No days	MSL
January	31	3.155
February	28	3.194
March	31	3.175
April	30	3.095
May	31	3.091
June	30	3.137
July	31	3.186
August	31	3.205
September	30	3.236
October	31	3.312
November	30	3.272
December	31	3.203
	Sum	Avg
	365	3.188

Lerwick – Tide Gauge Information

Latitude 60° 09' 14.5" N **Longitude** 01° 08' 25.1" W **Grid Ref** HU 4783 4137

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** Inner wall at breakwater entrance to the small boat harbour, south of Victoria Pier

Measuring Points As above

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	HU 4783 4129	OSBM bolt on breakwater wall
Aux1	HU 4784 4125	Queen's Hotel 7.5m SW face south angle
Aux2	HU 4777 4110	Lerwick Parish Church North face NW angle

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 1.22m below Ordnance Datum Local (ODL)

TGZ = 4.57m below TGBM

Levelling No levelling was carried out in 2010

Site visits

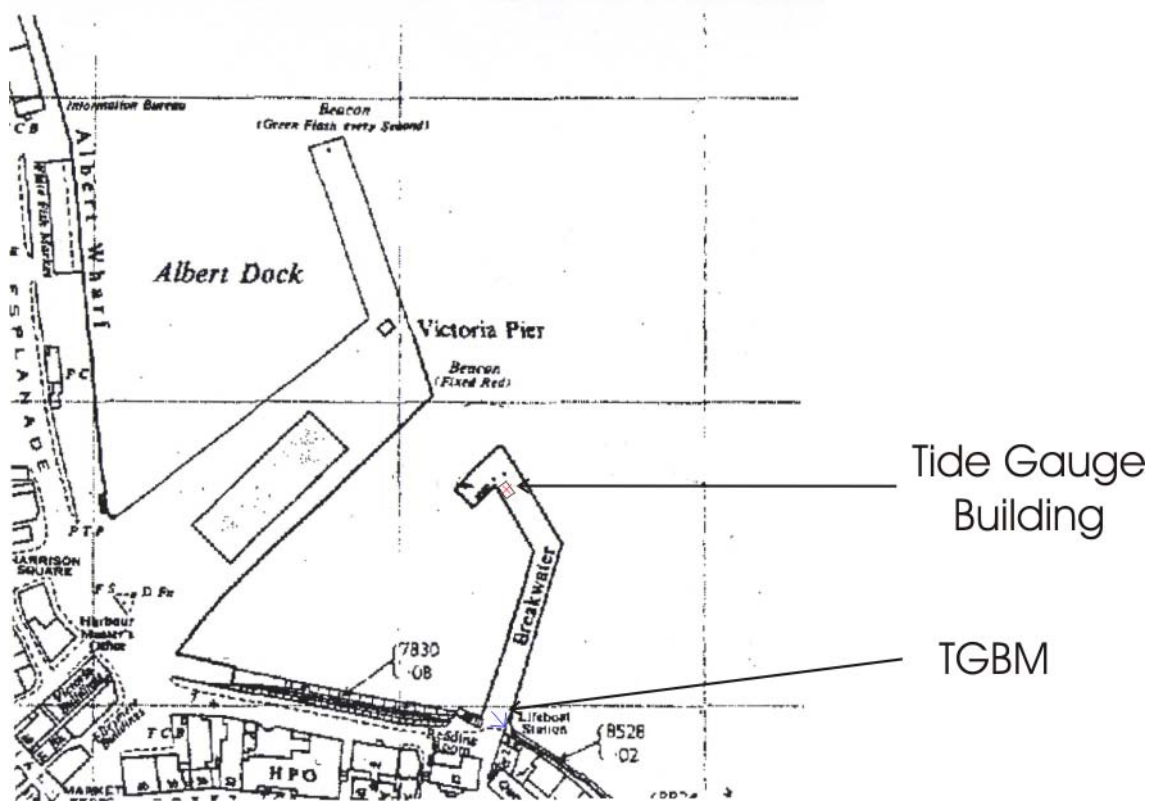
Day 265-266 Replaced compressor

Day 284 Replaced compressor

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	151,175,265-266	310-315,319-365

Lerwick – Map & Images of Site



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Lerwick – Statistics

Surge maxima	Value	Day	Time
January	0.101	16	14:30:00
February	0.124	22	19:45:00
March	0.454	19	11:00:00
April	0.321	30	05:00:00
May	0.164	1	00:00:00
June	0.178	12	02:15:00
July	0.282	7	16:45:00
August	0.305	21	23:30:00
September	0.282	14	18:30:00
October	0.439	30	08:30:00
November	0.43	2	12:00:00
December			

Surge minima	Value	Day	Time
January	-0.364	9	17:15:00
February	-0.326	7	09:45:00
March	-0.181	9	09:45:00
April	-0.194	13	20:30:00
May	-0.18	7	02:15:00
June	-0.151	15	18:00:00
July	-0.133	22	22:45:00
August	-0.203	14	01:30:00
September	-0.14	26	08:15:00
October	-0.159	11	05:00:00
November	-0.114	6	17:15:00
December			

Extreme maxima	Value	Day	Time
January	2.364	31	11:30:00
February	2.395	2	12:45:00
March	2.458	19	12:45:00
April	2.399	29	11:30:00
May	2.205	1	00:00:00
June	2.129	29	00:15:00
July	2.306	12	23:00:00
August	2.346	10	23:15:00
September	2.436	11	00:00:00
October	2.574	6	21:45:00
November	2.377	4	21:15:00
December			

Extreme minima	Value	Day	Time
January	0.037	2	18:00:00
February	0.052	1	18:30:00
March	-0.024	2	18:00:00
April	0.225	27	16:00:00
May	0.306	18	07:15:00
June	0.176	15	06:45:00
July	0.157	14	06:30:00
August	-0.037	12	06:15:00
September	0.094	10	05:30:00
October	0.204	8	04:45:00
November	0.405	6	16:45:00
December			

Mean sea level	No days	MSL
January	31	1.253
February	28	1.252
March	31	1.28
April	30	1.216
May	31	1.191
June	30	1.224
July	31	1.318
August	31	1.319
September	27	1.347
October	31	1.443
November	7	1.517
December	0	
	Sum	Avg
	308	1.305

Liverpool – Tide Gauge Information

Latitude 53° 26' 58.9" N **Longitude** 03° 01' 04.8" W **Grid Ref** SJ 3249 9525

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** In the old Lock Keeper's office at the entrance to Gladstone Dock

Measuring Points Seaward side of Gladstone Dock

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	SJ 3249 9525	NBM rivet NE face E angle base of building
Aux1	SJ 3250 9523	Rivet E side of quay above hinge SW dock gate
Aux2	SJ 3244 9538	Building wall E face SE angle
Aux3	SJ 3294 9558	Rivet concrete adjacent to building No 335

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 4.93m below Ordnance Datum Newlyn (ODN)

TGZ = 14.475m below TGBM

Levelling No levelling was carried out in 2010

Site visits

Day 014 Onsite to reinstate power

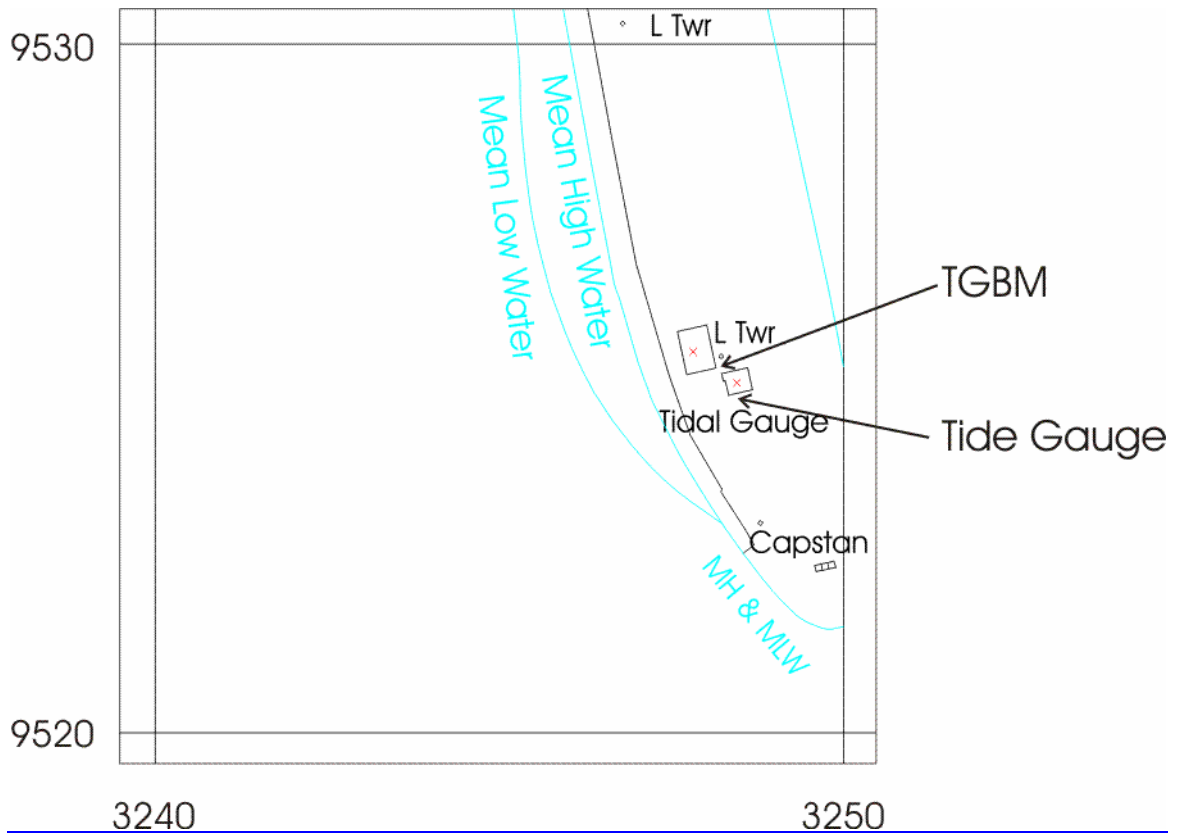
Day 039 Onsite

Day 308-309 Carried out general maintenance and survey for EA Fixed electrical fault

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	125,356-358	001-002,004-005,007,011-014,019-022,030-037,041-052,057-059,061-067,074-076,079-082,085-095,100-109,112-118,120-121,132-138,149,162,164-167,195,258,263-272,274,276-288,294,296-302,305,310-315,320,322-333,335-349,352-356,359,361-365

Liverpool – Map & Images of Site



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Liverpool – Statistics

Surge maxima	Value	Day	Time
January	0.623	16	07:30:00
February	0.537	25	17:15:00
March	0.598	26	05:15:00
April	0.551	6	01:15:00
May	0.33	27	23:45:00
June	0.316	11	18:00:00
July	0.81	16	09:30:00
August	0.546	23	18:45:00
September	0.77	14	22:00:00
October	0.686	29	18:00:00
November	1.794	11	22:00:00
December	0.473	27	10:45:00

Surge minima	Value	Day	Time
January	-0.494	10	03:15:00
February	-0.318	12	19:45:00
March	-0.227	10	17:00:00
April	-0.267	15	17:00:00
May	-0.215	4	23:45:00
June	-0.168	15	01:00:00
July	-0.157	26	04:45:00
August	-0.194	15	01:15:00
September	-0.222	24	13:30:00
October	-0.221	10	08:15:00
November	-0.432	7	07:30:00
December	-0.478	16	21:15:00

Extreme maxima	Value	Day	Time
January	10.049	31	11:30:00
February	10.342	2	13:00:00
March	10.34	2	12:00:00
April	10.121	1	00:00:00
May	9.497	1	00:15:00
June	9.289	13	23:45:00
July	9.994	15	01:00:00
August	10.187	12	00:00:00
September	10.372	9	23:30:00
October	10.23	8	23:15:00
November	9.751	5	22:15:00
December	9.646	6	11:00:00

Extreme minima	Value	Day	Time
January	0.569	31	19:00:00
February	0.455	1	19:45:00
March	0.279	2	19:30:00
April	0.918	1	07:00:00
May	1.39	1	07:15:00
June	1.062	15	07:30:00
July	0.909	14	07:30:00
August	0.441	12	07:30:00
September	0.539	9	06:15:00
October	0.585	9	06:30:00
November	0.832	7	06:00:00
December	1.121	24	20:00:00

Mean sea level	No days	MSL
January	17	5.237
February	13	5.352
March	16	5.233
April	9	5.347
May	30	5.23
June	30	5.275
July	31	5.35
August	31	5.359
September	26	5.371
October	11	5.458
November	24	5.472
December	10	5.4
	Sum	Avg
	248	5.34

Llandudno – Tide Gauge Information

Latitude 53° 19' 54.0" N **Longitude** 03° 49' 30.8" W **Grid Ref** SH 7855 8319

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** A sub-platform under the pavilion at the end of Llandudno pier

Measuring Points A leg of the pier below the tide gauge building

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	SH 7834 8292	Rivet stone butt gate entrance
Aux1	SH 7827 8255	OSBM bolt concrete step SE side of slipway
Aux2	SH 7840 8243	OSBM bolt bottom concrete step
Aux3	SH 7864 8229	OSBM bolt concrete ramp 6.5M NW C slipway

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 3.85m below Ordnance Datum Newlyn (ODN)

TGZ = 12.558m below TGBM

Levelling No levelling was carried out in 2010

Site visits

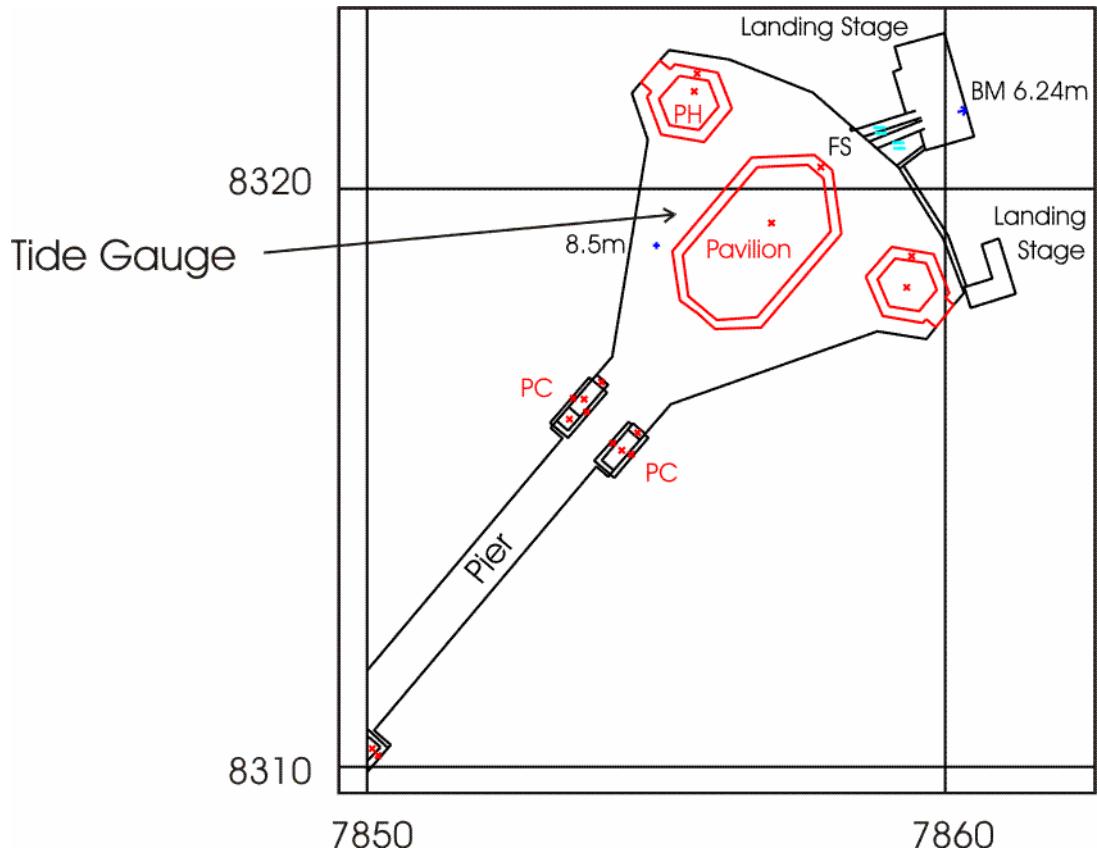
Day 019 Carried out general maintenance

Day 266 Site inspection by EA and Electrical contractors

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	266-267

Llandudno – Map & Images of Site



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Llandudno – Statistics

Surge maxima	Value	Day	Time
January	0.666	16	06:30:00
February	0.475	24	03:00:00
March	0.539	26	05:15:00
April	0.434	6	00:45:00
May	0.199	29	10:45:00
June	0.224	8	06:15:00
July	0.5	16	09:15:00
August	0.356	20	14:30:00
September	0.328	10	14:15:00
October	0.566	29	11:30:00
November	1.048	11	10:00:00
December	0.429	26	23:15:00

