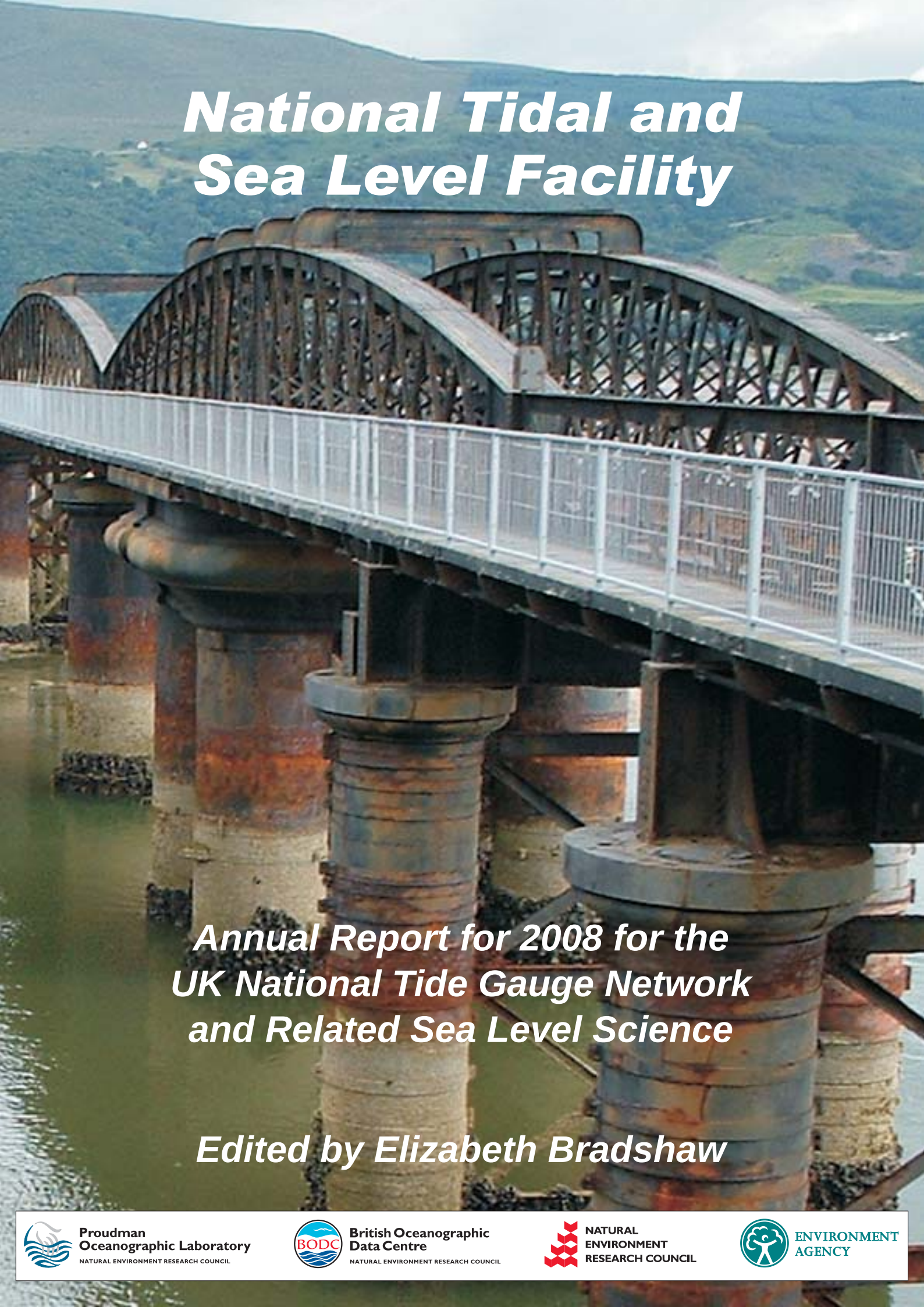

National Tidal and Sea Level Facility

Annual Report for 2008 for the UK National Tide Gauge Network and Related Sea Level Science

Edited by Elizabeth Bradshaw

Proudman Oceanographic Laboratory
NATURAL ENVIRONMENT RESEARCH COUNCIL

BODC British Oceanographic Data Centre
NATURAL ENVIRONMENT RESEARCH COUNCIL

NATURAL ENVIRONMENT RESEARCH COUNCIL

ENVIRONMENT AGENCY

National Tidal and Sea Level Facility

Annual Report for 2008 for the UK National Tide Gauge Network and Related Sea Level Science

Tide gauge instrument information, data processing procedures and gauge location

Report for 2008 on Data Quality and visits to sites

Report on 'Monitoring Vertical Land Movements at Tide Gauges' in 2008

Report on gauges in the South Atlantic

Contributors to the Annual Report:

Kevin Horsburgh, POL	- Introduction
Les Bradley, POL	- Instrument documentation and site information
Dave Smith, POL	- Maps and site information
Steve Loch, BODC	- Calculating statistics in Edteva
Richard Bingley, Univ. Of Nottingham	- Monitoring Vertical Land Movements at Tide Gauges
Peter Foden, POL	- South Atlantic Network Management
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Juan Brown, BODC	- Director BODC
David Blackman, POL	- Tide Gauge Data Products
Libby Macleod, BODC	- Tide Gauge Data Sets
Richard Downer, BODC	- Web Development and Management
Kevin Horsburgh, POL	- Operational Tide-Surge Models and Chair of NTSLF
Peter Foden, POL	- South Atlantic Network Management
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Simon Holgate, PSMSL	- Permanent Service for Mean Sea Level (PSMSL) aspects
Philip Knight, POL	- Real-time systems development and management
Lesley Rickards, BODC	- Director of the PSMSL
Dave Smith, POL	- Leader Tide Gauge Inspectorate
Simon Williams, POL	- GPS and Absolute Gravity Networks

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

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 Proudman Oceanographic Laboratory, with research partners in top universities and at 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 the period January-December 2008.

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.

The NTSLF manages precision tide gauges at 44 sites around the UK. Sophisticated telemetry systems make these 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. Major projects this year included the development of a new site in the Bristol Channel and the addition of mid-tide sensors at several locations to improve data quality control and the accuracy of long-term sea level measurements. Real-time data from all locations can be seen on our web pages (http://www/pol.ac.uk/ntslf). Quality-controlled tide gauge data are available free of charge from the British Oceanographic Data Centre (BODC).

Storm surges are the effect of low atmospheric pressure and strong winds on the sea surface. Around the UK, surges can raise sea level by 2–3 m on top of some of the world's largest tidal ranges. NTSLF scientists continuously improve the accuracy of computer models used for coastal flood warning. This year, along with colleagues at the Met Office, we have developed an operational ensemble prediction system, where multiple simulations help to quantify the forecast uncertainty.

The UK National Tide Gauge network is owned and funded by the Environment Agency. We would like to thank all those who contribute scientifically towards, and make use of, the NTSLF.

Dr Kevin Horsburgh
Head of NTSLF

Tide gauge instrument information, data processing procedures and gauge location

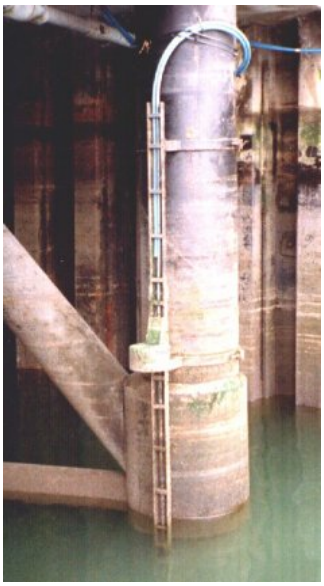
Instrument documentation

Bubbler tide gauge

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 may be recorded. The pressure points which you can see mounted underwater in the photograph are similar in appearance to 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 air line equals the pressure exerted by the column of water above it, then the excess air is released as bubbles through the copper nozzle. This means that 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. The reason for this is that when the measuring point is exposed as in the photograph below it can be accurately levelled 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.

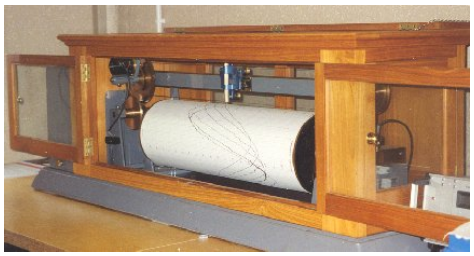


Pressure Transducer

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 copper nozzle, transducer measuring port and connecting tube are filled with oil so the pressure is transmitted to the crystal element via the oil, thus keeping the transducer components free from the effects of the saltwater.

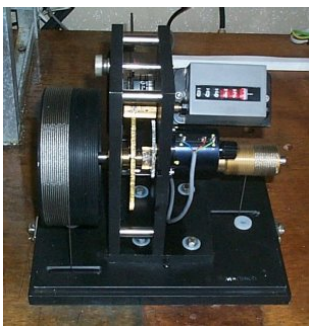
Munro float gauge

The Munro gauge measures sea level by means of 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 and another drum contains a counter balance wire. The drum is geared to a slotted tape attached to a pen carriage which traces the tide curve on the chart during the rise and fall of the tide. A precision potentiometer is attached to the gauge to provide an input to the data logger.



Wellhead float gauge

The Wellhead gauge measures the sea level by means of a float in a stilling well. The float is usually of a smaller diameter than that used on a Munro gauge (about 45cm diameter), and has a counterweight attached to a smaller diameter pulley than that of the float so it is not immersed in the sea when the float rises. The Wellhead unit does not produce a chart but does give a readout of the height. It is interfaced to the data logger via a precision potentiometer.



Data Processing

The data are collected on demand each week at the Proudman Oceanographic Laboratory. 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 and gaps are filled in with null values and marked with an 'N' flag. The files are placed on the web for users to download. Statistics are produced monthly, again using Edserplo.

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

Calculating Statistics in Edserplo

There are essentially four types of summary information determined by Edserplo:

- 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 POL’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.

Aberdeen Tide Gauge

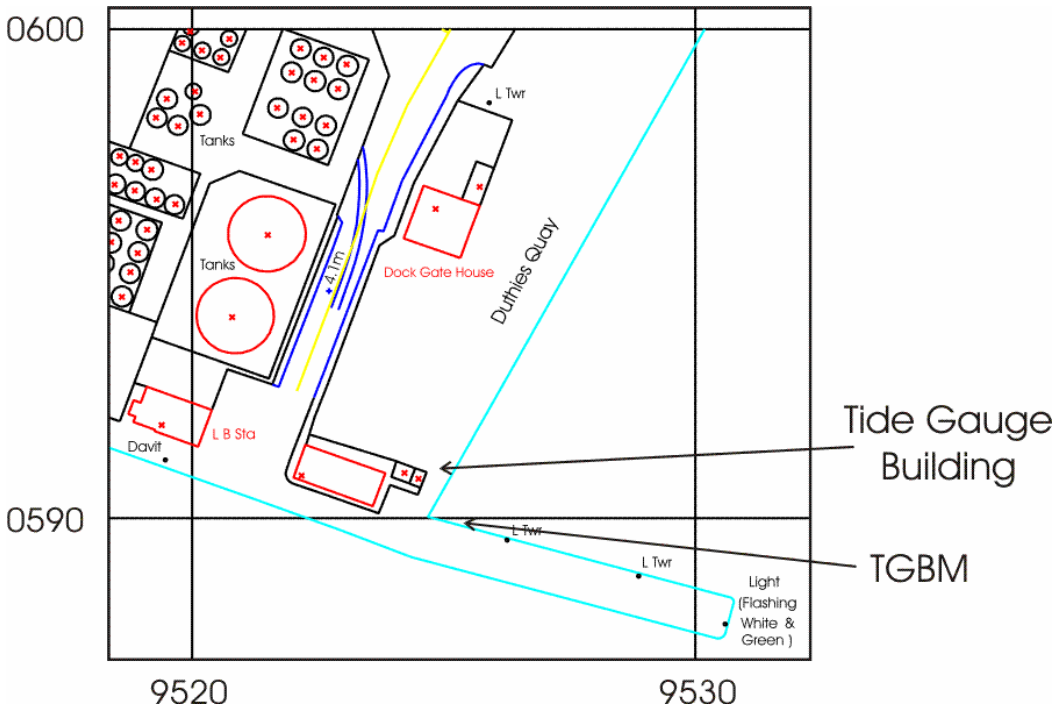
Latitude: 57° 08' 38.6" N Longitude: 02° 04' 38.5" W

Grid Reference: NJ 9525 0591

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is located on Waterloo Quay and the pressure points are located in the South West corner of Telford Dock.



Tide gauge location

Aerial view of site

Avonmouth Tide Gauge

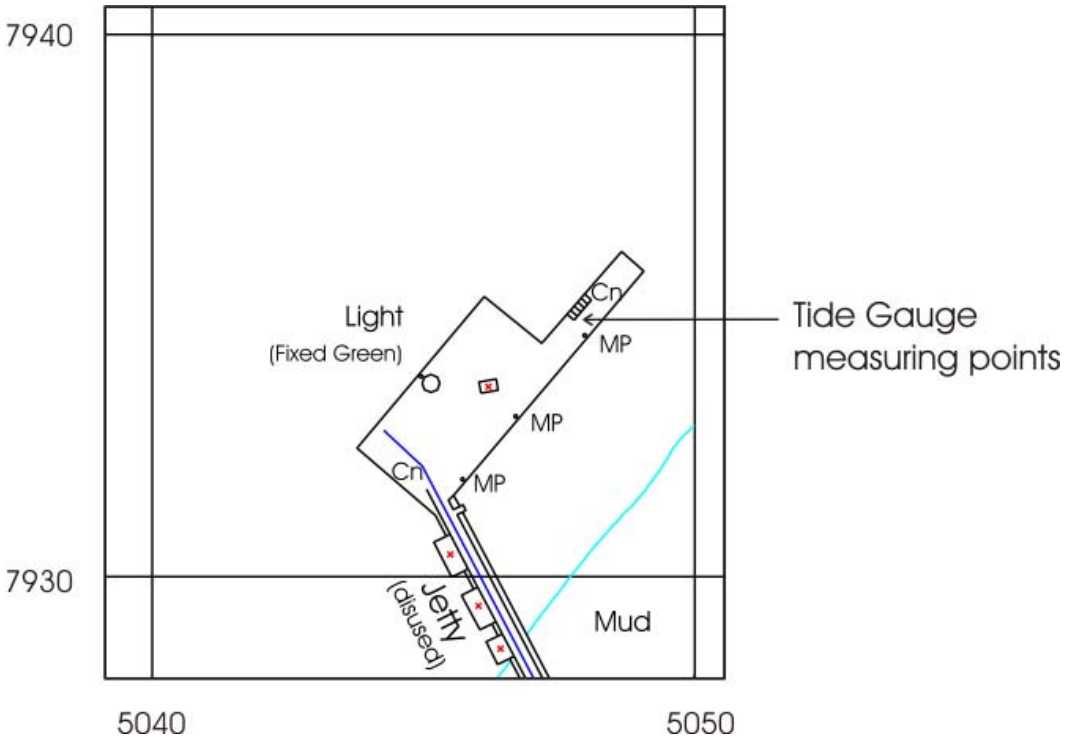
Latitude: 51° 30' 27.6" N Longitude: 02° 42' 45.9" W

Grid Reference: ST 5063 7899

Instrument type: Data acquisition system with dual underwater pressure transducers.

Site of Gauge:

The tide gauge building is located on land between the disused oil jetty and the fuel storage depot, with the measuring points being located at the seaward end of the jetty.



Bangor Tide Gauge

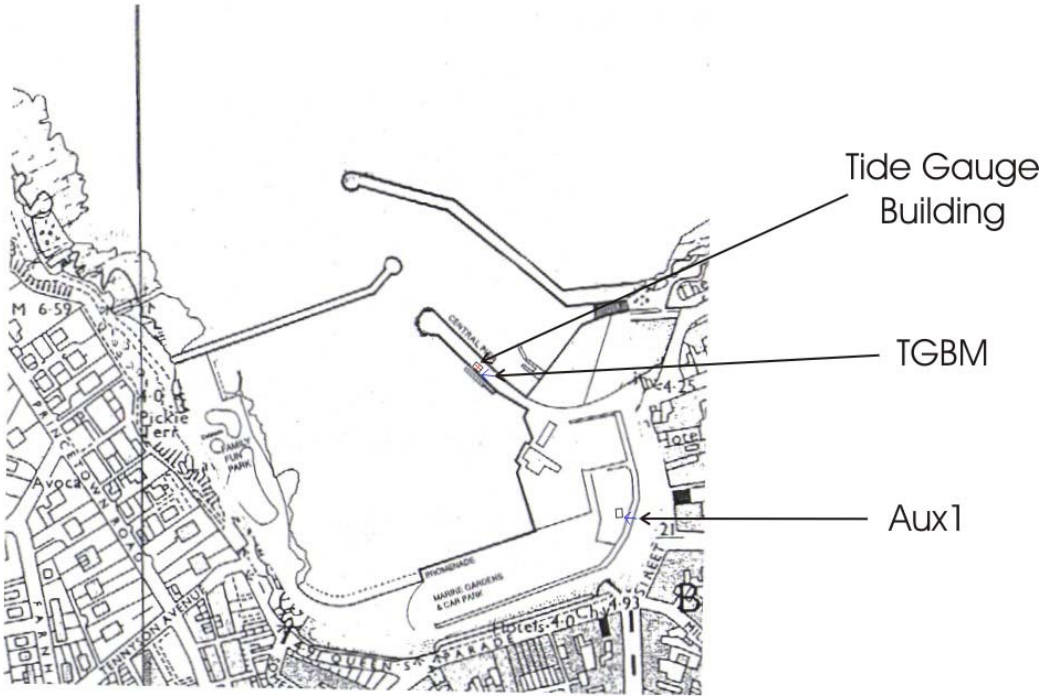
Latitude: 54° 39' 53.1" N Longitude: 05° 40' 10.1" W

Grid Reference: NW 6340 3620

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building and pressure points are located on Central Pier at Bangor Marina. The pressure points are on the seaward side of the open pier directly beneath the tide gauge building.



Barmouth Tide Gauge

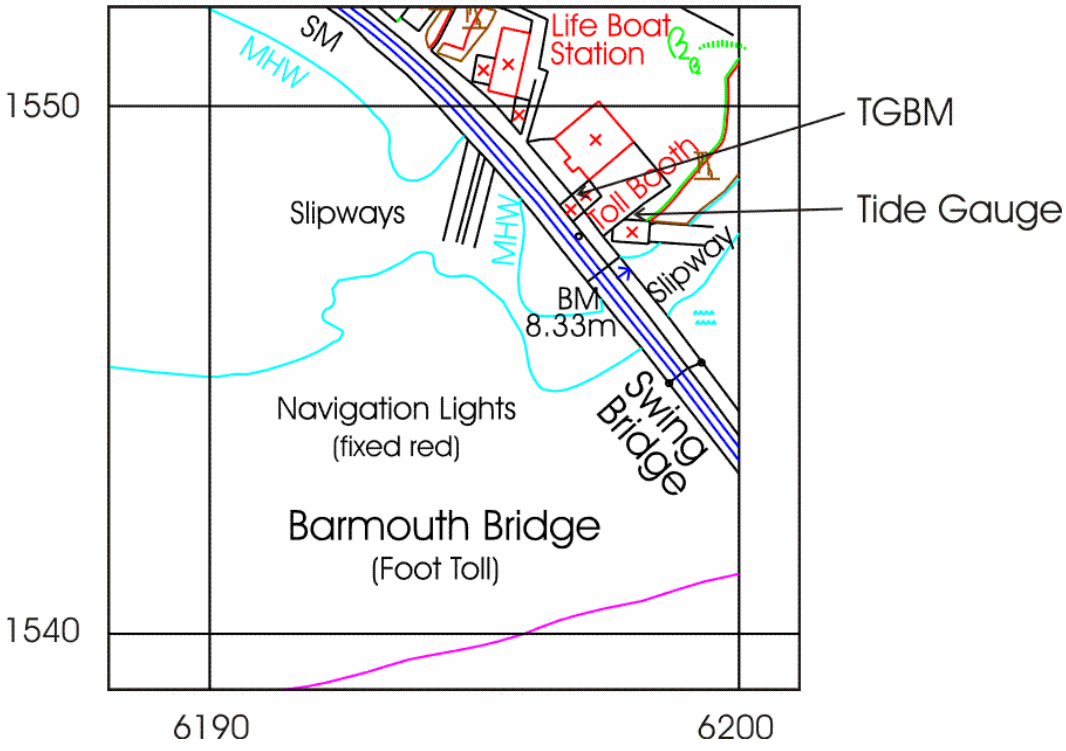
Latitude: 52° 43' 09.6" N Longitude: 04° 02' 42.1" W

Grid Reference: SH 6197 1548

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge cabinet is located in the toll booth on the north end of Barmouth railway bridge which crosses the river Mawddach. The pressure points are attached to the first leg of the railway bridge in the deep channel.



Bournemouth Tide Gauge

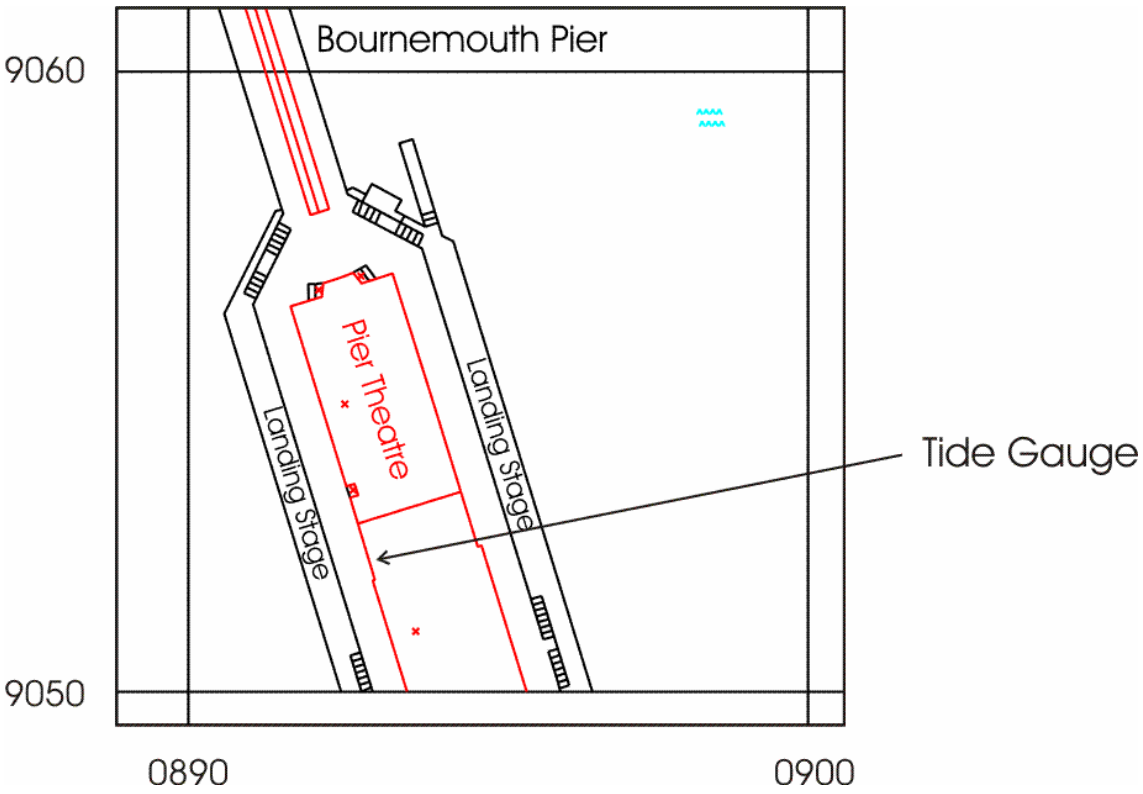
Latitude: 50° 42' 51.6" N Longitude: 01° 52' 29.5" W

Grid Reference: SZ 0893 9053

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge equipment is located in the pier electrical room at the west side of the South Pier. The measuring points are mounted directly below on one of the pier legs.



Cromer Tide Gauge

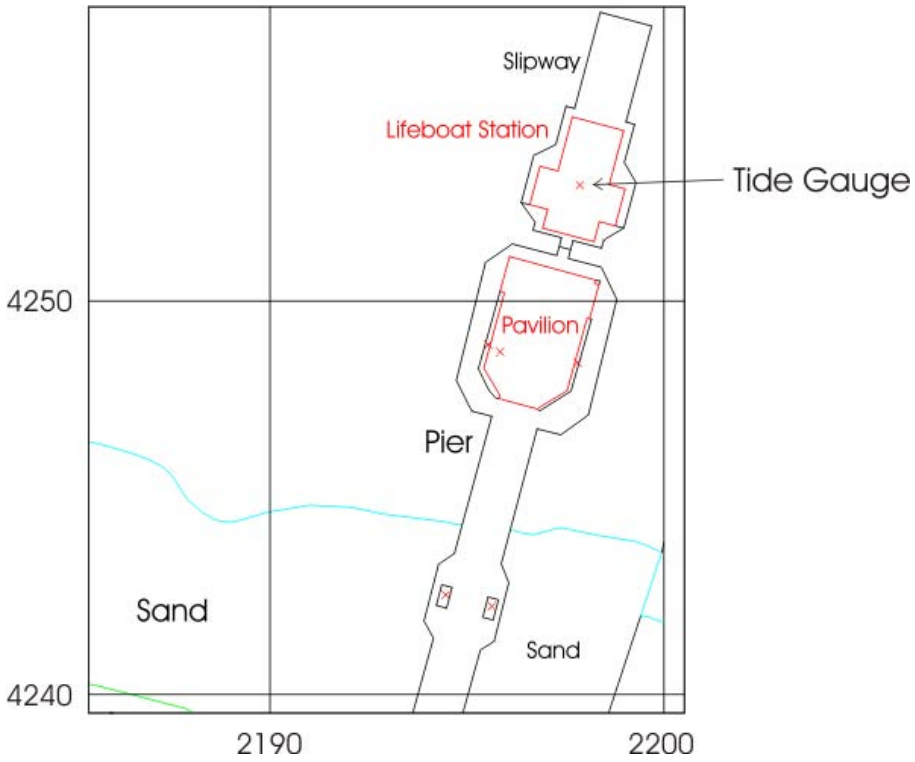
Latitude: 52° 56' 03.7" N Longitude: 01° 18' 05.9" E

Grid Reference: TG 2198 4254

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge cabinet is located within Cromer lifeboat station, with the pressure points attached to a leg of the lifeboat slipway.



Devonport Tide Gauge

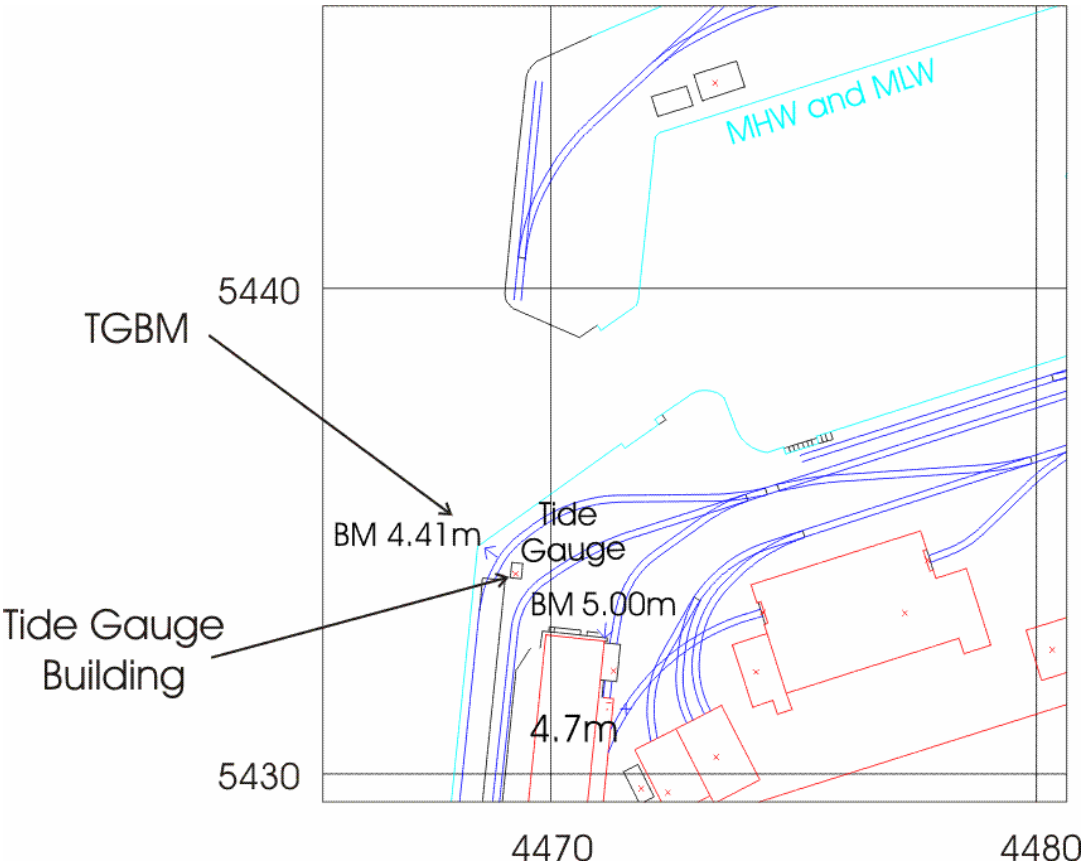
Latitude: 50° 22' 06. 2" N Longitude: 04° 11' 06.9" W

Grid Reference: SX 4469 5434

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge building is situated on No. 1 Jetty in Devonport Royal Naval base. The pressure points are attached to the stilling well beneath the building.



Dover Tide Gauge

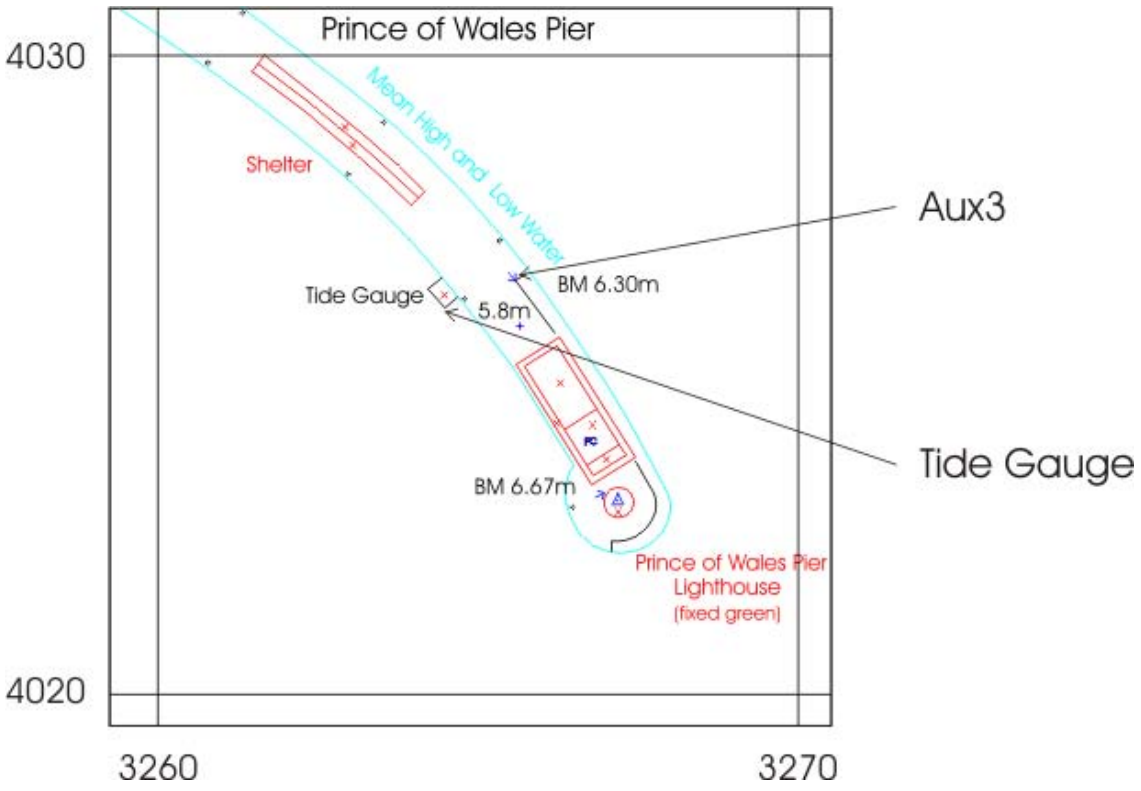
Latitude: 51° 06' 51.8" N Longitude: 01° 19' 21.6" E

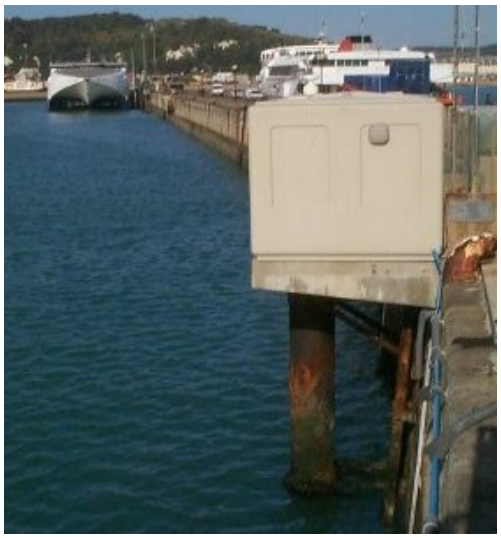
Grid Reference: TR 3265 4026

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is at the seaward end of Prince of Wales Pier, Western Dock, just before the lighthouse. The pressure points are attached to the stilling well.