Surge minima	Value	Day	Time
January	-0.587	29	15:30:00
February	-0.277	12	16:00:00
March	-0.535	31	10:30:00
April	-0.29	15	21:15:00
May	-0.317	4	23:45:00
June	-0.217	15	01:45:00
July	-0.198	5	01:15:00
August	-0.322	29	23:15:00
September	-0.17	16	23:30:00
October	-0.289	20	03:30:00
November	-0.506	25	17:45:00
December	-0.588	16	22:00:00

Extreme maxima	Value	Day	Time
January	8.195	31	11:15:00
February	8.437	2	12:45:00
March	8.462	1	11:00:00
April	8.156	1	12:00:00
May	7.722	1	00:00:00
June	7.558	13	23:15:00
July	8.221	15	00:30:00
August	8.262	11	23:30:00
September	8.489	9	23:15:00
October	8.421	8	22:45:00
November	7.943	7	23:15:00
December	7.878	6	10:45:00

Extreme minima	Value	Day	Time
January	-0.155	31	18:00:00
February	-0.213	1	18:45:00
March	-0.304	2	18:30:00
April	0.016	1	06:15:00
May	0.65	1	06:30:00
June	0.347	15	06:45:00
July	0.293	14	06:45:00
August	-0.321	12	06:30:00
September	-0.091	9	05:15:00
October	-0.015	9	05:30:00
November	0.123	6	04:30:00
December	0.347	23	18:30:00

Mean sea level	No days	MSL
January	31	4.02
February	28	4.12
March	31	4.045
April	30	3.994
May	31	3.964
June	30	4.009
July	31	4.082
August	31	4.065
September	27	4.122
October	31	4.19
November	30	4.173
December	31	4.064
	Sum	Avg
	362	4.071

Lowestoft – Tide Gauge Information

Latitude 52° 28' 23.2" N **Longitude** 01° 45' 00.4" E **Grid Ref** TM 5478 9274

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** East of the Harbour Master's office

Measuring Points On the quay wall, east of the tide gauge building

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	TM 5482 9273	Bolt on quay wall S side of pier
Aux1	TM 5477 9272	Bolt on concrete jetty at SW corner of TG building
Aux2	TM 5478 9274	CM Harbour Masters Office SE angle S face

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 1.50m below Ordnance Datum Newlyn (ODN)

TGZ = 4.483m below TGBM

Levelling No levelling was carried out in 2010

Site visits

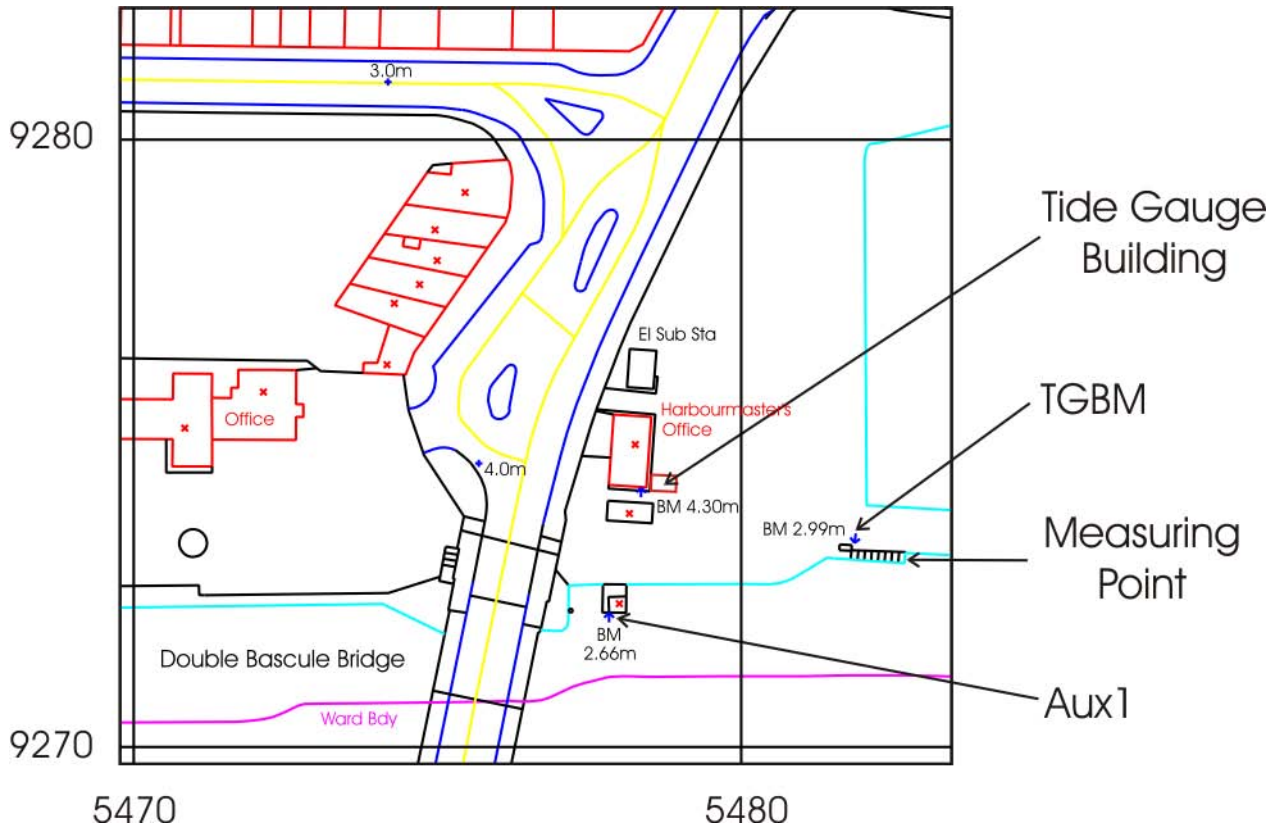
Day 022 Carried out general maintenance

Day 277 Replaced compressor

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
95	15 minutes	118-125,153- 159,160,167,266	265-266,278

Lowestoft – Map & Images of Site



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Lowestoft – Statistics

Surge maxima	Value	Day	Time
January	0.946	28	03:00:00
February	0.537	28	17:00:00
March	0.64	20	02:15:00
April	0.464	20	17:15:00
May	0.574	30	19:15:00
June	0.621	19	18:15:00
July	0.409	5	09:45:00
August	0.943	29	19:15:00
September	0.702	25	18:15:00
October	0.657	20	03:00:00
November	0.867	12	09:00:00
December	0.921	16	12:45:00

Surge minima	Value	Day	Time
January	-0.872	16	17:15:00
February	-0.344	16	03:00:00
March	-0.251	7	09:15:00
April	-0.378	5	18:30:00
May	-0.221	22	11:00:00
June	-0.181	22	12:30:00
July	-0.402	16	14:30:00
August	-0.23	7	03:15:00
September	-0.559	29	21:45:00
October	-0.732	1	22:45:00
November	-1.077	11	15:30:00
December	-0.415	29	00:45:00

Extreme maxima	Value	Day	Time
January	3.012	29	20:45:00
February	3.175	2	23:30:00
March	2.996	19	23:45:00
April	2.599	1	22:45:00
May	2.738	30	23:30:00
June	3.035	19	14:30:00
July	2.747	13	10:00:00
August	3.009	30	00:30:00
September	3.038	25	10:15:00
October	3.044	24	09:30:00
November	2.889	12	13:45:00
December	2.92	12	00:45:00

Extreme minima	Value	Day	Time
January	0.152	16	16:15:00
February	0.005	2	05:45:00
March	0.229	3	05:30:00
April	0.181	1	05:00:00
May	0.43	22	23:00:00
June	0.317	15	18:00:00
July	-0.01	15	18:15:00
August	0.233	12	17:15:00
September	0.027	10	17:00:00
October	0.317	8	15:45:00
November	0.411	8	04:30:00
December	0.363	25	06:15:00

Mean sea level	No days	MSL
January	31	1.61
February	28	1.683
March	31	1.65
April	26	1.567
May	26	1.607
June	18	1.677
July	31	1.641
August	31	1.732
September	28	1.716
October	31	1.789
November	30	1.717
December	31	1.735
	Sum	Avg
	342	1.677

Milford Haven – Tide Gauge Information

Latitude 51° 42' 26.6" N **Longitude** 05° 03' 05.5" W **Grid Ref** SM 8925 0537

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge
Location **Tide Gauge Building** Store room at the shore end of Milford Haven Port
 Authority jetty
Measuring Points Seaward end of the jetty

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	SM 8921 0536	OSBM Bolt on wall W side of entrance to jetty
Aux1	SM 8918 0541	Fl Br G4977 office buildings. SW face NW angle.
Aux2	SM 9001 0601	OSBM bolt wall Victoria Road

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)
 TGZ = 3.71m below Ordnance Datum Newlyn (ODN)
 TGZ = 16.734m below TGBM

Levelling No levelling was carried out in 2010

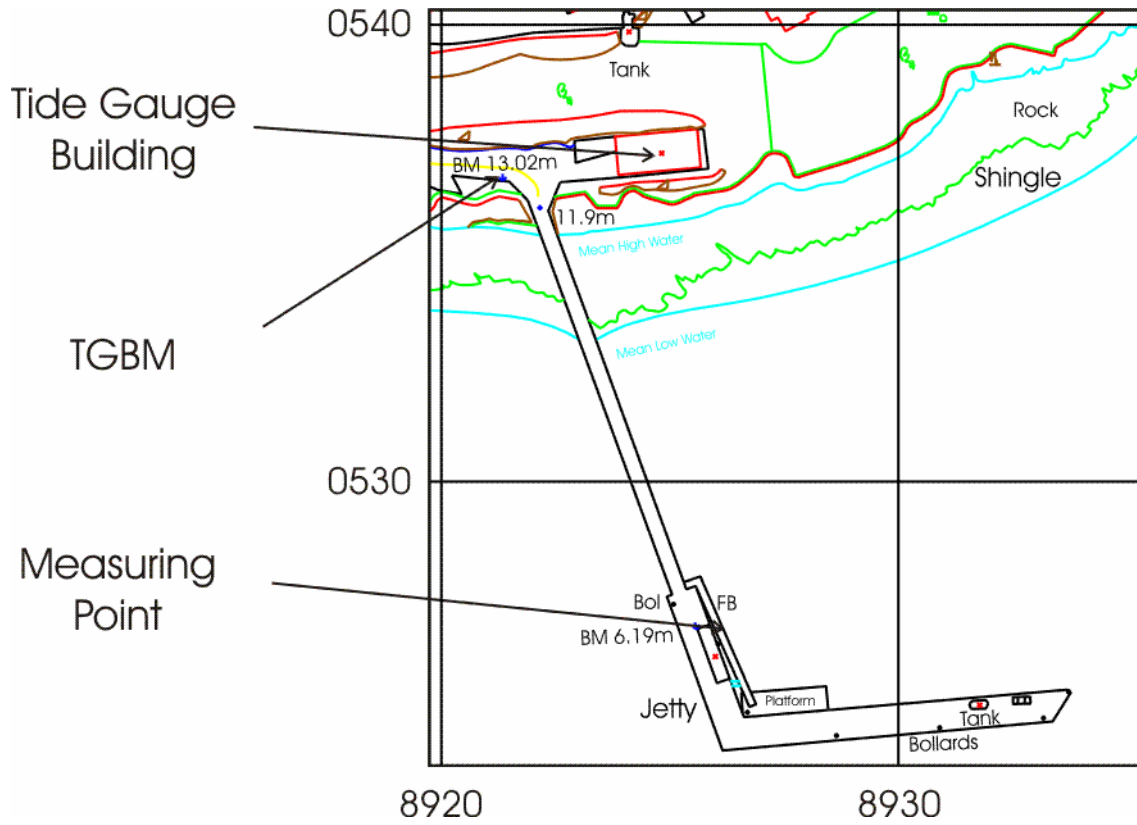
Site visits

None

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	031,250	013-018,194-195,332-333

Milford Haven – Map & Images of Site



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Milford Haven – Statistics

Surge maxima	Value	Day	Time
January	0.545	12	13:00:00
February	0.681	24	08:45:00
March	0.554	30	01:45:00
April	0.483	2	15:15:00
May	0.328	29	07:00:00
June	0.319	8	01:30:00
July	0.584	15	18:30:00
August	0.342	20	01:00:00
September	0.37	6	10:30:00
October	0.501	29	13:00:00
November	0.727	11	04:45:00
December	0.432	27	03:15:00

Surge minima	Value	Day	Time
January	-0.325	27	03:00:00
February	-0.128	6	12:45:00
March	-0.16	13	19:15:00
April	-0.188	15	22:15:00
May	-0.249	5	04:30:00
June	-0.144	16	21:45:00
July	-0.103	5	13:15:00
August	-0.114	29	20:15:00
September	-0.136	24	08:30:00
October	-0.157	16	04:15:00
November	-0.22	7	10:45:00
December	-0.403	16	20:00:00

Extreme maxima	Value	Day	Time
January	7.581	31	06:45:00
February	7.733	2	08:15:00
March	7.883	2	07:15:00
April	7.61	1	07:30:00
May	6.985	29	19:00:00
June	6.943	13	18:45:00
July	7.807	15	20:45:00
August	7.648	11	19:15:00
September	7.903	10	19:30:00
October	7.86	8	18:15:00
November	7.476	8	07:00:00
December	7.285	6	06:15:00

Extreme minima	Value	Day	Time
January	0.418	31	13:15:00
February	0.233	1	14:00:00
March	0.184	2	13:30:00
April	0.327	1	01:30:00
May	1.016	1	01:45:00
June	0.83	15	02:00:00
July	0.866	13	01:00:00
August	0.191	12	01:30:00
September	0.334	10	01:00:00
October	0.523	9	13:00:00
November	0.544	7	12:45:00
December	0.821	24	14:15:00

Mean sea level	No days	MSL
January	25	3.9
February	28	4.021
March	31	3.909
April	30	3.86
May	31	3.846
June	30	3.883
July	28	3.922
August	31	3.917
September	30	3.965
October	31	4.042
November	28	4.072
December	31	3.941
	Sum	Avg
	354	3.94

Millport – Tide Gauge Information

Latitude 55° 44' 59.3" N **Longitude** 04° 54' 22.8" W **Grid Ref** NS 1769 5454

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** Store room at the shore end of the University Marine Biological Station pier

Measuring Points Seaward end of the pier

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	NS 1757 5449	Fl Br G4602 Marine station
Aux1	NS 1772 5457	OSBM bolt rock SE side Rd 5M NE end wall
Aux2	NS 1769 5454	Rivet pier 0.8M prod SE face of TG building
Aux3	NS 1718 5451	No 45 Marine Parade NW angle N face

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 1.62m below Ordnance Datum Newlyn (ODN)

TGZ = 7.825m below TGBM

Levelling No levelling was carried out in 2010

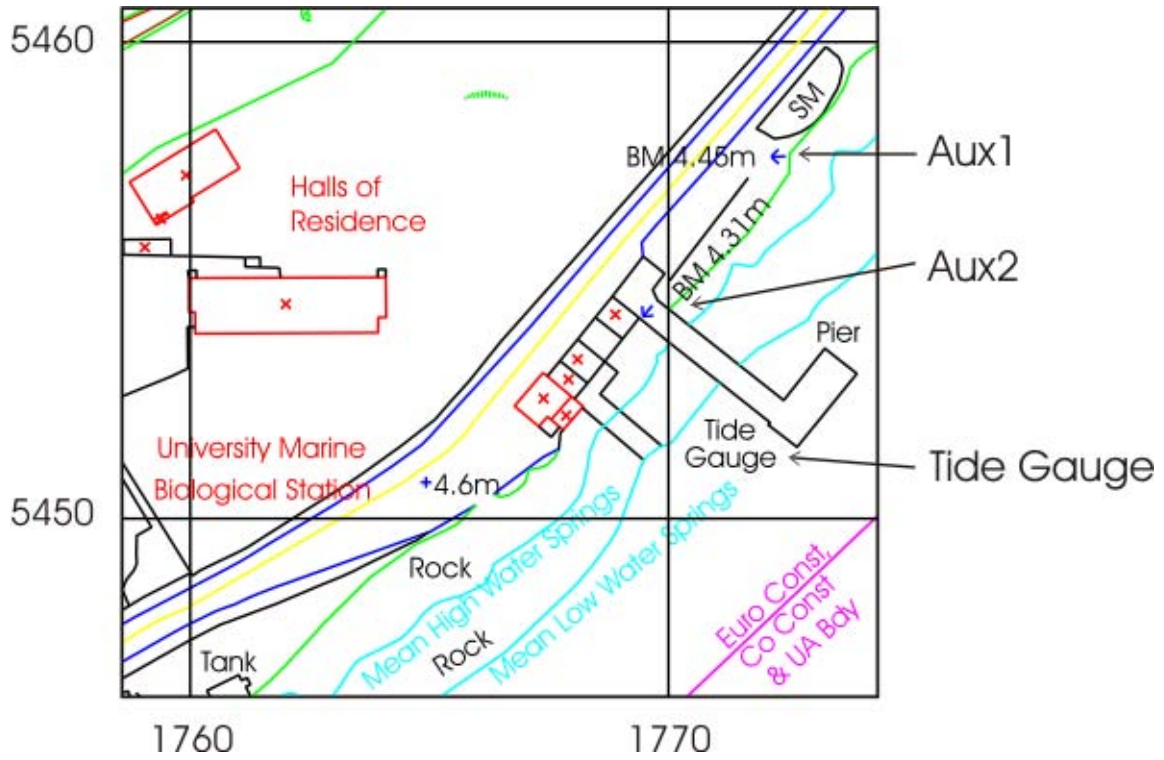
Site visits

Day 293 Installed new heater in TG building

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	014,048,230	None

Millport – Map & Images of Site



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Millport – Statistics

Surge maxima	Value	Day	Time
January	0.828	16	09:00:00
February	0.369	24	03:30:00
March	0.578	19	00:00:00
April	0.594	6	01:15:00
May	0.207	29	10:30:00
June	0.186	27	12:30:00
July	0.607	4	17:15:00
August	0.467	20	13:00:00
September	0.401	10	10:00:00
October	0.744	29	02:15:00
November	1.208	11	14:45:00
December	0.49	26	23:45:00

Surge minima	Value	Day	Time
January	-0.565	10	05:15:00
February	-0.391	12	21:15:00
March	-0.505	31	12:00:00
April	-0.341	15	20:30:00
May	-0.284	4	14:15:00
June	-0.24	14	12:45:00
July	-0.207	22	23:00:00
August	-0.297	29	23:30:00
September	-0.328	24	12:00:00
October	-0.308	20	02:00:00
November	-0.466	9	07:45:00
December	-0.584	17	01:15:00

Extreme maxima	Value	Day	Time
January	3.875	4	14:45:00
February	3.87	3	15:00:00
March	3.855	3	14:00:00
April	3.696	1	13:45:00
May	3.509	1	01:45:00
June	3.501	28	01:15:00
July	3.871	16	03:00:00
August	3.586	13	02:00:00
September	3.872	11	01:45:00
October	4.1	29	15:30:00
November	4.647	11	15:15:00
December	3.838	27	16:15:00

Extreme minima	Value	Day	Time
January	-0.054	5	21:15:00
February	0.101	2	20:00:00
March	-0.108	31	06:15:00
April	0.177	1	07:00:00
May	0.269	2	08:00:00
June	0.12	16	08:15:00
July	0.161	14	07:15:00
August	-0.16	13	07:30:00
September	0.119	9	05:45:00
October	0.204	9	06:00:00
November	0.142	9	19:45:00
December	0.162	24	19:45:00

Mean sea level	No days	MSL
January	31	1.966
February	28	2.02
March	31	1.962
April	30	1.917
May	31	1.857
June	30	1.897
July	31	2.006
August	31	1.965
September	30	2.028
October	31	2.13
November	30	2.121
December	31	1.985
	Sum	Avg
	365	1.988

Mumbles – Tide Gauge Information

Latitude 51° 34' 12.0" N **Longitude** 03° 58' 31.6" W **Grid Ref** SS 6319 8753

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** Mumbles lifeboat station

Measuring Points Near the end of the lifeboat slipway

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	SS 6298 8743	OSBM bolt living rock S side of road
Aux1	SS 6317 8752	OSBM bolt lifeboat station Mumbles Pier
Aux2	SS 6284 8750	OSBM bolt concrete base bollard Lifeboat Cottages
Aux3	SS 6258 8760	Rivet SE side concrete chamber

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 5.00m below Ordnance Datum Newlyn (ODN)

TGZ = 13.821m below TGBM

Levelling No levelling was carried out in 2010

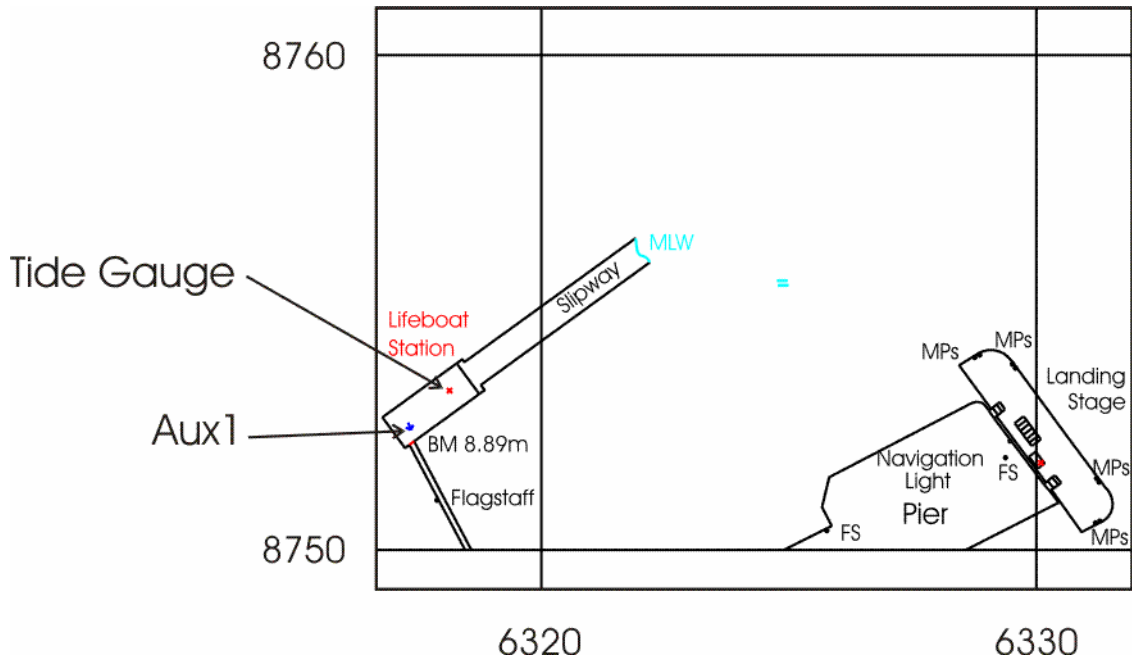
Site visits

None

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	None

Mumbles – Map & Images of Site



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Mumbles – Statistics

Surge maxima	Value	Day	Time
January	0.6	16	03:45:00
February	0.646	23	21:00:00
March	0.531	30	23:15:00
April	0.398	2	16:00:00
May	0.231	29	08:45:00
June	0.239	8	12:00:00
July	0.459	15	21:30:00
August	0.265	20	01:30:00
September	0.29	7	10:30:00
October	0.585	29	14:15:00
November	0.83	11	14:00:00
December	0.371	27	04:00:00

Surge minima	Value	Day	Time
January	-0.461	9	11:30:00
February	-0.28	11	21:30:00
March	-0.305	10	11:00:00
April	-0.375	11	20:45:00
May	-0.416	5	05:45:00
June	-0.273	16	21:00:00
July	-0.242	6	04:45:00
August	-0.246	29	18:30:00
September	-0.237	3	13:15:00
October	-0.259	16	04:30:00
November	-0.327	9	15:45:00
December	-0.55	16	18:30:00

Extreme maxima	Value	Day	Time
January	10.061	31	07:00:00
February	10.233	1	07:45:00
March	10.419	2	07:15:00
April	10.119	1	07:30:00
May	9.312	29	19:15:00
June	9.3	13	19:00:00
July	10.198	15	21:15:00
August	10.165	11	19:15:00
September	10.426	10	19:30:00
October	10.363	8	18:30:00
November	9.906	8	07:15:00
December	9.643	6	06:15:00

Extreme minima	Value	Day	Time
January	0.623	31	13:00:00
February	0.423	1	13:45:00
March	0.267	3	01:45:00
April	0.44	1	01:15:00
May	1.232	1	01:30:00
June	1.095	15	01:45:00
July	1.025	13	13:15:00
August	0.317	12	13:45:00
September	0.416	10	01:00:00
October	0.555	8	12:15:00
November	0.719	7	12:30:00
December	1.106	24	01:45:00

Mean sea level	No days	MSL
January	31	5.185
February	28	5.294
March	31	5.182
April	30	5.12
May	31	5.108
June	30	5.142
July	31	5.191
August	31	5.195
September	30	5.238
October	31	5.309
November	30	5.339
December	31	5.203
	Sum	Avg
	365	5.209

Newhaven – Tide Gauge Information

Latitude 50° 46' 54.4" N **Longitude** 00° 03' 25.3" E **Grid Ref** TQ 4511 0004

Instrument Data acquisition system with two full-tide bubbler gauges

Location **Tide Gauge Building** Within the Port Control building on West Pier

Measuring Points On the pier wall, south east of the Port Control building

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	TQ 4510 0003	Bolt concrete 7.4M SW of SW angle of tower
Aux1	TQ 4495 0001	OSBM bolt concrete sea wall 154.3M SW of tower
Aux2	TQ 4503 0008	Steel ball Gun mount

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 3.52m below Ordnance Datum Newlyn (ODN)

TGZ = 8.783m below TGBM

Levelling No levelling was carried out in 2010

Site visits

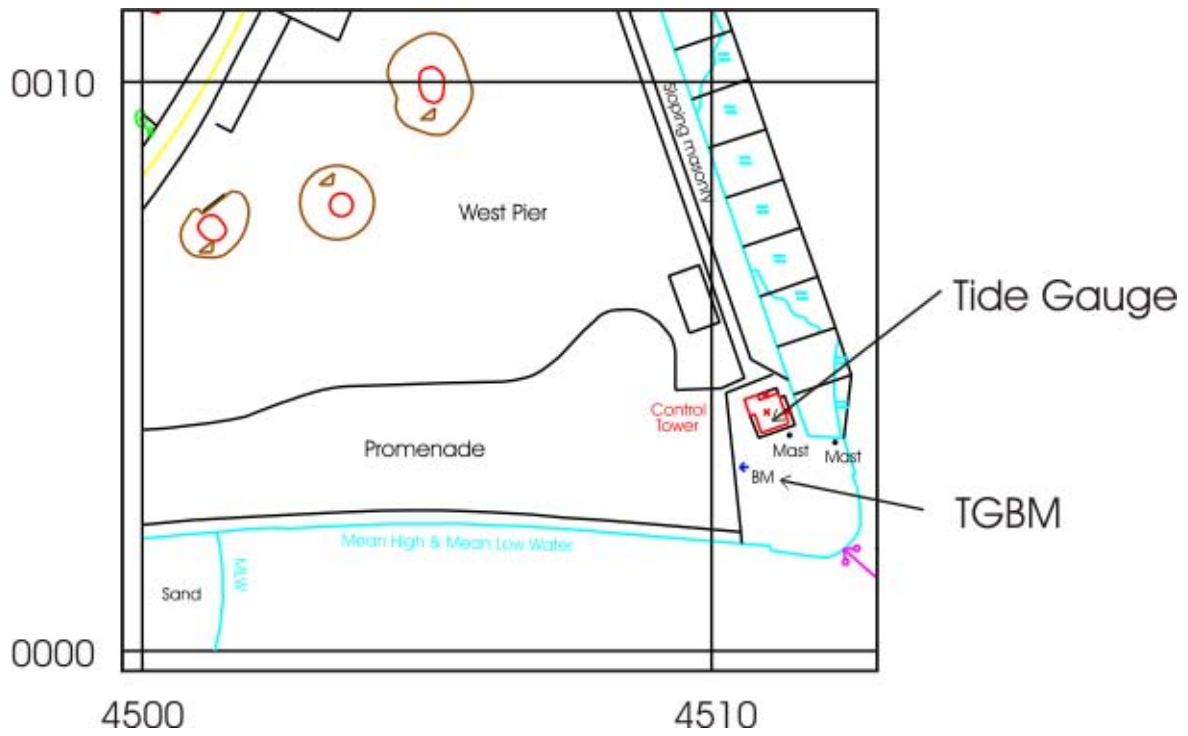
Day 035 Carried out general maintenance

Day 329 Carried out general maintenance

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	202-207

Newhaven – Map & Images of Site



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Newhaven – Statistics

Surge maxima	Value	Day	Time
January	0.447	28	04:45:00
February	0.574	28	11:15:00
March	0.47	31	05:30:00
April	0.262	2	22:30:00
May	0.23	30	23:45:00
June	0.368	19	22:30:00
July	0.321	14	23:45:00
August	0.412	30	00:30:00
September	0.322	16	03:00:00
October	0.383	6	04:30:00
November	0.7	12	17:00:00
December	0.678	16	18:15:00

Surge minima	Value	Day	Time
January	-0.455	9	16:00:00
February	-0.303	11	20:00:00
March	-0.386	7	01:00:00
April	-0.322	12	07:45:00
May	-0.328	5	00:15:00
June	-0.217	16	11:45:00
July	-0.22	18	13:45:00
August	-0.199	14	12:00:00
September	-0.279	13	12:15:00
October	-0.365	2	04:30:00
November	-0.292	28	05:00:00
December	-0.321	1	04:00:00

Extreme maxima	Value	Day	Time
January	7.102	31	23:45:00
February	7.366	28	10:45:00
March	7.334	30	23:30:00
April	7.148	1	00:30:00
May	6.772	1	00:30:00
June	6.6	14	12:15:00
July	7.018	14	13:00:00
August	7.117	12	12:45:00
September	7.265	10	12:15:00
October	7.234	8	11:00:00
November	7.046	6	10:45:00
December	6.872	5	10:30:00

Extreme minima	Value	Day	Time
January	0.473	31	18:15:00
February	0.356	1	19:15:00
March	0.254	2	18:45:00
April	0.45	1	06:30:00
May	0.82	15	05:45:00
June	0.648	16	08:00:00
July	0.642	14	07:00:00
August	0.324	12	06:45:00
September	0.347	10	06:15:00
October	0.467	9	06:00:00
November	0.627	6	17:15:00
December	0.649	25	20:15:00

Mean sea level	No days	MSL
January	31	3.62
February	28	3.727
March	31	3.615
April	30	3.556
May	31	3.585
June	30	3.612
July	24	3.62
August	31	3.68
September	30	3.683
October	31	3.741
November	30	3.758
December	31	3.67
	Sum	Avg
	358	3.656

Newlyn – Tide Gauge Information

Latitude 50° 06' 10.8" N **Longitude** 05° 32' 34.2" W **Grid Ref** SW 4676 2856

Instrument Data acquisition system with a full-tide and mid-tide bubbler gauge and a back-up potentiometer attached to a Munro float gauge

Location **Tide Gauge Building** Tidal Observatory at the end of South Pier, next to the lighthouse

Measuring Points Seaward side of the pier, behind the lighthouse

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	SW 4677 2856	Brass bolt in the floor of the recorder hut.
Aux1	SW 4673 2851	Flush Bracket 1565 on wall S pier NW face 17.8m SW
Aux2	SW 4659 2841	F Bracket 1520 wall SE side of S Pier Rd NW face

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 3.05m below Ordnance Datum Newlyn (ODN)