Felixstowe Tide Gauge

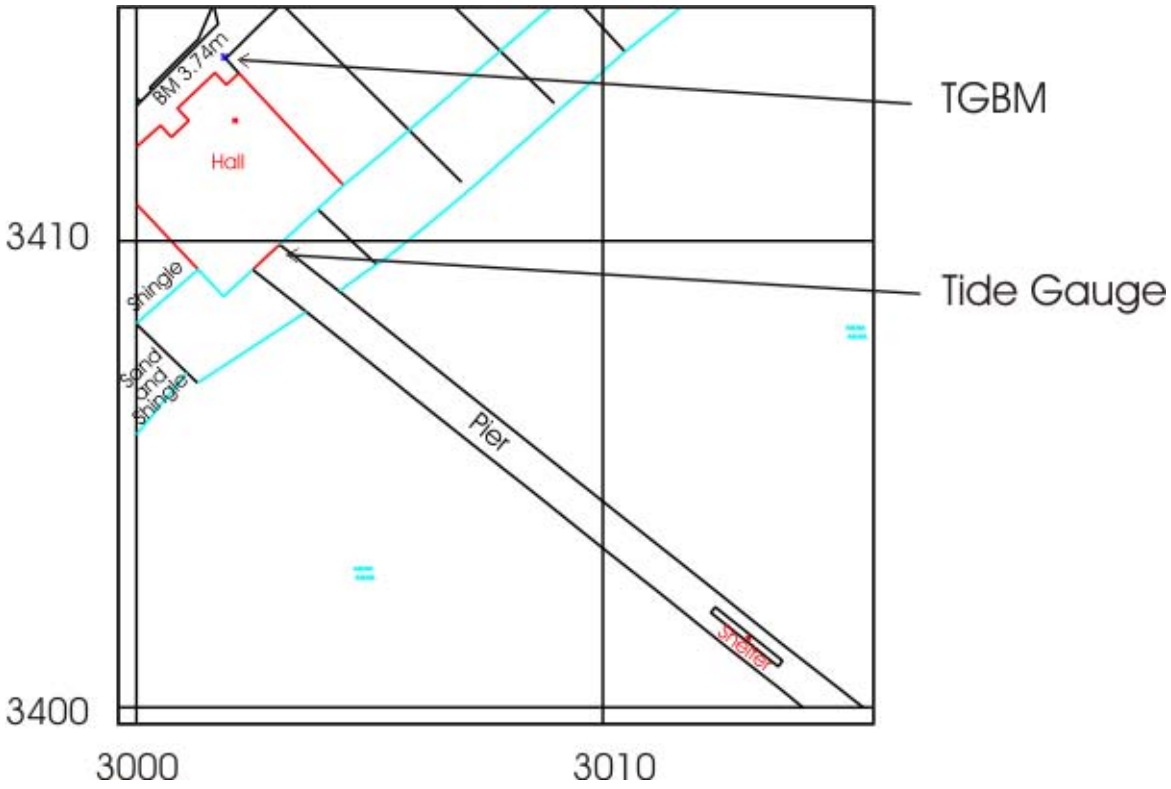
Latitude: 51° 57' 27.7" N Longitude: 01° 20' 47.6" E

Grid Reference: TM 3003 3409

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building and pressure points are located on Felixstowe pier. The equipment is located on the landward end and the pressure points are located in deep water at the seaward end.



Fishguard Tide Gauge

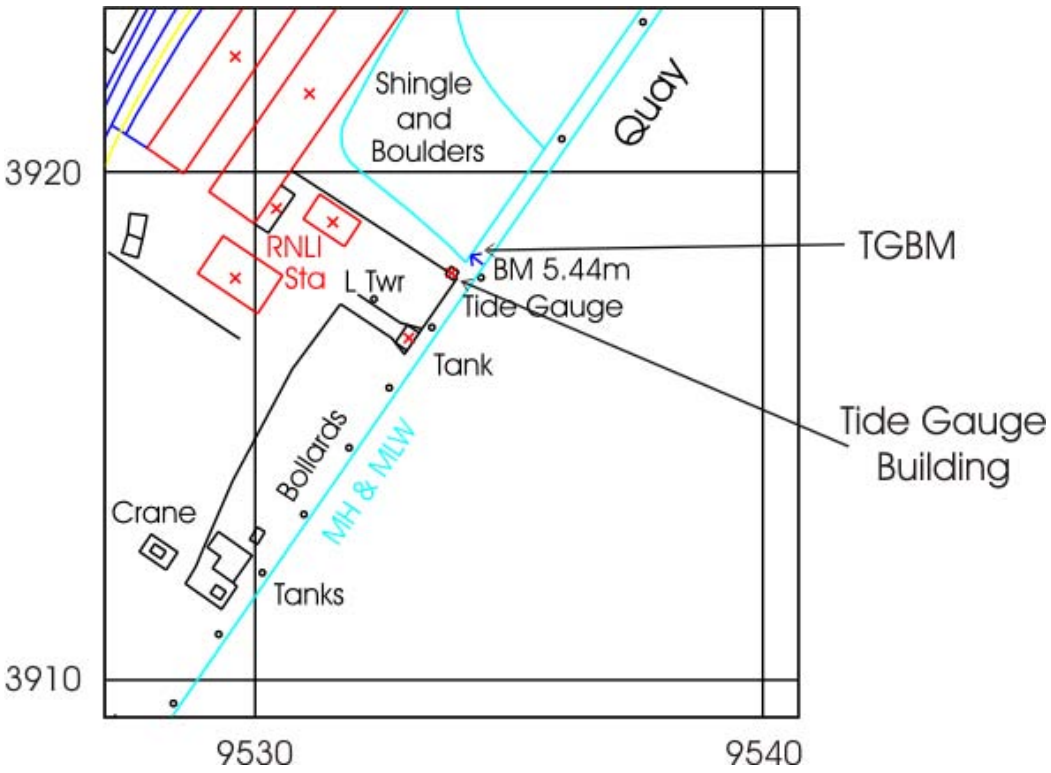
Latitude: 52° 00' 47.6" N Longitude: 04° 59' 01.5" W

Grid Reference: SM 9534 3918

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is located on Fishguard Quay adjacent to the RNLI station, and the pressure points are located approximately 10m from the end of the quay.



Harwich Tide Gauge

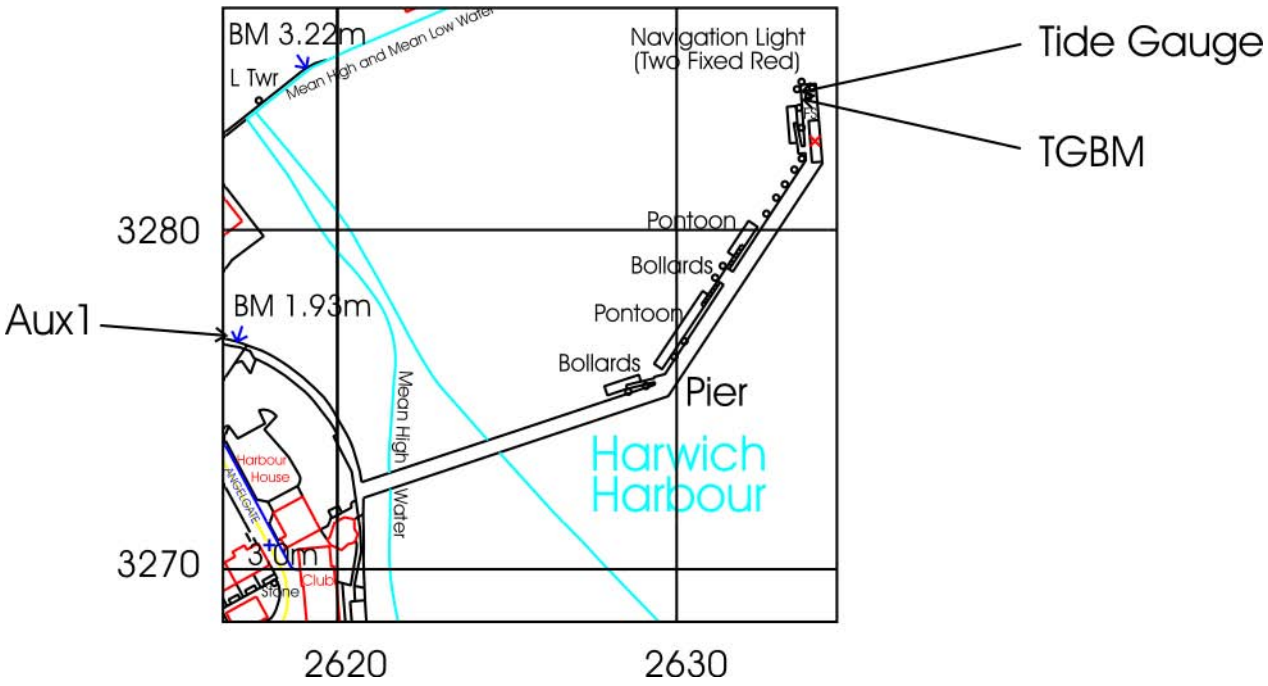
Latitude: 51° 56' 52.8" N Longitude: 01° 17' 31.7" E

Grid Reference: TM 2634 3284

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge cabinet is located on the seaward end of Harwich Haven Authority jetty. The pressure points are directly below the cabinet.



Heysham Tide Gauge

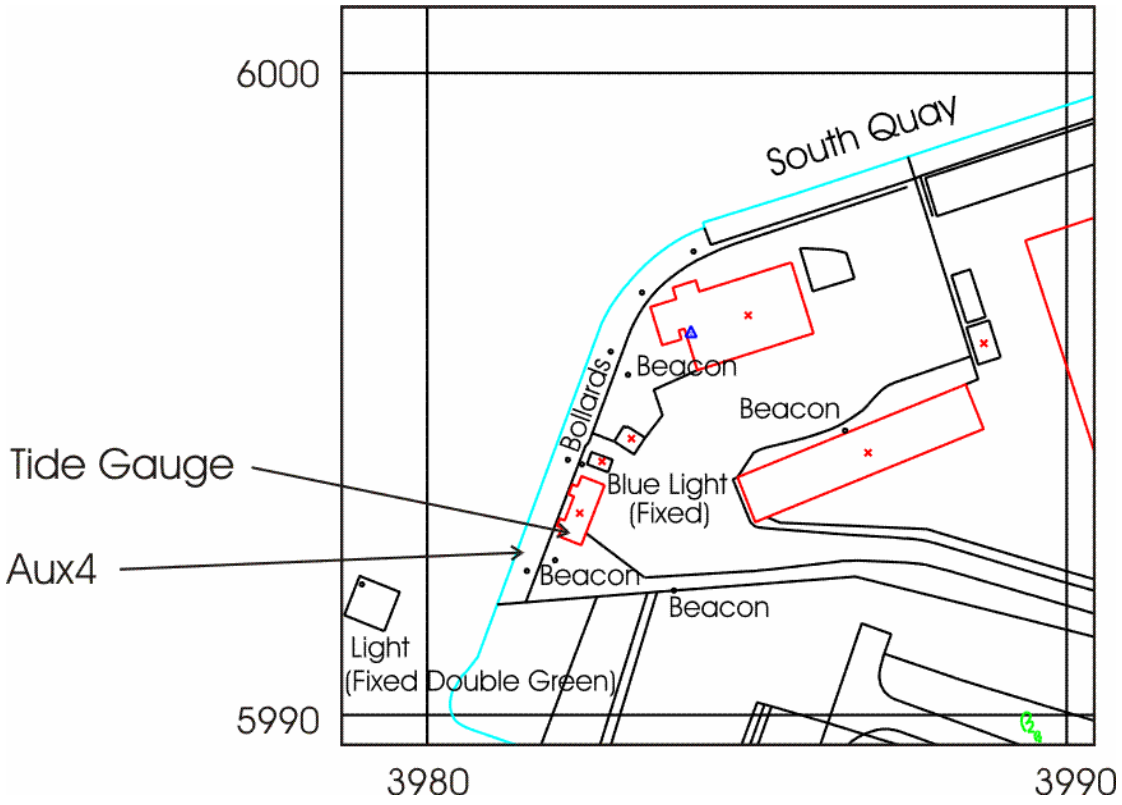
Latitude: 54° 01' 54.6" N Longitude: 02° 55' 12.9" W

Grid Reference: SD 3982 5993

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is located on the south side of the entrance to Heysham harbour.



Hinkley Point Tide Gauge

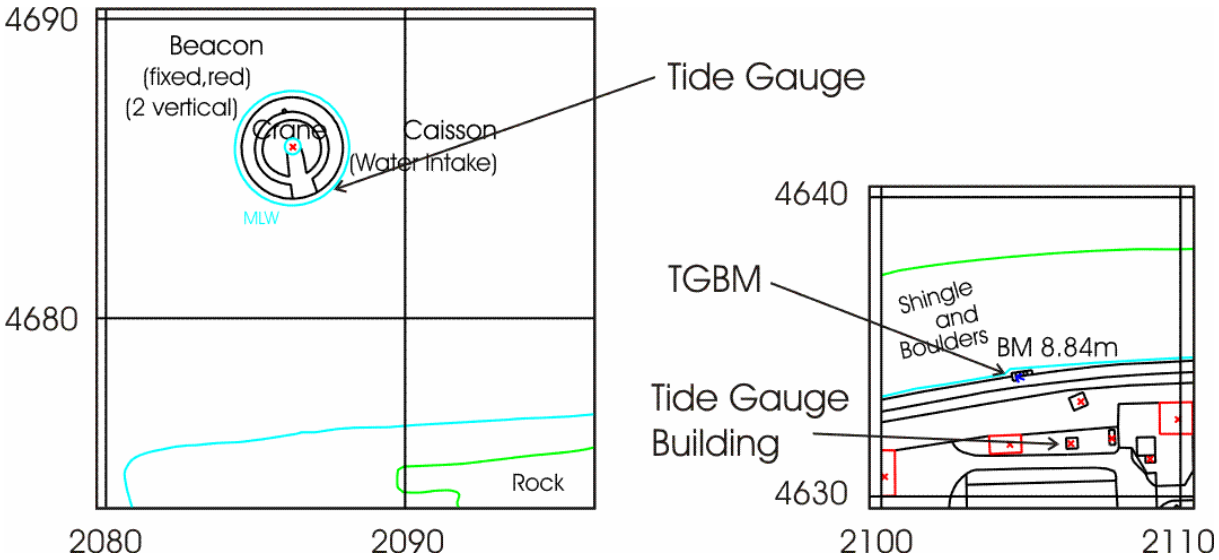
Latitude: 51° 12' 38.2" N Longitude: 03° 07' 52.8" W

Grid Reference: ST 2107 4632

Instrument type: Dataring system with dual underwater pressure transducers.

Site of Gauge:

The tide gauge building is located in the Hinkley Point "A" station. The transducers are located in underwater vented chambers, suspended from a steel pole attached to the structure of the water intake tower, some 400m offshore.



Holyhead Tide Gauge

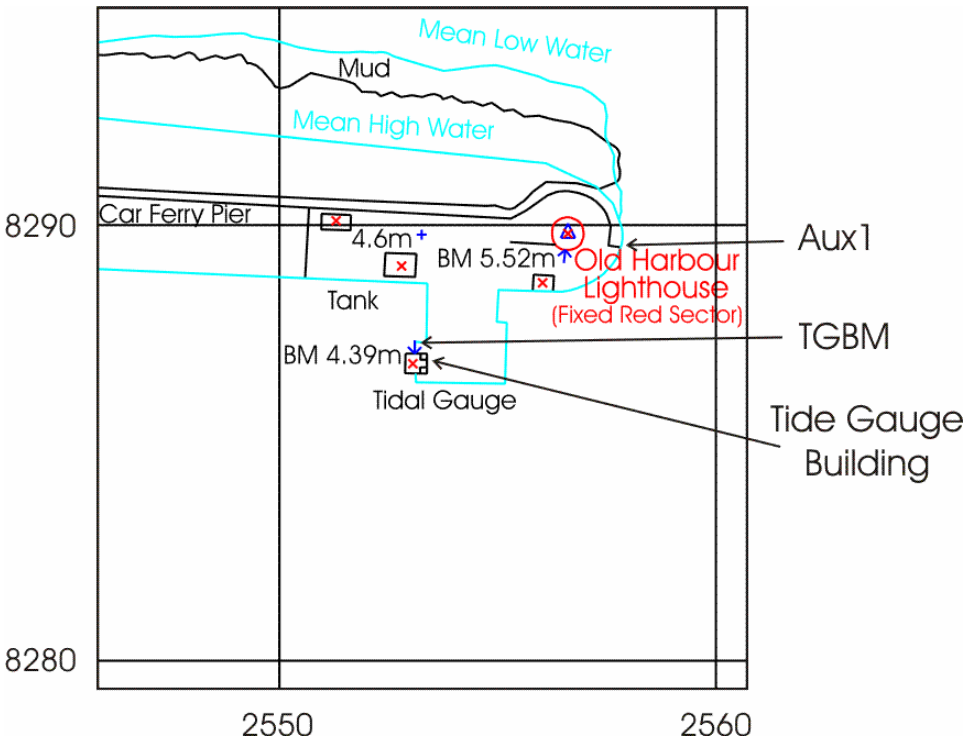
Latitude: 53° 18' 50.2" N Longitude: 04° 37' 13.6" W

Grid Reference: SH 2553 8287

Instrument type: Data acquisition system with a full tide and a mid-tide bubbler gauge and a back-up Munro float gauge installed. Wind speed and wind direction are also recorded.

Site of Gauge:

The tide gauge building, pressure points and stilling well are situated on Salt Island jetty, close to the old harbour lighthouse.



Ilfracombe Tide Gauge

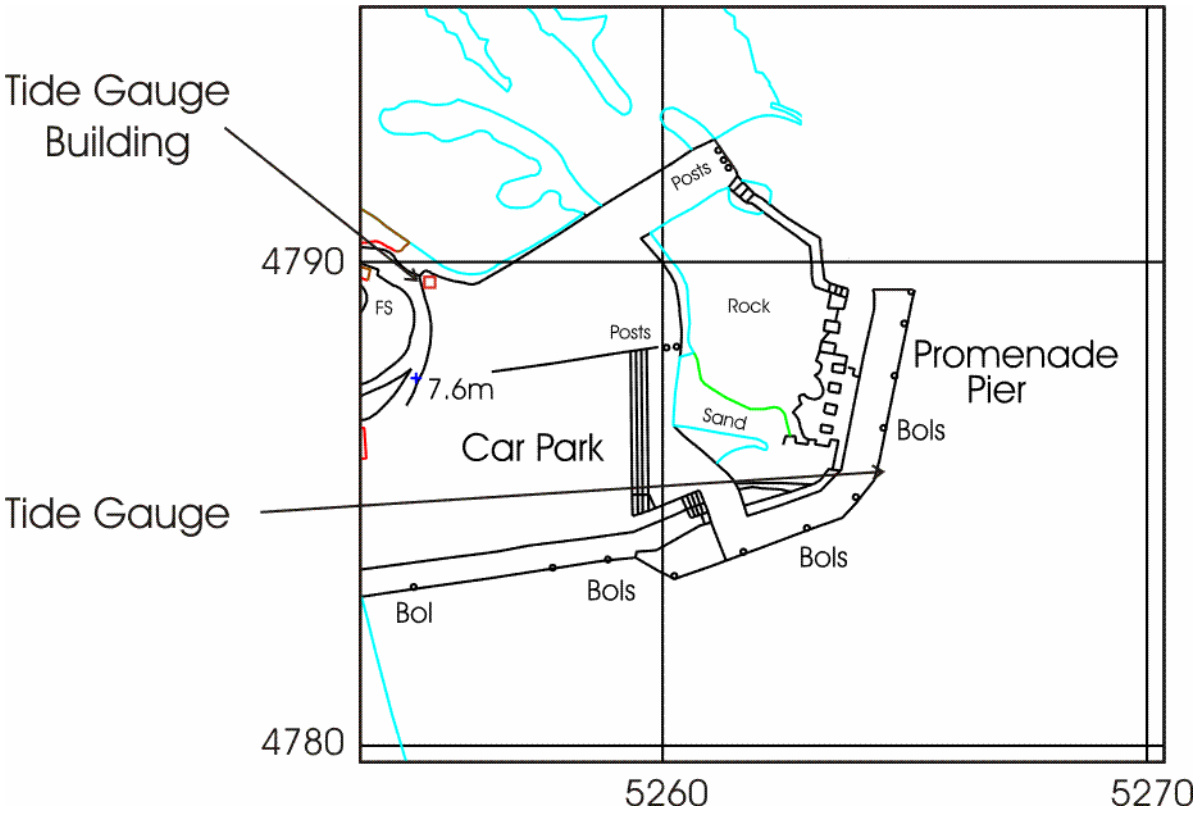
Latitude: 51° 12' 40.1" N Longitude: 04° 06' 44.6" W

Grid Reference: SS 5255 4789

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is located in the north west corner of the car park, east of Lantern Hill. The pressure points are located on the seaward side of Ilfracombe pier at the harbour entrance.



Immingham Tide Gauge

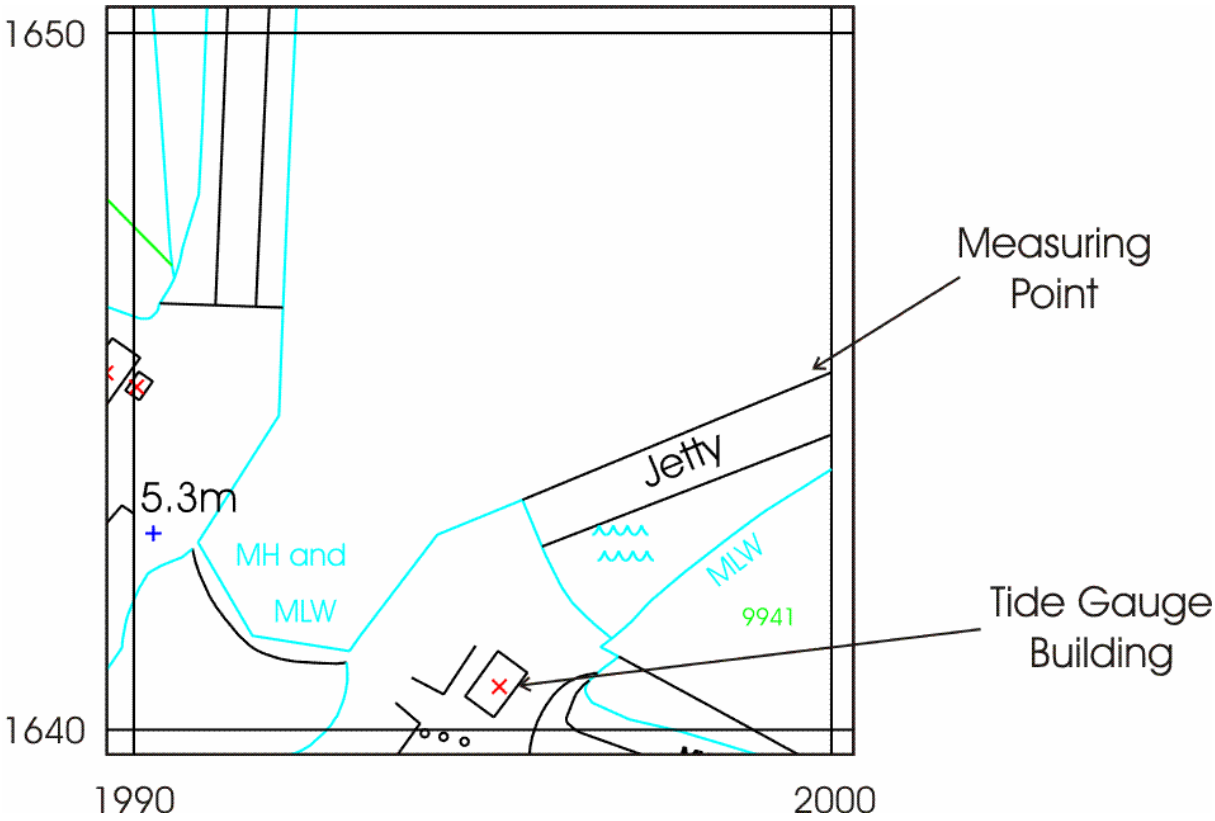
Latitude: 53° 37' 48.8" N Longitude: 00° 11' 14.7" W

Grid Reference: TA 1996 1638

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is east of the lock gates at the entrance to Immingham Docks. The pressure points are fixed to a leg of the lead-in jetty on the east side of the entrance to Immingham Docks.



Port Erin (Isle of Man) Tide Gauge

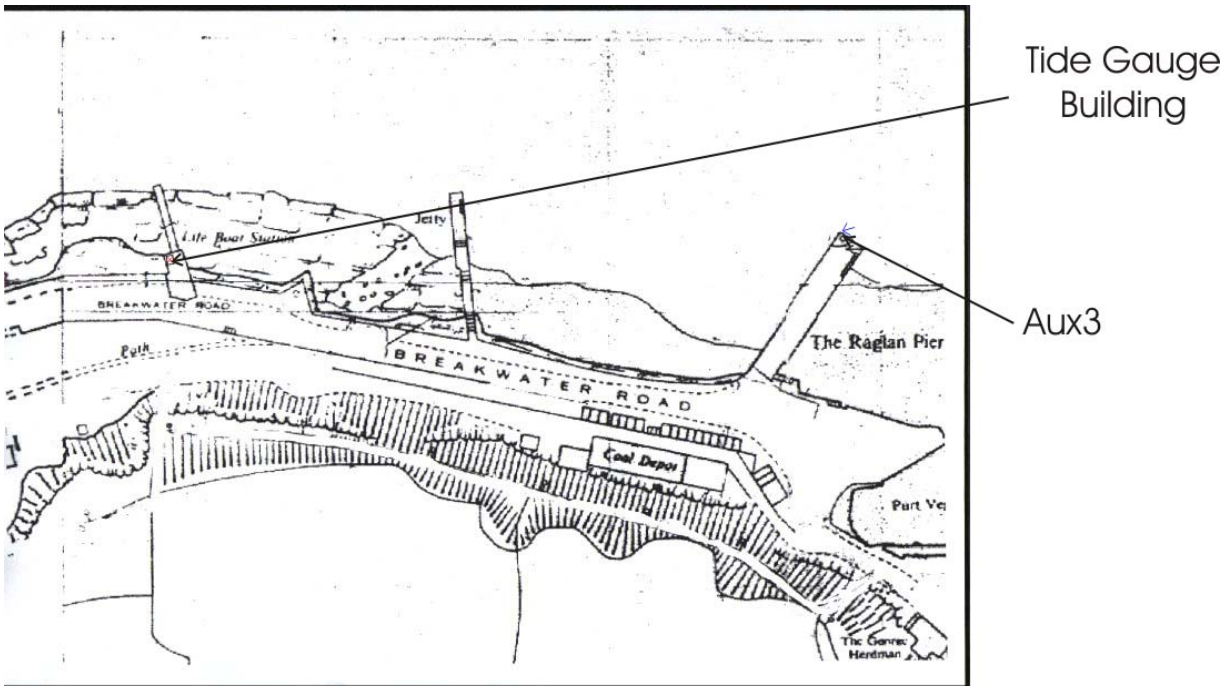
Latitude: 54° 05' 07.4" N Longitude: 04° 46' 05.0" W

Grid Reference: SC 1904 6904

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge cabinet is located in Port Erin lifeboat station and the pressure points are mounted close to the end of the lifeboat slipway. The mid-tide pressure point is mounted on steelwork attached to a concrete leg of the boathouse.



Port Ellen (Isle of Islay) Tide Gauge

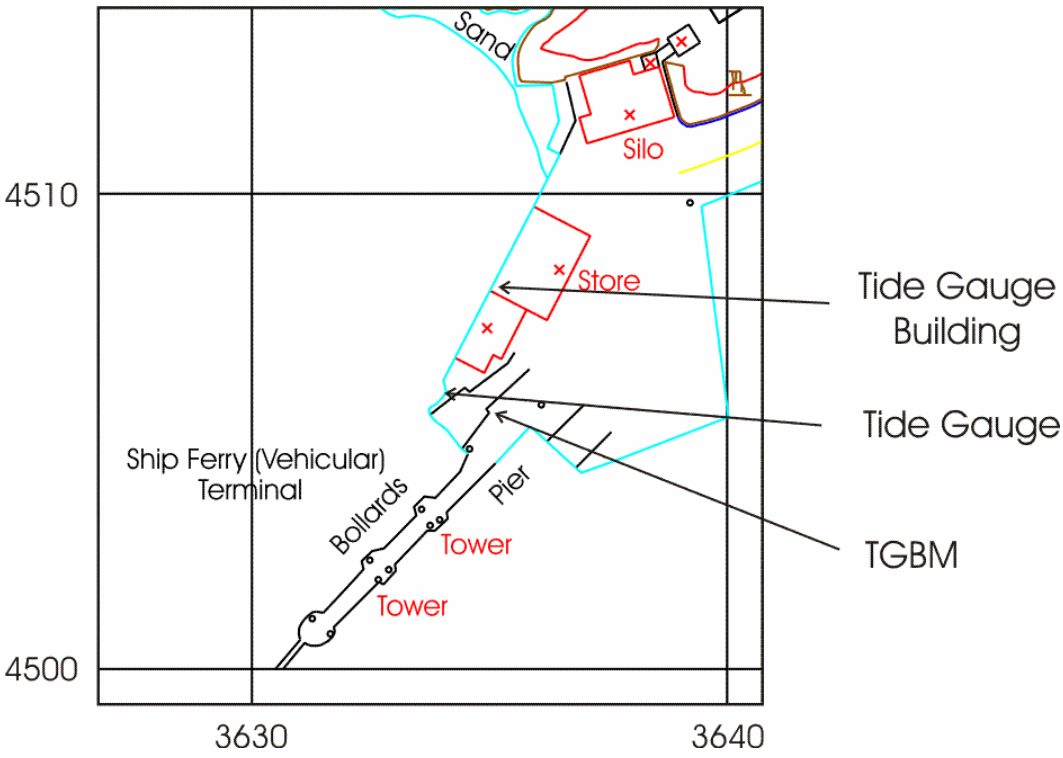
Latitude: 55° 37' 39.3" N Longitude: 06° 11' 23.7" W

Grid Reference: NR 3636 4508

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge cabinet is located in the Caledonian MacBrayne storeroom next to Port Ellen ferry terminal. The pressure points are located south west of the ferry terminal offices.



St. Helier (Jersey) Tide Gauge

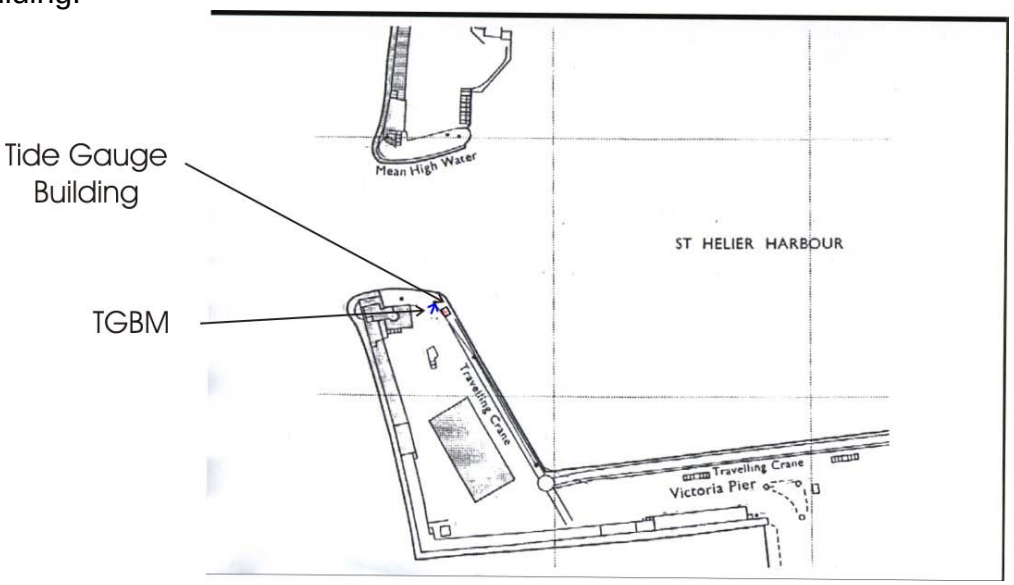
Latitude: 49° 11' 00" N Longitude: 02° 07' 00 " W

Grid Reference: 13/11 6466 4763

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is located on Victoria Pier, St. Helier, adjacent to the Port Control building. The pressure points are located on the inside wall of the pier, 2m from the tide gauge building.



Kinlochbervie Tide Gauge

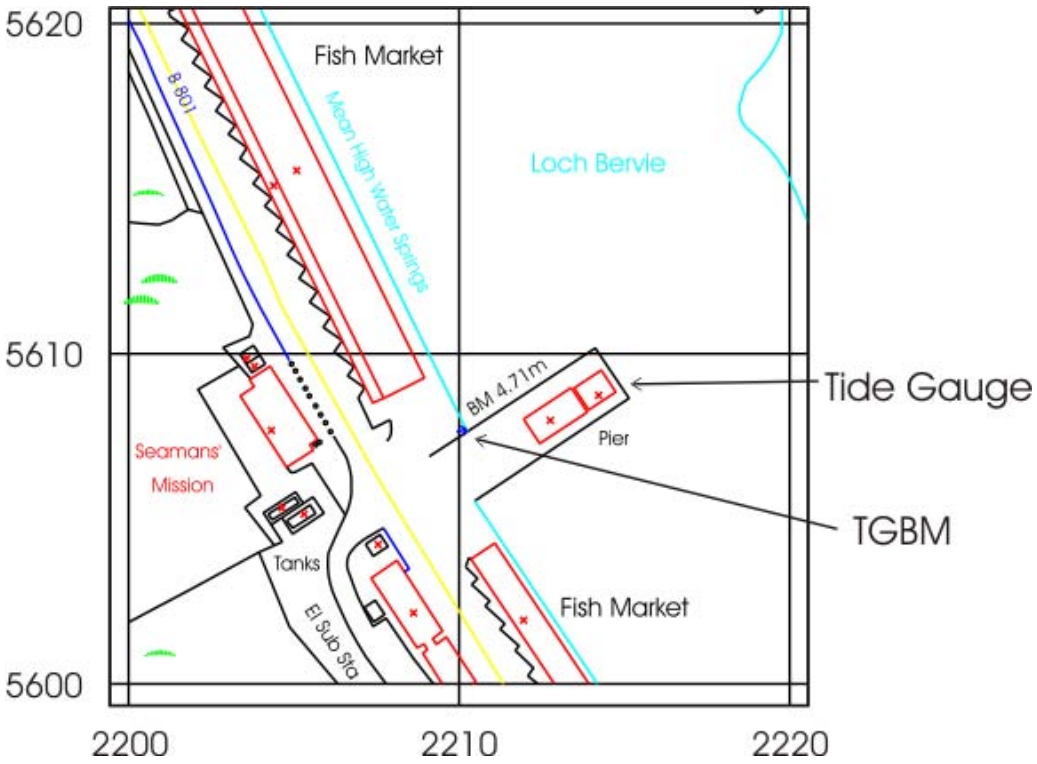
Latitude: 58° 27' 23.8" N Longitude: 05° 03' 01.3" W

Grid Reference: NC 2213 5608

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge cabinet is located in the ice plant, on the pier. The pressure points are mounted on a leg of the jetty beneath the ice plant.