TGZ = 7.801m below TGBM

Levelling No levelling was carried out in 2010

Site visits

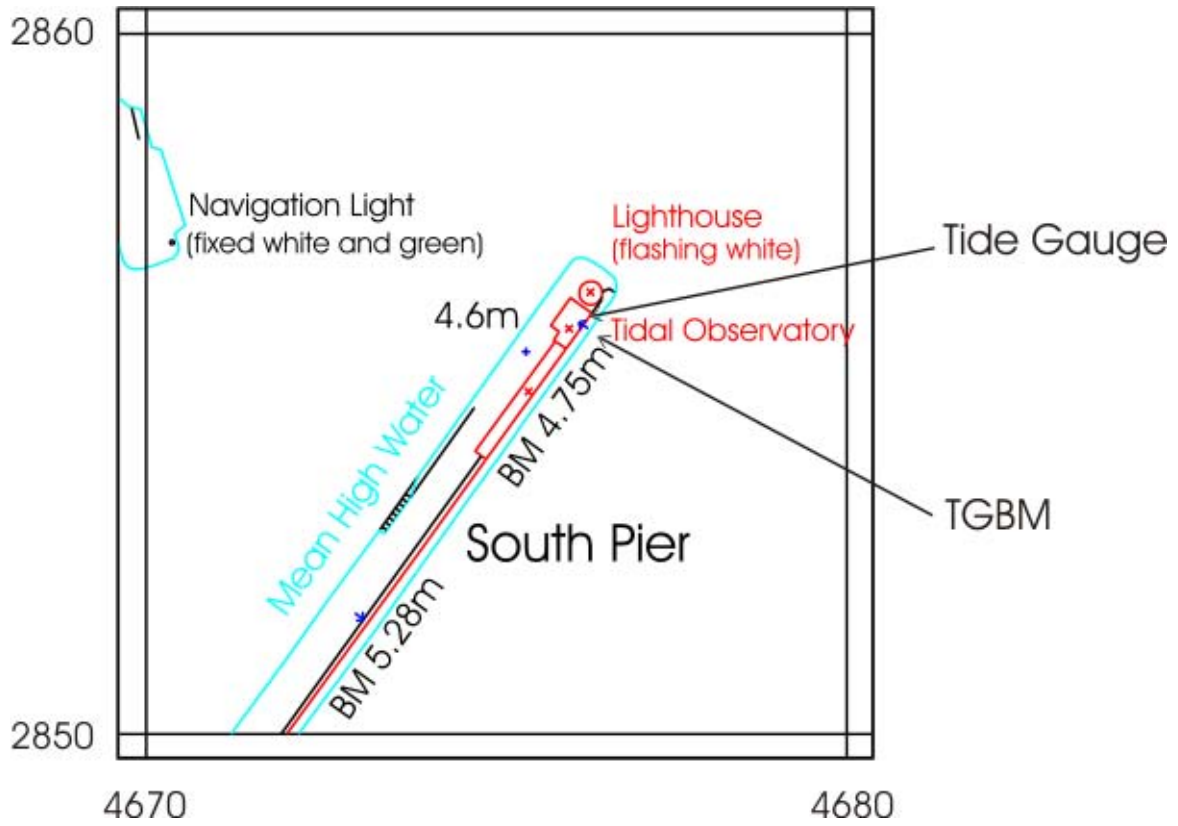
Day 222-224 Divers installed new metalwork and moved Channel 2 from outside to inner harbour wall Float gauge well flushed out Mid tide tubing replaced New pressure points installed plus an extra one for new data logger

Day 315 Carried out general maintenance and survey for EA

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	223-224	012-223,224-226

Newlyn – Map & Images of Site



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Newlyn – Statistics

Surge maxima	Value	Day	Time
January	0.332	3	12:45:00
February			
March			
April			
May			
June			
July			
August	0.266	25	15:45:00
September	0.267	6	09:15:00
October	0.472	30	19:45:00
November	0.487	17	02:00:00
December	0.302	20	01:00:00

Surge minima	Value	Day	Time
January	-0.201	8	23:45:00
February			
March			
April			
May			
June			
July			
August	-0.133	28	23:15:00
September	-0.203	12	22:00:00
October	-0.174	17	19:00:00
November	-0.181	6	12:00:00
December	-0.295	15	01:00:00

Extreme maxima	Value	Day	Time
January	6.038	3	06:30:00
February			
March			
April			
May			
June			
July			
August	5.644	25	17:00:00
September	6.124	10	17:45:00
October	6.192	8	17:00:00
November	5.922	8	05:45:00
December	5.8	6	04:30:00

Extreme minima	Value	Day	Time
January	0.739	4	13:45:00
February			
March			
April			
May			
June			
July			
August	0.841	14	14:45:00
September	0.363	10	00:00:00
October	0.674	8	23:30:00
November	0.625	7	11:30:00
December	0.737	24	13:00:00

Mean sea level	No days	MSL
January	10	3.278
February	0	
March	0	
April	0	
May	0	
June	0	
July	0	
August	16	3.244
September	30	3.253
October	31	3.333
November	30	3.353
December	31	3.264
	Sum	Avg
	148	3.288

Newport – Tide Gauge Information

Latitude 51° 33' 00.0" N **Longitude** 02° 59' 14.8" W **Grid Ref** ST 3163 8392

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** West side of the entrance to Newport Docks
Measuring Points Attached to the dock wall on the west side of the dock entrance, close to the lock gates

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	ST 3163 8392	Brass bolt adjacent to TG building
Aux1	ST 3160 8414	Pin in quay west side of South Lock
Aux2	ST 3160 8426	Pin in quay east side of South Lock
Aux3	ST 3147 8427	Pin in quay south west corner of South Dock

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)
 TGZ = 5.81m below Ordnance Datum Newlyn (ODN)
 TGZ = 14.525m below TGBM

Levelling No levelling was carried out in 2010

Site visits

Day 323 Carried out general maintenance

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	335,356-358	001-005,007-014

Newport – Map & Images of Site



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Newport – Statistics

Surge maxima	Value	Day	Time
January	0.693	16	03:15:00
February	1.114	23	21:15:00
March	0.954	2	02:30:00
April	0.747	1	02:45:00
May	0.46	29	22:45:00
June	0.75	11	13:30:00
July	0.906	15	05:30:00
August	0.762	12	15:15:00
September	0.908	10	14:30:00
October	0.845	29	16:30:00
November	1.244	11	16:30:00
December	0.615	27	06:30:00

Surge minima	Value	Day	Time
January	-0.674	26	03:15:00
February	-0.614	13	13:45:00
March	-0.762	4	04:45:00
April	-0.644	16	03:00:00
May	-0.65	31	15:45:00
June	-0.624	29	15:30:00
July	-0.618	28	15:15:00
August	-0.795	14	17:15:00
September	-0.715	12	16:45:00
October	-0.687	11	16:15:00
November	-0.994	9	16:00:00
December	-0.738	16	20:45:00

Extreme maxima	Value	Day	Time
January	12.964	31	20:15:00
February	13.255	1	08:30:00
March	13.461	2	08:15:00
April	13.126	1	08:30:00
May	11.94	29	20:00:00
June	11.94	13	19:45:00
July	12.893	14	21:00:00
August	13.14	11	20:15:00
September	13.458	10	20:30:00
October	13.286	8	19:30:00
November	12.766	8	08:00:00
December	12.264	6	07:00:00

Extreme minima	Value	Day	Time
January	0.236	31	15:15:00
February	0.195	1	16:15:00
March	0.038	3	04:15:00
April	0.21	29	02:15:00
May	0.52	1	03:15:00
June	0.315	14	15:15:00
July	0.474	13	15:15:00
August	0.213	14	05:00:00
September	0.199	10	15:45:00
October	0.258	9	15:15:00
November	0.364	7	14:45:00
December	0.659	25	04:30:00

Mean sea level	No days	MSL
January	16	6.11
February	28	6.228
March	31	6.162
April	30	6.089
May	31	6.077
June	30	6.115
July	31	6.19
August	31	6.208
September	30	6.244
October	31	6.274
November	30	6.306
December	26	6.168
	Sum	Avg
	345	6.181

North Shields – Tide Gauge Information

Latitude 55° 00' 26.8" N **Longitude** 01° 26' 23.2" W **Grid Ref** NZ 3592 6823

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** North side of the River Tyne, close to the Port of Tyne
Authority offices

Measuring Points As above

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	NZ 3592 6823	Bolt adjacent to tide gauge building
Aux1	NZ 3626 6842	PA Bolt low lighthouse W face SW angle
Aux2	NZ 3630 6895	PA Bolt butt N side railway

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 2.60m below Ordnance Datum Newlyn (ODN)

TGZ = 6.754m below TGBM

Levelling Site was levelled on Day 090

Site visits

Day 069 Installed new software, which proved to be faulty

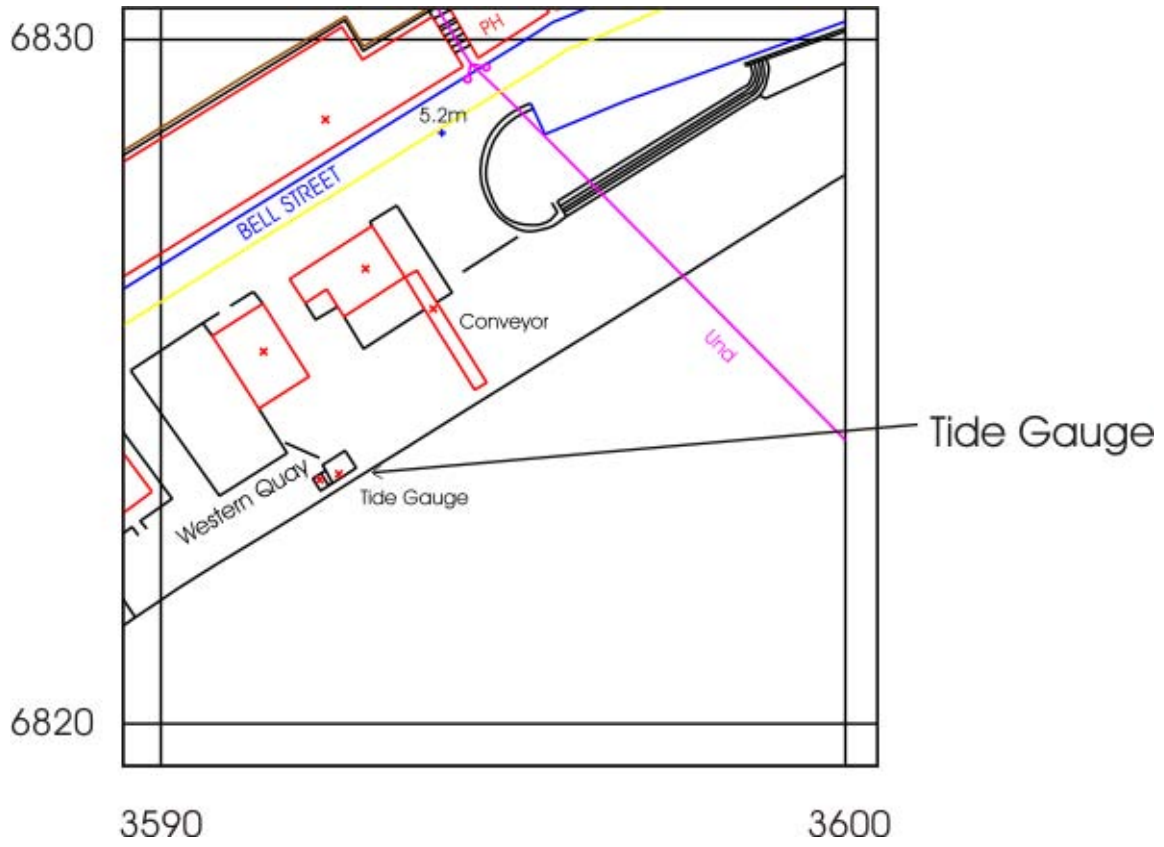
Day 077 Onsite upgrading software

Day 090 Site was re-levelled

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	069-073	060-069,073-090

North Shields – Map & Images of Site



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North Shields – Statistics

Surge maxima	Value	Day	Time
January			
February			
March	0.257	31	11:45:00
April	0.309	29	11:45:00
May	0.271	30	17:00:00
June	0.279	19	13:15:00
July	0.379	5	05:45:00
August	0.365	21	09:30:00
September	0.349	15	15:00:00
October	0.442	6	11:00:00
November	0.653	12	03:15:00
December	0.543	16	06:30:00

Surge minima	Value	Day	Time
January			
February			
March	-0.182	31	19:00:00
April	-0.262	5	12:30:00
May	-0.2	4	14:00:00
June	-0.215	15	22:00:00
July	-0.282	16	09:30:00
August	-0.159	14	08:45:00
September	-0.328	29	17:00:00
October	-0.348	1	19:45:00
November	-0.374	27	10:15:00
December	-0.278	25	10:30:00

Extreme maxima	Value	Day	Time
January			
February			
March	5.381	31	16:00:00
April	5.443	29	15:45:00
May	5.137	1	04:45:00
June	5.056	14	04:15:00
July	5.378	15	05:15:00
August	5.575	13	05:15:00
September	5.782	11	04:45:00
October	5.626	8	03:00:00
November	5.444	6	02:30:00
December	5.213	6	03:15:00

Extreme minima	Value	Day	Time
January			
February			
March	0.088	31	22:45:00
April	0.387	27	21:00:00
May	0.737	17	11:30:00
June	0.425	15	11:30:00
July	0.281	16	13:00:00
August	0.009	12	11:00:00
September	-0.046	10	10:30:00
October	0.231	8	09:30:00
November	0.603	7	22:15:00
December	0.514	24	23:45:00

Mean sea level	No days	MSL
January	0	
February	0	
March	0	
April	30	2.863
May	31	2.864
June	30	2.904
July	31	2.938
August	31	2.982
September	30	2.994
October	31	3.074
November	30	3.022
December	31	2.99
	Sum	Avg
	275	2.959

Portbury – Tide Gauge Information

Latitude 51° 30' 00.0" N **Longitude** 02° 43' 42.5" W **Grid Ref** ST 4953 7815

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** Western, seaward side of the jetty

Measuring Points On the wall below the tide gauge cabinet

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark **Grid Ref** **Description**

TGBM ST 4953 7815 Brass bolt quay edge adjacent to tide gauge

AUX 1 ST 4986 7774 Brass pin coping stone SW corner Portbury Dock

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 6.50m below Ordnance Datum Newlyn (ODN)

TGZ = 9.226m below TGBM

Levelling No levelling was carried out in 2010

Site visits

Day 330 Carried out general maintenance

Data quality

CI% Sample Interval Missing Data

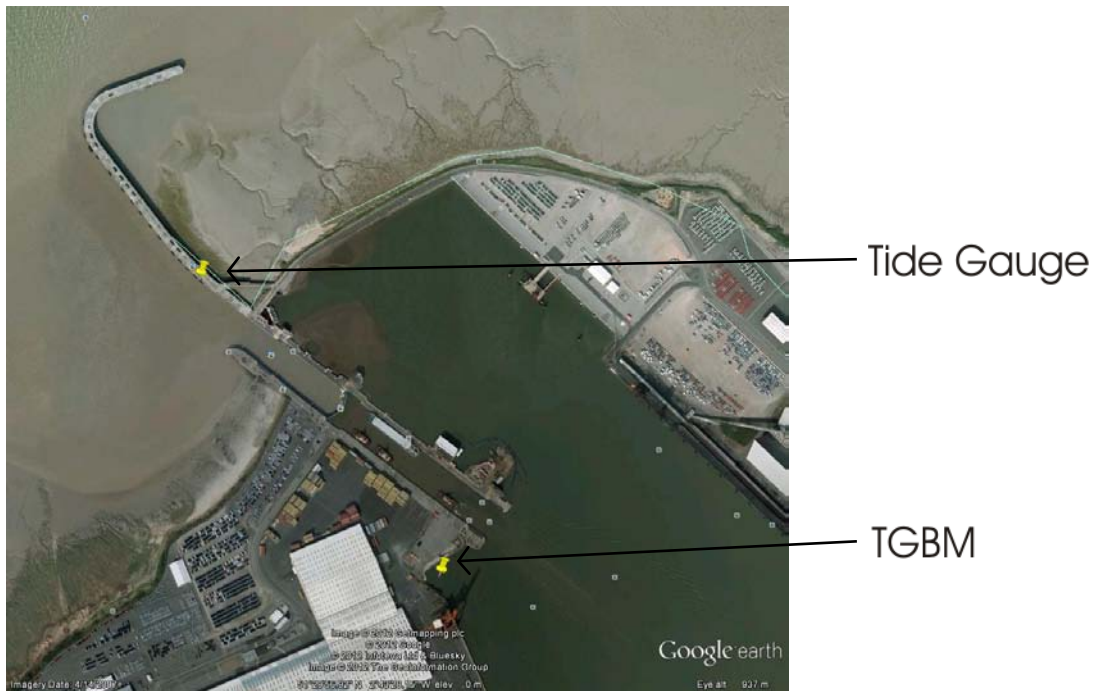
100 15 minutes

None

Suspect Data

119-125,161-162,183,304

Portbury – Map & Images of Site



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Image © 2012 The Geoinformation Group



Portbury Tide Gauge Cabinet

Portbury – Statistics

Surge maxima	Value	Day	Time
January	0.839	1	02:45:00
February	1.328	23	21:00:00
March	1.143	30	15:15:00
April	0.753	2	17:00:00
May	0.673	15	15:45:00
June	0.915	11	13:45:00
July	1.143	15	05:30:00
August	0.824	6	10:45:00
September	0.721	10	15:00:00
October	0.793	6	10:30:00
November	1.367	11	17:15:00
December	0.64	27	06:45:00

Surge minima	Value	Day	Time
January	-0.785	26	03:30:00
February	-0.471	1	13:30:00
March	-0.54	10	20:45:00
April	-0.657	9	21:30:00
May	-0.6	8	20:45:00
June	-0.468	1	16:30:00
July	-0.307	27	15:00:00
August	-0.36	5	15:00:00
September	-0.426	3	14:45:00
October	-0.696	17	21:15:00
November	-0.617	9	16:15:00
December	-0.735	16	21:15:00

Extreme maxima	Value	Day	Time
January	14.169	31	20:30:00
February	14.458	1	08:45:00
March	14.669	2	08:15:00
April	14.299	1	08:45:00
May	13.048	29	20:15:00
June	13.057	13	19:45:00
July	14.037	14	21:15:00
August	14.343	11	20:15:00
September	14.637	9	20:00:00
October	14.47	8	19:30:00
November	13.908	8	08:15:00
December	13.405	6	07:15:00