Leith Tide Gauge

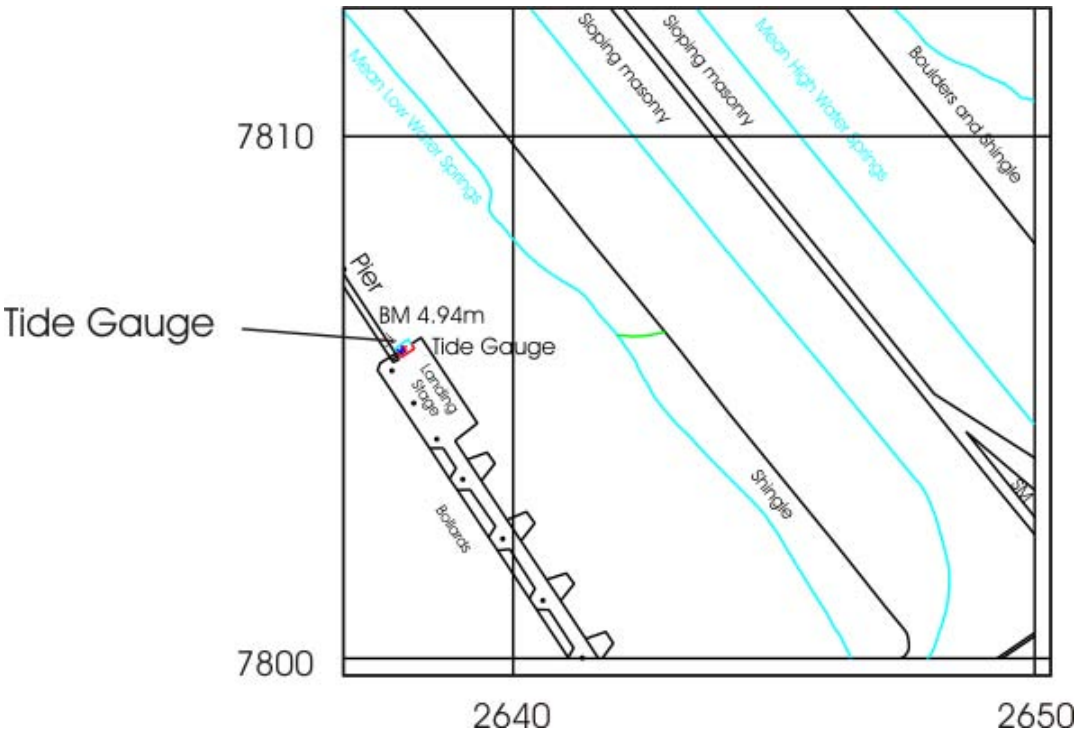
Latitude: 55° 59' 23.4"N Longitude: 03° 10' 54.1"W

Grid Reference: NT 2638 7806

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building and pressure points are located on the lead-in jetty, east of the entrance to Leith docks.



Lerwick Tide Gauge

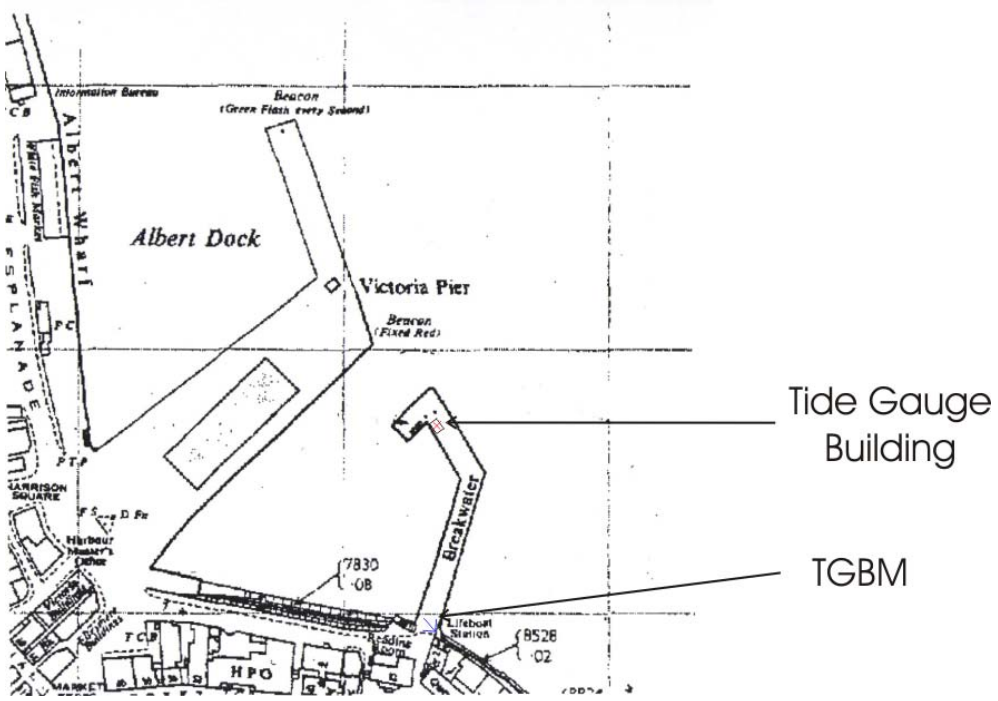
Latitude: 60° 09' 14.5" N Longitude: 01° 08' 25.1" W

Grid Reference: HU 4783 4137

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed. Wind speed and wind direction are also recorded.

Site of Gauge:

The tide gauge building and measuring points are located on the inner wall at breakwater entrance to the small boat harbour, south of Victoria Pier, Lerwick.



Liverpool Tide Gauge

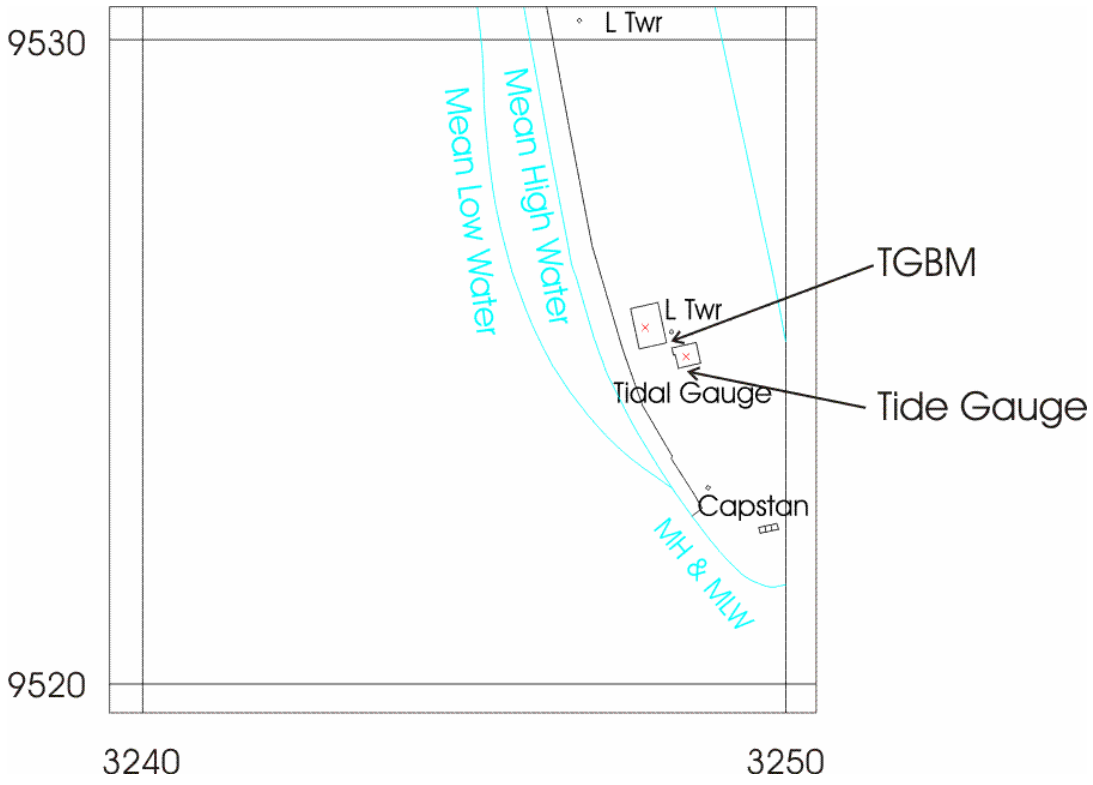
Latitude: 53° 26' 58.9" N Longitude: 03° 01' 04.8" W

Grid Reference: SJ 3249 9525

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The Tide Gauge is located within the old Lock Keeper's office at the entrance to Gladstone Dock. The pressure points are located on the seaward side of Gladstone Dock. The wind speed and direction instruments are mounted at the top of the light tower located next to the tide gauge building.



Llandudno Tide Gauge

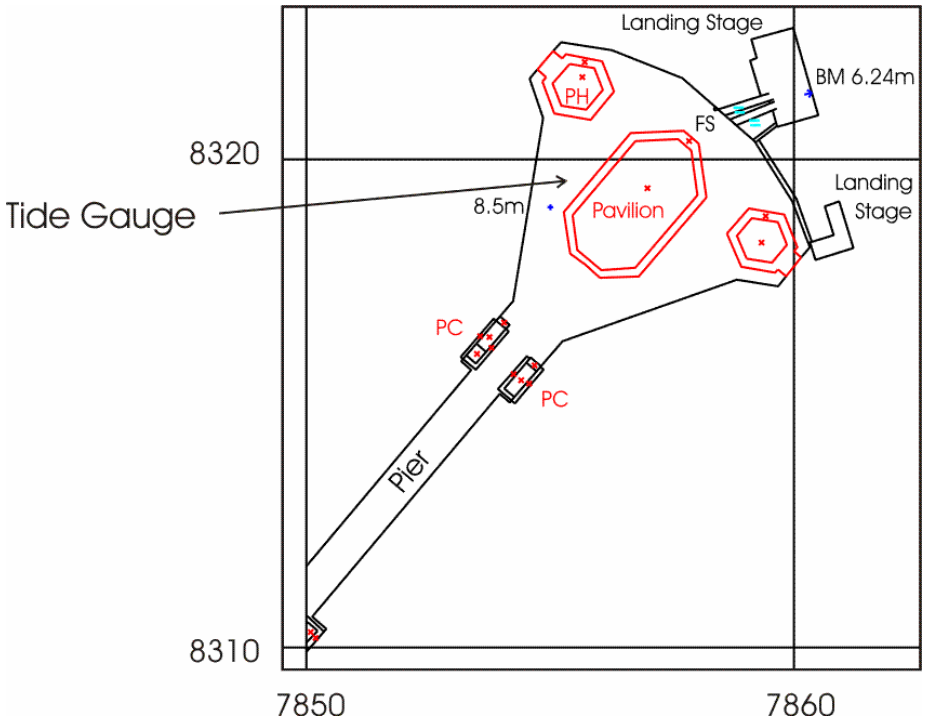
Latitude: 53° 19' 54.0" N Longitude: 03° 49' 30.8" W

Grid Reference: SH 7855 8319

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is located on the sub-platform under the pavilion at the seaward end of Llandudno pier. The pressure points are located on a leg of the pier below the tide gauge building.



Lowestoft Tide Gauge

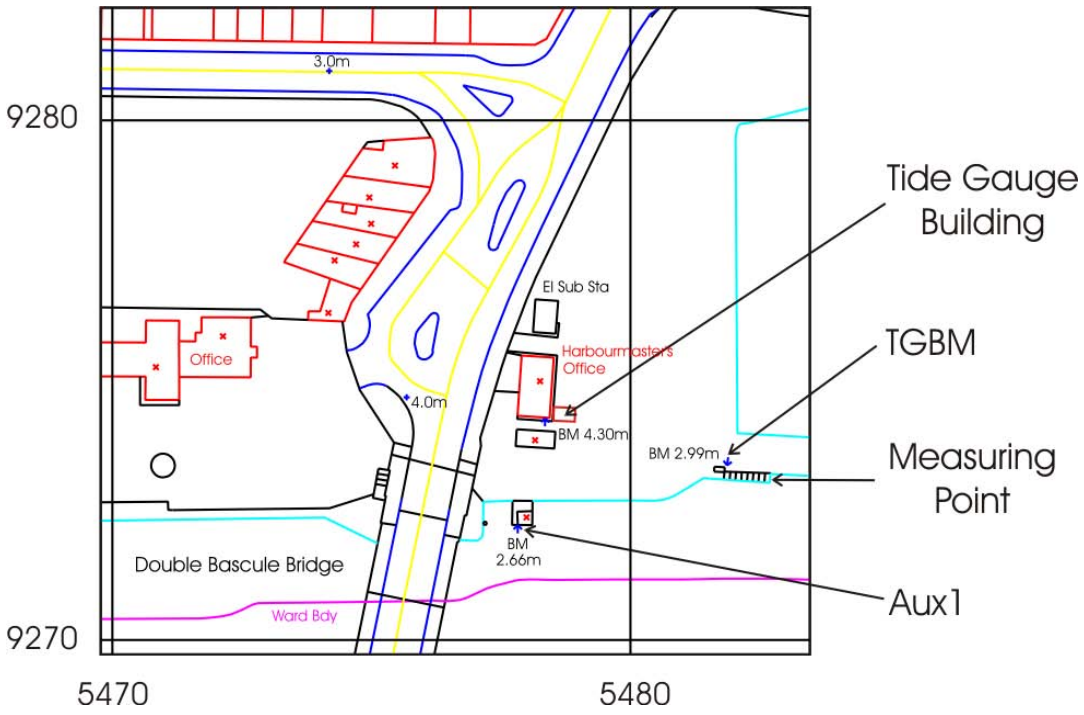
Latitude: 52° 28' 23.2" N Longitude: 01° 45' 00.4" E

Grid Reference: TM 5478 9274

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is situated east of the Harbour Master's office with the pressure points located on the quay wall, east of the tide gauge building.



Milford Haven Tide Gauge

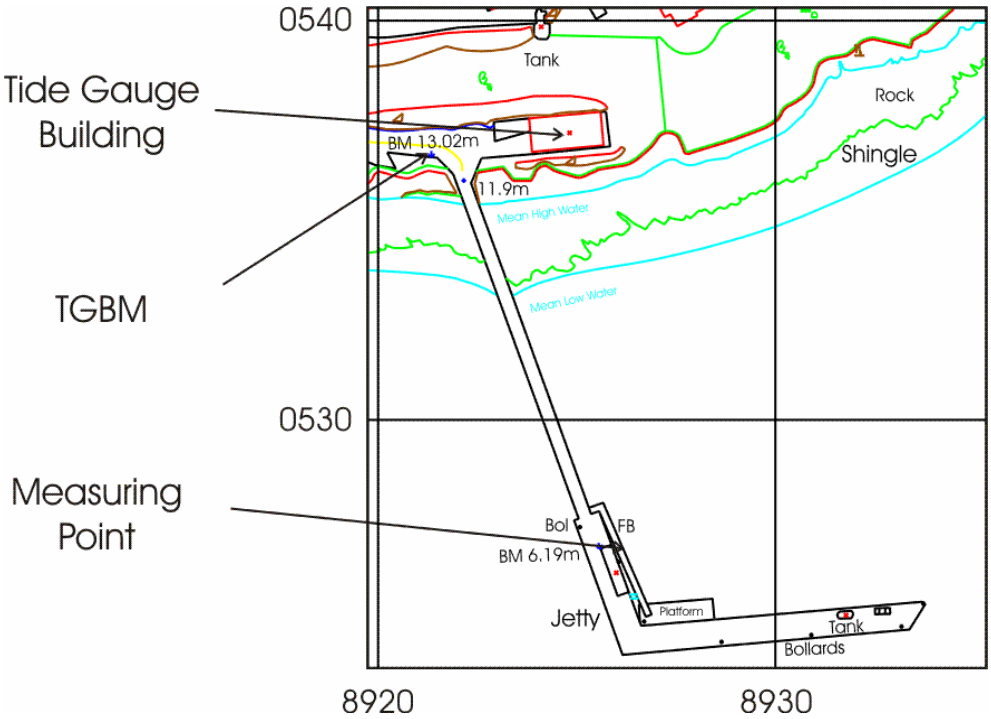
Latitude: 51° 42' 26.6" N Longitude: 05° 03' 05.5" W

Grid Reference: SM 8925 0537

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge is located in the store room at the shore end of Milford Haven Port Authority jetty. The pressure points are mounted at the seaward end of the jetty.



Millport Tide Gauge

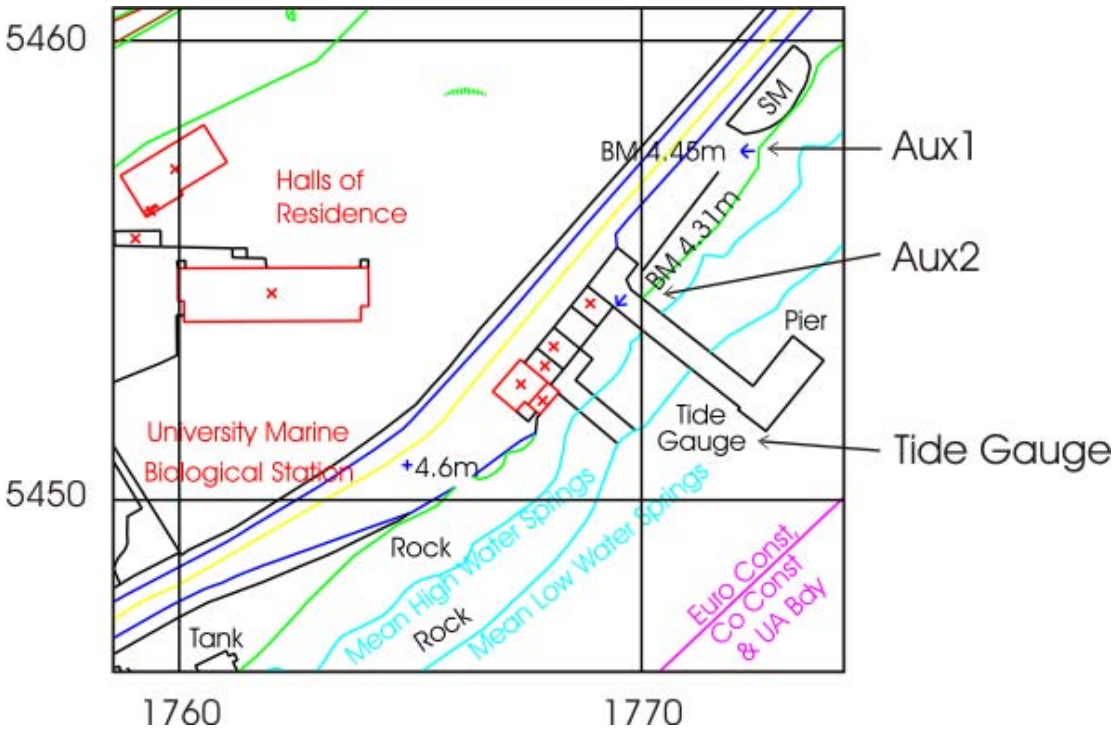
Latitude: 55° 44' 59.3" N Longitude: 04° 54' 22.8" W

Grid Reference: NS 1769 5454

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge is housed in a storeroom at the shore end of the University Marine Biological Station pier. The pressure points are mounted at the seaward end of the pier.



Mumbles (West Glamorgan) Tide Gauge

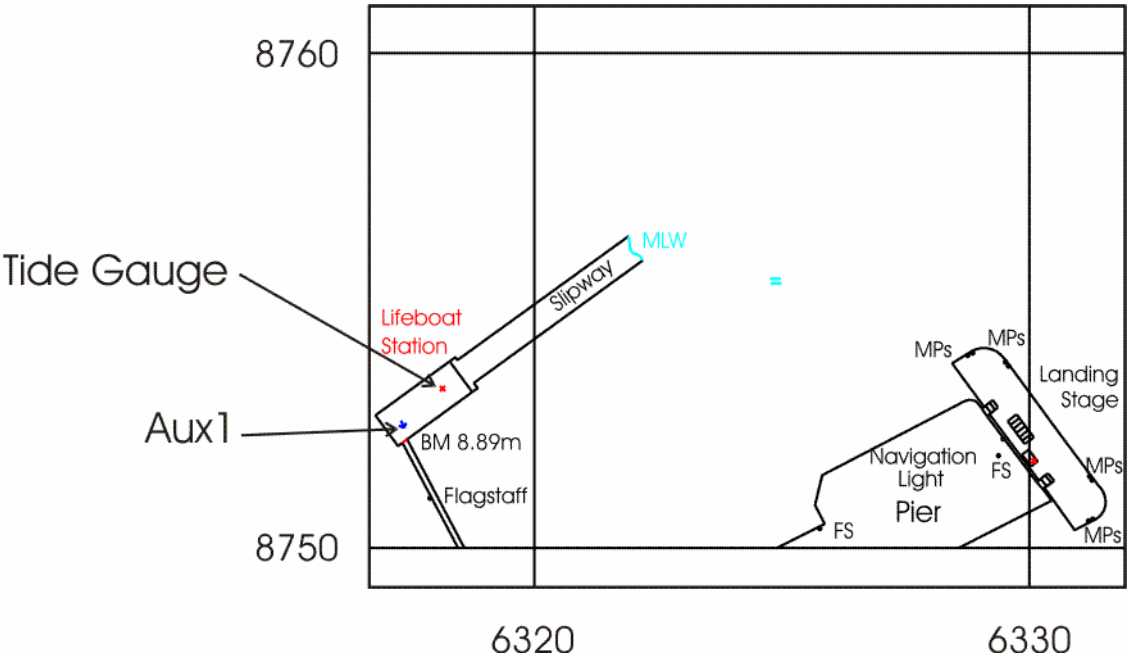
Latitude: 51° 34' 12.0" N Longitude: 03° 58' 31.6" W

Grid Reference: SS 6319 8753

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge cabinet is located in the Mumbles lifeboat station and the pressure points are mounted close to the end of the lifeboat slipway.



Newlyn Tide Gauge

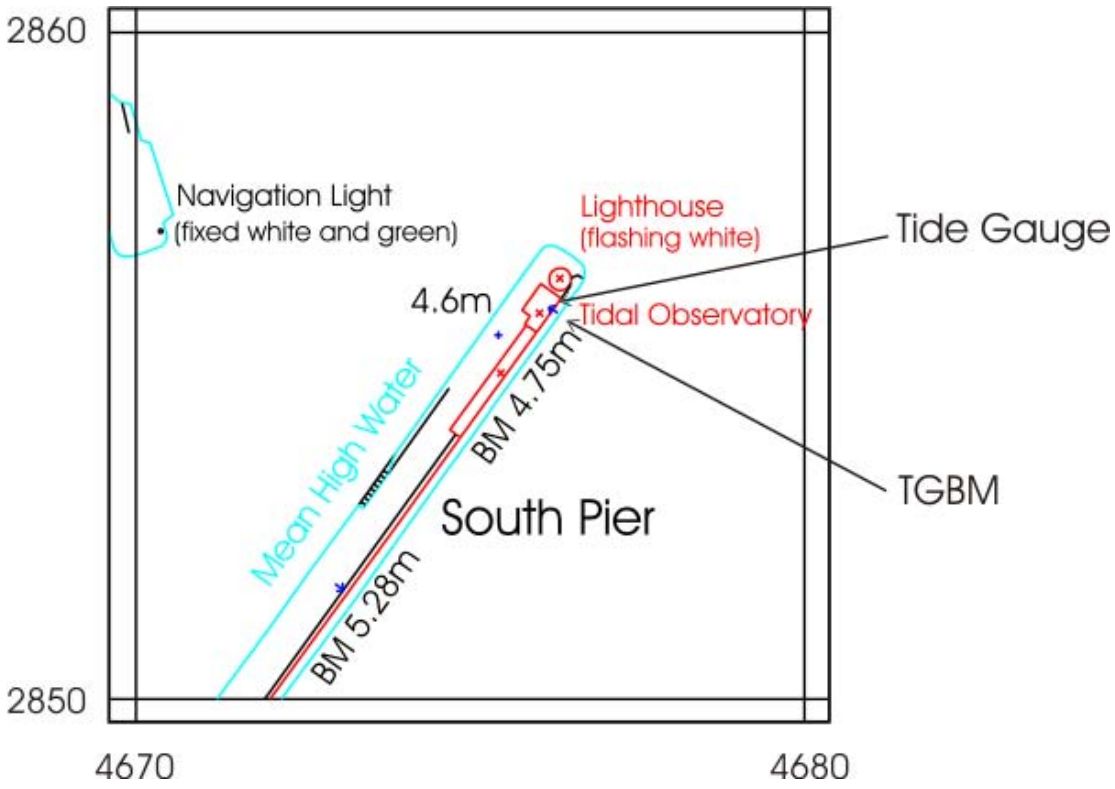
Latitude: 50° 06' 10.8" N Longitude: 05° 32' 34.2" W

Grid Reference: SW 4676 2856

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

Site of Gauge:

The Tidal Observatory is located at the end of South Pier, next to the lighthouse. The pressure points are located on the seaward side of the pier, behind the lighthouse.



Newhaven (Sussex) Tide Gauge

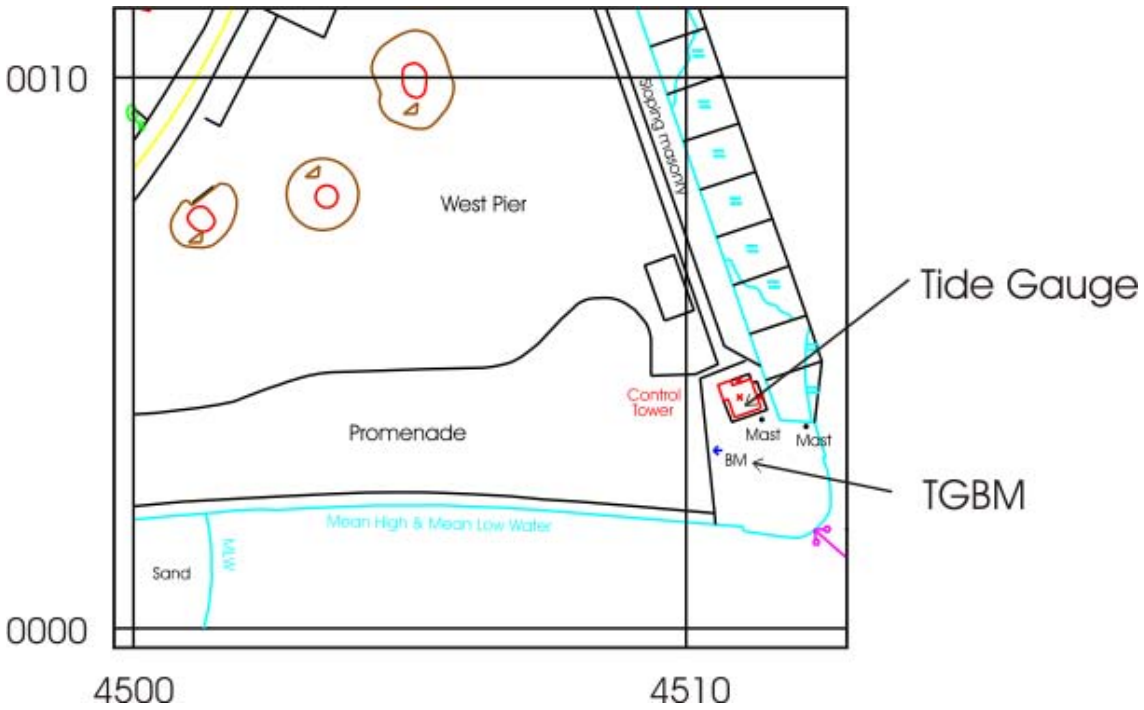
Latitude: 50° 46' 54.4" N Longitude: 00° 03' 25.3" E

Grid Reference: TQ 4511 0004

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge is located within the Port Control building on West Pier, and the pressure points are located on the pier wall, south east of the Port Control building. The anemometer and wind vane are located on the signals mast.



Newport (Wales) Tide Gauge

Latitude: 51° 33' 00.0" N Longitude: 02° 59' 14.8" W

Grid Reference: ST 3163 8392

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is located on the west side of the entrance to Newport Docks. The pressure points are attached to the dock wall on the west side of the dock entrance, close to the lock gates.

North Shields (Tyne and Wear) Tide Gauge

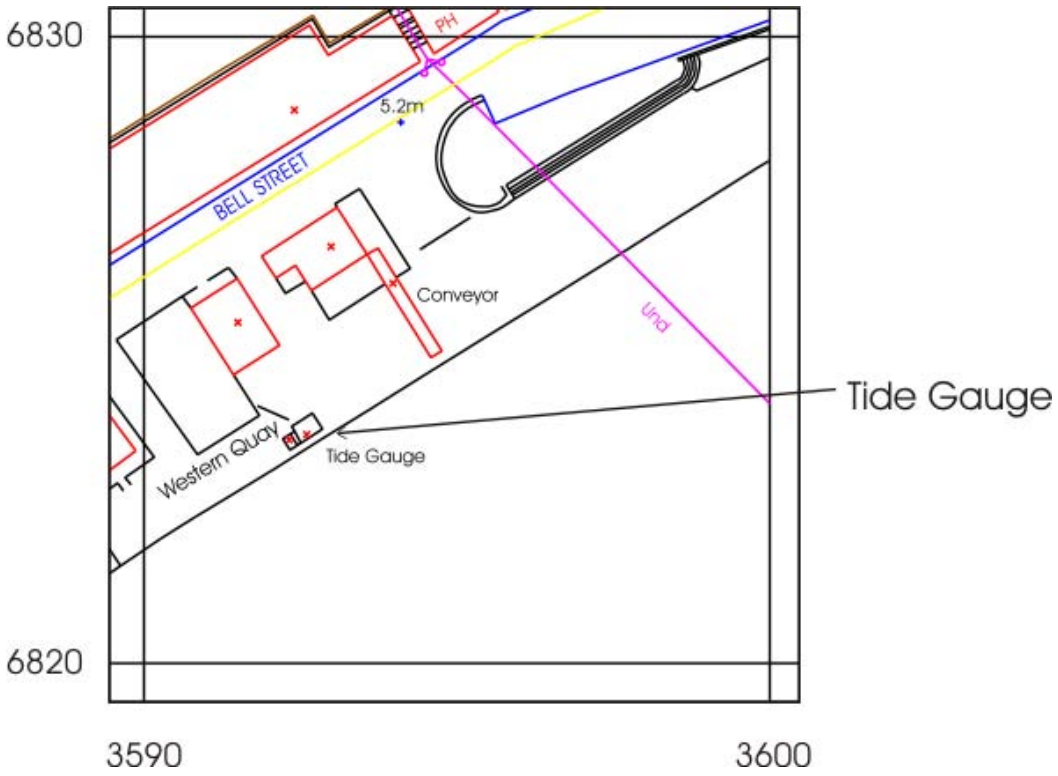
Latitude: 55° 00' 26.8" N Longitude: 01°26' 23.2" W

Grid Reference: NZ 3593 6824

Instrument type: Data acquisition system with potentiometers attached to the Munro float gauge and the Wellhead float gauge installed.

Site of Gauge:

The tide gauge building is located on the north side of the River Tyne, close to the Port of Tyne Authority offices.



Portpatrick (Scotland) Tide Gauge

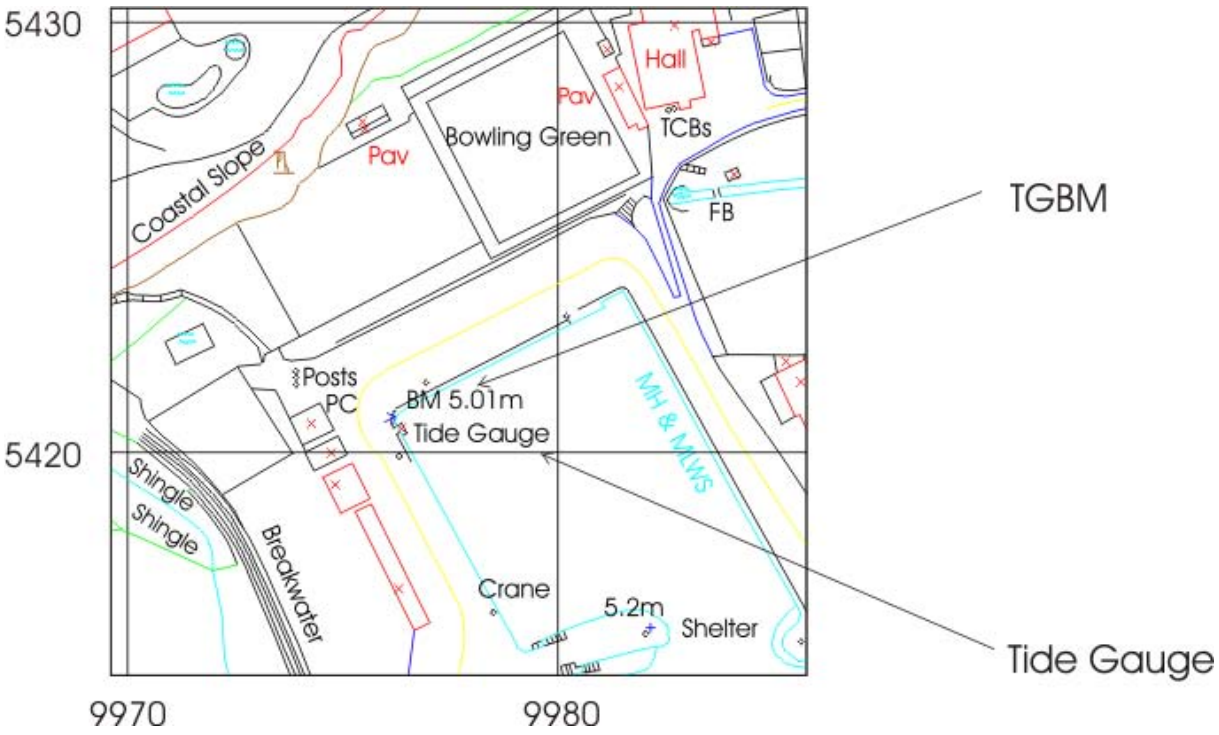
Latitude: 54° 50' 33.2" N Longitude: 05° 07' 12.1" W

Grid Reference: NW 9976 5421

Instrument type: Data acquisition system with a full tide bubbler gauge and a potentiometer attached to an installed Munro float gauge.

Site of Gauge:

The tide gauge building is mounted over the stilling well in the corner of Portpatrick harbour. The pressure point is located directly beneath the building.



Portrush (Northern Ireland) Tide Gauge

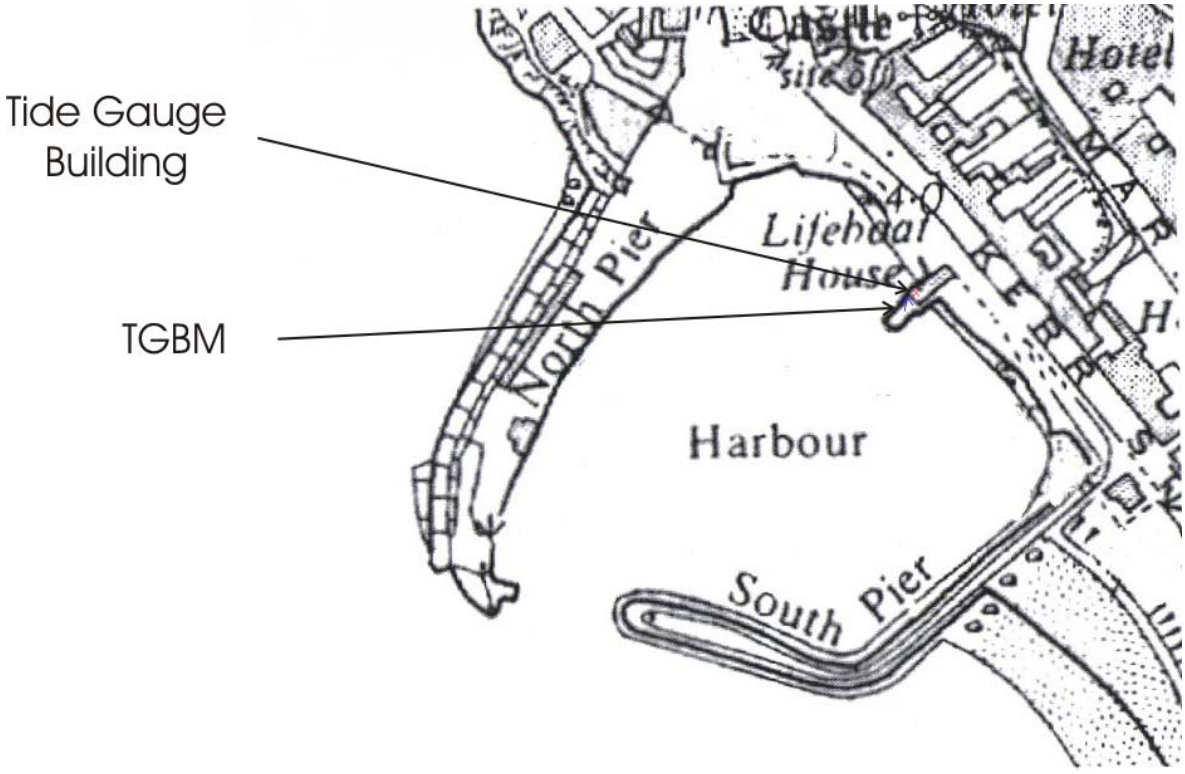
Latitude: 55° 12' 24.4" N Longitude: 06° 39' 24.6" W

Grid Reference: NW 0416 9952

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge cabinet is located in the RNLI boathouse, with the pressure points fixed to a leg of the slipway.



Portsmouth (Hampshire) Tide Gauge

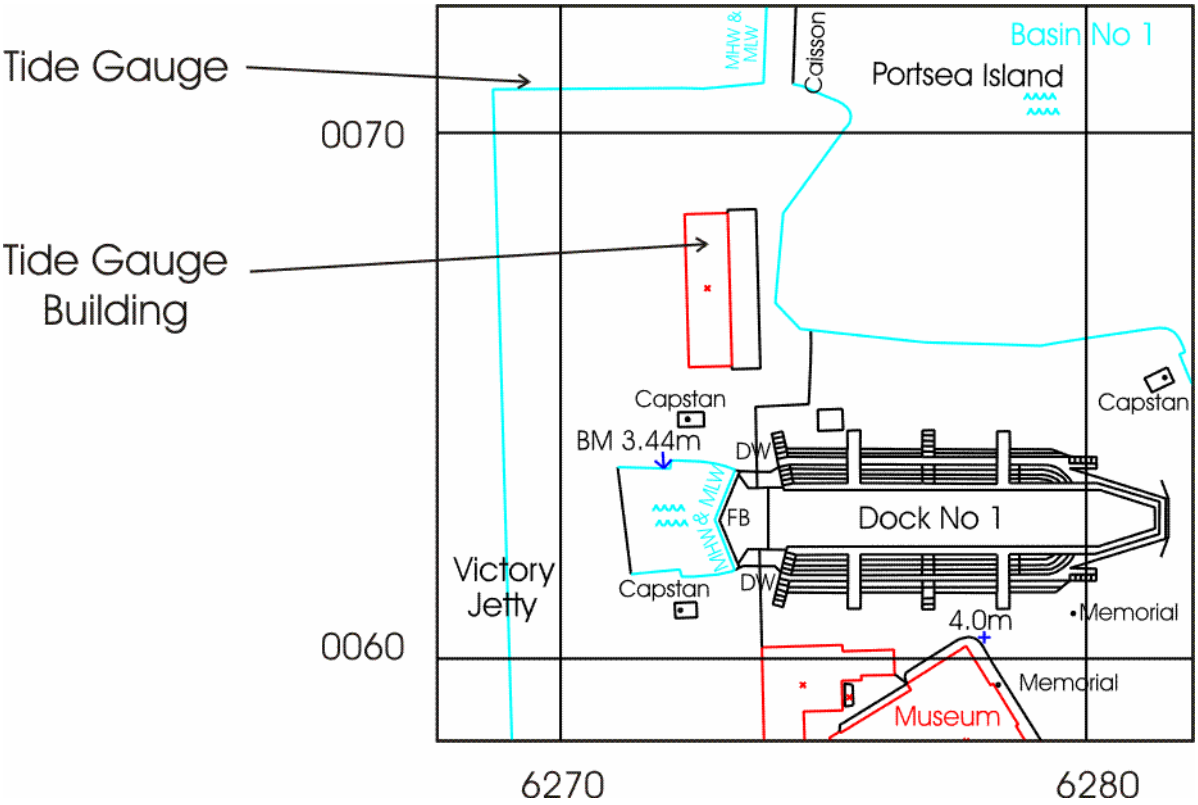
Latitude: 50° 48' 08.2" N Longitude: 01° 06' 40.2" W

Grid Reference: SU 6273 0068

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is located on Victory Jetty in the Royal Naval base. The pressure points are mounted on a leg at the north west corner of the jetty.



Sheerness (Kent) Tide Gauge

Latitude: 51° 26' 44.3" N Longitude: 00° 44' 36.4" E

Grid Reference: TQ 9074 7542

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is located on the jetty at Garrison Point, in the Port of Sheerness.

St. Mary's (Isles of Scilly) Tide Gauge

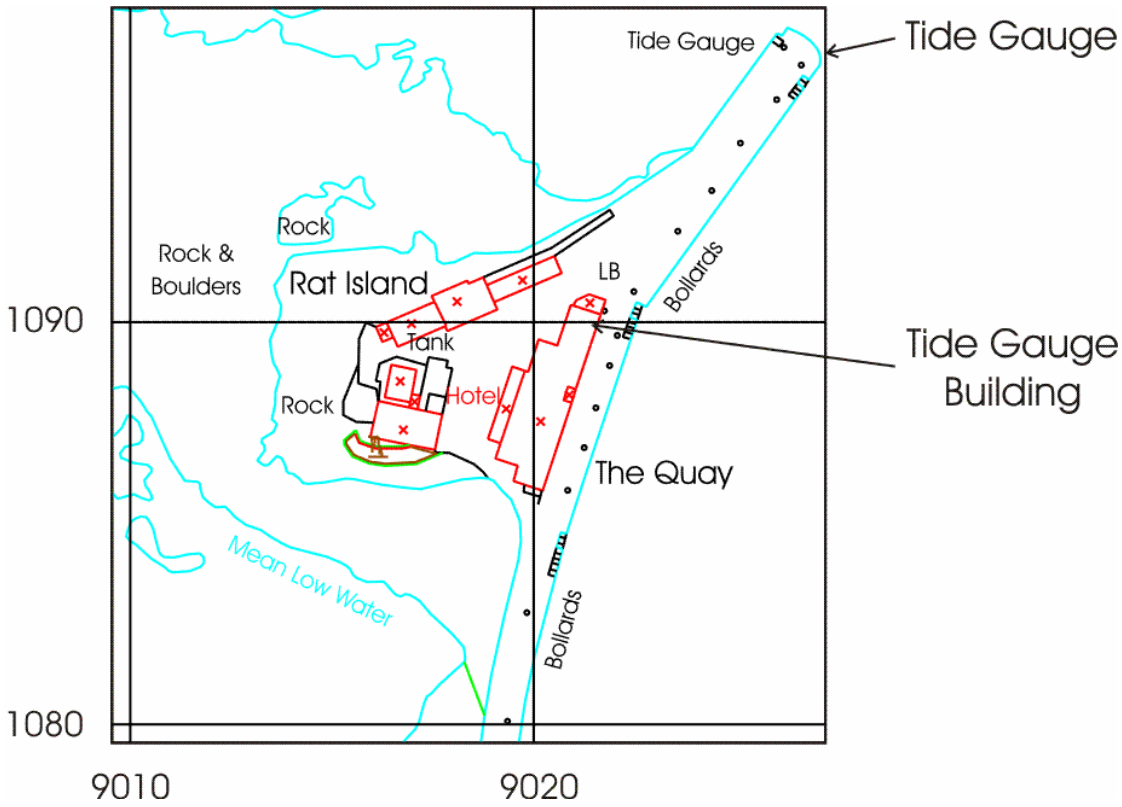
Latitude: 49° 55' 04.3" N Longitude: 06° 19' 02.0" W

Grid Reference: SV 9021 1090

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge cabinet is located in the Harbour Office storeroom on The Quay, Hugh Town. The pressure points are located on the nose of the quay.



Stornoway (Hebrides) Tide Gauge

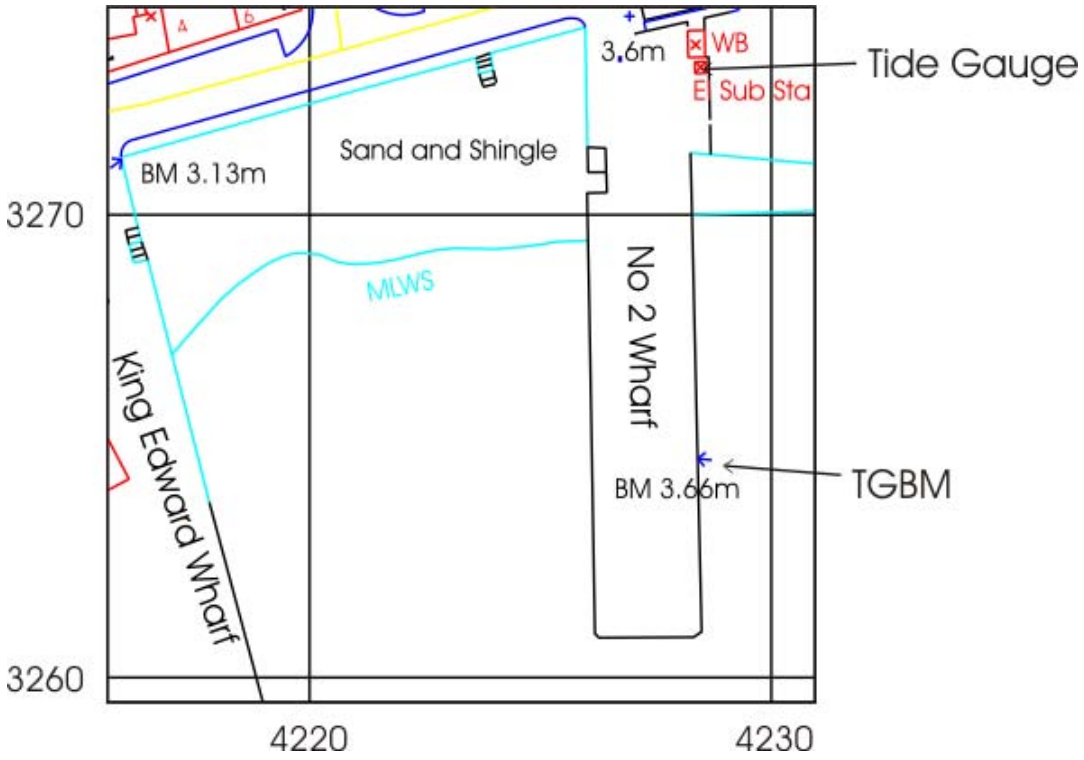
Latitude: 58° 12' 28.1" N Longitude: 06° 23' 20.3" W

Grid Reference: NB 4228 3274

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is located by the weighbridge at the entrance to Stornoway Port Authority, No. 2 wharf. The pressure points are attached to a leg on the east side of the wharf.



Tobermory (Mull) Tide Gauge

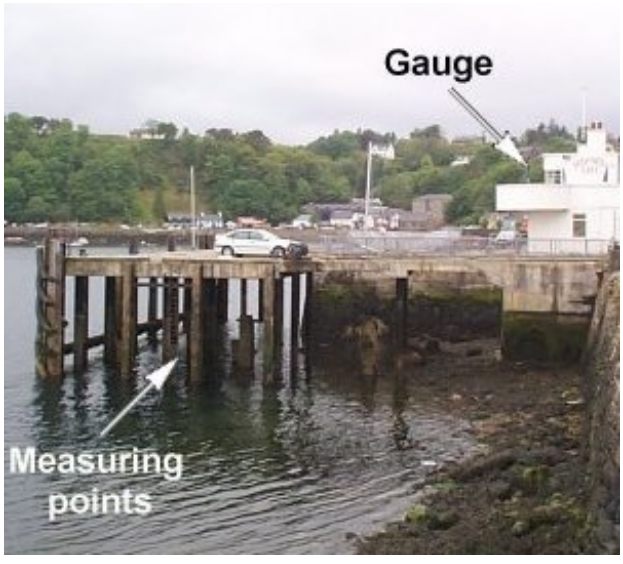
Latitude: 56° 37' 23.2" N Longitude: 06° 03' 51.2" W

Grid Reference: NM 5079 5531

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge cabinet is located in the Caledonian MacBrayne ferry terminal on Mishnish Pier, Tobermory, and the pressure points are located on one of the pier legs.



Ullapool (Scotland) Tide Gauge

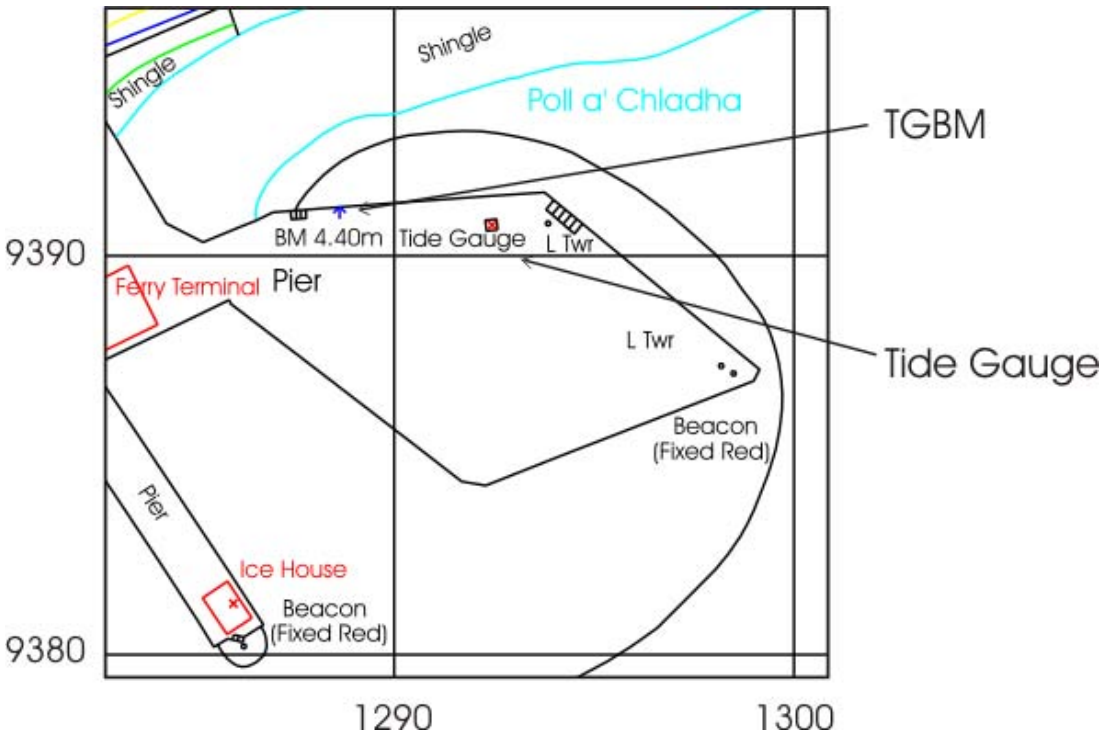
Latitude: 57° 53' 42.9" N Longitude: 05° 09' 28.4" W

Grid Reference: NH 1293 9391

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

Site of Gauge:

The tide gauge building is located on the pier, Ullapool harbour. The pressure points are mounted below the tide gauge building.



Weymouth (Dorset) Tide Gauge

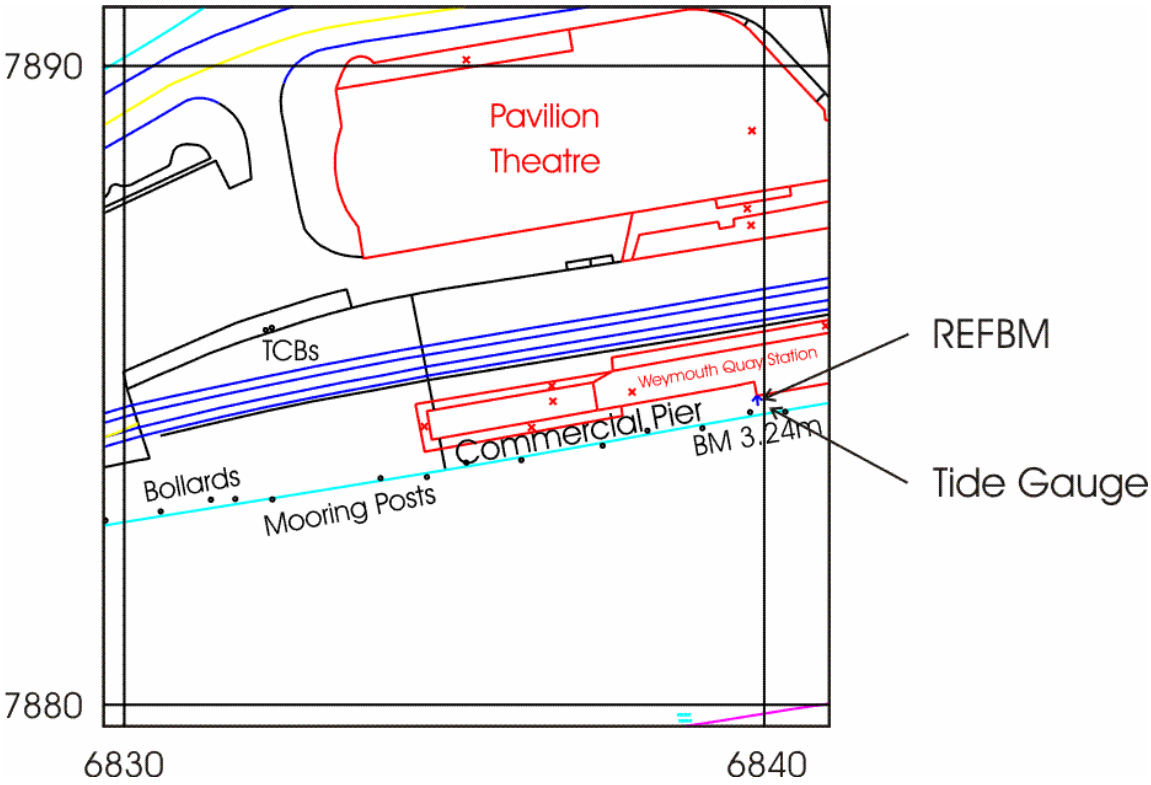
Latitude: 50° 36' 30.6" N Longitude: 02° 26' 52.6" W

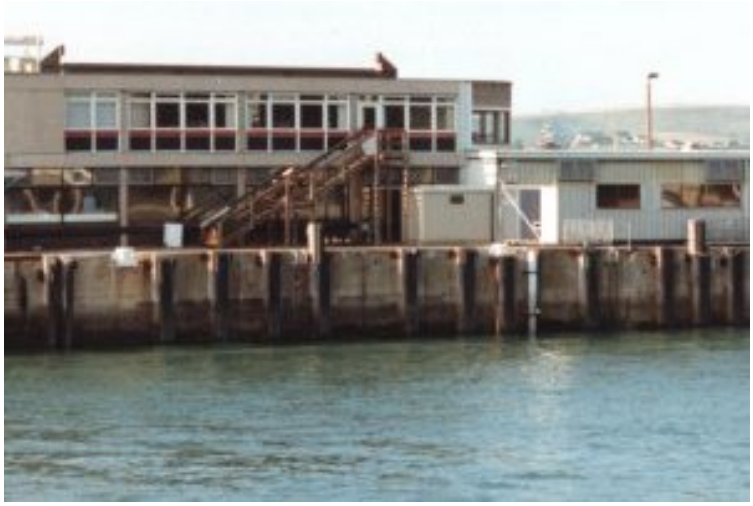
Grid Reference: SY 6840 7885

Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge building is located on Commercial Pier, adjacent to the ferry terminal. The pressure points are located on the pier wall, directly in front of the tide gauge building.





Whitby (Yorkshire) Tide Gauge

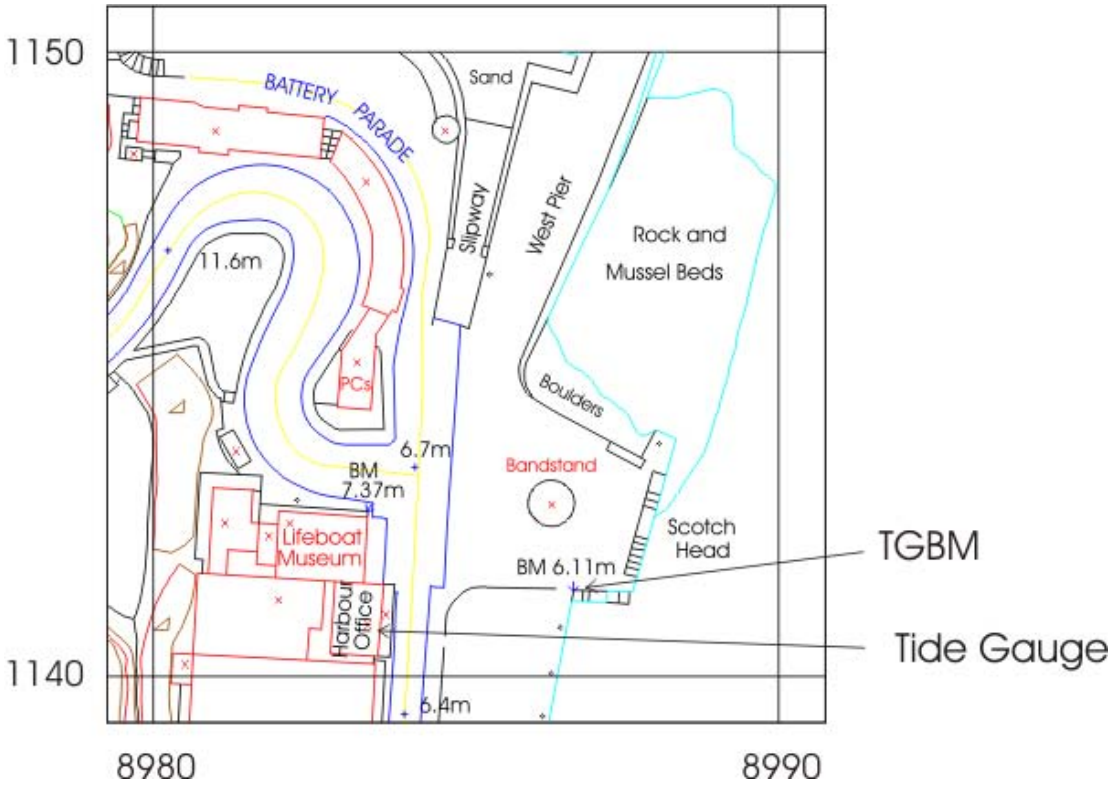
Latitude: 54° 29' 24.0" N Longitude: 00° 36' 52.6" W

Grid Reference: NZ 8984 1140

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge is located in the Harbour Master's office, Pier Road. The pressure points are positioned underneath the quay, adjacent to the Harbour Office.



Wick (Scotland) Tide Gauge

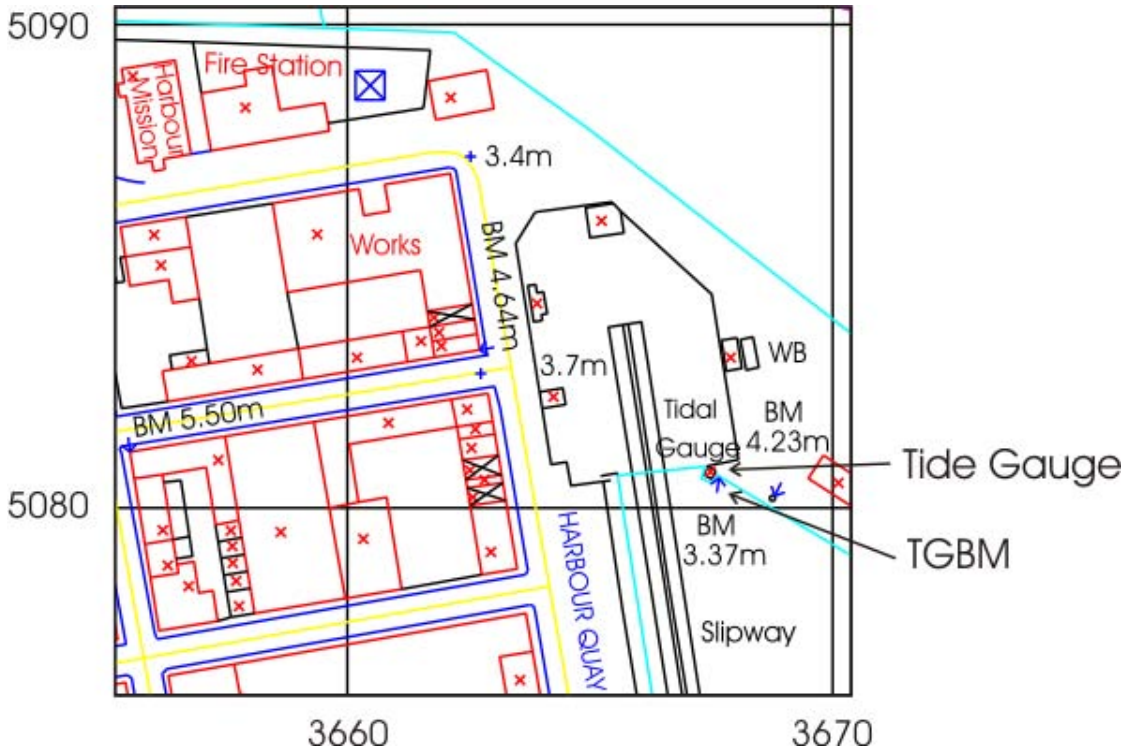
Latitude: 58° 26' 27.5" N Longitude: 03° 05' 10.7" W

Grid Reference: ND 3668 5081

Instrument type: Data acquisition system with two full tide and a mid-tide bubbler gauge installed.

Site of Gauge:

The tide gauge building is sited in the north west corner of Wick harbour next to the ship repair slipway. The pressure points are attached to an unused stilling well beneath the building.



Workington (Cumbria) Tide Gauge

Latitude: 54° 39' 02.6" N Longitude: 03° 34' 01.8" W

Grid Reference: NX 9898 2953

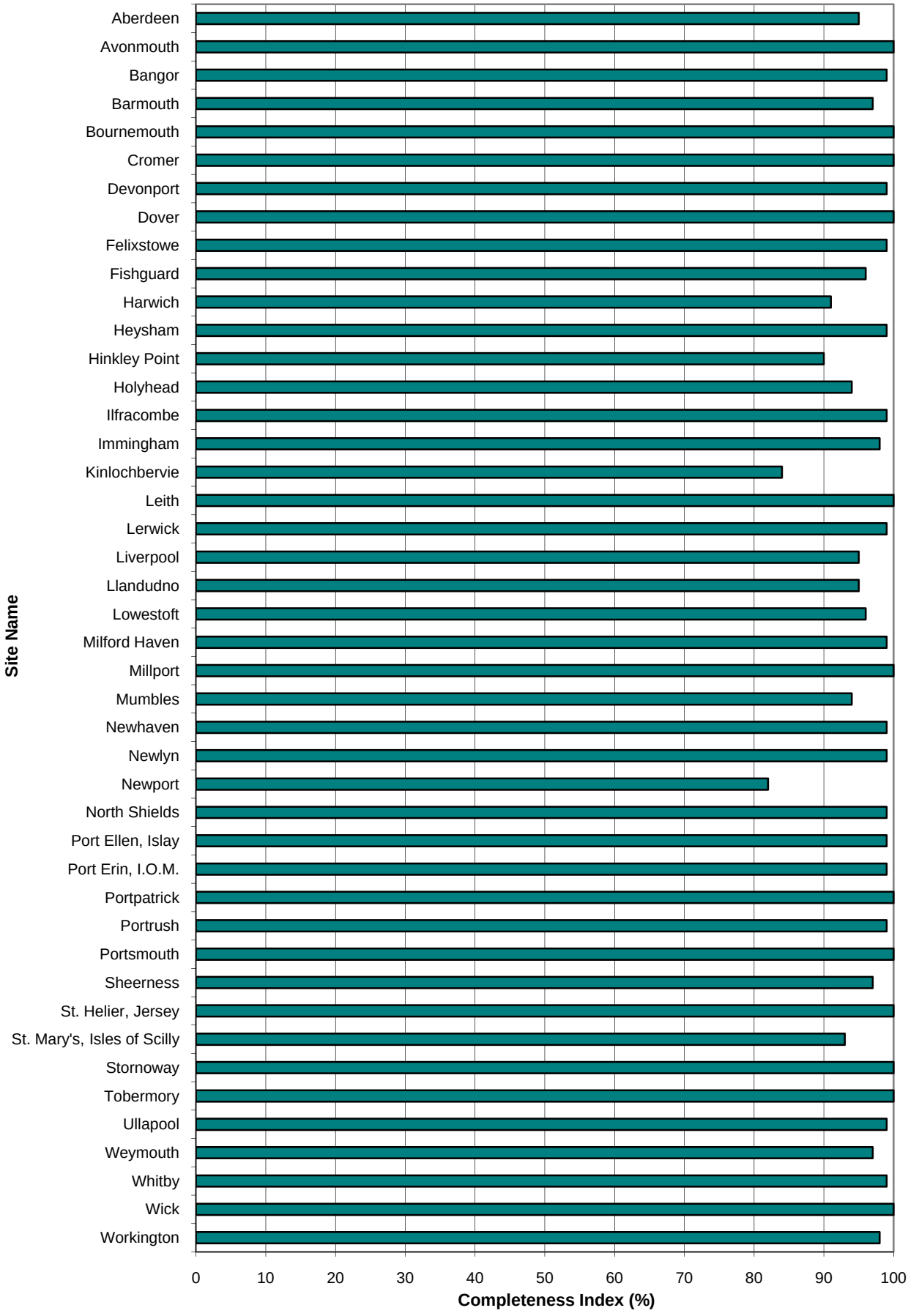
Instrument type: Data acquisition system with two full tide bubbler gauges installed.

Site of Gauge:

The tide gauge is located in a concrete building on the north side of the dock entrance. The pressure points are located behind fender piles on the north seaward side of the dock gates. The wind speed and direction instruments are mounted at the top of the mast located next to the tide gauge building.

Report for 2008 on Data Quality and visits to sites

Histogram of Completeness Index (CI%) for UK Tide Gauge sites



Aberdeen Tide Gauge

Latitude: 57° 08' 38.6" N
Longitude: 02° 04' 38.5" W
Grid Reference: NJ 9525 0591

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.25m below Ordnance Datum Newlyn (ODN)
TGZ = 6.318m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: There were no visits to site in 2008.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
95	15 minutes	101,310-316,345-353	None

Statistics:

Surge maxima	Value	Day	Time
January	0.803	25	10:00:00
February	0.744	21	23:00:00
March	0.930	1	04:30:00
April	0.370	26	23:45:00
May	0.170	30	15:15:00
June	0.276	19	13:30:00
July	0.265	15	10:15:00
August	0.389	25	20:15:00
September	0.292	11	18:45:00
October	0.911	26	01:15:00
November	0.312	15	03:30:00
December	0.713	20	06:00:00

Surge minima	Value	Day	Time
January	-0.403	4	16:15:00
February	-0.339	7	09:45:00
March	-0.396	5	01:00:00
April	-0.269	2	20:30:00
May	-0.178	25	22:30:00
June	-0.142	9	01:15:00
July	-0.160	27	05:45:00
August	-0.119	30	21:30:00
September	-0.252	24	15:30:00
October	-0.336	25	15:00:00
November	-0.426	25	12:30:00
December	-0.501	27	09:00:00

Extreme Maxima	Value	Day	Time
January	4.796	25	15:00:00
February	4.838	22	02:00:00
March	4.907	10	15:00:00
April	4.510	9	15:30:00
May	4.373	7	14:15:00
June	4.331	4	13:15:00
July	4.392	6	03:15:00
August	4.581	4	02:45:00
September	4.658	2	02:15:00
October	4.889	25	23:00:00
November	4.830	15	02:00:00
December	4.408	18	17:30:00

Extreme minima	Value	Day	Time
January	0.531	22	19:15:00
February	0.392	10	21:30:00
March	0.364	22	20:00:00
April	0.136	7	20:15:00
May	0.352	5	19:00:00
June	0.403	6	08:45:00
July	0.366	5	08:45:00
August	0.349	31	07:30:00
September	0.224	17	08:00:00
October	0.558	15	07:00:00
November	0.463	16	21:30:00
December	0.787	29	20:45:00

Mean sea level	No days	MSL
January	31	2.716
February	29	2.651
March	31	2.641
April	30	2.512
May	31	2.444
June	30	2.548
July	31	2.569
August	31	2.606
September	30	2.561
October	31	2.742
November	22	2.636
December	21	2.558
	Sum	Avg
	348	2.599

Avonmouth Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

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

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: There were no visits to site in 2008.