Extreme minima	Value	Day	Time
January	0.672	31	15:15:00
February	0.433	1	16:00:00
March	0.187	3	04:00:00
April	0.641	1	03:30:00
May	1.358	14	14:00:00
June	1.134	14	15:15:00
July	1.06	13	15:15:00
August	0.525	12	03:30:00
September	0.544	10	03:15:00
October	0.544	8	14:30:00
November	0.785	7	14:45:00
December	1.186	24	03:45:00

Mean sea level	No days	MSL
January	31	6.988
February	28	7.095
March	31	7.029
April	27	6.928
May	26	6.96
June	28	6.984
July	30	7.058
August	31	7.077
September	30	7.107
October	29	7.133
November	30	7.169
December	31	7.037
	Sum	Avg
	352	7.047

Portpatrick – Tide Gauge Information

Latitude 54° 50' 33.2" N **Longitude** 05° 07' 12.1" W **Grid Ref** NW 9976 5421

Instrument Data acquisition system with a full-tide bubbler gauge and a potentiometer attached to a Munro float gauge

Location **Tide Gauge Building** The western corner of Portpatrick harbour
Measuring Points The stilling well is directly underneath the tide gauge building

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	NW 9976 5421	Bolt Harbour wall 13.84M NE angle of building
Aux1	NW 9977 5411	Rivet E side of Jetty wall 16.6M SE angle Lifeboat HQ
Aux2	NW 9995 5412	Rivet S angle No 53 Main St
Aux3	NX 0006 5423	Church hall SE side of Rd W angle

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)
 TGZ = 1.80m below Ordnance Datum Newlyn (ODN)
 TGZ = 6.827m below TGBM

Levelling No levelling was carried out in 2010

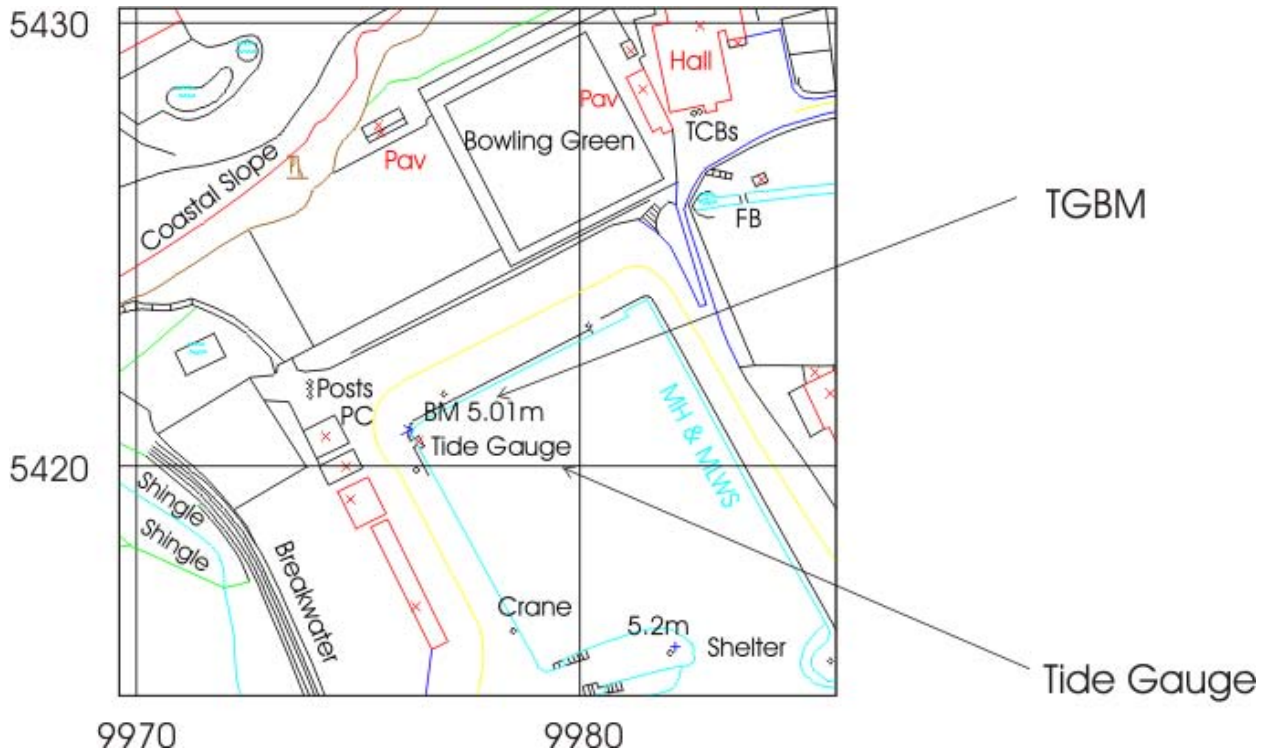
Site visits

Day 292 Carried out general maintenance

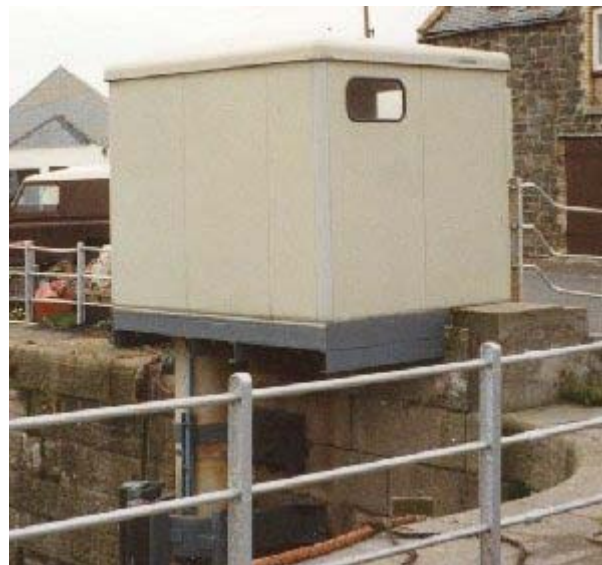
Data quality

CI%	Sample Interval	Missing Data	Suspect Data
96	15 minutes	048-049,149-150,214,220,245,272,302,355,357,359,362,365	001-014,038-149,150-213,214-219,220-301,302-354,355-356,357-358,359-361,362-364,365

Portpatrick – Map & Images of Site



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Portpatrick – Statistics

Surge maxima	Value	Day	Time
January	0.739	16	08:00:00
February	0.426	24	04:30:00
March	0.505	26	06:15:00
April	0.612	6	01:30:00
May	0.198	29	10:45:00
June	0.163	8	09:30:00
July	0.492	4	16:30:00
August	0.41	20	12:30:00
September	0.33	10	11:15:00
October	0.648	29	13:45:00
November	0.947	11	20:15:00
December	0.478	27	01:45:00

Surge minima	Value	Day	Time
January	-0.479	29	15:15:00
February	-0.341	12	20:15:00
March	-0.402	31	10:45:00
April	-0.284	15	19:15:00
May	-0.254	5	22:15:00
June	-0.209	14	18:30:00
July	-0.141	22	17:00:00
August	-0.231	29	23:00:00
September	-0.259	24	10:15:00
October	-0.265	20	02:45:00
November	-0.384	27	08:45:00
December	-0.456	17	00:30:00

Extreme maxima	Value	Day	Time
January	4.269	4	14:00:00
February	4.349	2	13:30:00
March	4.363	3	13:15:00
April	4.201	1	13:00:00
May	3.944	1	01:00:00
June	3.885	29	01:00:00
July	4.417	16	02:30:00
August	4.16	12	00:30:00
September	4.411	11	01:00:00
October	4.377	8	23:45:00
November	4.749	11	14:30:00
December	4.249	27	15:45:00

Extreme minima	Value	Day	Time
January	0.004	31	18:15:00
February	0.044	1	19:15:00
March	-0.061	31	06:00:00
April	0.173	1	06:45:00
May	0.339	2	07:45:00
June	0.151	15	07:15:00
July	0.284	14	07:00:00
August	-0.126	13	07:30:00
September	0.144	9	05:30:00
October	0.273	9	06:00:00
November	0.217	7	05:30:00
December	0.219	24	19:30:00

Mean sea level	No days	MSL
January	31	2.127
February	24	2.196
March	31	2.142
April	30	2.092
May	29	2.036
June	30	2.091
July	31	2.199
August	20	2.161
September	30	2.221
October	29	2.294
November	30	2.309
December	21	2.179
	Sum	Avg
	336	2.171

Portrush – Tide Gauge Information

Latitude 55° 12' 24.4" N **Longitude** 06° 39' 24.6" W **Grid Ref** NW 0416 9952

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** Portrush RNLI boathouse

Measuring Points Fixed to a leg of the boathouse slipway

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	NR 0385 0018	Pin RNLI slipway
Aux1	NR 0395 0008	Cut mark wall Kerr St
Aux2	NW 0406 9992	Cut mark wall Kerr St

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 1.24m below Ordnance Datum Belfast (ODB)

TGZ = 2.844m below TGBM

Levelling No levelling was carried out in 2010

Site visits

Day 291 Replaced compressor

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	119	None

Portrush – Map & Images of Site



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Portrush – Statistics

Surge maxima	Value	Day	Time
January	0.622	16	08:15:00
February	0.287	24	03:45:00
March	0.547	19	00:45:00
April	0.427	5	21:00:00
May	0.092	29	09:30:00
June	0.125	27	17:45:00
July	0.476	4	16:00:00
August	0.401	20	14:30:00
September	0.414	13	17:15:00
October	0.553	29	09:00:00
November	1.03	11	16:15:00
December	0.336	26	22:15:00

Surge minima	Value	Day	Time
January	-0.384	10	21:00:00
February	-0.281	6	16:30:00
March	-0.289	31	12:15:00
April	-0.314	15	20:00:00
May	-0.3	6	23:00:00
June	-0.258	14	21:15:00
July	-0.213	22	15:45:00
August	-0.259	29	21:30:00
September	-0.259	24	13:30:00
October	-0.257	24	14:00:00
November	-0.422	27	07:00:00
December	-0.361	15	06:30:00

Extreme maxima	Value	Day	Time
January	2.769	16	07:30:00
February	2.583	28	06:15:00
March	2.584	1	06:45:00
April	2.384	28	18:15:00
May	2.197	29	19:30:00
June	2.231	27	19:15:00
July	2.499	14	20:15:00
August	2.435	11	19:15:00
September	2.609	8	18:15:00
October	2.595	7	17:45:00
November	2.708	8	07:15:00
December	2.401	6	06:30:00

Extreme minima	Value	Day	Time
January	0.126	30	12:45:00
February	0.006	1	01:15:00
March	0.011	31	00:30:00
April	0.064	1	01:15:00
May	0.384	16	13:45:00
June	0.182	14	13:15:00
July	0.293	13	13:15:00
August	-0.068	13	14:00:00
September	0.138	9	12:15:00
October	0.258	9	12:45:00
November	0.218	7	12:30:00
December	0.213	24	01:45:00

Mean sea level	No days	MSL
January	31	1.259
February	28	1.293
March	31	1.245
April	30	1.193
May	31	1.137
June	30	1.18
July	31	1.294
August	31	1.255
September	30	1.326
October	31	1.401
November	30	1.38
December	31	1.276
	Sum	Avg
	365	1.27

Portsmouth – Tide Gauge Information

Latitude 50° 48' 08.1" N **Longitude** 01° 06' 40.5" W **Grid Ref** SU 6273 0068

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** Victory Jetty in Portsmouth Royal Naval base

Measuring Points On a leg at the north west corner of the jetty

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	SU 6269 0053	Bolt in concrete jetty TG building S angle
Aux1	SU 6330 9996	GP N side entrance to HMS Vernon
Aux2	SU 6274 0039	Building SW face 0.6M S angle
Aux3	SU 6283 0050	Building SW side of Main Rd NE face N angle

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 2.73m below Ordnance Datum Newlyn (ODN)

TGZ = 6.007m below TGBM

Levelling No levelling was carried out in 2010

Site visits

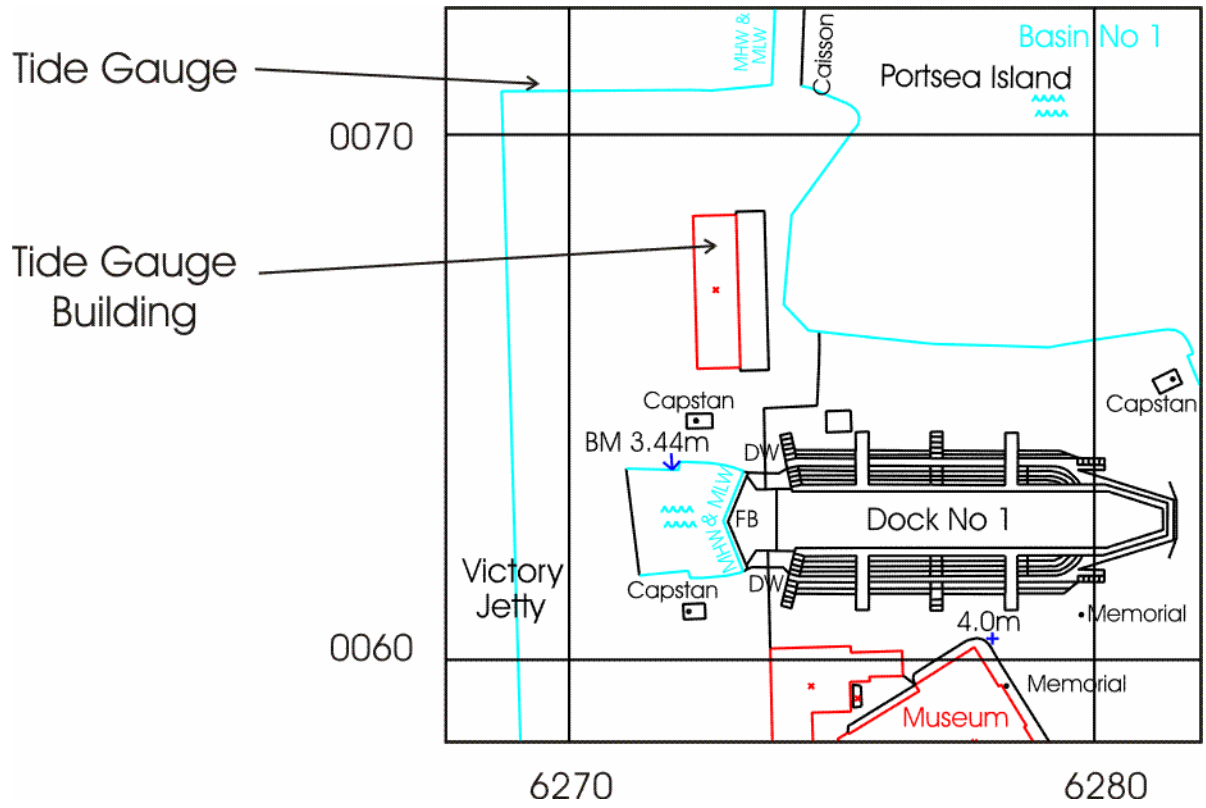
Day 034 Carried out general maintenance

Day 161 Carried out general maintenance and compressor change

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	279	None

Portsmouth – Map & Images of Site



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Portsmouth – Statistics

Surge maxima	Value	Day	Time
January	0.328	28	06:30:00
February	0.597	25	20:15:00
March	0.471	31	04:00:00
April	0.352	2	12:00:00
May	0.239	29	12:15:00
June	0.331	20	00:30:00
July	0.373	15	05:30:00
August	0.406	23	02:45:00
September	0.31	16	04:30:00
October	0.408	31	03:45:00
November	0.646	12	16:30:00
December	0.537	16	20:15:00

Surge minima	Value	Day	Time
January	-0.481	9	17:15:00
February	-0.278	11	21:00:00
March	-0.306	8	15:30:00
April	-0.337	12	08:30:00
May	-0.338	5	08:30:00
June	-0.221	16	06:15:00
July	-0.207	7	14:45:00
August	-0.223	31	10:00:00
September	-0.334	30	05:30:00
October	-0.315	2	06:00:00
November	-0.274	2	08:30:00
December	-0.377	12	20:15:00

Extreme maxima	Value	Day	Time
January	5.013	31	12:00:00
February	5.278	28	11:00:00
March	5.352	30	23:30:00
April	5.057	1	00:15:00
May	4.804	1	00:45:00
June	4.743	12	23:15:00
July	5.091	15	01:15:00
August	4.975	11	12:15:00
September	5.125	10	12:30:00
October	5.113	8	11:15:00
November	5.037	9	00:45:00
December	5.018	5	10:30:00