Data quality:

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

Statistics:

Surge maxima	Value	Day	Time
January	1.374	31	08:15:00
February	1.755	29	18:45:00
March	1.486	10	04:45:00
April	1.015	28	18:45:00
May	0.54	9	15:15:00
June	0.926	22	05:15:00
July	0.991	7	06:30:00
August	0.936	19	04:30:00
September	1.097	3	17:30:00
October	0.906	1	04:30:00
November	0.937	9	21:00:00
December	1.254	4	07:45:00

Surge minima	Value	Day	Time
January	-0.643	28	05:15:00
February	-0.859	17	21:45:00
March	-0.886	4	13:30:00
April	-0.683	2	23:00:00
May	-0.669	26	17:00:00
June	-0.643	9	18:00:00
July	-0.595	23	17:00:00
August	-0.651	22	17:00:00
September	-0.805	20	04:45:00
October	-0.853	9	20:45:00
November	-0.96	24	11:30:00
December	-0.962	8	22:00:00

Exteme Maxima	Value	Day	Time
January	13.577	25	09:00:00
February	13.769	23	08:45:00
March	14.536	10	09:00:00
April	14.189	8	08:30:00
May	13.762	6	19:45:00
June	13.471	5	20:30:00
July	13.644	5	21:00:00
August	13.836	3	20:45:00
September	13.862	1	20:15:00
October	14.008	15	19:30:00
November	13.794	14	19:45:00
December	13.595	14	08:00:00

Extreme minima	Value	Day	Time
January	0.847	24	15:30:00
February	0.614	10	16:30:00
March	0.546	22	14:45:00
April	0.347	6	14:30:00
May	0.515	6	14:45:00
June	0.91	5	02:45:00
July	1.097	4	15:00:00
August	0.825	31	14:30:00
September	0.476	18	03:45:00
October	0.65	17	03:15:00
November	0.672	14	02:15:00
December	0.764	15	03:30:00

Mean sea level	No days	MSL
January	31	7.113
February	29	6.965
March	31	7.047
April	30	6.968
May	31	6.908
June	30	6.976
July	31	7.024
August	31	7.089
September	30	7.019
October	31	7.062
November	30	7.001
December	31	6.907
	Sum	Avg
	366	7.007

Bangor Tide Gauge

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

Benchmarks and Benchmark relationships:

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

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

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 204 Fitted new compressor, carried out general maintenance, and purged system.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	204	043,056-057,059-066,068-069,117-120,122,140,145-146,172,189,315-316,318,322-324,326-328,362-365

Statistics:

Surge maxima	Value	Day	Time
January	0.867	31	10:30:00
February	0.813	29	17:45:00
March	0.759	10	08:00:00
April	0.384	1	01:00:00
May	0.181	4	03:00:00
June	0.378	22	09:45:00
July	0.296	10	03:00:00
August	0.364	9	14:45:00
September	0.503	11	00:45:00
October	0.772	23	17:15:00
November	0.477	9	00:30:00
December	0.51	4	10:00:00

Surge minima	Value	Day	Time
January	-0.215	22	06:00:00
February	-0.281	14	14:15:00
March	-0.54	22	11:45:00
April	-0.276	5	20:00:00
May	-0.24	26	06:30:00
June	-0.242	12	10:45:00
July	-0.169	23	10:15:00
August	-0.169	23	00:30:00
September	-0.33	22	10:00:00
October	-0.386	3	06:00:00
November	-0.831	24	15:15:00
December	-0.491	24	02:15:00

Exteme Maxima	Value	Day	Time
January	4.205	13	13:45:00
February	3.891	8	11:45:00
March	4.204	10	12:15:00
April	3.606	9	13:15:00
May	3.582	9	01:30:00
June	3.617	18	23:00:00
July	3.77	6	01:00:00
August	3.804	19	00:00:00
September	3.749	2	00:00:00
October	4.028	23	18:15:00
November	3.755	10	20:45:00
December	3.89	12	22:45:00

Extreme minima	Value	Day	Time
January	0.459	24	18:30:00
February	0.317	10	19:15:00
March	0.076	22	17:30:00
April	0.113	6	17:15:00
May	0.233	5	16:30:00
June	0.212	7	07:15:00
July	0.365	4	05:30:00
August	0.324	3	06:00:00
September	0.242	17	05:45:00
October	0.397	14	04:15:00
November	0.24	24	15:15:00
December	0.174	14	18:00:00

Mean sea level	No days	MSL
January	31	2.221
February	21	2.081
March	21	2.012
April	26	1.979
May	24	1.949
June	27	1.99
July	31	2.036
August	31	2.084
September	30	2.025
October	31	2.123
November	23	2.025
December	29	2.003
	Sum	Avg
	325	2.044

Barmouth Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.44m below ODN
TGZ = 10.363m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 011 TGI on site to replace modem.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
97	15 minutes	001-011	030-038,040-041,072-078,086-128,306-309

Statistics:

Surge maxima	Value	Day	Time
January	0.705	18	19:00:00
February	0.886	29	16:00:00
March	0.998	10	06:00:00
April			
May	0.182	28	19:00:00
June	0.677	26	19:00:00
July	0.463	9	21:15:00
August	0.56	19	00:15:00
September	0.735	3	12:30:00
October	0.715	23	17:00:00
November	0.776	9	22:15:00
December	1.14	4	05:45:00

Surge minima	Value	Day	Time
January	-0.256	30	03:00:00
February	-0.392	14	15:00:00
March	-0.626	4	02:15:00
April			
May	-0.378	26	21:15:00
June	-0.275	10	11:00:00
July	-0.245	22	13:30:00
August	-0.229	28	21:30:00
September	-0.38	26	09:00:00
October	-0.512	28	21:30:00
November	-0.797	24	10:45:00
December	-0.618	9	20:15:00

Exteme Maxima	Value	Day	Time
January	5.596	13	11:15:00
February	5.439	22	09:15:00
March	6.115	10	09:45:00
April			
May	5.211	7	09:15:00
June	5.143	4	20:30:00
July	5.368	5	22:00:00
August	5.554	18	21:15:00
September	5.416	30	20:45:00
October	5.532	15	20:15:00
November	5.343	15	09:00:00
December	5.404	12	19:45:00

Extreme minima	Value	Day	Time
January	0.916	26	18:30:00
February	0.761	10	18:15:00
March	0.619	22	16:45:00
April			
May	0.696	7	05:00:00
June	0.726	7	06:15:00
July	0.812	4	04:30:00
August	0.759	30	03:15:00
September	0.721	28	02:45:00
October	0.807	17	05:00:00
November	0.779	24	12:45:00
December	0.691	15	18:00:00

Mean sea level	No days	MSL
January	17	2.916
February	22	2.686
March	15	2.697
April		
May	24	2.613
June	30	2.674
July	31	2.713
August	31	2.788
September	30	2.718
October	31	2.806
November	25	2.742
December	31	2.652
	Sum	Avg
	287	2.728

Bournemouth Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

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

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 039 TGI on site; compressor change & general maintenance.

Data quality:

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

Statistics:

Surge maxima	Value	Day	Time
January	0.732	15	09:00:00
February	0.584	5	00:45:00
March	1.155	10	06:15:00
April	0.412	29	15:00:00
May	0.228	27	05:30:00
June	0.292	19	01:15:00
July	0.35	6	05:15:00
August	0.365	12	13:30:00
September	0.454	5	07:30:00
October	0.453	5	13:45:00
November	0.44	10	13:00:00
December	0.561	4	07:30:00

Surge minima	Value	Day	Time
January	-0.416	25	15:00:00
February	-0.287	16	16:00:00
March	-0.416	5	15:00:00
April	-0.329	1	17:15:00
May	-0.18	5	10:30:00
June	-0.208	9	15:45:00
July	-0.203	23	14:00:00
August	-0.183	28	21:45:00
September	-0.327	27	03:00:00
October	-0.312	25	08:30:00
November	-0.431	24	21:45:00
December	-0.542	26	22:45:00

Exteme Maxima	Value	Day	Time
January	2.685	11	10:30:00
February	2.444	23	10:00:00
March	3.093	10	10:30:00
April	2.396	7	09:15:00
May	2.318	6	21:15:00
June	2.339	4	21:15:00
July	2.528	5	22:30:00
August	2.495	18	21:30:00
September	2.51	1	21:30:00
October	2.46	15	21:15:00
November	2.342	14	09:00:00
December	2.458	13	07:30:00

Extreme minima	Value	Day	Time
January	0.099	25	17:30:00
February	0.214	10	17:45:00
March	0.257	7	15:30:00
April	0.158	6	15:45:00
May	0.23	7	04:30:00
June	0.273	6	05:00:00
July	0.348	4	04:00:00
August	0.281	31	03:30:00
September	0.246	17	04:30:00
October	0.417	17	17:00:00
November	0.317	15	16:45:00
December	0.18	15	17:30:00

Mean sea level	No days	MSL
January	31	1.646
February	29	1.56
March	31	1.624
April	30	1.584
May	31	1.59
June	30	1.566
July	31	1.632
August	31	1.64
September	30	1.614
October	31	1.657
November	30	1.627
December	31	1.54
	Sum	Avg
	366	1.607

Cromer Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.75m below Ordnance Datum Newlyn
TGZ = 10.117m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site:		
	Day 028	TGI on site carrying out general maintenance but mainly in connection with Tsunami gauge.
	Day 050	TGI on site to carry out general maintenance.
	Day 123	TGI on site; section of tubing needed to be secured on to slipway.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	012,032-033,061,064-065,070-071,076-079,081-086,097-099,107-113,277-278,306-307,326-327,329-330,345-346,354-356

Statistics:

Surge maxima	Value	Day	Time
January	1.006	25	17:15:00
February	0.908	22	04:45:00
March	1.261	1	06:30:00
April	0.542	5	15:00:00
May	0.212	30	10:45:00
June	0.486	23	05:45:00
July	0.574	21	03:00:00
August	0.354	26	03:30:00
September	0.356	12	01:00:00
October	0.922	26	07:45:00
November	0.716	18	07:30:00
December	1.326	20	09:30:00

Surge minima	Value	Day	Time
January	-1.377	31	10:15:00
February	-0.812	7	15:45:00
March	-0.788	28	13:00:00
April	-0.593	1	08:15:00
May	-0.362	28	21:45:00
June	-0.318	22	17:15:00
July	-0.251	29	23:45:00
August	-0.462	9	15:45:00
September	-0.411	13	13:45:00
October	-1.121	4	17:30:00
November	-0.639	17	17:30:00
December	-1.351	13	03:15:00

Exteme Maxima	Value	Day	Time
January	5.574	25	20:15:00
February	5.762	22	19:30:00
March	5.565	9	19:30:00
April	5.488	5	18:15:00
May	5.226	6	18:45:00
June	5.083	3	17:45:00
July	5.395	21	08:00:00
August	5.384	4	08:15:00
September	5.469	30	06:30:00
October	5.683	16	06:30:00
November	5.426	15	19:30:00
December	5.157	18	22:45:00

Extreme minima	Value	Day	Time
January	0.4	23	01:15:00
February	0.55	11	03:30:00
March	0.293	10	15:00:00
April	0.279	8	02:15:00
May	0.522	6	01:15:00
June	0.633	6	15:00:00
July	0.576	5	15:00:00
August	0.491	2	14:00:00
September	0.417	17	14:30:00
October	0.634	4	15:45:00
November	0.637	13	12:45:00
December	-0.047	13	01:00:00

Mean sea level	No days	MSL
January	31	2.958
February	26	2.949
March	13	2.989
April	18	2.943
May	31	2.915
June	30	2.954
July	31	2.984
August	31	2.974
September	30	2.948
October	28	3.082
November	21	3.004
December	26	2.899
	Sum	Avg
	316	2.967

Devonport Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 3.22m below ODN
TGZ = 7.631m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 038 TGI on site; compressor change and general maintenance.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	051	015-021,094-095,114-119,124-135,242-245,317,356-360,362-366

Statistics:

Surge maxima	Value	Day	Time
January	0.643	13	16:00:00
February	0.508	3	15:15:00
March	0.815	10	03:30:00
April	0.402	29	17:30:00
May	0.207	27	07:00:00
June	0.272	18	21:00:00
July	0.402	5	13:30:00
August	0.304	12	01:45:00
September	0.503	5	07:00:00
October	0.32	7	07:30:00
November	0.296	8	18:45:00
December	0.452	4	04:30:00

Surge minima	Value	Day	Time
January	-0.304	26	12:15:00
February	-0.218	16	16:15:00
March	-0.383	4	09:45:00
April	-0.27	1	20:15:00
May	-0.065	31	19:00:00
June	-0.185	8	16:30:00
July	-0.199	22	08:30:00
August	-0.203	27	19:45:00
September	-0.251	27	03:45:00
October	-0.314	9	19:30:00
November	-0.349	24	23:45:00
December	-0.378	27	00:30:00

Exteme Maxima	Value	Day	Time
January	5.851	13	08:45:00
February	5.686	23	07:15:00
March	6.344	10	07:30:00
April	5.776	8	07:00:00
May	5.31	21	18:15:00
June	5.655	4	18:00:00
July	5.904	4	18:45:00
August	5.781	18	18:45:00
September	5.887	1	18:45:00
October	5.739	15	18:00:00
November	5.594	15	06:45:00
December	5.76	14	06:30:00

Extreme minima	Value	Day	Time
January	0.524	25	14:00:00
February	0.567	10	14:15:00
March	0.54	9	13:00:00
April	0.39	6	12:00:00
May	1.265	19	23:30:00
June	0.645	6	01:15:00
July	0.81	4	00:15:00
August	0.618	4	01:45:00
September	0.504	17	00:45:00
October	0.619	17	01:00:00
November	0.597	14	12:15:00
December	0.594	15	13:45:00

Mean sea level	No days	MSL
January	23	3.442
February	29	3.368
March	31	3.391
April	22	3.422
May	17	3.431
June	30	3.343
July	31	3.413
August	27	3.433
September	28	3.401
October	31	3.432
November	30	3.408
December	20	3.411
	Sum	Avg
	319	3.408

Dover Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

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

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: There were no visits to site in 2008.

Data quality:

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

Statistics:

Surge maxima	Value	Day	Time
January	0.676	16	14:15:00
February	0.971	2	01:15:00
March	1.572	1	13:00:00
April	0.489	2	06:15:00
May	0.275	27	01:30:00
June	0.376	23	12:45:00
July	0.472	20	23:15:00
August	0.427	10	14:30:00
September	0.518	5	23:15:00
October	0.878	5	11:30:00
November	1.04	21	12:30:00
December	0.951	20	15:30:00

Surge minima	Value	Day	Time
January	-1.21	31	15:00:00
February	-0.511	7	19:45:00
March	-0.6	10	12:30:00
April	-0.409	17	19:15:00
May	-0.208	29	05:30:00
June	-0.341	9	13:00:00
July	-0.2	24	11:00:00
August	-0.334	9	18:30:00
September	-0.458	26	06:00:00
October	-0.766	25	22:00:00
November	-0.561	8	16:15:00
December	-1.266	13	10:30:00

Exteme Maxima	Value	Day	Time
January	7.063	25	00:30:00
February	7.159	23	00:00:00
March	7.206	21	23:00:00
April	7.067	5	22:30:00
May	6.888	6	23:30:00
June	6.755	5	11:45:00
July	6.947	21	12:45:00
August	7.003	4	12:45:00
September	7.036	30	11:30:00
October	7.268	16	11:30:00
November	6.977	16	00:15:00
December	6.761	15	00:00:00

Extreme minima	Value	Day	Time
January	0.608	25	08:15:00
February	0.624	7	18:45:00
March	0.555	23	07:15:00
April	0.359	8	07:30:00
May	0.516	6	06:30:00
June	0.759	5	19:30:00
July	0.795	4	19:15:00
August	0.62	3	19:45:00
September	0.555	17	19:45:00
October	0.745	17	19:45:00
November	0.716	13	18:00:00
December	0.358	13	06:00:00

Mean sea level	No days	MSL
January	31	3.761
February	29	3.725
March	31	3.859
April	30	3.73
May	31	3.723
June	30	3.737
July	31	3.785
August	31	3.775
September	30	3.754
October	31	3.851
November	30	3.838
December	31	3.701
	Sum	Avg
	366	3.77

Felixstowe Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 1.95m below ODN
TGZ = 5.69m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site:

Day 049	TGI on site to carry out general maintenance.
Day 127	TGI on site - purged compressor and carried out general maintenance.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	127,280-282	164-166,286,291-294,297-300,302-317,321-339,341-342,345-352,360-365

Statistics:

Surge maxima	Value	Day	Time
January	0.746	31	23:15:00
February	1.312	2	01:45:00
March	2.104	1	13:30:00
April	0.476	6	01:15:00
May	0.353	27	00:15:00
June	0.537	23	09:15:00
July	0.652	21	08:30:00
August	0.429	10	14:45:00
September	0.332	30	23:45:00
October	0.871	24	16:15:00
November	0.681	18	12:45:00
December	1.333	20	14:45:00

Surge minima	Value	Day	Time
January	-1.506	31	13:30:00
February	-0.719	29	20:30:00
March	-0.904	28	16:15:00
April	-0.614	1	11:00:00
May	-0.312	29	02:00:00
June	-0.297	22	16:15:00
July	-0.209	30	04:30:00
August	-0.536	9	18:15:00
September	-0.422	26	20:15:00
October	-1.078	4	22:30:00
November	-0.373	13	19:15:00
December	-0.962	20	01:00:00

Exteme Maxima	Value	Day	Time
January	4.214	11	13:15:00
February	4.438	23	00:45:00
March	4.437	21	11:45:00
April	4.11	10	02:00:00
May	4.058	8	01:00:00
June	4.093	6	00:45:00
July	4.22	21	01:15:00
August	4.106	4	01:00:00
September	4.099	30	12:00:00
October	4.314	16	12:15:00
November	4.311	16	13:30:00
December	4.219	20	17:45:00

Extreme minima	Value	Day	Time
January	-0.079	31	12:30:00
February	0.164	7	17:45:00
March	0.038	23	06:15:00
April	0.037	8	06:30:00
May	0.21	6	05:30:00
June	0.274	7	20:15:00
July	0.213	6	20:00:00
August	0.146	3	19:00:00
September	0.073	1	18:45:00
October	-0.099	4	20:15:00
November	0.243	13	17:15:00
December	0.35	21	12:00:00

Mean sea level	No days	MSL
January	31	2.049
February	29	2.066
March	31	2.189
April	30	2.063
May	30	2.073
June	27	2.079
July	31	2.122
August	31	2.078
September	30	2.046
October	11	2.177
November	3	2.152
December	6	2.137
	Sum	Avg
	290	2.103

Fishguard Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.44m below ODN
TGZ = 7.88m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: There were no visits to site in 2008.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
96	15 minutes	210-211,251-262	063

Statistics:

Surge maxima	Value	Day	Time
January	0.674	31	07:45:00
February	0.528	3	12:30:00
March	0.857	10	04:30:00
April	0.297	19	01:45:00
May	0.188	1	13:30:00
June	0.382	18	19:00:00
July	0.357	5	03:15:00
August	0.388	18	15:00:00
September	0.401	5	07:15:00
October	0.338	4	14:15:00
November	0.33	11	01:45:00
December	0.608	4	06:30:00

Surge minima	Value	Day	Time
January	-0.347	31	17:30:00
February	-0.25	16	15:45:00
March	-0.532	4	02:30:00
April	-0.25	2	00:15:00
May	-0.206	5	19:30:00
June	-0.22	10	04:30:00
July	-0.214	22	13:30:00
August	-0.209	28	21:15:00
September	-0.262	26	08:45:00
October	-0.353	3	03:15:00
November	-0.629	24	11:30:00
December	-0.463	9	20:45:00

Exteme Maxima	Value	Day	Time
January	5.151	13	10:15:00
February	4.986	22	08:00:00
March	5.716	10	08:45:00
April	5.141	8	08:30:00
May	4.933	6	07:30:00
June	4.884	4	19:30:00
July	5.098	4	20:15:00
August	5.129	18	20:30:00
September	5.106	1	20:15:00
October	5.137	15	19:30:00
November	4.962	15	08:15:00
December	5.013	12	18:45:00

Extreme minima	Value	Day	Time
January	0.627	24	15:15:00
February	0.587	10	15:45:00
March	0.417	22	14:15:00
April	0.366	6	13:45:00
May	0.505	5	13:15:00
June	0.708	6	03:15:00
July	0.79	4	02:15:00
August	0.67	3	03:00:00
September	0.704	1	02:15:00
October	0.637	16	02:00:00
November	0.677	15	15:00:00
December	0.577	14	15:00:00

Mean sea level	No days	MSL
January	31	2.812
February	29	2.693
March	31	2.685
April	30	2.688
May	31	2.676
June	30	2.654
July	28	2.713
August	31	2.746
September	17	2.691
October	31	2.745
November	30	2.7
December	31	2.662
	Sum	Avg
	350	2.705

Harwich Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.02m below ODN
TGZ = 6.17m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 127 TGI on site to work on compressor and general maintenance.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
91	15 minutes	072-105	053-055,060-072,328,333-366

Statistics:

Surge maxima	Value	Day	Time
January	0.715	31	23:15:00
February	1.42	2	02:15:00
March			
April	0.419	29	22:00:00
May	0.326	26	09:15:00
June	0.528	23	09:00:00
July	0.623	21	08:45:00
August	0.464	10	15:00:00
September	0.3	6	14:00:00
October	0.848	5	13:30:00
November	1.336	21	11:30:00
December	7.496	17	12:45:00

Surge minima	Value	Day	Time
January	-1.522	31	13:45:00
February	-0.638	7	20:15:00
March			
April	-0.282	16	07:15:00
May	-0.332	29	02:15:00
June	-0.322	9	15:15:00
July	-0.283	10	06:00:00
August	-0.613	9	18:45:00
September	-0.509	4	03:15:00
October	-1.023	4	21:45:00
November	-0.722	8	15:15:00
December	7.458	17	12:30:00

Exteme Maxima	Value	Day	Time
January	4.428	11	13:15:00
February	4.336	6	11:15:00
March			
April	4.132	21	00:00:00
May	4.218	8	01:15:00
June	4.272	6	01:00:00
July	4.411	21	01:30:00
August	4.3	4	01:15:00
September	4.286	30	12:00:00
October	4.475	17	00:45:00
November	4.486	16	13:45:00
December	10.087	17	12:45:00

Extreme minima	Value	Day	Time
January	-0.02	31	13:00:00
February	0.165	7	18:00:00
March			
April	0.523	23	06:45:00
May	0.188	6	05:30:00
June	0.274	7	20:15:00
July	0.216	6	20:15:00
August	0.138	3	19:15:00
September	0.111	1	18:45:00
October	0.023	4	20:15:00
November	0.256	13	17:15:00
December	9.867	17	12:30:00

Mean sea level	No days	MSL
January	31	2.134
February	25	2.128
March		
April	16	2.156
May	31	2.131
June	30	2.149
July	31	2.191
August	31	2.171
September	30	2.158
October	31	2.269
November	27	2.25
December		
	Sum	Avg
	283	2.174

Heysham Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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.

TGZ = Admiralty Chart Datum (ACD)
TGZ = 4.90m below Ordnance Datum Newlyn (ODN)
TGZ = 12.098m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: There were no visits to site in 2008.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	030-031,207,211	122-135,143-170,196-197,198-202,205-213,315-317,324-329,352-366

Statistics:

Surge maxima	Value	Day	Time
January	1.141	8	19:45:00
February	1.195	29	15:00:00
March	1.661	12	05:15:00
April	0.626	1	04:45:00
May	0.253	21	09:15:00
June	0.849	22	10:15:00
July	0.581	10	00:30:00
August	0.676	9	13:30:00
September	0.692	10	01:00:00
October	0.941	20	08:15:00
November	0.953	10	00:00:00
December	0.744	4	10:00:00

Surge minima	Value	Day	Time
January	-0.427	2	21:00:00
February	-0.352	14	11:45:00
March	-0.789	4	06:15:00
April	-0.27	5	17:45:00
May	-0.073	15	00:00:00
June	-0.186	23	04:30:00
July	-0.124	21	02:45:00
August	-0.207	29	00:45:00
September	-0.44	22	11:15:00
October	-0.51	3	04:00:00
November	-0.893	24	14:00:00
December	-0.528	6	04:30:00

Exteme Maxima	Value	Day	Time
January	10.218	25	13:00:00
February	10.396	22	12:00:00
March	10.807	10	12:45:00
April	10.277	8	12:30:00
May	9.077	22	00:15:00
June	9.299	18	23:15:00
July	9.944	6	01:00:00
August	10.1	4	00:45:00
September	10.103	2	00:15:00
October	10.235	15	23:15:00
November	10.137	14	23:45:00
December	10.1	12	22:45:00

Extreme minima	Value	Day	Time
January	1.171	24	19:30:00
February	0.916	10	20:15:00
March	0.711	21	18:00:00
April	0.598	7	18:45:00
May	1.846	19	17:15:00
June	1.767	23	08:30:00
July	0.971	5	07:15:00
August	0.907	3	07:00:00
September	0.737	17	06:45:00
October	0.931	17	06:45:00
November	0.959	15	19:00:00
December	0.726	14	19:00:00

Mean sea level	No days	MSL
January	28	5.445
February	28	5.286
March	31	5.269
April	30	5.179
May	6	5.194
June	12	5.297
July	14	5.297
August	30	5.275
September	30	5.196
October	31	5.307
November	20	5.189
December	16	5.211
	Sum	Avg
	276	5.262

Hinkley Point Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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.

TGZ = Admiralty Chart Datum (ACD)
TGZ = 5.80m below Ordnance Datum Newlyn (ODN)
TGZ = 14.639m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: There were no visits to site in 2008.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
90	15 minutes	023-025,044-046,065-067,114-116,169-172,178,184-186,254-256,282-284,295,310-312,324-325,335,345	001-018,025-044,046-058,168-169,172-178

Statistics:

Surge maxima	Value	Day	Time
January			
February	0.973	29	18:15:00
March	0.779	1	18:30:00
April			
May			
June			
July			
August			
September			
October			
November			
December			

Surge minima	Value	Day	Time
January			
February	-0.363	29	02:30:00
March	-1	4	12:15:00
April			
May			
June			
July			
August			
September			
October			
November			
December			

Exteme Maxima	Value	Day	Time
January			
February	10.425	27	10:00:00
March	9.439	4	16:45:00
April			
May			
June			
July			
August			
September			
October			
November			
December			

Extreme minima	Value	Day	Time
January			
February	1.927	27	03:45:00
March	2.161	4	23:00:00
April			
May			
June			
July			
August			
September			
October			
November			
December			

Mean sea level	No days	MSL
January		
February	2	6.27
March	3	6.317
April		
May		
June		
July		
August		
September		
October		
November		
December		
	Sum	Avg
	5	6.294

Holyhead Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	SH 2553 8287	Bolt on concrete foundation, N side of T G building.
Aux1	SH 2556 8289	Cut mark lighthouse.
Aux3	SH 2506 8292	Bolt Salt Island bridge.

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

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site:

Day 030	TGI on site installing new counter card.
Day 225	TGI on site testing Tsunami broadband. Whilst there, changed counter board on dataring. This proved to have no power supply.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
94	15 minutes	058-059,070-071,225-226,232,240-249,261-263,357	226-232

Statistics:

Surge maxima	Value	Day	Time
January	0.844	31	07:00:00
February	0.725	29	16:45:00
March	0.87	10	03:45:00
April	0.39	1	04:00:00
May	0.237	1	13:45:00
June	0.462	18	22:30:00
July	0.314	9	23:00:00
August	0.36	9	13:00:00
September	0.483	10	23:45:00
October	0.55	23	19:45:00
November	0.462	8	22:15:00
December	0.618	4	06:30:00

Surge minima	Value	Day	Time
January	-0.321	22	05:15:00
February	-0.255	14	13:15:00
March	-0.642	4	07:30:00
April	-0.254	6	05:15:00
May	-0.251	26	21:15:00
June	-0.212	12	12:30:00
July	-0.162	22	15:15:00
August	-0.166	22	23:15:00
September	-0.341	22	10:00:00
October	-0.422	3	06:45:00
November	-0.806	24	13:15:00
December	-0.528	9	21:00:00

Exteme Maxima	Value	Day	Time
January	6.113	13	13:15:00
February	6.047	22	11:15:00
March	6.576	10	12:00:00
April	5.948	8	11:30:00
May	5.773	6	10:30:00
June	5.706	4	22:45:00
July	5.921	4	23:15:00
August	5.942	3	23:45:00
September	5.881	29	22:15:00
October	5.976	15	22:30:00
November	5.866	14	23:00:00
December	6.151	12	22:00:00

Extreme minima	Value	Day	Time
January	0.467	24	17:45:00
February	0.451	10	18:30:00
March	0.229	22	16:45:00
April	0.139	6	16:15:00
May	0.299	5	15:45:00
June	0.472	6	05:45:00
July	0.571	4	04:45:00
August	0.442	3	05:30:00
September	0.46	16	04:30:00
October	0.484	16	04:30:00
November	0.444	15	17:30:00
December	0.325	14	17:30:00

Mean sea level	No days	MSL
January	31	3.418
February	26	3.271
March	28	3.227
April	30	3.221
May	31	3.196
June	30	3.211
July	31	3.261
August	17	3.3
September	19	3.235
October	31	3.31
November	30	3.251
December	28	3.219
	Sum	Avg
	332	3.26

Ilfracombe Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	SS 5263 4791	OSBM Bolt on concrete pier, S.angle of T G hut.
Aux1	SS 5245 4782	Pier Hotel, The Quay
Aux2	SS 5251 4789	St Nicholas chapel N face 6.1M from NW angle

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

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: There were no visits to site in 2008.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	364-365	070-072,082,108-109,147,304,363

Statistics:

Surge maxima	Value	Day	Time
January	0.669	15	20:15:00
February	0.698	5	00:00:00
March	1	10	03:15:00
April	0.472	29	19:30:00
May	0.267	1	12:30:00
June	0.443	22	03:15:00
July	0.536	5	03:45:00
August	0.481	18	16:15:00
September	0.517	5	18:15:00
October	0.432	7	07:45:00
November	0.663	9	18:15:00
December	0.81	4	05:30:00

Surge minima	Value	Day	Time
January	-0.32	31	14:15:00
February	-0.256	15	15:00:00
March	-0.63	4	11:30:00
April	-0.261	1	22:45:00
May	-0.208	26	20:15:00
June	-0.215	12	03:45:00
July	-0.197	22	12:15:00
August	-0.243	28	20:30:00
September	-0.308	26	07:45:00
October	-0.312	28	20:45:00
November	-0.617	24	13:00:00
December	-0.416	9	19:30:00

Exteme Maxima	Value	Day	Time
January	9.378	24	07:00:00
February	9.481	23	07:30:00
March	10.309	10	07:30:00
April	9.832	8	07:15:00
May	9.506	6	18:30:00
June	9.328	4	18:15:00
July	9.514	5	19:45:00
August	9.603	3	19:30:00
September	9.609	1	19:00:00
October	9.677	15	18:15:00
November	9.477	14	18:30:00
December	9.414	14	06:45:00

Extreme minima	Value	Day	Time
January	0.704	24	13:15:00
February	0.592	10	14:00:00
March	0.479	9	13:00:00
April	0.287	7	12:30:00
May	0.497	6	12:00:00
June	0.893	5	00:15:00
July	1.013	4	00:15:00
August	0.758	31	12:00:00
September	0.524	17	00:30:00
October	0.614	16	00:15:00
November	0.721	13	23:45:00
December	0.779	15	13:45:00

Mean sea level	No days	MSL
January	31	5.093
February	29	4.965
March	24	4.982
April	27	4.972
May	29	4.965
June	30	4.943
July	31	5.012
August	31	5.038
September	30	5.006
October	29	5.042
November	30	5.003
December	27	4.962
	Sum	Avg
	348	4.999

Immingham Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 3.90m below ODN
TGZ = 9.131m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site:		
	Day 024	TGI on site for general maintenance and made enquiries regarding BT line to site.
	Day 127	Fitting of new modem; gauge now back on BT line.
	Day 225	TGI on site to inspect new gauge housing, checked ducting for pneumatic pipes awaiting electrics.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
98	15 minutes	357-362	128-134

Statistics:

Surge maxima	Value	Day	Time
January	0.944	25	15:45:00
February	0.985	1	19:15:00
March	1.635	1	10:00:00
April	0.497	27	04:15:00
May	0.277	24	12:45:00
June	0.338	10	06:30:00
July	0.541	20	14:30:00
August	0.466	26	00:45:00
September	0.44	12	00:30:00
October	0.969	24	11:00:00
November	1.049	21	07:45:00
December	1.326	20	09:15:00

Surge minima	Value	Day	Time
January	-1.299	31	10:00:00
February	-0.755	7	14:30:00
March	-0.55	5	13:15:00
April	-0.629	1	07:00:00
May	-0.272	29	00:45:00
June	-0.362	22	16:30:00
July	-0.191	29	20:45:00
August	-0.385	9	14:45:00
September	-0.348	13	11:30:00
October	-1.026	25	17:00:00
November	-0.519	17	16:15:00
December	-1.011	13	05:30:00

Exteme Maxima	Value	Day	Time
January	7.661	25	19:30:00
February	7.622	22	19:00:00
March	7.804	9	19:00:00
April	7.573	5	17:15:00
May	7.408	6	18:15:00
June	7.226	4	18:15:00
July	7.392	5	07:15:00
August	7.53	4	07:30:00
September	7.56	30	06:15:00
October	7.76	16	06:15:00
November	7.554	15	06:45:00
December	7.201	14	19:00:00

Extreme minima	Value	Day	Time
January	0.567	25	02:15:00
February	0.734	11	02:45:00
March	0.643	10	01:45:00
April	0.392	8	01:30:00
May	0.69	6	00:15:00
June	0.808	6	14:00:00
July	0.766	5	14:00:00
August	0.638	3	13:45:00
September	0.533	17	13:30:00
October	0.877	15	12:15:00
November	0.869	17	02:30:00
December	0.524	13	00:00:00

Mean sea level	No days	MSL
January	31	4.201
February	29	4.189
March	31	4.271
April	30	4.175
May	23	4.174
June	30	4.18
July	31	4.226
August	31	4.226
September	30	4.198
October	31	4.325
November	30	4.278
December	23	4.174
	Sum	Avg
	350	4.218

Port Erin (Isle of Man) Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

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

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site:		
	Day 038	TGI on site; compressor change and general maintenance. Meeting with Met Office.
	Day 164	TGI on site. Power loss repaired..

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	219-222	150-164

Statistics:

Surge maxima	Value	Day	Time
January	0.878	31	08:30:00
February	0.901	29	16:15:00
March	0.867	10	08:00:00
April	0.453	1	03:15:00
May	0.261	1	12:30:00
June	0.479	18	21:30:00
July	0.381	10	02:30:00
August	0.461	9	14:00:00
September	0.556	11	00:15:00
October	0.671	23	15:45:00
November	0.547	9	00:30:00
December	0.599	4	09:15:00

Surge minima	Value	Day	Time
January	-0.213	22	05:45:00
February	-0.185	16	16:30:00
March	-0.676	4	07:00:00
April	-0.272	5	19:15:00
May	-0.207	25	07:15:00
June	-0.122	23	06:30:00
July	-0.12	23	12:30:00
August	-0.121	23	00:30:00
September	-0.3	22	11:00:00
October	-0.383	3	05:30:00
November	-0.741	24	15:30:00
December	-0.42	9	19:30:00

Exteme Maxima	Value	Day	Time
January	5.888	13	14:15:00
February	5.729	22	12:00:00
March	6.214	10	12:45:00
April	5.585	8	12:30:00
May	5.389	7	12:15:00
June	5.284	18	23:15:00
July	5.604	6	01:00:00
August	5.667	19	00:15:00
September	5.621	2	00:15:00
October	5.61	15	23:15:00
November	5.545	14	23:45:00
December	5.838	12	22:30:00

Extreme minima	Value	Day	Time
January	0.295	24	18:45:00
February	0.201	10	19:30:00
March	-0.05	22	17:45:00
April	-0.111	6	17:15:00
May	0.077	5	17:00:00
June	0.701	23	08:00:00
July	0.317	4	05:45:00
August	0.193	3	06:15:00
September	0.105	17	06:00:00
October	0.261	16	05:30:00
November	0.22	15	18:30:00
December	0.07	14	18:15:00

Mean sea level	No days	MSL
January	31	3.095
February	29	2.966
March	31	2.917
April	30	2.88
May	28	2.845
June	17	2.949
July	31	2.925
August	26	2.977
September	30	2.907
October	31	2.988
November	30	2.921
December	31	2.883
	Sum	Avg
	345	2.938

Port Ellen (Isle of Islay) Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 0.19m below Ordnance Datum Newlyn (ODN)
TGZ = 2.839m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 051 TGI on site to change compressor and carry out general maintenance.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	051,363-364	None

Statistics:

Surge maxima	Value	Day	Time
January	1.214	9	01:30:00
February	0.902	29	14:45:00
March	0.888	10	08:15:00
April	0.584	1	07:30:00
May	0.299	4	03:00:00
June	0.457	22	10:45:00
July	0.452	1	11:00:00
August	0.457	24	01:30:00
September	0.646	11	02:00:00
October	0.954	23	17:30:00
November	0.677	8	22:00:00
December	0.618	4	10:45:00

Surge minima	Value	Day	Time
January	-0.132	22	07:15:00
February	-0.261	1	06:30:00
March	-0.576	4	07:15:00
April	-0.312	6	09:30:00
May	-0.174	27	00:30:00
June	-0.145	12	11:15:00
July	-0.106	21	09:15:00
August	-0.059	29	02:45:00
September	-0.3	22	08:30:00
October	-0.357	3	06:15:00
November	-0.773	24	17:30:00
December	-0.402	9	16:00:00

Exteme Maxima	Value	Day	Time
January	1.802	9	02:45:00
February	1.461	25	17:00:00
March	1.671	10	07:00:00
April	1.046	1	07:30:00
May	1.044	4	04:15:00
June	1.081	19	02:00:00
July	1.008	5	19:00:00
August	1.167	18	18:45:00
September	1.161	10	22:30:00
October	1.705	23	17:30:00
November	1.46	10	15:15:00
December	1.315	12	17:15:00

Extreme minima	Value	Day	Time
January	0.012	28	01:45:00
February	-0.094	10	00:00:00
March	-0.536	21	22:45:00
April	-0.306	5	22:00:00
May	-0.054	25	11:15:00
June	-0.075	10	13:15:00
July	-0.049	23	12:00:00
August	-0.073	4	12:45:00
September	-0.096	17	11:45:00
October	-0.031	28	10:00:00
November	-0.316	24	08:15:00
December	-0.103	15	00:30:00

Mean sea level	No days	MSL
January	31	0.739
February	28	0.618
March	31	0.539
April	30	0.487
May	31	0.461
June	30	0.509
July	31	0.545
August	31	0.608
September	30	0.545
October	31	0.649
November	30	0.562
December	28	0.54
	Sum	Avg
	362	0.567

St. Helier (Jersey) Tide Gauge

Latitude: 49° 11' 00" N
Longitude: 02° 07' 00 " W
Grid Reference: 13/11 6466 4763

Benchmarks and Benchmark relationships:

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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 5.88m below Ordnance Datum Local (ODL)
TGZ = 13.658m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: There were no visits to site in 2008.

Data quality:

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

Statistics:

Surge maxima	Value	Day	Time
January	0.72	15	20:00:00
February	0.565	5	02:45:00
March	1.248	10	15:45:00
April	0.458	29	20:15:00
May	0.263	28	09:15:00
June	0.248	19	00:45:00
July	0.499	5	04:30:00
August	0.393	12	05:15:00
September	0.645	5	19:00:00
October	0.492	5	10:00:00
November	0.499	10	13:30:00
December	0.671	4	07:15:00

Surge minima	Value	Day	Time
January	-0.358	25	12:45:00
February	-0.316	16	01:45:00
March	-0.55	4	05:45:00
April	-0.235	3	21:30:00
May	-0.259	5	11:30:00
June	-0.229	9	03:00:00
July	-0.266	22	23:00:00
August	-0.224	27	18:30:00
September	-0.326	27	01:45:00
October	-0.366	9	20:45:00
November	-0.44	24	15:15:00
December	-0.472	27	09:15:00

Exteme Maxima	Value	Day	Time
January	11.132	24	07:30:00
February	11.207	23	07:45:00
March	12.328	10	08:15:00
April	11.713	8	07:45:00
May	11.393	6	19:00:00
June	11.109	5	19:30:00
July	11.276	4	19:30:00
August	11.437	3	20:00:00
September	11.509	1	19:30:00
October	11.467	15	18:45:00
November	11.205	14	06:30:00
December	11.292	14	07:00:00

Extreme minima	Value	Day	Time
January	1.001	25	15:00:00
February	0.924	10	15:15:00
March	0.844	9	14:15:00
April	0.595	7	13:45:00
May	0.806	7	01:45:00
June	1.148	6	02:30:00
July	1.316	4	01:30:00
August	1.008	3	02:00:00
September	0.834	17	02:00:00
October	0.953	17	02:00:00
November	1.042	14	13:15:00
December	1.041	15	14:45:00

Mean sea level	No days	MSL
January	31	6.103
February	29	5.98
March	31	6.045
April	30	6.029
May	31	6.031
June	30	5.991
July	31	6.057
August	31	6.071
September	30	6.043
October	31	6.067
November	30	6.067
December	31	5.981
	Sum	Avg
	366	6.039

Kinlochbervie Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.50m below Ordnance Datum Newlyn (ODN)
TGZ = 7.213m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 141 Repaired power failure but new battery needed.
Day 143 Installed new battery.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
84	15 minutes	086-141,143	None

Statistics:

Surge maxima	Value	Day	Time
January	0.883	31	09:30:00
February	0.91	29	14:30:00
March	0.792	1	00:45:00
April			
May	0.15	29	03:45:00
June	0.371	26	01:30:00
July	0.358	1	12:30:00
August	0.412	25	03:30:00
September	0.561	11	12:15:00
October	1.015	23	17:30:00
November	0.695	10	13:45:00
December	0.8	19	20:45:00

Surge minima	Value	Day	Time
January	-0.179	1	06:15:00
February	-0.536	1	10:30:00
March	-0.527	21	21:00:00
April			
May	-0.254	26	06:30:00
June	-0.19	1	17:30:00
July	-0.153	21	11:15:00
August	-0.167	14	08:00:00
September	-0.314	23	07:30:00
October	-0.487	31	02:45:00
November	-0.687	25	01:00:00
December	-0.489	27	03:45:00

Exteme Maxima	Value	Day	Time
January	5.41	25	09:15:00
February	5.53	22	08:30:00
March	5.589	10	08:45:00
April			
May	4.497	20	19:30:00
June	4.947	4	19:30:00
July	4.978	4	20:30:00
August	5.125	2	20:00:00
September	5.183	1	20:00:00
October	5.374	15	19:15:00
November	5.379	14	19:45:00
December	5.314	13	07:00:00

Extreme minima	Value	Day	Time
January	0.774	23	14:15:00
February	0.379	10	15:45:00
March	0.181	22	14:00:00
April			
May	1.154	20	13:45:00
June	0.5	6	02:45:00
July	0.478	5	02:45:00
August	0.472	4	03:15:00
September	0.187	17	02:15:00
October	0.494	17	02:15:00
November	0.607	16	15:30:00
December	0.446	14	14:30:00

Mean sea level	No days	MSL
January	31	3.091
February	29	2.999
March	24	2.868
April		
May	8	2.681
June	30	2.821
July	31	2.843
August	31	2.898
September	30	2.865
October	31	3.044
November	30	2.934
December	31	2.914
	Sum	Avg
	306	2.905

Leith Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

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

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 022 TGI on site for general maintenance & compressor change.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	127

Statistics:

Surge maxima	Value	Day	Time
January	0.649	25	12:15:00
February	0.707	21	23:15:00
March	1.021	1	07:00:00
April	0.417	27	02:00:00
May	0.231	4	09:30:00
June	0.277	18	23:15:00
July	0.309	20	09:30:00
August	0.4	25	22:15:00
September	0.389	6	05:45:00
October	0.946	26	02:15:00
November	0.636	9	19:30:00
December	0.756	20	07:45:00

Surge minima	Value	Day	Time
January	-1.226	9	06:45:00
February	-0.566	7	11:00:00
March	-0.467	5	02:30:00
April	-0.374	2	21:45:00
May	-0.202	13	08:00:00
June	-0.219	9	05:30:00
July	-0.281	27	11:45:00
August	-0.172	31	01:30:00
September	-0.295	26	19:15:00
October	-0.805	25	15:45:00
November	-0.508	25	18:15:00
December	-0.89	19	19:45:00

Exteme Maxima	Value	Day	Time
January	6.034	26	17:00:00
February	5.98	22	03:15:00
March	6.183	10	16:15:00
April	5.882	9	16:45:00
May	5.785	7	15:45:00
June	5.759	5	15:30:00
July	5.826	4	15:30:00
August	5.87	4	04:15:00
September	5.885	2	03:45:00
October	6.049	16	03:00:00
November	6.134	15	03:15:00
December	5.712	14	03:00:00

Extreme minima	Value	Day	Time
January	0.314	24	22:30:00
February	0.42	10	22:45:00
March	0.35	8	21:00:00
April	0.124	7	21:15:00
May	0.383	5	20:30:00
June	0.433	6	10:15:00
July	0.473	5	10:15:00
August	0.354	3	09:45:00
September	0.259	17	09:30:00
October	0.542	15	08:15:00
November	0.511	14	21:00:00
December	0.246	14	22:00:00

Mean sea level	No days	MSL
January	31	3.268
February	29	3.21
March	31	3.234
April	30	3.147
May	29	3.114
June	30	3.164
July	31	3.203
August	31	3.241
September	30	3.193
October	31	3.312
November	30	3.226
December	31	3.152
	Sum	Avg
	364	3.205

Lerwick Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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.

TGZ = Admiralty Chart Datum (ACD)
TGZ = 1.22m below Ordnance Datum Local (ODL)
TGZ = 4.57m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: There were no visits to site in 2008.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	282-283,357	None

Statistics:

Surge maxima	Value	Day	Time
January	0.628	31	18:15:00
February	0.64	29	23:30:00
March	0.624	1	01:00:00
April	0.332	28	12:45:00
May	0.145	1	11:15:00
June	0.261	19	15:30:00
July	0.265	2	06:15:00
August	0.281	25	21:00:00
September	0.247	30	16:30:00
October	0.66	26	00:15:00
November	0.445	10	10:45:00
December	0.355	21	21:45:00

Surge minima	Value	Day	Time
January	-0.218	1	06:15:00
February	-0.358	14	16:00:00
March	-0.252	22	02:00:00
April	-0.223	7	11:15:00
May	-0.166	27	04:30:00
June	-0.087	1	04:45:00
July	-0.192	27	07:00:00
August	-0.105	30	22:45:00
September	-0.247	24	10:15:00
October	-0.195	31	16:45:00
November	-0.366	24	23:00:00
December	-0.461	27	08:15:00

Exteme Maxima	Value	Day	Time
January	2.784	25	12:45:00
February	2.72	22	11:30:00
March	2.627	8	11:15:00
April	2.188	9	12:45:00
May	2.113	7	12:15:00
June	2.156	19	23:30:00
July	2.242	3	23:15:00
August	2.338	4	00:00:00
September	2.445	30	23:30:00
October	2.555	15	23:00:00
November	2.474	15	12:15:00
December	2.384	17	14:15:00

Extreme minima	Value	Day	Time
January	0.411	22	16:30:00
February	0.193	10	19:15:00
March	0.163	22	17:15:00
April	-0.008	6	17:00:00
May	0.172	5	16:30:00
June	0.164	7	07:15:00
July	0.173	5	06:30:00
August	0.217	31	05:00:00
September	0.102	17	05:45:00
October	0.448	17	05:45:00
November	0.267	16	18:45:00
December	0.165	14	18:15:00

Mean sea level	No days	MSL
January	31	1.466
February	29	1.402
March	31	1.363
April	30	1.21
May	31	1.159
June	30	1.271
July	31	1.284
August	31	1.334
September	30	1.288
October	29	1.503
November	30	1.382
December	28	1.298
	Sum	Avg
	361	1.33

Liverpool Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 4.93m below Ordnance Datum Newlyn (ODN)
TGZ = 14.475m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 190 TGI on site testing broadband software.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
95	15 minutes	240,254-258,317-328	039-132,250

Statistics:

Surge maxima	Value	Day	Time
January	1.815	7	05:30:00
February	1.034	1	00:00:00
March			
April			
May	0.341	28	20:45:00
June	0.756	22	20:15:00
July	0.578	9	23:30:00
August	0.617	9	13:45:00
September	0.582	3	21:30:00
October	0.816	23	20:15:00
November	0.951	8	22:15:00
December	0.963	4	09:30:00

Surge minima	Value	Day	Time
January	-0.387	2	21:00:00
February	-0.133	7	19:30:00
March			
April			
May	-0.319	26	10:45:00
June	-0.145	8	20:45:00
July	-0.131	23	20:00:00
August	-0.139	29	00:00:00
September	-0.343	22	11:30:00
October	-0.382	30	07:15:00
November	-0.696	24	15:30:00
December	-0.447	27	19:00:00

Exteme Maxima	Value	Day	Time
January	9.962	24	12:15:00
February	9.602	8	11:45:00
March			
April			
May	8.877	22	00:00:00
June	9.56	4	11:00:00
July	9.674	5	00:00:00
August	9.828	4	00:30:00
September	9.883	29	23:00:00
October	10.026	15	23:15:00
November	9.507	11	21:15:00
December	9.775	12	22:30:00

Extreme minima	Value	Day	Time
January	1.199	24	19:30:00
February	1.386	7	18:15:00
March			
April			
May	1.881	19	17:15:00
June	0.938	5	06:30:00
July	0.99	5	07:15:00
August	0.87	3	07:00:00
September	0.731	17	06:45:00
October	0.957	17	07:00:00
November	1.815	24	15:15:00
December	0.783	14	19:00:00

Mean sea level	No days	MSL
January	31	5.575
February	7	5.626
March		
April		
May	20	5.258
June	30	5.335
July	31	5.373
August	31	5.407
September	20	5.303
October	31	5.461
November	16	5.409
December	31	5.315
	Sum	Avg
	248	5.406

Llandudno Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 3.85m below Ordnance Datum Newlyn (ODN)
TGZ = 12.558m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 190 TGI on site, power was off - replaced both batteries.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
95	15 minutes	163,184-190,205-209,310-312,332	021-022

Statistics:

Surge maxima	Value	Day	Time
January	1.088	31	07:30:00
February	0.846	29	16:00:00
March	0.936	12	04:45:00
April	0.459	1	02:45:00
May	0.272	1	10:30:00
June	0.516	18	21:30:00
July	0.41	9	23:45:00
August	0.525	9	13:30:00
September	0.547	10	23:30:00
October	0.654	23	20:45:00
November	0.622	8	23:00:00
December	0.726	4	06:15:00

Surge minima	Value	Day	Time
January	-0.323	22	05:30:00
February	-0.303	1	09:00:00
March	-0.81	22	09:30:00
April	-0.311	6	06:45:00
May	-0.386	26	23:15:00
June	-0.262	12	09:15:00
July	-0.211	21	05:45:00
August	-0.176	27	16:45:00
September	-0.42	6	15:45:00
October	-0.625	3	03:30:00
November	-0.923	24	17:00:00
December	-0.525	6	04:45:00

Exteme Maxima	Value	Day	Time
January	8.014	13	13:45:00
February	8.164	22	11:30:00
March	8.689	10	12:15:00
April	8.128	8	11:45:00
May	7.898	6	10:45:00
June	7.769	4	10:45:00
July	7.677	31	22:00:00
August	8.009	4	00:15:00
September	8.019	1	23:45:00
October	8.124	15	22:45:00
November	7.995	14	23:15:00
December	8.107	12	22:15:00

Extreme minima	Value	Day	Time
January	0.29	24	18:45:00
February	0.257	10	19:15:00
March	-0.112	22	17:30:00
April	-0.228	6	17:00:00
May	0.077	5	16:45:00
June	0.287	6	06:45:00
July	0.583	21	06:45:00
August	0.223	3	06:15:00
September	0.111	17	06:00:00
October	0.234	16	05:30:00
November	0.269	15	18:15:00
December	0.116	14	18:15:00

Mean sea level	No days	MSL
January	31	4.244
February	29	4.11
March	31	4.063
April	30	4.039
May	31	4.012
June	30	4.051
July	16	4.078
August	31	4.137
September	30	4.062
October	31	4.134
November	26	4.05
December	31	4.033
	Sum	Avg
	347	4.084

Lowestoft Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 1.50m below Ordnance Datum Newlyn (ODN)
TGZ = 4.483m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site:

Day 050	TGI on site to carry out general maintenance.
Day 127	TGI on site to assess time needed before we can rehouse dataring equipment in Port Control building (current building is being moved).
Day 329-331	TGI on site to re-house dataring. All channels set to incorrect datum, flagged - until TGI remotely corrected the datum settings.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
96	15 minutes	268-276,324-329	178,329-331

Statistics:

Surge maxima	Value	Day	Time
January	0.846	31	22:45:00
February	1.127	2	01:00:00
March	1.918	1	11:45:00
April	0.432	6	00:00:00
May	0.182	27	01:00:00
June	0.396	23	07:15:00
July	0.566	21	03:45:00
August	0.328	26	04:30:00
September	0.224	12	02:45:00
October	0.839	24	13:30:00
November	0.62	18	16:30:00
December	1.113	20	14:15:00

Surge minima	Value	Day	Time
January	-1.23	31	11:45:00
February	-0.712	7	17:00:00
March	-0.76	28	16:30:00
April	-0.631	1	10:30:00
May	-0.419	29	00:45:00
June	-0.298	22	15:45:00
July	-0.257	30	04:00:00
August	-0.436	9	18:30:00
September	-0.357	13	15:00:00
October	-0.965	25	22:45:00
November	-0.55	17	22:30:00
December	-1.223	13	05:45:00

Exteme Maxima	Value	Day	Time
January	3.083	25	23:00:00
February	3.185	22	22:15:00
March	3.612	1	13:45:00
April	2.912	5	20:45:00
May	2.578	6	22:00:00
June	2.838	23	11:45:00
July	3.058	21	10:30:00
August	2.868	4	11:00:00
September	2.81	3	11:00:00
October	3.222	26	07:15:00
November	3	18	13:00:00
December	3.172	20	15:30:00

Extreme minima	Value	Day	Time
January	0.09	31	10:15:00
February	0.278	11	06:15:00
March	0.197	10	17:00:00
April	0.139	8	04:45:00
May	0.329	6	03:45:00
June	0.36	7	18:30:00
July	0.299	6	18:30:00
August	0.294	3	17:15:00
September	0.228	17	17:00:00
October	0.136	4	18:30:00
November	0.354	17	06:00:00
December	-0.265	13	03:30:00

Mean sea level	No days	MSL
January	31	1.638
February	29	1.65
March	31	1.772
April	30	1.613
May	31	1.602
June	28	1.643
July	31	1.683
August	31	1.673
September	22	1.643
October	29	1.772
November	21	1.684
December	31	1.606
	Sum	Avg
	345	1.665

Milford Haven Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

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

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 189 TGI on site and purged system.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	261	177-189

Statistics:

Surge maxima	Value	Day	Time
January	0.685	13	11:15:00
February	0.707	4	23:00:00
March	1.064	10	02:15:00
April	0.437	29	21:00:00
May	0.302	1	05:45:00
June	0.547	18	19:00:00
July	0.462	9	17:45:00
August	0.525	18	17:15:00
September	0.544	5	17:15:00
October	0.429	7	08:45:00
November	0.568	9	16:45:00
December	0.686	4	04:00:00

Surge minima	Value	Day	Time
January	-0.206	31	15:45:00
February	-0.142	13	12:00:00
March	-0.504	4	11:45:00
April	-0.177	1	22:45:00
May	-0.101	5	19:30:00
June	-0.129	9	01:30:00
July	-0.117	22	13:00:00
August	-0.13	28	20:00:00
September	-0.18	26	06:30:00
October	-0.272	3	05:45:00
November	-0.548	24	11:45:00
December	-0.376	9	20:30:00

Exteme Maxima	Value	Day	Time
January	7.344	13	09:15:00
February	7.31	23	07:30:00
March	8.178	10	07:45:00
April	7.547	8	07:30:00
May	7.286	6	06:15:00
June	7.198	4	18:30:00
July	7.004	31	17:15:00
August	7.433	18	19:15:00
September	7.402	1	19:15:00
October	7.435	15	18:15:00
November	7.244	14	18:45:00
December	7.285	12	17:45:00

Extreme minima	Value	Day	Time
January	0.638	24	13:45:00
February	0.589	10	14:30:00
March	0.442	22	12:45:00
April	0.314	6	12:30:00
May	0.494	6	00:15:00
June	0.768	6	01:45:00
July	1.045	21	02:00:00
August	0.675	3	01:30:00
September	0.551	17	01:15:00
October	0.594	17	01:15:00
November	0.667	14	12:45:00
December	0.619	15	14:15:00

Mean sea level	No days	MSL
January	31	4.049
February	29	3.933
March	31	3.922
April	30	3.918
May	31	3.911
June	24	3.884
July	23	3.917
August	31	3.97
September	30	3.935
October	31	3.962
November	30	3.912
December	31	3.869
	Sum	Avg
	352	3.932

Millport Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 1.62m below Ordnance Datum Newlyn (ODN)
TGZ = 7.825m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 260 TGI on site to change compressor & general maintenance.

Data quality:

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

Statistics:

Surge maxima	Value	Day	Time
January	1.244	9	00:15:00
February	0.982	29	18:15:00
March	0.939	10	06:45:00
April	0.571	1	08:15:00
May	0.247	1	13:30:00
June	0.483	22	11:30:00
July	0.426	1	11:45:00
August	0.416	18	23:15:00
September	0.692	11	01:15:00
October	0.962	23	18:00:00
November	0.676	10	14:30:00
December	0.661	4	10:15:00

Surge minima	Value	Day	Time
January	-0.408	31	21:45:00
February	-0.334	14	15:00:00
March	-0.724	22	06:45:00
April	-0.422	6	09:30:00
May	-0.295	27	02:15:00
June	-0.238	12	10:15:00
July	-0.198	21	07:15:00
August	-0.195	29	04:30:00
September	-0.352	24	01:00:00
October	-0.546	3	06:45:00
November	-0.974	24	16:00:00
December	-0.617	24	01:45:00

Exteme Maxima	Value	Day	Time
January	4.346	9	00:30:00
February	4.17	25	15:00:00
March	4.229	12	02:45:00
April	3.618	10	02:45:00
May	3.538	9	02:15:00
June	3.607	19	00:15:00
July	3.72	7	02:45:00
August	3.726	4	01:45:00
September	3.73	2	01:30:00
October	4.117	19	15:00:00
November	3.821	10	22:00:00
December	3.897	13	00:00:00

Extreme minima	Value	Day	Time
January	0.348	24	19:15:00
February	0.144	10	20:00:00
March	-0.234	22	06:00:00
April	-0.153	6	17:45:00
May	0.103	5	17:30:00
June	0.125	7	08:00:00
July	0.216	21	07:30:00
August	0.216	3	06:45:00
September	0.062	17	06:30:00
October	0.179	3	07:30:00
November	-0.005	24	15:45:00
December	0.047	14	18:45:00

Mean sea level	No days	MSL
January	31	2.224
February	29	2.094
March	31	2.011
April	30	1.937
May	31	1.893
June	30	1.961
July	31	1.99
August	31	2.061
September	30	1.99
October	31	2.113
November	30	2.015
December	31	1.981
	Sum	Avg
	366	2.023

Mumbles (West Glamorgan) Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 5.00m below Ordnance Datum Newlyn (ODN)
TGZ = 13.821m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site:

Day 106	TGI on site. Compressor and processor now on separate batteries.
Day 158	TGI on site. No power. Now using compressor battery.
Day 188	TGI on site - purged system with large compressor and carried out survey for divers.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
94	15 minutes	093-106,156-158,184-188	001-002,010-012,022-030,037-093,106-107,111-114,121-156,158-177,181-184,206-209,215-223,241-246,262-275

Statistics:

Surge maxima	Value	Day	Time
January	0.623	31	09:15:00
February	0.705	4	23:45:00
March			
April	0.398	29	19:15:00
May			
June	0.127	26	18:30:00
July	0.365	9	19:30:00
August	0.412	13	07:45:00
September	0.455	9	08:15:00
October	0.429	7	07:45:00
November	0.778	9	18:45:00
	0.764	4	05:15:00

Surge minima	Value	Day	Time
January	-0.441	30	15:15:00
February	-0.277	1	01:45:00
March			
April	-0.178	25	06:00:00
May			
June	-0.236	27	04:30:00
July	-0.275	23	01:15:00
August	-0.304	27	20:00:00
September	-0.325	18	13:15:00
October	-0.371	3	05:45:00
November	-0.734	24	12:30:00
	-0.443	27	03:30:00

Exteme Maxima	Value	Day	Time
January	9.641	24	07:30:00
February	9.602	9	07:45:00
March			
April	9.403	20	18:30:00
May			
June	8.035	25	22:30:00
July	9.617	6	20:45:00
August	9.891	18	19:15:00
September	9.875	1	19:15:00
October	9.957	15	18:30:00
November	9.749	14	18:45:00
	9.684	14	07:00:00

Extreme minima	Value	Day	Time
January	1.129	23	13:30:00
February	2.341	5	11:15:00
March			
April	1.399	21	12:30:00
May			
June	2.157	26	04:45:00
July	1.282	21	01:45:00
August	0.971	2	12:45:00
September	0.618	17	01:00:00
October	0.766	16	00:30:00
November	0.897	14	00:15:00
	0.944	15	01:30:00

Mean sea level	No days	MSL
January	15	5.404
February	4	5.368
March		
April	7	5.192
May		
June	2	5.064
July	22	5.178
August	18	5.27
September	14	5.277
October	30	5.283
November	30	5.242
December	31	5.18
	Sum	Avg
	173	5.246

Newlyn Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 3.05m below Ordnance Datum Newlyn (ODN)
TGZ = 7.801m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Ordnance Datum Newlyn (ODN) is based on mean sea level at Newlyn between 1915 and 1921 (inclusive).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 190 TGI on site to look at mid-tide.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	191	268-269,271-276

Statistics:

Surge maxima	Value	Day	Time
January	0.601	13	15:15:00
February	0.496	3	11:30:00
March	0.811	10	02:15:00
April	0.452	19	00:00:00
May	0.283	26	17:30:00
June	0.258	18	15:45:00
July	0.381	4	15:45:00
August	0.315	11	23:00:00
September	0.552	5	04:15:00
October	0.34	7	06:00:00
November	0.269	8	16:30:00
December	0.406	4	04:00:00

Surge minima	Value	Day	Time
January	-0.204	25	22:00:00
February	-0.103	13	09:30:00
March	-0.355	4	10:45:00
April	-0.187	1	21:45:00
May	-0.09	5	09:15:00
June	-0.132	12	02:00:00
July	-0.164	22	08:45:00
August	-0.155	27	20:30:00
September	-0.21	26	17:15:00
October	-0.216	9	19:45:00
November	-0.267	19	12:15:00
December	-0.368	21	15:00:00

Exteme Maxima	Value	Day	Time
January	5.87	13	07:30:00
February	5.698	23	06:00:00
March	6.348	10	06:15:00
April	5.887	8	05:45:00
May	5.718	7	18:00:00
June	5.717	4	17:00:00
July	5.955	4	17:30:00
August	5.798	3	18:15:00
September	5.851	1	17:45:00
October	5.791	16	17:15:00
November	5.623	15	05:30:00
December	5.779	14	05:15:00

Extreme minima	Value	Day	Time
January	0.59	24	12:30:00
February	0.672	22	12:15:00
March	0.594	9	12:15:00
April	0.487	6	11:15:00
May	0.591	5	10:45:00
June	0.694	6	00:30:00
July	0.832	3	23:30:00
August	0.679	31	23:45:00
September	0.64	16	23:45:00
October	0.673	16	11:45:00
November	0.626	15	12:15:00
December	0.589	15	13:15:00

Mean sea level	No days	MSL
January	31	3.299
February	29	3.227
March	31	3.221
April	30	3.249
May	31	3.27
June	30	3.192
July	28	3.25
August	31	3.256
September	23	3.275
October	28	3.275
November	30	3.242
December	31	3.201
	Sum	Avg
	353	3.246

Newhaven (Sussex) Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 3.52m below Ordnance Datum Newlyn (ODN)
TGZ = 8.783m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: There were no visits to site in 2008.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	211	064,181

Statistics:

Surge maxima	Value	Day	Time
January	0.602	15	11:15:00
February	0.763	1	02:30:00
March	0.986	1	14:00:00
April	0.337	19	21:45:00
May	0.221	28	13:00:00
June	0.242	23	12:45:00
July	0.328	6	10:00:00
August	0.39	12	08:30:00
September	0.507	5	23:30:00
October	0.715	5	11:45:00
November	0.529	21	13:45:00
December	0.527	20	16:00:00

Surge minima	Value	Day	Time
January	-0.404	31	17:00:00
February	-0.371	7	18:15:00
March	-0.405	5	14:45:00
April	-0.347	1	14:30:00
May	-0.15	5	19:30:00
June	-0.191	9	13:00:00
July	-0.179	22	10:00:00
August	-0.208	26	23:45:00
September	-0.307	27	00:45:00
October	-0.372	25	06:15:00
November	-0.548	24	19:00:00
December	-0.616	26	20:30:00

Exteme Maxima	Value	Day	Time
January	6.875	11	12:45:00
February	6.921	22	12:00:00
March	7.201	10	13:15:00
April	7.024	8	00:00:00
May	6.922	6	23:45:00
June	6.801	4	23:30:00
July	6.938	5	12:45:00
August	6.936	4	13:00:00
September	7.009	30	11:45:00
October	7.168	16	11:45:00
November	6.907	14	11:15:00
December	6.738	15	00:30:00

Extreme minima	Value	Day	Time
January	0.572	23	18:00:00
February	0.481	8	18:30:00
March	0.509	8	18:15:00
April	0.339	7	18:15:00
May	0.425	7	06:15:00
June	0.589	5	06:00:00
July	0.678	4	06:00:00
August	0.614	3	06:30:00
September	0.501	17	06:15:00
October	0.642	17	19:00:00
November	0.603	14	18:00:00
December	0.434	13	17:30:00

Mean sea level	No days	MSL
January	31	3.686
February	29	3.602
March	31	3.709
April	30	3.619
May	31	3.611
June	27	3.613
July	29	3.664
August	31	3.673
September	30	3.644
October	31	3.708
November	30	3.69
December	31	3.577
	Sum	Avg
	361	3.65

Newport (Wales) Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

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

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 023 TGI on site to replace modem.
Day 128 TGI on site to install GSM modem (from Immingham).