Extreme minima	Value	Day	Time
January	0.416	31	17:30:00
February	0.337	1	18:15:00
March	0.213	2	18:00:00
April	0.526	1	05:45:00
May	0.756	15	05:00:00
June	0.545	16	07:00:00
July	0.666	14	06:00:00
August	0.276	12	06:00:00
September	0.371	10	05:30:00
October	0.506	9	05:00:00
November	0.605	6	16:15:00
December	0.563	24	18:30:00

Mean sea level	No days	MSL
January	31	2.864
February	28	2.971
March	31	2.863
April	30	2.802
May	31	2.822
June	30	2.853
July	31	2.867
August	31	2.913
September	30	2.925
October	31	2.987
November	30	3.001
December	31	2.904
	Sum	Avg
	365	2.898

Sheerness – Tide Gauge Information

Latitude 51° 26' 44.3" N **Longitude** 00° 44' 36.4" E **Grid Ref** TQ 9074 7542

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge
Location **Tide Gauge Building** On the jetty at Garrison Point, Port of Sheerness
Measuring Points As above

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	TQ 9080 7549	Flush bracket 11859, Garrison Fort, S angle, SW building
Aux1	TQ 9133 7532	Flush bracket G.4790, on house, NW angle, N face
Aux2	TQ 9115 7533	Wall on SW side of road, NE angle
Aux3	TQ 9147 7516	Bolt Ch. Dis, SW side of road, E face, NE angle

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)
 TGZ = 2.90m below Ordnance Datum Newlyn (ODN)
 TGZ = 7.532m below TGBM

Levelling No levelling was carried out in 2010

Site visits

Day 035 Onsite to purge system
 Day 063 Carried out general maintenance
 Day 328 Carried out general maintenance

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	153	001-183,187-196,200-365

Sheerness – Map & Images of Site



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Sheerness – Statistics

Surge maxima	Value	Day	Time
January			
February	0.542	11	06:00:00
March	0.571	6	07:30:00
April			
May			
June	0.088	30	15:00:00
July	0.557	5	14:15:00
August			
September			
October			
November			
December			

Surge minima	Value	Day	Time
January			
February	-0.479	16	09:45:00
March	-0.174	9	11:30:00
April			
May			
June	-0.149	30	22:00:00
July	-0.587	16	18:15:00
August			
September			
October			
November			
December			

Extreme maxima	Value	Day	Time
January			
February	6.288	3	03:00:00
March	3.732	4	17:30:00
April			
May			
June	5.516	30	14:45:00
July	5.925	16	03:30:00
August			
September			
October			
November			
December			

Extreme minima	Value	Day	Time
January			
February	0.393	16	08:15:00
March	0.304	3	08:30:00
April			
May			
June	0.713	30	21:15:00
July	0.228	16	22:30:00
August			
September			
October			
November			
December			

Mean sea level	No days	MSL
January	0	
February	0	
March	0	
April	0	
May	0	
June	0	
July	4	3.051
August	0	
September	0	
October	0	
November	0	
December	0	
	Sum	Avg
	4	3.051

St Mary's (Isles of Scilly) – Tide Gauge Information

Latitude 49° 55' 04.3" N **Longitude** 06° 19' 02.0" W **Grid Ref** SV 9021 1090

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** Cabinet in the Harbour Office storeroom on the quay, Hugh Town

Measuring Points End of the quay

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	N/A	Bolt by VTS
Aux1	N/A	Bolt by VTS 2
Aux2	N/A	Bolt by top of steps
Aux3	N/A	Bolt by top of steps
Aux4	SV 9028 1097	Point above pressure points
Aux5	SV 9014 1071	Cut Mark east angle Mermaid Inn
Aux6	SV 9007 1065	Cut Mark Guard House top of Garrison Hill
VTS	SV 9023 1091	Tide staff 7.210 metre mark
VTS2	N/A	Tide staff 7.245 metre mark

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 2.91m below Ordnance Datum Local (ODL)

TGZ = 7.425m below TGBM

TGZ = 7.399m below Aux 1

TGZ = 6.776m below Aux 2

Levelling No levelling was carried out in 2010

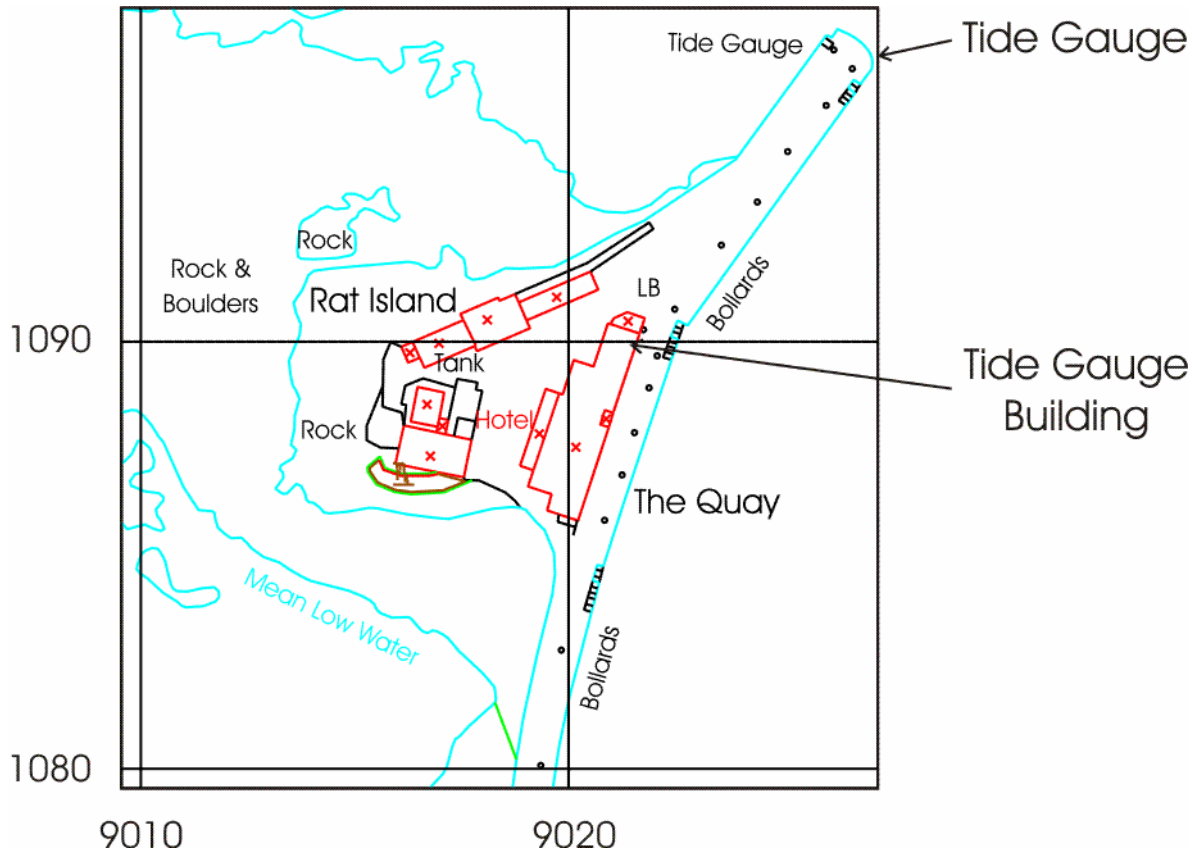
Site visits

None

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	029-107,109-147,169,173-180

St Mary's (Isles of Scilly) – Map & Images of Site



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St Mary's (Isles of Scilly) – Statistics

Surge maxima	Value	Day	Time
January	0.425	12	11:45:00
February	0.334	5	15:00:00
March			
April	0.304	3	04:00:00
May	0.187	29	04:15:00
June	0.216	7	23:45:00
July	0.373	15	15:00:00
August	0.179	20	00:45:00
September	0.237	6	08:30:00
October	0.408	30	20:00:00
November	0.379	11	09:45:00
December	0.255	6	04:45:00

Surge minima	Value	Day	Time
January	-0.309	27	01:00:00
February	-0.073	6	05:15:00
March			
April	-0.072	18	11:15:00
May	-0.084	31	01:00:00
June	-0.125	6	13:45:00
July	-0.167	6	02:30:00
August	-0.162	28	08:45:00
September	-0.177	12	17:30:00
October	-0.168	17	19:45:00
November	-0.209	6	11:15:00
December	-0.319	15	01:45:00

Extreme maxima	Value	Day	Time
January	6.207	3	06:15:00
February	5.387	5	09:00:00
March			
April	5.575	3	07:00:00
May	5.609	29	17:30:00
June	5.611	13	17:15:00
July	6.106	14	18:30:00
August	6.066	11	17:30:00
September	6.261	10	18:00:00
October	6.297	8	17:00:00
November	6.007	8	05:30:00
December	5.922	6	04:45:00

Extreme minima	Value	Day	Time
January	0.673	2	12:00:00
February	1.55	6	04:00:00
March			
April	0.998	18	00:45:00
May	0.97	27	22:45:00
June	0.713	16	01:30:00
July	0.683	15	01:15:00
August	0.178	12	00:15:00
September	0.226	9	23:45:00
October	0.534	8	23:30:00
November	0.479	7	11:15:00
December	0.665	24	13:00:00

Mean sea level	No days	MSL
January	28	3.243
February	0	
March	0	
April	0	
May	4	3.205
June	20	3.177
July	31	3.161
August	31	3.156
September	30	3.197
October	31	3.281
November	30	3.321
December	31	3.233
	Sum	Avg
	236	3.219

Stornoway – Tide Gauge Information

Latitude 58° 12' 28.1" N **Longitude** 06° 23' 20.3" W **Grid Ref** NB 4228 3274

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** By the weighbridge at the entrance to Stornoway Port Authority, No. 2 wharf

Measuring Points Attached to a leg on the east side of the wharf

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	NB 4228 3264	OSBM bolt E side of No 2 wharf
Aux1	NB 4215 3271	OSBM bolt STS NE angle King Edwards Wharf
Aux2	NB 4212 3275	Amity House E side of Espl Rd N face NW angle
Aux3	NB 4223 3280	BK S side Worth Beach NW angle N face

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 2.71m below Ordnance Datum Local (ODL)

TGZ = 6.368m below TGBM

Levelling No levelling was carried out in 2010

Site visits

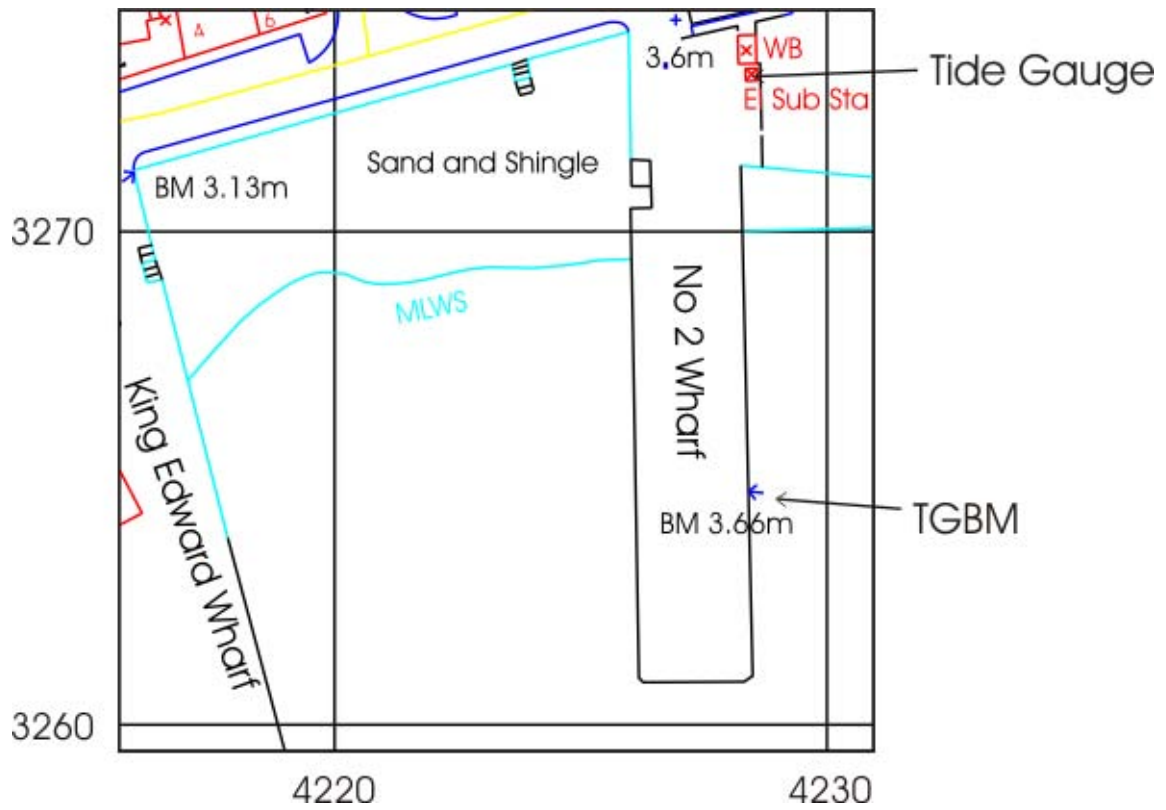
Day 026 Carried out general maintenance

Day 333 Carried out general maintenance and survey for EA

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	014,273-311

Stornoway – Map & Images of Site



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Stornoway – Statistics

Surge maxima	Value	Day	Time
January	0.57	16	14:45:00
February	0.207	23	19:45:00
March	0.6	19	10:00:00
April	0.491	5	19:15:00
May	0.175	13	08:00:00
June	0.218	28	04:15:00
July	0.456	4	16:15:00
August	0.503	21	01:15:00
September	0.28	14	11:15:00
October			
November	0.767	11	17:45:00
December	0.229	27	06:30:00

Surge minima	Value	Day	Time
January	-0.426	10	23:30:00
February	-0.321	7	07:30:00
March	-0.242	12	19:15:00
April	-0.243	15	19:00:00
May	-0.225	3	04:00:00
June	-0.186	19	07:15:00
July	-0.143	22	14:30:00
August	-0.225	13	22:30:00
September	-0.213	25	23:00:00
October			
November	-0.463	26	23:45:00
December	-0.392	16	23:15:00

Extreme maxima	Value	Day	Time
January	5.243	16	07:30:00
February	5.331	2	08:45:00
March	5.398	1	07:00:00
April	5.186	28	18:45:00
May	4.775	28	19:00:00
June	4.825	27	19:30:00
July	5.139	14	20:30:00
August	5.312	11	19:45:00
September	5.564	10	19:45:00
October			
November	5.335	8	07:45:00
December	5.001	6	06:45:00

Extreme minima	Value	Day	Time
January	0.181	31	14:00:00
February	0.135	1	14:45:00
March	0.013	2	14:15:00
April	0.279	1	02:00:00
May	0.84	1	02:30:00
June	0.538	15	03:00:00
July	0.451	14	02:30:00
August	0.042	13	03:00:00
September	0.122	10	01:45:00
October			
November	0.774	9	15:00:00
December	0.568	24	15:15:00

Mean sea level	No days	MSL
January	29	2.884
February	28	2.883
March	31	2.881
April	30	2.82
May	31	2.771
June	30	2.823
July	31	2.937
August	31	2.9
September	24	2.943
October	0	
November	22	2.949
December	31	2.88
	Sum	Avg
	318	2.879

Tobermory – Tide Gauge Information

Latitude 56° 37' 23.2" N **Longitude** 06° 03' 51.2" W **Grid Ref** NM 5079 5531

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** In the Caledonian MacBrayne ferry terminal on Mishnish Pier

Measuring Points Attached to a leg of the pier

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	NM 5069 5530	F bracket G5186 on SW angle of Royal bldg
Aux2	NM 5077 5529	NBM rivet in sea wall of Mishnish Pier

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 2.39m below Ordnance Datum Newlyn (ODN)

TGZ = Chart Datum = 6.856m below TGBM

Levelling No levelling was carried out in 2010

Site visits

Day 028 Carried out general maintenance

Day 081 Onsite to fix electrical fault

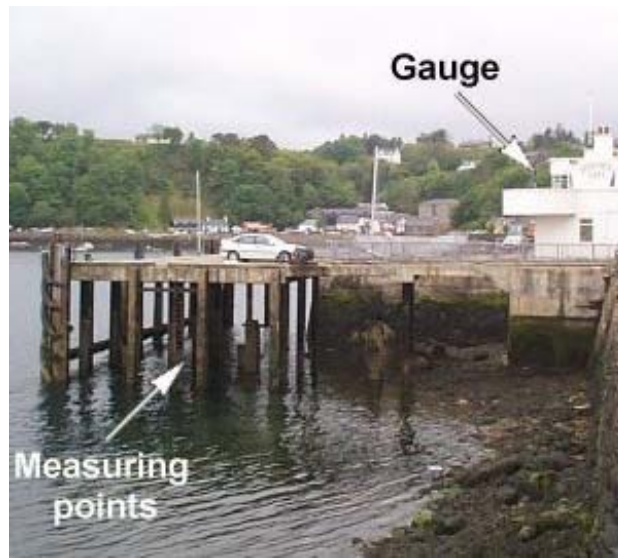
Data quality

CI%	Sample Interval	Missing Data	Suspect Data
96	15 minutes	069-081	None

Tobermory – Map & Images of Site



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Tobermory – Statistics

Surge maxima	Value	Day	Time
January	0.664	16	08:30:00
February	0.249	23	19:00:00
March	0.43	22	17:15:00
April	0.483	5	18:45:00
May	0.133	1	03:45:00
June	0.203	27	17:15:00
July	0.602	4	15:15:00
August	0.466	20	16:00:00
September	0.428	13	16:45:00
October	0.705	29	04:30:00
November	1.092	11	15:45:00
December	0.307	27	05:00:00