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
82	15 minutes	001-028,030-033,058-063,066-072,075-084,121-129,338	None

Statistics:

Surge maxima	Value	Day	Time
January	0.547	29	18:30:00
February	1.192	5	01:15:00
March	1.152	28	17:30:00
April	0.913	28	18:15:00
May	0.59	17	00:30:00
June	0.971	22	04:30:00
July	0.949	6	05:15:00
August	0.914	13	10:00:00
September	0.946	3	17:00:00
October	1.011	4	16:45:00
November	1.172	9	20:45:00
December	1.078	4	05:45:00

Surge minima	Value	Day	Time
January	-0.379	28	17:00:00
February	-0.626	12	05:00:00
March	-0.969	4	13:15:00
April	-0.569	4	00:00:00
May	-0.57	26	16:45:00
June	-0.551	2	12:00:00
July	-0.604	23	16:45:00
August	-0.527	22	17:00:00
September	-0.731	20	04:30:00
October	-0.599	17	15:30:00
November	-0.946	24	13:30:00
December	-0.776	27	13:45:00

Exteme Maxima	Value	Day	Time
January	10.937	28	10:30:00
February	12.606	23	08:30:00
March	12.399	12	10:00:00
April	13.034	8	08:30:00
May	12.183	8	21:00:00
June	12.348	5	20:15:00
July	12.55	5	20:45:00
August	12.721	3	20:30:00
September	12.706	1	20:15:00
October	12.834	15	19:15:00
November	12.582	14	19:45:00
December	12.41	14	07:45:00

Extreme minima	Value	Day	Time
January	1.168	28	17:00:00
February	0.299	23	03:30:00
March	0.376	24	03:30:00
April	0.205	8	15:45:00
May	0.6	9	04:00:00
June	0.392	5	02:30:00
July	0.511	4	02:30:00
August	0.479	3	15:30:00
September	0.324	18	03:45:00
October	0.354	17	15:30:00
November	0.471	14	02:15:00
December	0.464	15	16:00:00

Mean sea level	No days	MSL
January	1	6.043
February	23	6.146
March	9	6.228
April	28	6.168
May	22	6.091
June	30	6.172
July	31	6.221
August	31	6.289
September	30	6.228
October	31	6.269
November	30	6.209
December	31	6.116
	Sum	Avg
	297	6.182

North Shields (Tyne and Wear) Tide Gauge

Latitude: 55° 00' 26.8" N
Longitude: 01° 26' 23.2" W
Grid Reference: NZ 3593 6824

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.60m below Ordnance Datum Newlyn (ODN)
TGZ = 6.754m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site:

Day 023	TGI on site; general maintenance.
Day 162	TGI on site to check wells - float problems.
Day 170	TGI on site to replace and recalibrate float on Channel 1.
Day 205	TGI on site to service port control readout.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	184	205

Statistics:

Surge maxima	Value	Day	Time
January	0.696	25	13:30:00
February	0.78	22	00:30:00
March	1.167	1	07:30:00
April	0.365	27	03:00:00
May	0.148	28	08:00:00
June	0.247	23	01:45:00
July	0.38	20	11:30:00
August	0.412	26	01:45:00
September	0.434	6	07:00:00
October	0.905	26	03:30:00
November	0.549	22	04:45:00
December	0.891	20	06:30:00

Surge minima	Value	Day	Time
January	-0.832	9	07:15:00
February	-0.623	7	11:30:00
March	-0.474	5	05:30:00
April	-0.355	1	06:30:00
May	-0.191	28	17:45:00
June	-0.195	9	04:00:00
July	-0.176	27	05:00:00
August	-0.159	30	11:30:00
September	-0.277	26	20:15:00
October	-0.738	25	16:00:00
November	-0.424	25	17:45:00
December	-0.666	13	01:15:00

Exteme Maxima	Value	Day	Time
January	5.57	26	17:30:00
February	5.518	22	04:00:00
March	5.642	9	16:30:00
April	5.334	9	17:30:00
May	5.228	6	15:45:00
June	5.202	5	16:30:00
July	5.232	21	05:00:00
August	5.418	4	05:00:00
September	5.462	2	04:30:00
October	5.662	16	03:30:00
November	5.57	15	04:00:00
December	5.165	16	18:00:00

Extreme minima	Value	Day	Time
January	0.433	22	21:45:00
February	0.378	11	00:00:00
March	0.398	9	23:15:00
April	0.106	7	22:30:00
May	0.318	5	21:30:00
June	0.389	6	11:15:00
July	0.371	5	11:15:00
August	0.297	3	11:00:00
September	0.2	17	10:45:00
October	0.518	15	09:30:00
November	0.506	16	23:45:00
December	0.252	14	23:00:00

Mean sea level	No days	MSL
January	31	3.046
February	29	2.988
March	31	3.031
April	30	2.913
May	31	2.86
June	30	2.927
July	29	2.983
August	31	3.002
September	30	2.973
October	31	3.113
November	30	3.031
December	31	2.926
	Sum	Avg
	364	2.983

Portpatrick (Scotland) Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

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

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 261 TGI on site to survey for mid-tide sensor.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	081-082,096-097,323-327,330-331,333-338,340-345,353-355,357,360-361,363-364

Statistics:

Surge maxima	Value	Day	Time
January	0.958	9	02:30:00
February	0.922	29	17:00:00
March	0.894	10	08:15:00
April	0.497	1	01:15:00
May	0.261	1	12:15:00
June	0.498	22	10:00:00
July	0.385	10	03:15:00
August	0.453	9	15:00:00
September	0.625	11	01:15:00
October	0.91	23	17:00:00
November	0.565	9	01:15:00
December	0.623	12	19:00:00

Surge minima	Value	Day	Time
January	-0.199	22	05:00:00
February	-0.215	14	14:15:00
March	-0.677	4	07:30:00
April	-0.302	5	19:45:00
May	-0.191	27	01:30:00
June	-0.206	12	11:00:00
July	-0.132	21	05:30:00
August	-0.111	29	03:15:00
September	-0.281	22	09:45:00
October	-0.413	3	06:30:00
November	-0.831	24	15:00:00
December	-0.46	9	19:30:00

Exteme Maxima	Value	Day	Time
January	4.625	13	14:15:00
February	4.396	22	12:30:00
March	4.692	10	13:00:00
April	4.08	9	13:45:00
May	4.015	9	01:45:00
June	4.023	18	23:30:00
July	4.204	6	01:30:00
August	4.24	19	00:30:00
September	4.208	2	00:45:00
October	4.409	19	14:15:00
November	4.171	10	21:15:00
December	4.393	12	23:00:00

Extreme minima	Value	Day	Time
January	0.347	24	19:15:00
February	0.192	10	20:00:00
March	-0.078	22	06:00:00
April	-0.074	6	17:30:00
May	0.144	5	17:15:00
June	0.193	7	08:00:00
July	0.331	21	07:15:00
August	0.268	3	06:45:00
September	0.155	17	06:15:00
October	0.312	16	06:00:00
November	0.224	24	15:30:00
December	0.111	14	18:30:00

Mean sea level	No days	MSL
January	31	2.402
February	29	2.269
March	31	2.195
April	30	2.148
May	31	2.124
June	30	2.164
July	31	2.203
August	31	2.267
September	30	2.195
October	31	2.293
November	30	2.213
December	31	2.17
	Sum	Avg
	366	2.22

Portrush (Northern Ireland) Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	Description
TGBM	Sheet 6 C 8556 4079	Pin RNLI slipway
Aux1	Sheet 6 C 8567 4070	Cut mark wall Kerr St
Aux2	Sheet 6 C 8580 4055	Cut mark wall Kerr St

TGZ = Admiralty Chart Datum (ACD)
TGZ = 1.24m below Ordnance Datum Belfast (ODB)
TGZ = 2.844m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 204 TGI on site. New compressor and general maintenance.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	204,289-291	None

Statistics:

Surge maxima	Value	Day	Time
January	1.141	9	02:30:00
February	0.86	29	16:00:00
March	0.829	12	02:00:00
April	0.448	1	10:15:00
May	0.234	4	02:45:00
June	0.317	25	17:15:00
July	0.34	1	11:00:00
August	0.352	24	02:15:00
September	0.464	11	01:15:00
October	0.711	23	17:15:00
November	0.507	8	21:45:00
December	0.424	4	10:30:00

Surge minima	Value	Day	Time
January	-0.187	30	04:45:00
February	-0.288	14	13:00:00
March	-0.56	4	06:30:00
April	-0.274	5	18:30:00
May	-0.263	26	04:00:00
June	-0.207	8	23:30:00
July	-0.187	21	09:00:00
August	-0.133	8	05:15:00
September	-0.315	22	07:45:00
October	-0.433	30	16:15:00
November	-0.812	24	15:45:00
December	-0.453	26	22:30:00

Exteme Maxima	Value	Day	Time
January	2.755	9	06:30:00
February	2.627	22	07:30:00
March	2.963	10	08:15:00
April	2.216	9	08:15:00
May	2.357	4	05:15:00
June	2.182	3	05:30:00
July	2.302	4	19:30:00
August	2.472	18	19:30:00
September	2.439	1	19:30:00
October	2.663	23	16:15:00
November	2.56	10	16:15:00
December	2.615	12	18:00:00

Extreme minima	Value	Day	Time
January	0.525	26	02:15:00
February	0.212	10	02:00:00
March	-0.059	22	00:15:00
April	-0.02	7	00:45:00
May	0.176	6	00:15:00
June	0.313	6	14:00:00
July	0.343	20	13:30:00
August	0.234	31	12:15:00
September	0.171	17	13:15:00
October	0.314	31	01:15:00
November	0.203	24	22:45:00
December	0.214	15	01:45:00

Mean sea level	No days	MSL
January	31	1.466
February	29	1.345
March	31	1.285
April	30	1.22
May	31	1.191
June	30	1.24
July	31	1.273
August	31	1.331
September	30	1.268
October	27	1.374
November	30	1.286
December	31	1.251
	Sum	Avg
	362	1.294

Portsmouth (Hampshire) Tide Gauge

Latitude: 50° 48' 08.2" N
Longitude: 01° 06' 40.2" W
Grid Reference: SU 6273 0068

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.73m below Ordnance Datum Newlyn (ODN)
TGZ = 6.007m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: There were no visits to site in 2008.

Data quality:

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

Statistics:

Surge maxima	Value	Day	Time
January	0.78	15	09:30:00
February	0.65	1	04:45:00
March	1.087	10	06:45:00
April	0.451	29	16:15:00
May	0.228	26	10:30:00
June	0.302	19	02:45:00
July	0.422	7	06:15:00
August	0.42	12	14:45:00
September	0.46	5	12:15:00
October	0.512	5	12:30:00
November	0.413	10	14:00:00
December	0.65	4	08:30:00

Surge minima	Value	Day	Time
January	-0.495	31	18:30:00
February	-0.341	14	08:30:00
March	-0.527	5	15:30:00
April	-0.374	1	16:15:00
May	-0.198	20	04:00:00
June	-0.234	9	09:15:00
July	-0.225	22	06:15:00
August	-0.252	28	14:15:00
September	-0.383	27	03:15:00
October	-0.372	25	22:30:00
November	-0.572	24	19:45:00
December	-0.601	20	06:00:00

Exteme Maxima	Value	Day	Time
January	5.057	11	12:45:00
February	4.931	22	12:15:00
March	5.497	10	13:00:00
April	4.943	8	00:15:00
May	4.858	7	00:00:00
June	4.836	4	23:45:00
July	5.009	5	13:00:00
August	4.899	4	13:30:00
September	5.008	30	11:45:00
October	5.041	16	12:00:00
November	4.906	14	11:30:00
December	4.846	12	23:00:00

Extreme minima	Value	Day	Time
January	0.415	25	18:45:00
February	0.454	8	17:45:00
March	0.511	23	05:30:00
April	0.32	6	16:45:00
May	0.418	7	05:30:00
June	0.557	6	06:00:00
July	0.659	4	05:00:00
August	0.573	31	04:45:00
September	0.466	17	05:30:00
October	0.621	17	17:45:00
November	0.572	14	17:00:00
December	0.454	15	18:30:00

Mean sea level	No days	MSL
January	31	2.934
February	29	2.85
March	31	2.926
April	30	2.867
May	31	2.865
June	30	2.848
July	31	2.91
August	31	2.92
September	30	2.895
October	31	2.942
November	30	2.912
December	31	2.816
	Sum	Avg
	366	2.89

Sheerness (Kent) Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

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

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: There were no visits to site in 2008.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
97	15 minutes	121-122,268-275,341	001-121,267,275-283

Statistics:

Surge maxima	Value	Day	Time
January			
February			
March			
April			
May	0.703	26	11:00:00
June	0.66	23	10:45:00
July	0.682	21	10:00:00
August	0.44	26	06:15:00
September	0.308	5	02:15:00
October	0.89	24	17:15:00
November	1.601	21	13:30:00
December	1.515	20	15:30:00

Surge minima	Value	Day	Time
January			
February			
March			
April			
May	-0.368	28	20:00:00
June	-0.475	22	18:15:00
July	-0.341	7	10:30:00
August	-0.676	9	20:00:00
September	-0.499	10	16:45:00
October	-1.072	25	23:45:00
November	-0.852	8	17:00:00
December	-1.547	13	08:45:00

Exteme Maxima	Value	Day	Time
January			
February			
March			
April			
May	6.055	8	02:00:00
June	6.074	6	01:45:00
July	6.186	5	01:45:00
August	6.138	4	02:15:00
September	5.981	2	14:00:00
October	6.251	16	13:00:00
November	6.22	16	14:30:00
December	5.998	17	16:00:00

Extreme minima	Value	Day	Time
January			
February			
March			
April			
May	0.382	6	07:00:00
June	0.493	7	21:45:00
July	0.306	6	21:45:00
August	0.283	3	20:30:00
September	0.221	1	20:15:00
October	0.523	15	19:00:00
November	0.395	13	18:45:00
December	-0.146	13	07:15:00

Mean sea level	No days	MSL
January		
February		
March		
April		
May	30	3.096
June	30	3.056
July	31	3.09
August	31	3.05
September	21	3.052
October	22	3.158
November	30	3.152
December	31	3.02
	Sum	Avg
	226	3.084

St. Mary's (Isles of Scilly) Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

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

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: There were no visits to site in 2008.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
93	15 minutes	163-186	005-007,192

Statistics:

Surge maxima	Value	Day	Time
January	0.482	15	16:15:00
February	0.436	3	09:00:00
March	0.638	10	01:30:00
April	0.345	18	23:15:00
May	0.193	24	07:00:00
June	0.077	4	15:15:00
July	0.311	5	02:00:00
August	0.267	18	16:15:00
September	0.408	5	15:00:00
October	0.241	7	06:45:00
November	0.25	8	16:15:00
December	0.346	4	03:45:00

Surge minima	Value	Day	Time
January	-0.22	26	00:00:00
February	-0.162	16	13:45:00
March	-0.433	4	10:30:00
April	-0.203	3	19:45:00
May	-0.143	5	16:30:00
June	-0.155	8	23:15:00
July	-0.161	22	11:30:00
August	-0.156	27	20:00:00
September	-0.2	26	17:15:00
October	-0.218	9	21:00:00
November	-0.26	24	13:00:00
December	-0.327	21	14:30:00

Exteme Maxima	Value	Day	Time
January	5.857	13	07:30:00
February	5.786	9	06:00:00
March	6.43	10	06:15:00
April	6.02	8	05:45:00
May	5.819	7	18:00:00
June	5.771	4	17:00:00
July	5.995	4	17:45:00
August	5.885	18	17:45:00
September	5.894	1	17:30:00
October	5.9	15	16:45:00
November	5.752	15	05:30:00
December	5.884	14	05:15:00

Extreme minima	Value	Day	Time
January	0.51	24	12:15:00
February	0.538	10	13:00:00
March	0.45	9	12:00:00
April	0.37	6	23:15:00
May	0.468	5	22:45:00
June	0.599	6	00:15:00
July	0.835	6	01:00:00
August	0.554	3	00:00:00
September	0.502	16	23:45:00
October	0.551	16	11:30:00
November	0.53	14	11:15:00
December	0.507	15	13:00:00

Mean sea level	No days	MSL
January	26	3.254
February	29	3.177
March	31	3.174
April	30	3.2
May	31	3.2
June	9	3.102
July	25	3.174
August	31	3.203
September	30	3.188
October	31	3.214
November	30	3.198
December	31	3.156
	Sum	Avg
	334	3.187

Stornoway (Hebrides) Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.71m below Ordnance Datum Local (ODL)
TGZ = 6.368m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 142 TGI on site for general maintenance. Purged system.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
100	15 minutes	None	026-142

Statistics:

Surge maxima	Value	Day	Time
January	0.596	5	06:30:00
February			
March			
April			
May	0.179	29	01:00:00
June	0.331	26	02:15:00
July	0.37	2	11:30:00
August	0.415	24	02:15:00
September	0.509	11	12:15:00
October	0.674	23	18:15:00
November	0.612	9	13:00:00
December	0.496	19	22:00:00

Surge minima	Value	Day	Time
January	-0.134	1	03:15:00
February			
March			
April			
May	-0.212	26	06:00:00
June	-0.141	12	21:15:00
July	-0.123	20	14:00:00
August	-0.102	8	02:15:00
September	-0.243	23	16:45:00
October	-0.346	31	03:00:00
November	-0.55	24	12:15:00
December	-0.44	27	03:30:00

Exteme Maxima	Value	Day	Time
January	5.336	24	08:00:00
February			
March			
April			
May	4.522	21	19:30:00
June	4.916	4	19:00:00
July	5.017	4	19:45:00
August	5.173	2	19:30:00
September	5.224	1	19:30:00
October	5.387	15	18:45:00
November	5.25	14	19:15:00
December	5.255	13	06:45:00

Extreme minima	Value	Day	Time
January	0.828	24	14:30:00
February			
March			
April			
May	1.245	22	02:00:00
June	0.59	6	02:30:00
July	0.597	5	02:30:00
August	0.529	4	02:45:00
September	0.301	17	01:45:00
October	0.504	17	02:00:00
November	0.659	16	15:00:00
December	0.537	14	14:00:00

Mean sea level	No days	MSL
January	24	3.123
February		
March		
April		
May	9	2.752
June	30	2.865
July	31	2.895
August	31	2.952
September	30	2.916
October	31	3.065
November	30	2.961
December	31	2.927
	Sum	Avg
	247	2.94

Tobermory (Mull) Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.39m below Ordnance Datum Newlyn (ODN)
TGZ = Chart Datum = 6.856m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 295 TGI on site; General maintenance. Converted to rechargeable battery. Re-loaded software onto larger memory card.

Data quality:

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

Statistics:

Surge maxima	Value	Day	Time
January	1.035	9	04:45:00
February	0.835	26	03:45:00
March	0.658	1	00:15:00
April	0.517	1	09:00:00
May	0.239	4	10:15:00
June	0.419	25	17:00:00
July	0.396	1	10:15:00
August	0.409	24	01:45:00
September	0.558	11	10:15:00
October	0.956	23	17:15:00
November	0.712	10	05:45:00
December	0.6	19	16:30:00

Surge minima	Value	Day	Time
January	-0.175	30	06:00:00
February	-0.301	14	11:45:00
March	-0.597	4	10:45:00
April	-0.42	6	06:30:00
May	-0.213	26	05:15:00
June	-0.211	12	20:15:00
July	-0.168	21	08:15:00
August	-0.136	8	02:30:00
September	-0.289	23	05:15:00
October	-0.396	30	22:00:00
November	-0.766	24	18:15:00
December	-0.457	9	16:30:00

Exteme Maxima	Value	Day	Time
January	5.246	9	05:45:00
February	5.167	22	07:00:00
March	5.432	10	07:30:00
April	4.728	8	07:00:00
May	4.662	4	04:30:00
June	4.597	4	18:00:00
July	4.693	4	18:45:00
August	4.882	3	19:15:00
September	4.935	1	18:45:00
October	5.023	15	18:00:00
November	5.002	14	18:30:00
December	4.966	12	17:15:00

Extreme minima	Value	Day	Time
January	0.915	23	00:15:00
February	0.536	10	01:45:00
March	0.196	22	00:15:00
April	0.173	6	12:00:00
May	0.445	6	00:15:00
June	0.664	6	13:45:00
July	0.715	6	14:15:00
August	0.577	4	14:00:00
September	0.466	16	12:30:00
October	0.571	16	12:45:00
November	0.682	16	01:45:00
December	0.543	15	01:30:00

Mean sea level	No days	MSL
January	31	2.934
February	29	2.821
March	31	2.731
April	30	2.663
May	31	2.636
June	30	2.692
July	31	2.718
August	31	2.783
September	30	2.726
October	31	2.852
November	30	2.753
December	31	2.725
	Sum	Avg
	366	2.753

Ullapool (Scotland) Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 2.75m below Ordnance Datum Newlyn (ODN)
TGZ = 7.155m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site:

Day 140	TGI on site for general maintenance.
Day 296	TGI on site; general maintenance and re-loaded software on to larger memory card.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	296	None

Statistics:

Surge maxima	Value	Day	Time
January	0.75	31	10:00:00
February	0.886	29	13:45:00
March	0.79	1	01:15:00
April	0.392	1	12:15:00
May	0.246	4	02:15:00
June	0.352	26	02:30:00
July	0.361	1	12:30:00
August	0.416	25	10:30:00
September	0.505	11	11:30:00
October	0.951	25	12:45:00
November	0.662	10	13:15:00
December	0.663	19	21:15:00

Surge minima	Value	Day	Time
January	-0.246	30	06:30:00
February	-0.475	1	10:15:00
March	-0.552	22	08:00:00
April	-0.417	6	20:30:00
May	-0.27	26	05:45:00
June	-0.193	13	04:00:00
July	-0.187	21	08:00:00
August	-0.195	14	08:30:00
September	-0.311	23	05:00:00
October	-0.444	31	03:00:00
November	-0.671	24	18:00:00
December	-0.488	27	03:15:00

Exteme Maxima	Value	Day	Time
January	5.755	9	07:30:00
February	5.862	22	07:30:00
March	5.92	10	08:30:00
April	5.367	7	07:15:00
May	5.242	6	07:00:00
June	5.213	4	19:00:00
July	5.283	4	19:45:00
August	5.452	31	19:15:00
September	5.49	1	19:45:00
October	5.715	15	19:00:00
November	5.685	14	19:15:00
December	5.561	13	06:45:00

Extreme minima	Value	Day	Time
January	0.82	23	14:00:00
February	0.437	10	15:15:00
March	0.222	22	13:45:00
April	0.088	7	14:00:00
May	0.391	6	13:15:00
June	0.57	6	02:30:00
July	0.59	5	02:30:00
August	0.549	4	03:00:00
September	0.259	17	02:00:00
October	0.51	17	02:00:00
November	0.711	16	15:00:00
December	0.485	14	14:15:00

Mean sea level	No days	MSL
January	31	3.282
February	29	3.188
March	31	3.096
April	30	2.998
May	31	2.945
June	30	3.026
July	31	3.051
August	31	3.102
September	30	3.066
October	31	3.237
November	30	3.137
December	31	3.104
	Sum	Avg
	366	3.103

Weymouth (Dorset) Tide Gauge

Latitude: 50° 36' 30.6" N
Longitude: 02° 26' 52.6" W
Grid Reference: SY 6840 7885
.
Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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 adjacent to Tide Gauge Hut

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

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 011 TGI on site to replace fuse & purge both channels.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
97	15 minutes	002-011,268	001-002,021-023,184-185,206-207,209-210,212-213,258,296-300,307,314-315,328-331,334,350-352,365-366

Statistics:

Surge maxima	Value	Day	Time
January	0.698	15	09:45:00
February	0.545	5	00:15:00
March	1.079	10	05:30:00
April	0.4	29	17:45:00
May	0.26	25	17:15:00
June	0.29	19	01:30:00
July	0.411	5	16:00:00
August	0.342	12	14:00:00
September	0.487	5	07:15:00
October	0.383	5	14:30:00
November	0.242	21	17:00:00
December	0.595	4	07:00:00

Surge minima	Value	Day	Time
January	-0.385	25	15:15:00
February	-0.254	16	16:30:00
March	-0.313	5	10:15:00
April	-0.274	1	16:30:00
May	-0.185	5	11:00:00
June	-0.222	9	16:00:00
July	-0.199	22	13:45:00
August	-0.191	28	21:45:00
September	-0.306	27	02:30:00
October	-0.304	9	18:45:00
November	-0.344	3	07:00:00
December	-0.504	26	23:00:00

Exteme Maxima	Value	Day	Time
January	2.555	13	09:45:00
February	2.498	23	08:30:00
March	3.041	10	09:00:00
April	2.352	8	08:15:00
May	2.295	7	20:15:00
June	2.286	4	19:15:00
July	2.548	5	20:45:00
August	2.475	18	20:00:00
September	2.5	1	20:00:00
October	2.438	30	07:30:00
November	2.249	15	07:45:00
December	2.476	13	06:30:00

Extreme minima	Value	Day	Time
January	-0.099	25	16:45:00
February	0.041	10	17:00:00
March	0.017	23	00:15:00
April	-0.102	6	15:00:00
May	-0.044	7	03:45:00
June	-0.013	6	04:15:00
July	0.06	4	03:30:00
August	-0.011	31	03:00:00
September	-0.061	17	03:45:00
October	0.099	16	03:15:00
November	0.024	15	16:00:00
December	-0.092	15	16:45:00

Mean sea level	No days	MSL
January	16	1.231
February	29	1.146
March	31	1.197
April	30	1.078
May	31	1.083
June	30	1.051
July	24	1.112
August	30	1.122
September	29	1.104
October	24	1.149
November	19	1.109
December	23	1.043
	Sum	Avg
	316	1.119

Whitby (Yorkshire) Tide Gauge

Latitude: 54° 29' 24.0" N
Longitude: 00° 36' 52.6" W
Grid Reference: NZ 8984 1140

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 3.00m below Ordnance Datum Newlyn (ODN)
TGZ = 9.105m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: There were no visits to site in 2008.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
99	15 minutes	296	002-013,030-032,034-042,071-073,116-179,282-338,345-346,348-349

Statistics:

Surge maxima	Value	Day	Time
January	0.93	25	13:00:00
February	1.026	22	01:15:00
March	1.413	1	07:45:00
April	0.476	2	03:30:00
May	0.133	7	02:00:00
June	0.295	30	07:15:00
July	0.552	20	12:15:00
August	0.461	26	01:15:00
September	0.401	6	02:15:00
October	0.67	3	11:15:00
November			
December	1.032	20	07:15:00

Surge minima	Value	Day	Time
January	-0.338	2	03:15:00
February	-0.273	23	14:15:00
March	-0.318	5	10:30:00
April	-0.221	1	07:15:00
May	0.094	7	02:30:00
June	-0.024	30	23:30:00
July	-0.113	24	18:30:00
August	-0.102	2	00:15:00
September	-0.251	13	12:30:00
October	-0.497	4	14:30:00
November			
December	-0.704	13	04:15:00

Exteme Maxima	Value	Day	Time
January	6.122	26	18:15:00
February	6.201	22	17:00:00
March	6.171	21	15:45:00
April	5.96	9	18:00:00
May	4.352	7	02:30:00
June	5.189	30	13:00:00
July	5.783	5	05:15:00
August	5.951	4	05:45:00
September	6.019	2	05:15:00
October	6.022	1	04:30:00
November			
December	5.701	16	18:45:00

Extreme minima	Value	Day	Time
January	0.805	24	23:45:00
February	0.978	12	01:00:00
March	0.734	9	23:30:00
April	0.573	7	23:00:00
May	1.055	6	23:30:00
June	1.618	30	19:30:00
July	0.767	5	11:45:00
August	0.68	3	11:15:00
September	0.559	17	11:00:00
October	1.304	2	11:30:00
November			
December	0.633	16	00:00:00

Mean sea level	No days	MSL
January	15	3.63
February	18	3.533
March	27	3.597
April	23	3.452
May		
June	3	3.457
July	31	3.448
August	31	3.46
September	30	3.412
October	6	3.582
November		
December	23	3.401
	Sum	Avg
	207	3.497

Wick (Scotland) Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 1.71m below Ordnance Datum (ODN)
TGZ = 5.084m below TGBM

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: There were no visits to site in 2008.

Data quality:

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

Statistics:

Surge maxima	Value	Day	Time
January	0.746	31	13:15:00
February	0.8	29	23:45:00
March	0.822	1	01:15:00
April	0.352	26	22:15:00
May	0.16	4	06:45:00
June	0.286	26	13:15:00
July	0.266	2	03:15:00
August	0.384	25	20:15:00
September	0.355	11	15:15:00
October	0.844	25	23:15:00
November	0.614	9	17:15:00
December	0.518	20	06:15:00

Surge minima	Value	Day	Time
January	-0.255	1	06:30:00
February	-0.383	14	14:30:00
March	-0.424	4	23:45:00
April	-0.298	7	02:30:00
May	-0.225	25	19:30:00
June	-0.136	1	18:15:00
July	-0.176	27	07:00:00
August	-0.141	6	04:15:00
September	-0.284	23	21:45:00
October	-0.342	31	16:30:00
November	-0.544	24	23:15:00
December	-0.509	27	08:15:00

Exteme Maxima	Value	Day	Time
January	4.146	25	13:00:00
February	3.962	21	11:45:00
March	4.097	10	13:00:00
April	3.641	9	13:15:00
May	3.518	7	12:30:00
June	3.527	4	23:45:00
July	3.573	5	00:30:00
August	3.711	4	00:45:00
September	3.828	2	00:30:00
October	4.059	25	21:00:00
November	3.946	14	23:45:00
December	3.766	16	13:45:00

Extreme minima	Value	Day	Time
January	0.558	23	18:00:00
February	0.318	10	19:30:00
March	0.168	22	17:45:00
April	0.001	6	17:15:00
May	0.283	5	16:45:00
June	0.306	7	07:45:00
July	0.272	5	06:30:00
August	0.291	31	05:15:00
September	0.169	17	05:45:00
October	0.504	15	05:00:00
November	0.369	16	19:15:00
December	0.283	14	18:15:00

Mean sea level	No days	MSL
January	31	2.231
February	29	2.148
March	31	2.086
April	30	1.954
May	31	1.897
June	30	2.003
July	31	2.019
August	31	2.068
September	30	2.03
October	31	2.223
November	30	2.11
December	31	2.058
	Sum	Avg
	366	2.069

Workington (Cumbria) Tide Gauge

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

Benchmarks and Benchmark relationships:

Benchmark	Grid Reference	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

TGZ = Admiralty Chart Datum (ACD)
TGZ = 4.20m below Ordnance Datum Newlyn (ODN)
TGZ = 11.59m below Aux1

Datum information: All data are to Admiralty Chart Datum (ACD).

Levelling information: No levelling was carried out in 2008.

T.G.I. visits to site: Day 305 TGI on site to replace compressor.

Data quality:

CI%	Sample Interval	Missing Data	Suspect Data
98	15 minutes	303-308	298-303,346-366

Statistics:

Surge maxima	Value	Day	Time
January	1.274	31	10:30:00
February	0.996	29	17:30:00
March	1.061	10	06:15:00
April	0.578	1	02:15:00
May	0.274	1	11:15:00
June	0.684	22	10:00:00
July	0.512	10	01:15:00
August	0.57	9	13:45:00
September	0.663	11	02:00:00
October	0.962	23	15:30:00
November	0.691	8	23:30:00
December	0.64	4	10:00:00

Surge minima	Value	Day	Time
January	-0.317	30	06:45:00
February	-0.341	17	16:15:00
March	-0.843	4	06:45:00
April	-0.401	5	17:15:00
May	-0.404	25	06:45:00
June	-0.245	12	09:15:00
July	-0.225	21	04:15:00
August	-0.229	29	01:00:00
September	-0.417	6	17:00:00
October	-0.594	3	04:30:00
November	-0.963	24	13:00:00
December	-0.605	10	00:30:00

Exteme Maxima	Value	Day	Time
January	8.789	25	13:15:00
February	8.84	22	12:30:00
March	9.355	10	13:00:00
April	8.775	8	12:45:00
May	8.508	6	11:30:00
June	8.423	6	00:30:00
July	8.604	5	00:30:00
August	8.733	4	01:00:00
September	8.726	2	00:30:00
October	8.804	15	23:30:00
November	8.74	15	00:00:00
December	7.62	2	14:00:00

Extreme minima	Value	Day	Time
January	0.868	24	19:15:00
February	0.589	10	20:00:00
March	0.39	22	18:15:00
April	0.235	6	18:00:00
May	0.43	5	17:30:00
June	0.643	5	06:30:00
July	0.784	5	07:15:00
August	0.658	3	07:00:00
September	0.478	17	06:45:00
October	0.728	17	06:45:00
November	0.711	15	19:00:00
December	1.276	11	04:00:00

Mean sea level	No days	MSL
January	31	4.75
February	29	4.588
March	31	4.527
April	30	4.443
May	31	4.4
June	30	4.514
July	31	4.55
August	31	4.602
September	30	4.522
October	22	4.652
November	27	4.531
December	9	4.535
	Sum	Avg
	332	4.551

Monitoring Vertical Land Movements at Tide Gauges

Dr Richard Bingley,

Institute of Engineering, Surveying and Space Geodesy,
University of Nottingham

Monitoring Vertical Land Movements at Tide Gauges

Global sea level has risen by 10 to 20 cm during the 20th century. Much of the evidence for this rise came from mean sea level (MSL) measurements obtained at tide gauges, which measure MSL with respect to a local tide gauge bench mark (TGBM). However, it is impossible to distinguish between any 'true sea level variations' and any changes in the level of the land at a tide gauge using these measurements alone. Around Britain sea levels have risen by different amounts over the last century, from a 7cm rise at Aberdeen to a 21cm rise at Sheerness. This is because different parts of the British Isles are rising and subsiding at different rates, due mainly to the removal of ice from the land at the end of the last ice age – so called, glacial isostatic adjustment (GIA). Therefore, to measure the climate related component of changes in sea level using a tide gauge, the rate of any vertical land movements at the specific tide gauge must be determined.

In recent years, modern geodetic techniques have developed to the stage where they can be used to measure such vertical land movements, which are typically of the order of 1 to 2 mm/yr for the British Isles. The two most suitable techniques for this purpose are measurements using the Global Positioning System (GPS) and measurements of absolute gravity (AG).

With funding from Defra and the Environment Agency, POL, together with the Institute of Engineering Surveying and Space Geodesy (IESSG) at the University of Nottingham, have been carrying out research on these geodetic techniques since 1990. By 2004, this had resulted in the establishment of a network of continuous GPS (CGPS) stations at, or close to, the tide gauges of Aberdeen, Liverpool, Lowestoft, Newlyn, North Shields, Portsmouth and Sheerness, and a network of AG stations close to the tide gauges of Aberdeen, Lerwick and Newlyn, some of which have been operational since 1996. During 2005, three new CGPS stations were established at, or close to, the tide gauges of Dover, Lerwick and Stornoway.

The data from the ten CGPS stations at, or close to, tide gauges are archived as part of the British Isles GPS archive Facility (BIGF), which is also operated by the IESSG at the University of Nottingham. By the end of 2008, BIGF contained data for a total of 155 CGPS stations, some of which are also used to help to understand vertical land movements at non-coastal locations in the British Isles.

Data from four of the CGPS stations at, or close to, tide gauges (namely Aberdeen, Newlyn, North Shields and Sheerness) are contributed to European initiatives, notably the European Sea Level Service (ESEAS), and international initiatives, notably the International GPS Service (IGS) Tide Gauge Pilot Project (TIGA); and data from Newlyn are also contributed to the EUREF Permanent Network (EPN).

This report includes copies of the log files for the ten CGPS stations at, or close to, tide gauges along with plots summarising their daily data availability and quality, based on the TEQC program available through the IGS. These plots show the time window length (taken as the period between the first and last epoch of data recorded on a single day), the number of observations (along with the maximum number of satellites available for a particular day), the multipath characteristics for the dual-frequency pseudo-range observables (given as MP1 and MP2 values), and the number of cycle slips on the carrier phase observables (given as slips per thousand observations).

The data from the AG stations are processed and analysed by POL. The data from the CGPS stations are combined with data from other CGPS stations on a global scale that form part of the IGS network and processed by the IESSG. The resultant time series are then analysed by POL and IESSG.

In 2007, results from the research carried out were published as R&D Technical Report FD2319/TR (Bingley et al., 2007) and may be downloaded from the Defra/EA Joint R&D FCERM Programme website. The conclusions of the report state that the results demonstrate how:

- the combined CGPS and AG estimates of changes in land level
    - correlate with long term geological and geophysical evidence for the 'tilt' of Great Britain, which have Scotland rising by 1 to 2mm/yr and the South of England subsiding by up to 1.2mm/yr.
    - are in general agreement with long term geological and geophysical evidence, in terms of whether there is subsidence or uplift at individual stations, although in some cases there are differences which are of the same order as the changes in land level themselves and are, therefore, significant in relation to any assumptions made regarding future changes in land level.

- when the combined AG and CGPS results are considered along with tide gauge estimates of changes in sea level, our 'best' current estimate for the average change in sea level (decoupled from changes in land level) around the coast of Great Britain over the past few decades/past century suggests that sea level has risen by 0.9 to 1.2mm/yr.

- the direct estimates of changes in land level at specific tide gauges can be combined with predictions of future changes in sea level to provide an assessment of future changes in sea level around the coast of Great Britain.

More recently, results from the research carried out have been published as Bingley et al. (2008) and Teferle et al. (2009), and as part of Woodworth et al. (2008) and Bradley et al. (2009). These results should still be considered preliminary; as more reliable estimates of vertical land movements will be obtained after an extended monitoring period. These will lead to improved estimates for the changes in sea level (decoupled from changes in land level) around the coast of Great Britain over the past few decades/past century but, perhaps more importantly, will establish the selected tide gauges as devices with increasingly concurrent sea level and land level data from where estimates for any accelerations in changes sea level can be obtained. This will enable the validation of climate change model predictions of sea level rise around Great Britain, particularly as we move into the period of increasing variance between the different IPCC scenario predictions, which will lead to a better assessment of risk and more informed decisions on planning and managing flood risk at the coast and in our estuaries.