Surge minima	Value	Day	Time
January	-0.459	10	21:45:00
February	-0.326	6	23:45:00
March	-0.379	31	12:45:00
April	-0.302	15	20:00:00
May	-0.263	3	03:45:00
June	-0.216	14	20:30:00
July	-0.199	22	22:00:00
August	-0.255	13	22:30:00
September	-0.259	24	17:30:00
October	-0.255	24	14:30:00
November	-0.456	27	02:00:00
December	-0.431	17	03:15:00

Extreme maxima	Value	Day	Time
January	4.987	16	06:45:00
February	5.067	2	07:45:00
March	5.123	2	06:45:00
April	4.859	28	17:45:00
May	4.494	29	18:45:00
June	4.495	27	18:30:00
July	4.9	14	19:30:00
August	4.974	11	18:45:00
September	5.256	10	19:00:00
October	5.16	8	18:00:00
November	5.15	8	06:45:00
December	4.727	6	06:00:00

Extreme minima	Value	Day	Time
January	0.413	31	13:15:00
February	0.199	1	01:15:00
March	0.059	31	13:00:00
April	0.234	1	01:00:00
May	0.82	16	13:30:00
June	0.572	14	13:15:00
July	0.584	14	13:45:00
August	0.086	12	13:30:00
September	0.299	9	12:15:00
October	0.447	9	12:45:00
November	0.535	7	12:15:00
December	0.6	24	01:45:00

Mean sea level	No days	MSL
January	31	2.7
February	28	2.728
March	17	2.697
April	30	2.637
May	31	2.58
June	30	2.627
July	31	2.736
August	31	2.701
September	30	2.763
October	31	2.861
November	30	2.827
December	31	2.704
	Sum	Avg
	351	2.713

Ullapool – Tide Gauge Information

Latitude 57° 53' 42.9" N **Longitude** 05° 09' 28.4" W **Grid Ref** NH 1293 9391

Instrument Data acquisition system with a full-tide and a mid-tide bubbler gauge and a back-up potentiometer attached to a Munro float gauge

Location **Tide Gauge Building** On the Ullapool harbour pier

Measuring Points Below the tide gauge building

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	NH 1288 9391	OSBM Pier NW Para 8.2M NE steps
Aux1	NH 1303 9425	PA bolt Church SW side of road NE face N angle
Aux2	NH 1288 9398	No 8 Shore Street SE face 0.3M S angle
Aux3	NH 1253 9376	Rivet Fnd No 21 West Shore Street S angle

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 2.75m below Ordnance Datum Newlyn (ODN)

TGZ = 7.155m below TGBM

Levelling No levelling was carried out in 2010

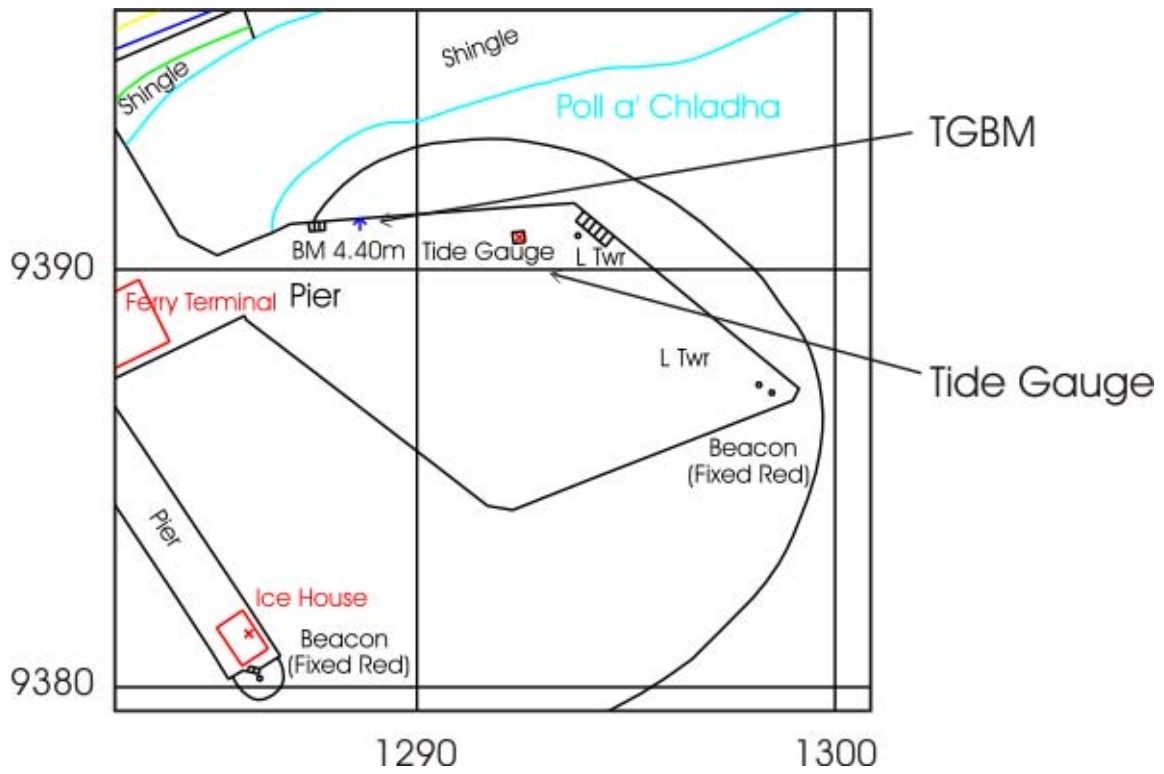
Site visits

Day 027 Carried out general maintenance

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	None

Ullapool – Map & Images of Site



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Ullapool – Statistics

Surge maxima	Value	Day	Time
January	0.583	16	15:00:00
February	0.173	22	19:00:00
March	0.638	19	08:45:00
April	0.486	6	02:30:00
May	0.159	13	08:15:00
June	0.17	28	04:45:00
July	0.553	4	17:30:00
August	0.552	21	01:00:00
September	0.3	13	18:00:00
October	0.742	29	12:45:00
November	0.877	11	18:00:00
December	0.265	27	06:15:00

Surge minima	Value	Day	Time
January	-0.52	10	23:30:00
February	-0.402	7	13:00:00
March	-0.303	12	13:30:00
April	-0.309	15	18:45:00
May	-0.298	3	03:45:00
June	-0.253	15	04:00:00
July	-0.216	22	08:45:00
August	-0.301	13	23:00:00
September	-0.295	24	22:30:00
October	-0.303	24	07:45:00
November	-0.563	26	23:00:00
December	-0.43	15	04:15:00

Extreme maxima	Value	Day	Time
January	5.513	31	07:30:00
February	5.658	2	08:45:00
March	5.742	1	07:00:00
April	5.543	28	18:45:00
May	5.045	28	19:00:00
June	5.082	27	19:30:00
July	5.394	14	20:45:00
August	5.62	11	19:45:00
September	5.891	10	20:00:00
October	5.753	7	18:15:00
November	5.771	8	07:45:00
December	5.302	6	06:45:00

Extreme minima	Value	Day	Time
January	0.199	31	14:15:00
February	0.105	1	14:45:00
March	-0.005	31	14:00:00
April	0.242	1	02:15:00
May	0.822	1	02:30:00
June	0.475	15	02:45:00
July	0.41	14	02:45:00
August	0.011	13	03:15:00
September	0.098	10	01:45:00
October	0.258	9	01:30:00
November	0.46	6	00:30:00
December	0.596	24	15:30:00

Mean sea level	No days	MSL
January	31	3.052
February	28	3.04
March	31	3.044
April	30	2.987
May	31	2.927
June	30	2.968
July	31	3.085
August	31	3.05
September	30	3.096
October	31	3.209
November	30	3.156
December	31	3.056
	Sum	Avg
	365	3.056

Weymouth – Tide Gauge Information

Latitude 50° 36' 30.6" N **Longitude** 02° 26' 52.6" W **Grid Ref** SY 6840 7885

Instrument Data acquisition system with two full-tide bubbler gauges
Location **Tide Gauge Building** Commercial Pier, next to the ferry terminal
Measuring Points On the pier wall, directly in front of the tide gauge building

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	SY 6826 7882	Bolt corner of quay wall NW side N angle
Aux1	SY 6822 7886	Bolt sea wall 5.5M W steps
Aux2	SY 6813 7888	Right base NW pillar NE entrance Alexandra gardens
Aux3	SY 6810 7893	Bolt sea wall 10.1M NW shelter
Aux4	SY 6806 7908	Bolt N base STS aquarium E side of esplanade
REFBM	SY 6837 7884	Bolt concrete SW corner of building next to tide gauge hut

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)
 TGZ = 1.02m below Ordnance Datum Newlyn (ODN)
 TGZ = 4.334m below TGBM

Levelling No levelling was carried out in 2010

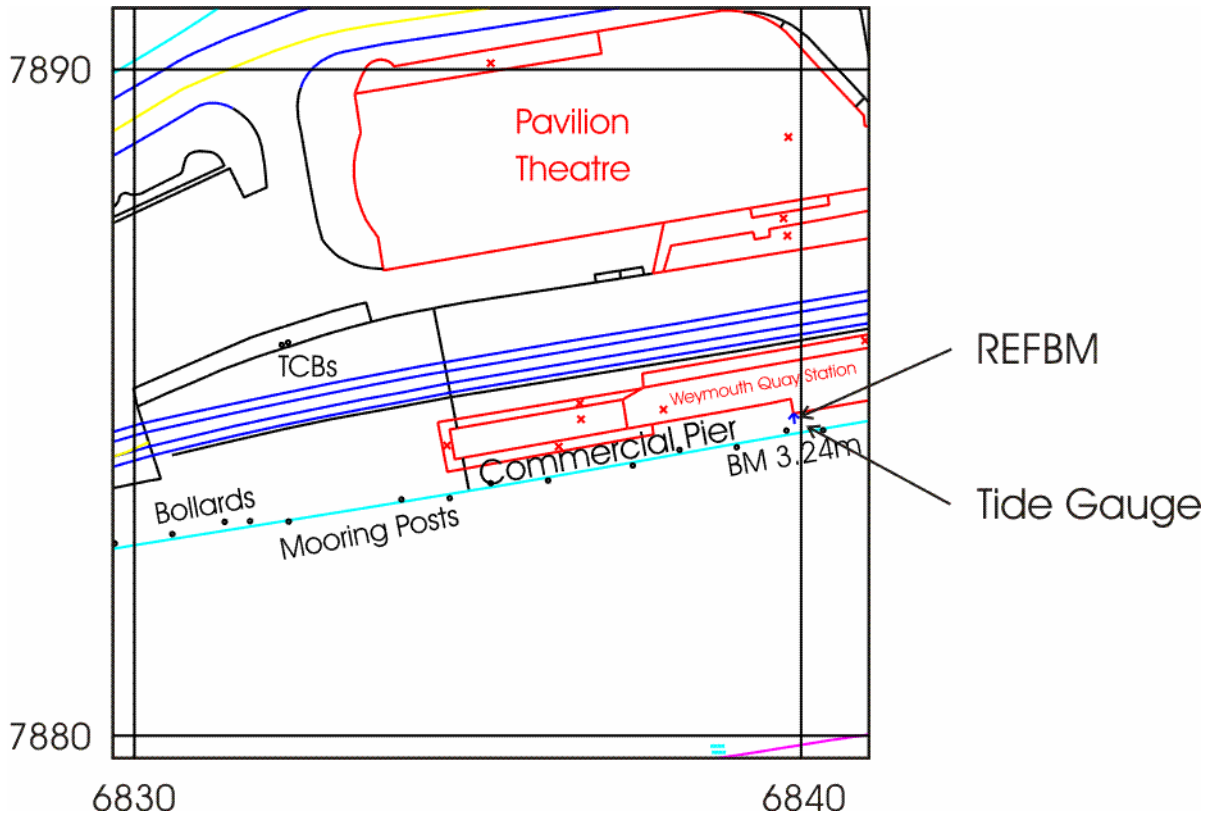
Site visits

Day 006 Onsite to purge system
 Day 160 Carried out general maintenance and changed compressor

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	006,096,178-179	001-006,178-180,360

Weymouth – Map & Images of Site



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Weymouth – Statistics

Surge maxima	Value	Day	Time
January	0.363	16	04:30:00
February	0.526	23	05:15:00
March	0.438	25	22:00:00
April	0.28	2	08:45:00
May	0.101	1	21:15:00
June	0.148	19	18:00:00
July	0.333	15	02:15:00
August	0.285	23	02:15:00
September	0.154	6	22:15:00
October	0.319	3	07:45:00
November	0.475	11	06:30:00
December	0.421	16	21:15:00

Surge minima	Value	Day	Time
January	-0.421	27	02:30:00
February	-0.312	11	15:30:00
March	-0.34	8	09:15:00
April	-0.381	12	10:00:00
May	-0.372	5	03:15:00
June	-0.293	16	06:30:00
July	-0.25	6	05:30:00
August	-0.24	29	15:30:00
September	-0.337	13	14:45:00
October	-0.254	27	15:45:00
November	-0.264	2	11:15:00
December	-0.372	15	04:00:00

Extreme maxima	Value	Day	Time
January	2.529	31	07:30:00
February	2.678	28	06:15:00
March	2.707	30	07:00:00
April	2.476	2	08:45:00
May	2.205	1	20:30:00
June	2.259	12	18:30:00
July	2.689	14	21:15:00
August	2.493	11	19:45:00
September	2.613	10	20:15:00
October	2.645	8	19:00:00
November	2.635	8	08:00:00
December	2.41	6	06:45:00

Extreme minima	Value	Day	Time
January	-0.12	31	15:45:00
February	-0.22	1	16:30:00
March	-0.286	2	16:15:00
April	-0.065	16	12:30:00
May	0.21	15	12:15:00
June	-0.006	16	05:30:00
July	0.098	13	03:30:00
August	-0.278	12	04:00:00
September	-0.187	10	03:45:00
October	0.027	9	03:15:00
November	0.087	7	15:15:00
December	0.019	25	17:45:00

Mean sea level	No days	MSL
January	25	1.064
February	28	1.194
March	31	1.073
April	30	1.012
May	31	1.031
June	27	1.064
July	31	1.08
August	31	1.111
September	30	1.135
October	31	1.199
November	30	1.223
December	31	1.113
	Sum	Avg
	356	1.108

Whitby – Tide Gauge Information

Latitude 54° 29' 24.0" N **Longitude** 00° 36' 52.9" W **Grid Ref** NZ 8984 1140

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** In the Harbourmaster's office

Measuring Points Underneath the quay, next to the Harbour Office

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	NZ 8986 1141	E side of Pier Rd
Aux1	NZ 8992 1105	Bolt butt of Whitby Bridge
Aux2	NZ 8985 1134	Rivet quayside SE side of Pier Rd
Aux3	NZ 8983 1142	Rivet wall angle S side of road angle of lifeboat museum

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 3.00m below Ordnance Datum Newlyn (ODN)

TGZ = 9.105m below TGBM

Levelling No levelling was carried out in 2010

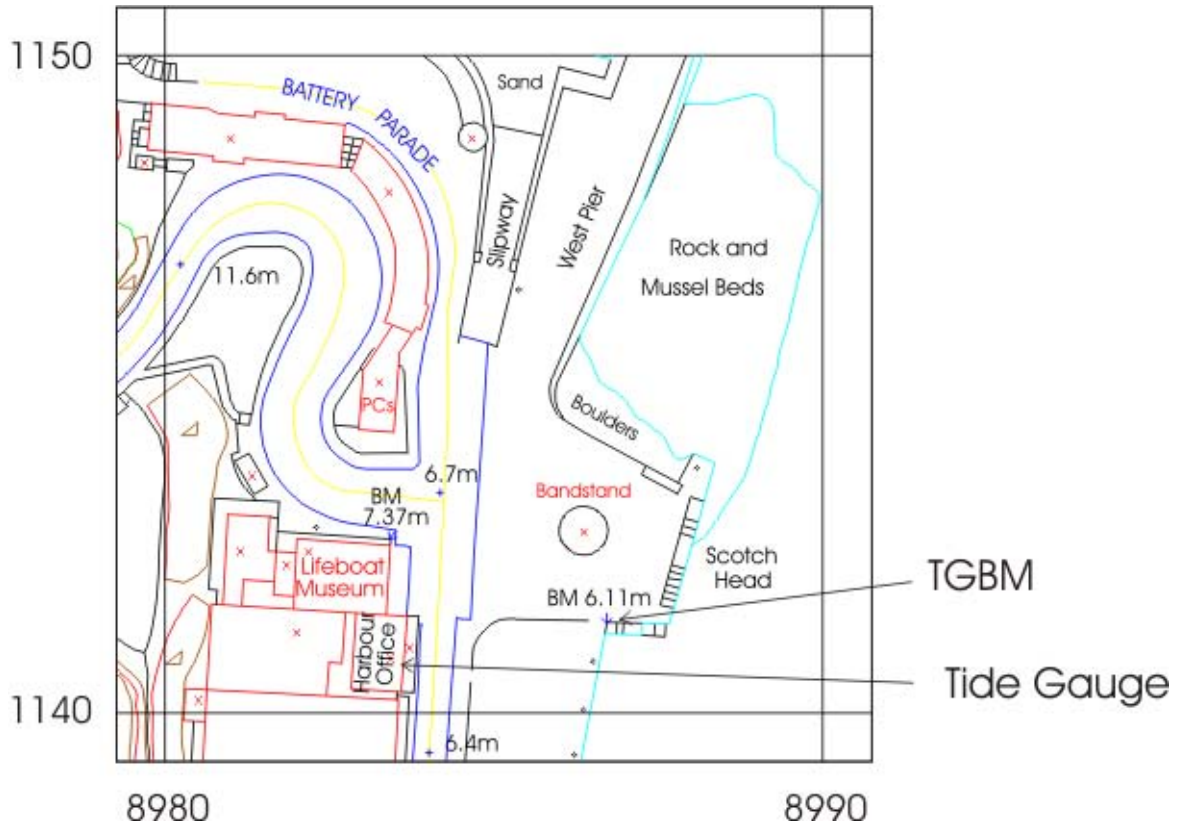
Site visits

Day 082 Onsite to sort flow rates of all channels and complete equipment survey

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	001-052,055-066,069-082,090-093,099-100,109-157,162,170-177,180-181,189-190,194,269-270,342

Whitby – Map & Images of Site



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Whitby – Statistics

Surge maxima	Value	Day	Time
January	0.232	1	20:45:00
February	0.337	22	20:30:00
March	0.481	30	22:00:00
April	0.405	20	13:15:00
May			
June	0.438	19	09:30:00
July	0.492	5	05:45:00
August	0.583	29	13:45:00
September	0.657	24	09:45:00
October	0.527	23	22:15:00
November	0.775	12	03:45:00
December	0.731	16	07:30:00

Surge minima	Value	Day	Time
January	-0.058	3	00:30:00
February	0.129	21	09:15:00
March	-0.143	7	07:15:00
April	-0.17	5	12:30:00
May			
June	-0.126	16	00:45:00
July	-0.182	16	10:00:00
August	-0.072	14	07:30:00
September	-0.252	29	17:15:00
October	-0.321	1	18:45:00
November	-0.333	11	11:00:00
December	-0.191	28	20:00:00

Extreme maxima	Value	Day	Time
January	2.568	1	20:15:00
February	5.055	21	20:15:00
March	6.161	30	16:00:00
April	5.526	17	17:45:00
May			
June	5.631	14	04:45:00
July	5.913	14	05:30:00
August	6.167	13	05:45:00
September	6.352	11	05:30:00
October	6.203	10	05:00:00
November	6.025	6	03:15:00
December	5.771	5	15:30:00

Extreme minima	Value	Day	Time
January	0.641	2	23:30:00
February	2.205	21	14:00:00
March	0.665	29	21:45:00
April	0.981	14	22:15:00
May			
June	0.775	15	12:00:00
July	0.641	14	12:00:00
August	0.413	12	11:30:00
September	0.296	10	11:15:00
October	0.541	8	10:00:00
November	0.895	7	22:45:00
December	0.88	25	00:30:00

Mean sea level	No days	MSL
January	0	
February	1	3.626
March	7	3.472
April	11	3.346
May	0	
June	9	3.389
July	25	3.432
August	31	3.504
September	26	3.499
October	31	3.583
November	30	3.512
December	29	3.49
	Sum	Avg
	200	3.485

Wick – Tide Gauge Information

Latitude 58° 26' 27.5" N **Longitude** 03° 05' 10.7" W **Grid Ref** ND 3668 5081

Instrument Data acquisition system with two full-tide and a mid-tide bubbler gauge

Location **Tide Gauge Building** Northwest corner of Wick harbour, next to the ship repair slipway

Measuring Points Attached to an unused stilling well beneath the building

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark	Grid Ref	Description
TGBM	ND 3667 5081	New OSBM bolt quay E angle tide gauge building
Aux1	ND 3670 5084	Rivet base of wall 15.5M NE angle of building
Aux2	ND 3670 5083	NBM rivet base SE end of wall NE side of N pier
Aux3	ND 3705 5055	Wall base of steps SE side of pier

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 1.71m below Ordnance Datum (ODN)

TGZ = 5.084m below TGBM

Levelling No levelling was carried out in 2010

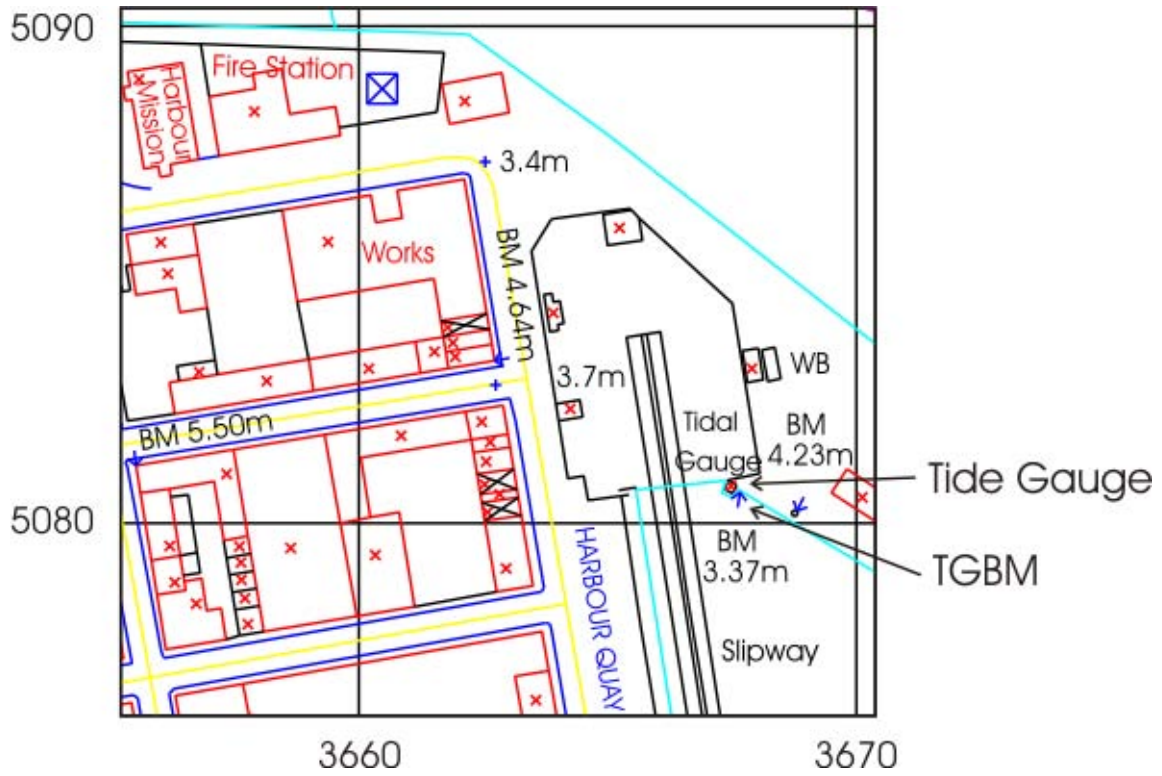
Site visits

Day 028 Carried out general maintenance

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	014-028,055-090,096-105,253-303,314-349

Wick – Map & Images of Site



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Wick – Statistics

Surge maxima	Value	Day	Time
January	0.228	13	19:15:00
February	0.11	16	07:45:00
March	0.095	31	03:45:00
April	0.328	6	01:45:00
May	0.144	13	14:45:00
June	0.167	28	09:00:00
July	0.381	7	13:30:00
August	0.426	21	05:30:00
September	0.168	7	18:45:00
October	0.439	30	09:15:00
November	0.43	2	10:00:00
December	0.161	27	10:30:00

Surge minima	Value	Day	Time
January	-0.497	11	03:30:00
February	-0.401	7	12:15:00
March	-0.223	31	18:00:00
April	-0.251	16	05:15:00
May	-0.235	7	04:15:00
June	-0.227	15	03:45:00
July	-0.192	22	23:15:00
August	-0.246	14	00:30:00
September	-0.166	5	09:45:00
October	-0.063	31	23:45:00
November	-0.234	10	02:30:00
December	-0.338	24	18:15:00

Extreme maxima	Value	Day	Time
January	3.734	31	12:00:00
February	3.867	2	13:30:00
March	3.677	31	12:00:00
April	3.746	29	11:45:00
May	3.462	1	00:30:00
June	3.408	28	00:00:00
July	3.694	15	01:30:00
August	3.728	10	23:30:00
September	3.882	10	00:00:00
October	3.393	30	16:00:00
November	3.955	8	12:15:00
December	3.511	27	15:30:00

Extreme minima	Value	Day	Time
January	0.07	31	18:15:00
February	0.071	1	18:45:00
March	0.026	31	18:00:00
April	0.3	1	06:15:00
May	0.525	18	08:00:00
June	0.259	15	07:00:00
July	0.205	14	06:45:00
August	-0.012	12	06:15:00
September	0.091	10	06:00:00
October	1.085	31	23:45:00
November	0.477	6	04:30:00
December	0.299	24	19:30:00

Mean sea level	No days	MSL
January	16	1.948
February	22	1.971
March	0	
April	18	1.977
May	31	1.903
June	30	1.942
July	31	2.055
August	31	2.033
September	8	2.017
October	1	2.243
November	9	2.198
December	15	2.02
	Sum	Avg
	212	2.028

Workington – Tide Gauge Information

Latitude 54° 39' 02.6" N **Longitude** 03° 34' 01.8" W **Grid Ref** NX 9898 2953

Instrument Data acquisition system with two full-tide bubbler gauges

Location **Tide Gauge Building** North side of the dock entrance

Measuring Points Behind fender piles on the north seaward side of the dock gates

Datum All data refer to Admiralty Chart Datum (ACD)

Benchmark **Grid Ref** **Description**

Aux1 NX 9917 2928 Building SW face 3.7M from S angle Workington Dock

Aux2 NX 9948 2967 NBM works building S side Rd N face NE angle

Benchmark Relationships

TGZ = Admiralty Chart Datum (ACD)

TGZ = 4.20m below Ordnance Datum Newlyn (ODN)

TGZ = 11.59m below Aux1

Levelling No levelling was carried out in 2010

Site visits

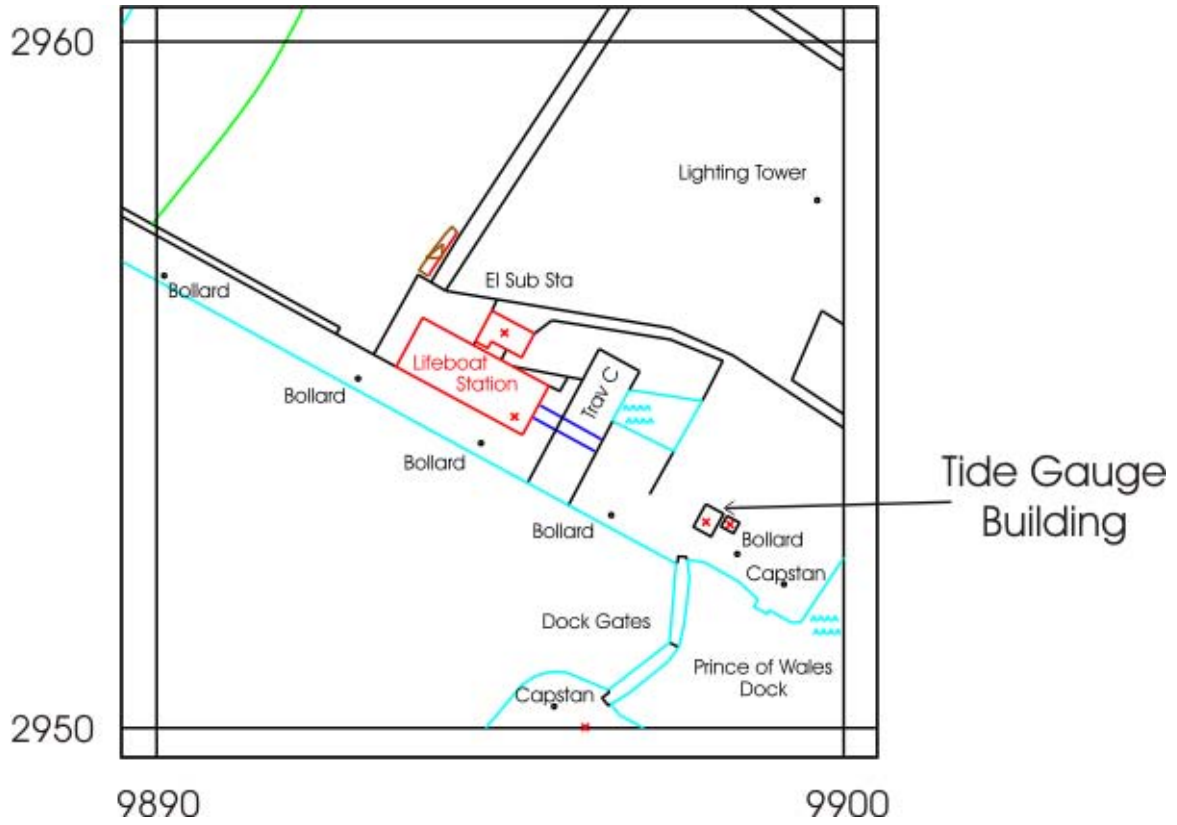
Day 166 Onsite to recover GSM modem

Day 306 Carried out general maintenance and survey for EA

Data quality

CI%	Sample Interval	Missing Data	Suspect Data
98	15 minutes	013-021	090-091

Workington – Map & Images of Site



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Workington – Statistics

Surge maxima	Value	Day	Time
January	0.45	22	00:15:00
February	0.481	27	20:00:00
March	0.626	26	04:30:00
April	0.478	6	00:30:00
May	0.176	14	01:00:00
June	0.112	8	07:15:00
July	0.714	16	05:00:00
August	0.391	20	12:15:00
September	0.358	13	18:00:00
October	0.717	29	18:00:00
November	1.259	11	20:30:00
December	0.494	27	00:00:00

Surge minima	Value	Day	Time
January	-0.657	29	13:45:00
February	-0.472	12	15:00:00
March	-0.535	31	11:00:00
April	-0.414	14	02:45:00
May	-0.362	4	22:45:00
June	-0.326	10	12:30:00
July	-0.271	22	16:00:00
August	-0.409	29	23:45:00
September	-0.514	24	14:15:00
October	-0.382	20	04:45:00
November	-0.609	25	16:15:00
December	-0.757	16	22:30:00

Extreme maxima	Value	Day	Time
January	8.834	31	12:00:00
February	9.058	2	13:30:00
March	9.113	1	11:45:00
April	8.852	1	12:45:00
May	8.371	1	00:45:00
June	8.111	16	01:45:00
July	8.913	16	02:15:00
August	8.907	12	00:15:00
September	9.239	10	00:00:00
October	9.077	8	23:30:00
November	8.856	8	00:15:00
December	8.55	6	11:30:00

Extreme minima	Value	Day	Time
January	0.217	31	18:45:00
February	0.28	1	19:30:00
March	0.047	2	19:00:00
April	0.65	27	17:00:00
May	0.965	1	07:15:00
June	0.669	15	07:30:00
July	0.645	14	07:30:00
August	0.049	13	07:45:00
September	0.26	9	06:00:00
October	0.336	9	06:15:00
November	0.498	7	06:00:00
December	0.678	24	19:45:00

Mean sea level	No days	MSL
January	21	4.346
February	28	4.5
March	30	4.443
April	29	4.381
May	31	4.343
June	30	4.39
July	31	4.508
August	31	4.47
September	30	4.523
October	31	4.609
November	30	4.603
December	31	4.455
	Sum	Avg
	353	4.464