References

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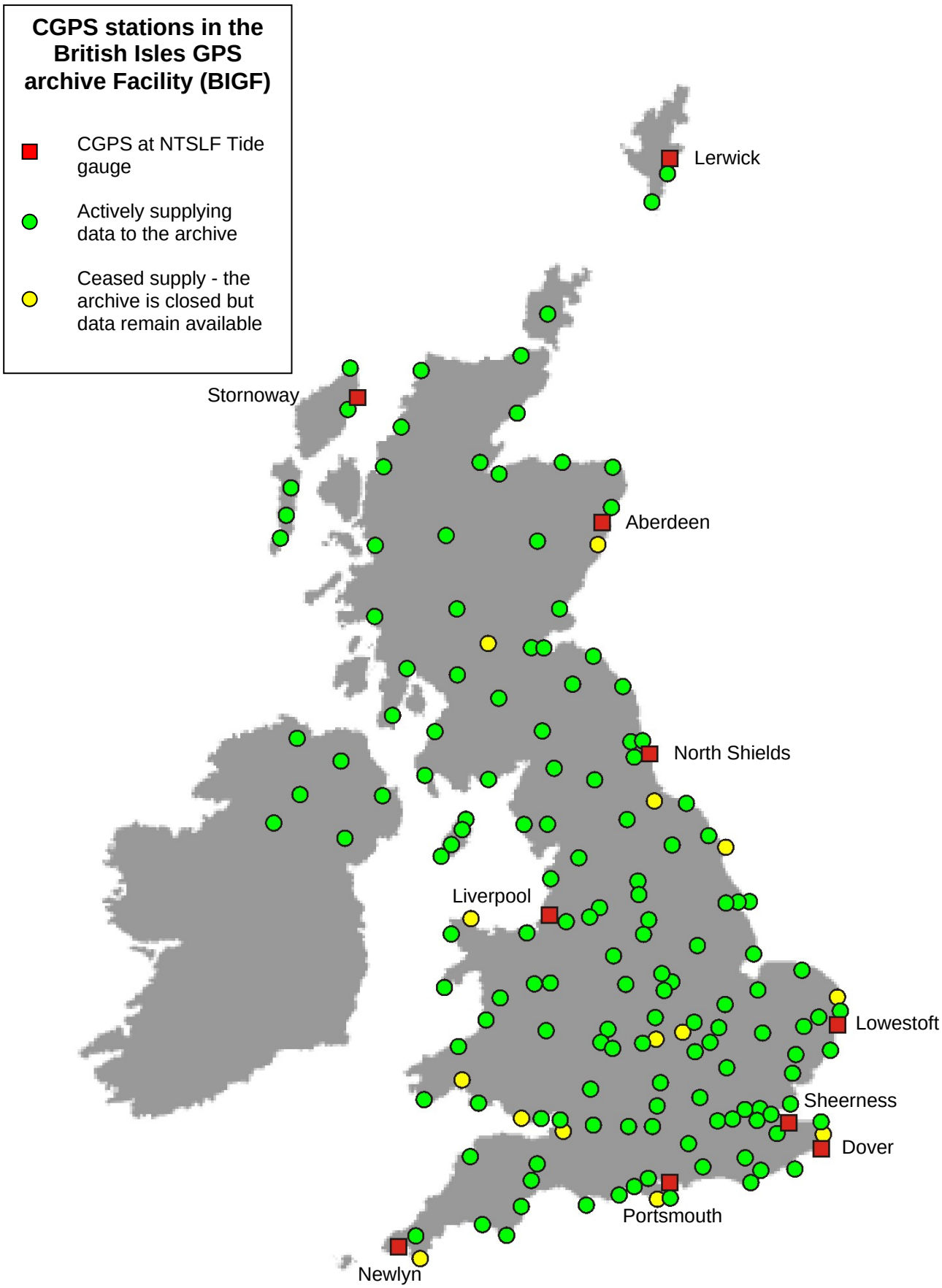
CGPS stations in the British Isles GPS archive Facility (BIGF)
CGPS at NTSLF Tide gauge
Actively supplying data to the archive
Ceased supply - the archive is closed but data remain available
Lerwick
Stornoway
Aberdeen
North Shields
Liverpool
Lowestoft
Sheerness
Dover
Portsmouth
Newlyn

Aberdeen

```
     ABER Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2008-12-17
     Report Type              : UPDATE
     If Update:
      Previous Site Log       : aber_20011212.log
      Modified/Added Sections : 3.2, 3.3


1.   Site Identification of the GNSS Monument

     Site Name                : Aberdeen Tide Gauge
     Four Character ID        : ABER
     Monument Inscription     :
     IERS DOMES Number        : 13231M001
     CDP Number               : (A4)
     Monument Description     : STEEL PLATE AND CARBON FIBRE PIPE
       Height of the Monument : 4.0m
       Monument Foundation    : QUAY
       Foundation Depth       : (m)
     Marker Description       : TOP OF 40mm DIA THREAD ON STEEL PLATE
     Date Installed           : 1998-09-17T12:00Z
     Geologic Characteristic  : GLACIAL SAND AND GRAVEL
       Bedrock Type           : METAMORPHIC (QUARTZ-MICA-SCHIST)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted adjacent to the
                              : tide gauge building, which is located on a
                              : concrete quay, with piled foundations.
                              : The GPS antenna is located on the monument
                              : which consists of a 4m carbon fibre pipe mounted
                              : on a steel plate, which is fixed to the concrete
                              : quay.
                              : The GPS antenna is attached to the carbon fibre
                              : pipe using a 5/8" thread.
                              : The carbon fibre pipe is attached to the steel
                              : plate using a 40 mm diameter thread.
                              : The male part of the 40mm diameter thread is on
                              : the steel plate and has a domed head, which
                              : serves as the survey marker.


2.   Site Location Information

     City or Town             : Aberdeen
     State or Province        :
     Country                  : Scotland
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       : 3466272.4
       Y coordinate (m)       : -125904.3
       Z coordinate (m)       : 5334662.3
       Latitude (N is +)      : +570838.42
       Longitude (E is +)     : -0020448.80
       Elevation (m,ellips.)  : 53.4
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 03140
     Firmware Version         : 1F50
     Elevation Cutoff Setting : 5
     Date Installed           : 1998-09-18T00:00Z
     Date Removed             : 1999-08-15T23:59Z
```

```
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 03140.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRS1F50 and
                              : CGHOSE v5.4.00 CGRS1F50.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.2  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 03140
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-08-17T00:00Z
     Date Removed             : 2008-12-16T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 03140.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00 and
                              : CGHOSE v6.0.00 CGRSCD00.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.3  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 03140
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 2008-12-17T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 03140.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00.
                              : Conversion to RINEX using TEQC 2008Oct2.

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH700936F_C    SNOW
     Serial Number            : 14767
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   3.9650
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 1998-09-17T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR 14767.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)
```

```
5.   Surveyed Local Ties

5.x  Tied Marker Name          :
     Tied Marker Usage         : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number    : (A4)
     Tied Marker DOMES Number  : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                  : (m)
       dy (m)                  : (m)
       dz (m)                  : (m)
     Accuracy (mm)             : (mm)
     Survey method             : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured             : (CCYY-MM-DDThh:mmZ)
     Additional Information    : (multiple lines)


6.   Frequency Standard

6.1  Standard Type             : INTERNAL
       Input Frequency         : (if external)
       Effective Dates         : 1998-09-17/CCYY-MM-DD
       Notes                   : (multiple lines)

6.x  Standard Type             : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency         : (if external)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)


7.   Collocation Information

7.x  Instrumentation Type      : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                  : (PERMANENT/MOBILE)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model    : NONE
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy (% rel h)      : (% rel h)
       Aspiration              : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)

8.1.x Humidity Sensor Model    :
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy (% rel h)      : (% rel h)
       Aspiration              : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)

8.2.1 Pressure Sensor Model    : NONE
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy                : (hPa)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)

8.2.x Pressure Sensor Model    :
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy                : (hPa)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)
```

```
8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.1 Radio Interferences     : ANTENNA
       Observed Degradations  : SN RATIO/DATA GAPS
       Effective Dates        : 1998-09-17/2001-05-01
       Additional Information : Harbour antenna transmitting DGPS corrections.
                              : Fault on antenna repaired on 2001-05-01.

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Aberdeen Harbour Board
     Preferred Abbreviation   : (A10)
     Mailing Address          : 16 Regents Quay
```

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                              : Aberdeen AB511SS
                              : UK
     Primary Contact
       Contact Name           : Port Surveyor
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           :
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Additional Information   : (multiple lines)


12.  Responsible Agency (if different from 11.)

     Agency                   : IESSG
     Preferred Abbreviation   : IESSG
     Mailing Address          : University of Nottingham
                              : University Park
                              : Nottingham NG72RD
                              : UK
     Primary Contact
       Contact Name           : Richard Bingley
       Telephone (primary)    : +44 (0)115 9513932
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name           : IESSG Experimental Officers
       Telephone (primary)    : +44 (0)115 9513921
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : iessg@nottingham.ac.uk
     Additional Information   : ABER is operated by the IESSG for the
                              : Proudman Oceanographic Laboratory and
                              : the UK Department for the Environment, Food
                              : and Rural Affairs (DEFRA)


13.  More Information

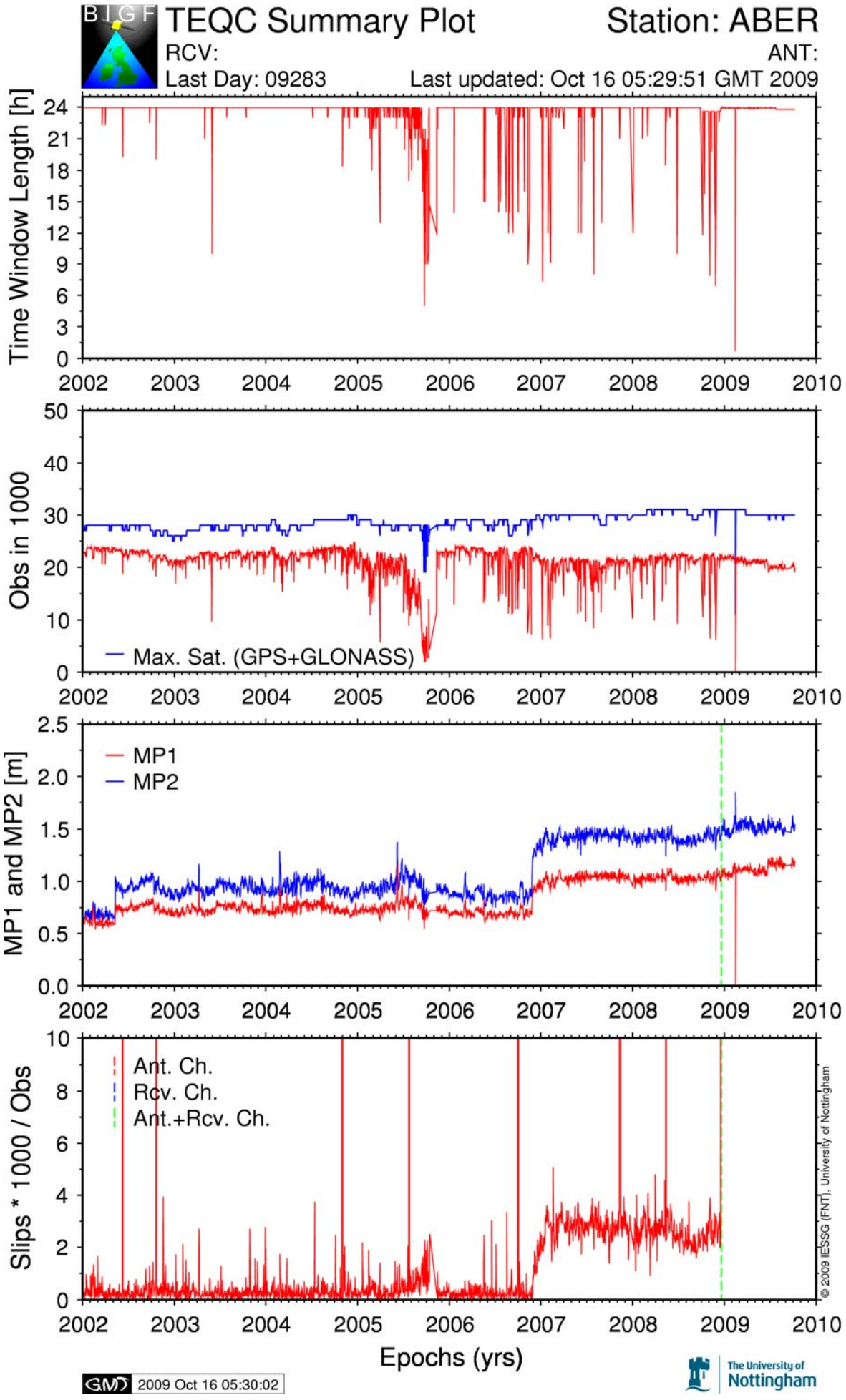
     Primary Data Center      :
     Secondary Data Center    :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map               : Y
       Site Diagram           : Y
       Horizon Mask           : Y
       Monument Description   : Y
       Site Pictures          : Y
     Additional Information   : (multiple lines)
     Antenna Graphics with Dimensions

ASH700936F_C


                       +---------+
                      /     +     \                      <--  0.1280 L2
                     |      +      |                     <--  0.1100 L1
    +-----------------+-------------+------------------+    <--  0.1008 TCR
    |                                                   |
    |                                                   |
    |                                                   |
    |                                                   |
  +-+---------------------------------------------------+-+  <--  0.0378
  +-------------------+-------------+--------------------+  <--  0.0348 BCR
                      |             |
                      |             |
                      +------x------+                      <--  0.0000 BPA=ARP

  <--                      0.3794                      -->


   ARP: Antenna Reference Point
   L1 : L1 Phase Center                  L2 : L2 Phase Center
   TCR: Top of Chokering                 BCR: Bottom of Chokering
```


TEQC Summary Plot
Station: ABER
RCV:
ANT:
Last Day: 09283
Last updated: Oct 16 05:29:51 GMT 2009
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS+GLONASS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
Epochs (yrs)
2009 Oct 16 05:30:02
© 2009 IESSG (FNT), University of Nottingham
The University of Nottingham

Dover

```
     DVTG Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2009-06-05
     Report Type              : UPDATE
     If Update:
      Previous Site Log       : dvtg_20081210.log
      Modified/Added Sections : 1, 2, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7


1.   Site Identification of the GNSS Monument

     Site Name                : Dover Tide Gauge
     Four Character ID        : DVTG
     Monument Inscription     :
     IERS DOMES Number        : 13283M002
     CDP Number               : (A4)
     Monument Description     : STEEL PLATE AND CARBON FIBRE PIPE
       Height of the Monument : 2.0m
       Monument Foundation    : PIER
       Foundation Depth       : (m)
     Marker Description       : TOP OF 40mm DIA THREAD ON STEEL PLATE
     Date Installed           : 1993-10-13T12:00Z
     Geologic Characteristic  : BEDROCK
       Bedrock Type           : SEDIMENTARY (CHALK)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted about 15m from the tide
                              : gauge building, and located on the Prince of
                              : Wales Pier.
                              : The GPS antenna is located on a monument which
                              : consists of a 2m (originally 1.8m) carbon fibre
                              : pipe mounted on a steel plate, which is fixed
                              : to the stone wall of the pier.
                              : The GPS antenna is attached to the carbon fibre
                              : pipe using a 5/8" thread.
                              : The carbon fibre pipe is attached to the steel
                              : plate using a 40 mm diameter thread.
                              : The male part of the 40mm diameter thread is on
                              : the steel plate and has a domed head, which
                              : serves as the survey marker.

2.   Site Location Information

     City or Town             : Dover
     State or Province        : Kent
     Country                  : England
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       : 4011084
       Y coordinate (m)       :   92599
       Z coordinate (m)       : 4941592
       Latitude (N is +)      : +510652.30
       Longitude (E is +)     : +011920.94
       Elevation (m,ellips.)  :      50.1
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 01884
     Firmware Version         : 4J90
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-07-02T14:38Z
     Date Removed             : 1999-07-08T09:31Z
     Temperature Stabiliz.    : NONE
```

```
     Additional Information   : Full receiver serial number is LP 01884.
                              : Operation on site.
                              : Download using HOSE.
                              : Conversion to RINEX using ASRINEXO v2.9.6
                              : (with PR SMOOTH FLAG 0).

3.2  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 01845
     Firmware Version         : 6J00
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-11-05T15:19Z
     Date Removed             : 1999-11-11T11:28Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 01845.
                              : Operation on site.
                              : Download using HOSE.
                              : Conversion to RINEX using ASRINEXO v2.9.6
                              : (with PR SMOOTH FLAG 0).

3.3  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 01845
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 2002-06-13T15:19Z
     Date Removed             : 2002-07-18T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 01845.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00 and
                              : CGHOSE v6.0.00 CGRSCD00.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.4  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 01845
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 2003-02-06T15:19Z
     Date Removed             : 2003-03-09T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 01845.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00 and
                              : CGHOSE v6.0.00 CGRSCD00.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.5  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 10207
     Firmware Version         : CJ00
     Elevation Cutoff Setting : 5
     Date Installed           : 2005-11-24T15:00Z
     Date Removed             : 2007-06-19T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Receiver is an Ashtech Micro-Z.
                              : Full receiver serial number is ZR 2001 0207.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v1.1.00 (2001).
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.6  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 26007
     Firmware Version         : CQ00
     Elevation Cutoff Setting : 5
     Date Installed           : 2007-06-22T00:00Z
     Date Removed             : 2008-12-09T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Receiver is an Ashtech Micro-Z.
                              : Full receiver serial number is UC1 2003 26007.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v1.1.00 (2001).
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).
```

```
3.7  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 26007
     Firmware Version         : CQ00
     Elevation Cutoff Setting : 5
     Date Installed           : 2008-12-10T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : Receiver is an Ashtech Micro-Z.
                              : Full receiver serial number is UC1 2003 26007.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v2.2.00 (Feb 1, 2005).
                              : Conversion to RINEX using TEQC 2008Oct2.

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH700936D_M    SNOW
     Serial Number            : 13145
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   1.8030
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : 1999-07-02T14:38Z
     Date Removed             : 1999-07-08T09:31Z
     Additional Information   : Full antenna serial number is CR 13145.
                              : On original monument consisting of original
                              : (first) bolts, original (first) steel plate
                              : and original (first) carbon fibre pipe.

4.2  Antenna Type             : ASH700936D_M    SNOW
     Serial Number            : 13141
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   1.8030
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : 1999-11-05T15:19Z
     Date Removed             : 1999-11-11T11:28Z
     Additional Information   : Full antenna serial number is CR 13141.
                              : On original monument consisting of original
                              : (first) bolts, original (first) steel plate
                              : and original (first) carbon fibre pipe.

4.3  Antenna Type             : ASH700936D_M    SNOW
     Serial Number            : 13141
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   1.8027
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : 2002-06-13T15:19Z
     Date Removed             : 2002-07-18T23:59Z
     Additional Information   : Full antenna serial number is CR 13141.
                              : On original monument consisting of original
                              : (first) bolts, original (first) steel plate
                              : and original (first) carbon fibre pipe.
```

```
4.4  Antenna Type             : ASH700936D_M    SNOW
     Serial Number            : 13141
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   1.8027
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : 2003-02-06T15:19Z
     Date Removed             : 2003-03-09T23:59Z
     Additional Information   : Full antenna serial number is CR 13141.
                              : On original monument consisting of original
                              : (first) bolts, original (first) steel plate
                              : and original (first) carbon fibre pipe.

4.5  Antenna Type             : ASH701945C_M    SNOW
     Serial Number            : 10215
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   2.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 2005-11-24T15:00Z
     Date Removed             : 2007-10-24T23:59Z
     Additional Information   : Full antenna serial number is CR5 2001 0215.
                              : The monument was re-installed on 2005-11-24
                              : with the same (firt) bolts but with a new (second)
                              : steel plate and a new (second) carbon fibre pipe.
                              : All attempts were made to put the new (second)
                              : steel plate in the same place as the previous
                              : (first) steel plate but local levelling suggests
                              : that the new survey marker may be 1mm higher than
                              : the previous survey marker.
                              : The monument was damaged in a storm some time
                              : shortly after 2007-10-24.

4.6  Antenna Type             : ASH701945C_M    SNOW
     Serial Number            : 10215
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   2.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 2008-01-24T12:30Z
     Date Removed             : 2009-05-08T23:59Z
     Additional Information   : Full antenna serial number is CR5 2001 0215.
                              : The monument was re-installed on 2008-01-24 with
                              : the same (second) carbon fibre piple but with
                              : new (second) bolts and a new (third) steel plate.
                              : The same antenna was put back in place but with a
                              : new 30m antenna cable.
                              : All attempts were made to put the new (third) steel
                              : plate at the same height as the previous (second)
                              : steel plate but local levelling suggests that the
                              : new survey marker may be 2 to 3mm lower than the
                              : previous survey marker and the GPS time series
                              : suggest that the new survey marker is about
                              : 39 to 43mm to the North, 10 to 14mm to the
                              : East and 3 to 5mm below the previous survey
                              : marker.
                              : For long term studies, therefore, it is
                              : advisable to allow for a coordinate offset in
                              : the time series between 2007-10-24 and 2008-01-24.
                              : The monument was damaged in a storm some time
                              : shortly after 2009-05-08.

4.7  Antenna Type             : ASH701945C_M    SNOW
     Serial Number            : 10215
```

```
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   2.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 2009-06-06T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR5 2001 0215.
                              : The monument was re-installed on 2009-06-05
                              : with the same (second) bolts and the same
                              : (second) carbon fibre pipe but with a new (fourth)
                              : steel plate.
                              : The same antenna was put back in place with the
                              : same 30m antenna cable.
                              : All attempts were made to put the new (fourth) steel
                              : plate at the same height as the previous (third)
                              : steel plate but local levelling suggests that the
                              : new survey marker may be 1mm higher than the
                              : previous survey marker.
                              : For long term studies, therefore, it is
                              : advisable to allow for a coordinate offset in
                              : the time series between 2009-05-08 and 2009-06-06.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties

5.x  Tied Marker Name         :
     Tied Marker Usage        : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number   : (A4)
     Tied Marker DOMES Number : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                 : (m)
       dy (m)                 : (m)
       dz (m)                 : (m)
     Accuracy (mm)            : (mm)
     Survey method            : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured            : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


6.   Frequency Standard

6.1  Standard Type            : INTERNAL
       Input Frequency        : (if external)
       Effective Dates        : 1999-07-02/CCYY-MM-DD
       Notes                  : (multiple lines)

6.x  Standard Type            : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency        : (if external)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


7.   Collocation Information

7.x  Instrumentation Type     : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                 : (PERMANENT/MOBILE)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)
```

```
8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.1.x Humidity Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.1 Pressure Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.x Pressure Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
```

```
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Port of Dover
     Preferred Abbreviation   :
     Mailing Address          : Harbour House
                              : Dover
                              : Kent CT17 9BU
                              : UK
     Primary Contact
       Contact Name           : Marine Services Manager
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           :
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Additional Information   : (multiple lines)

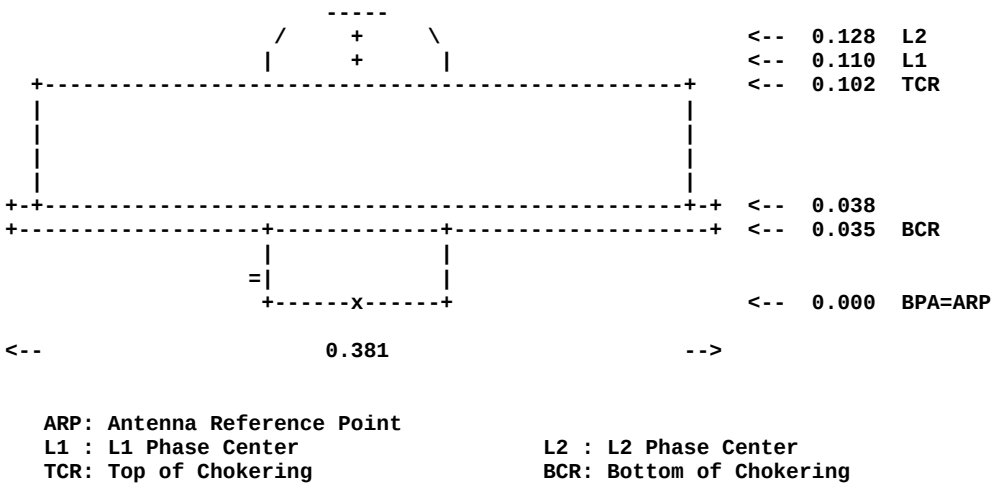

12.  Responsible Agency (if different from 11.)

     Agency                   : IESSG
     Preferred Abbreviation   : IESSG
     Mailing Address          : University of Nottingham
                              : University Park
                              : Nottingham NG72RD
                              : UK
     Primary Contact
       Contact Name           : Richard Bingley
       Telephone (primary)    : +44 (0)115 9513932
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name           : IESSG Experimental Officers
       Telephone (primary)    : +44 (0)115 9513921
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : iessg@nottingham.ac.uk
     Additional Information   : DVTG is operated by the IESSG for the
                              : Proudman Oceanographic Laboratory and
                              : the UK Department for the Environment, Food
                              : and Rural Affairs (DEFRA)
```

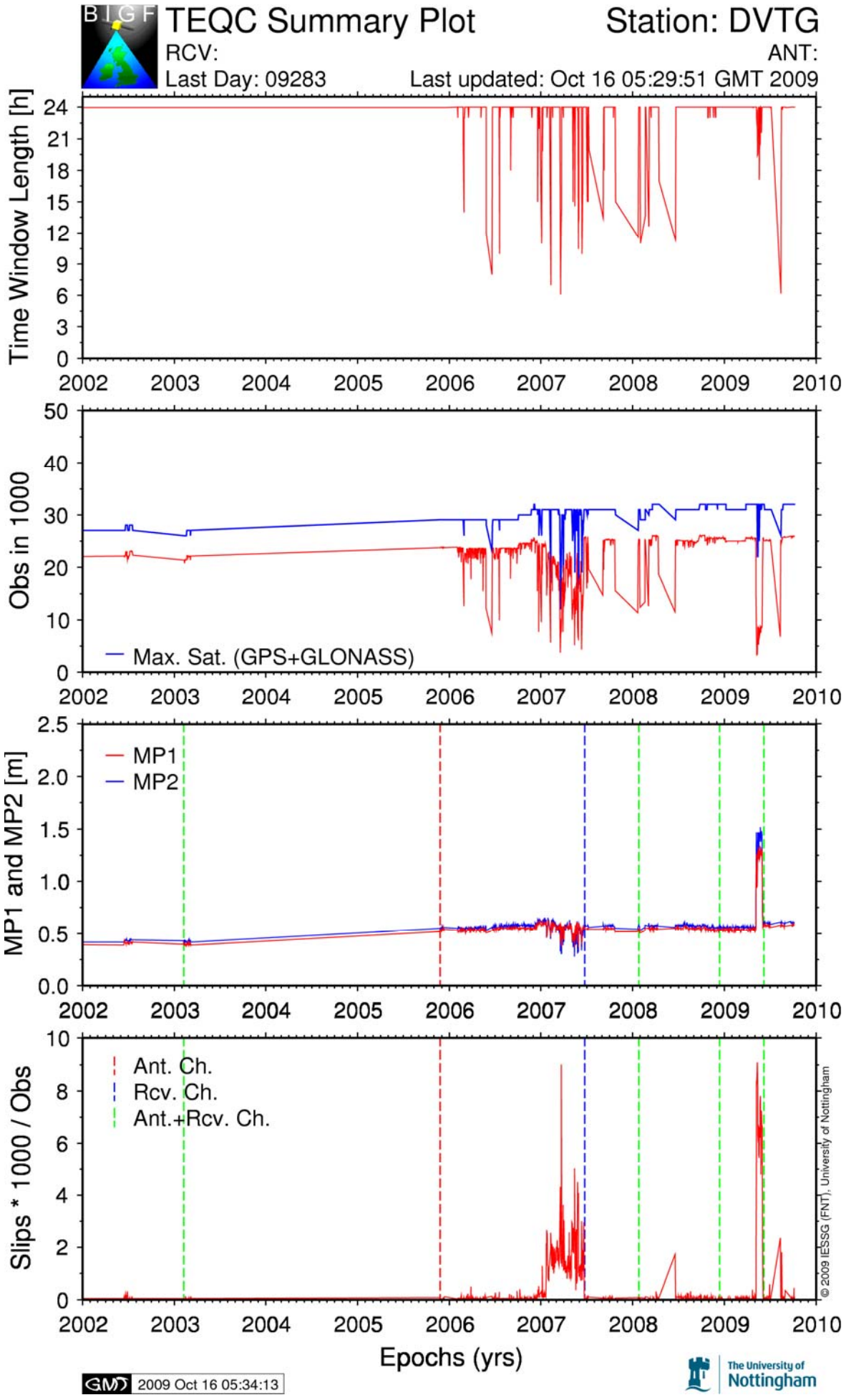
13. More Information

```
     Primary Data Center      :
     Secondary Data Center    :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map               : Y
       Site Diagram           : Y
       Horizon Mask           : Y
       Monument Description   : Y
       Site Pictures          : Y
     Additional Information   : (multiple lines)
     Antenna Graphics with Dimensions
```

ASH701945C_M




```
   ARP: Antenna Reference Point
   L1 : L1 Phase Center                L2 : L2 Phase Center
   TCR: Top of Chokering               BCR: Bottom of Chokering
```


TEQC Summary Plot
Station: DVTG
RCV:
ANT:
Last Day: 09283
Last updated: Oct 16 05:29:51 GMT 2009
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS+GLONASS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
Epochs (yrs)
2009 Oct 16 05:34:13
© 2009 IESSG (FNT), University of Nottingham
The University of Nottingham

Liverpool

```
     LIVE Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2008-12-17
     Report Type              : UPDATE
     If Update:
      Previous Site Log       : live_20050315.log
      Modified/Added Sections : 3.2, 3.3


1.   Site Identification of the GNSS Monument

     Site Name                : Liverpool Tide Gauge
     Four Character ID        : LIVE
     Monument Inscription     :
     IERS DOMES Number        : 13233M001
     CDP Number               : (A4)
     Monument Description     : STEEL PLATE AND STEEL PIPE
       Height of the Monument : 0.07m
       Monument Foundation    : CONCRETE PILLAR
       Foundation Depth       : (m)
     Marker Description       : TOP OF 40mm DIA THREAD ON STEEL PLATE
     Date Installed           : 1999-02-03T12:00Z
     Geologic Characteristic  : ALLUVIUM
       Bedrock Type           : SEDIMENTARY (SANDSTONE)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted on a 5m high
                              : concrete pillar which forms part of a
                              : wind-break and is about 5m from the
                              : tide gauge building, which is located
                              : on a stone pier, with piled foundations.
                              : The GPS antenna is located on the monument
                              : which consists of a 0.07m steel pipe mounted on
                              : a steel plate.
                              : The GPS antenna is attached to the steel pipe
                              : using a 5/8" thread.
                              : The steel pipe is attached to the steel plate
                              : using a 40 mm diameter thread.
                              : The male part of the 40mm diameter thread is on
                              : the steel plate and has a domed head, which
                              : serves as the survey marker.


2.   Site Location Information

     City or Town             : Liverpool
     State or Province        : Merseyside
     Country                  : England
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       : 3801351.8
       Y coordinate (m)       : -200433.1
       Z coordinate (m)       : 5100558.2
       Latitude (N is +)      : +532658.90
       Longitude (E is +)     : -0030105.62
       Elevation (m,ellips.)  : 66.0
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 03145
     Firmware Version         : 1F50
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-02-04T00:00Z
```

```
     Date Removed             : 1999-08-15T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 03145.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRS1F50 and
                              : CGHOSE v5.4.00 CGRS1F50.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.2  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 03145
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-08-17T00:00Z
     Date Removed             : 2008-12-16T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 03145.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00 and
                              : CGHOSE v6.0.00 CGRSCD00
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0)

3.3  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 03145
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 2008-12-17T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 03145.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00.
                              : Conversion to RINEX using TEQC 2008Oct2.

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH700936F_C    SNOW
     Serial Number            : 14774
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0310
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 1999-02-04T00:00Z
     Date Removed             : 2005-02-22T12:00Z
     Additional Information   : Full antenna serial number is CR 14774.

4.2  Antenna Type             : ASH700936D_M    SNOW
     Serial Number            : 13141
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0310
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 2005-03-15T09:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR 13141.
                                The antenna cable was not replaced.
```

```
4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties

5.x  Tied Marker Name         :
     Tied Marker Usage        : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number   : (A4)
     Tied Marker DOMES Number : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                 : (m)
       dy (m)                 : (m)
       dz (m)                 : (m)
     Accuracy (mm)            : (mm)
     Survey method            : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured            : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


6.   Frequency Standard

6.1  Standard Type            : INTERNAL
       Input Frequency        : (if external)
       Effective Dates        : 1999-02-04/CCYY-MM-DD
       Notes                  : (multiple lines)

6.x  Standard Type            : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency        : (if external)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


7.   Collocation Information

7.x  Instrumentation Type     : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                 : (PERMANENT/MOBILE)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.1.x Humidity Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.1 Pressure Sensor Model   : NONE
       Manufacturer           :
```

```
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.x Pressure Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.1 Multipath Sources       : SALT WATER CORROSION OF ANTENNA
       Effective Dates        : 2003-09-15/2005-02-22
       Additional Information : Apparent increase in MP1/2 values observed
                                and physical movement of antenna caused
                                by corrosion causing the pre-amp to detach
                                from the monument

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
```

```
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                    : (CCYY-MM-DDThh:mmZ)
     Event                   : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                    : (CCYY-MM-DDThh:mmZ)
     Event                   : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                  : Mersey Docks and Harbour Company
     Preferred Abbreviation  : (A10)
     Mailing Address         : Maritime Centre
                             : Port of Liverpool
                             : Merseyside L21 1LA
                             : UK
     Primary Contact
       Contact Name          : Marine Operations Manager
       Telephone (primary)   :
       Telephone (secondary) :
       Fax                   :
       E-mail                :
     Secondary Contact
       Contact Name          :
       Telephone (primary)   :
       Telephone (secondary) :
       Fax                   :
       E-mail                :
     Additional Information  : (multiple lines)

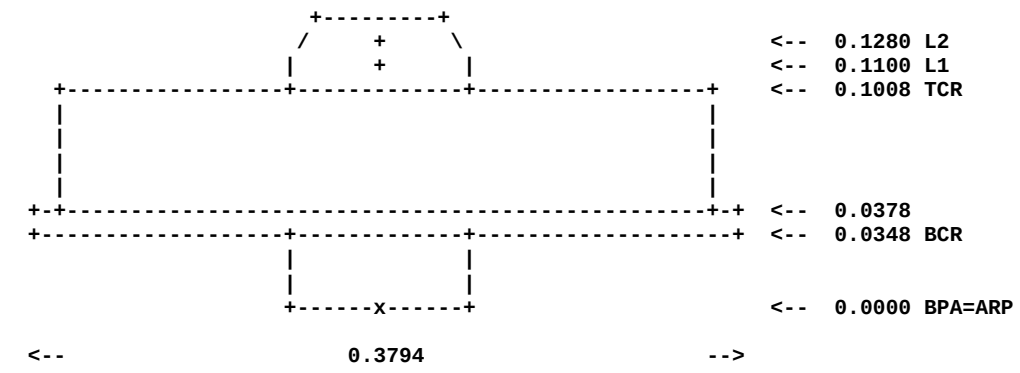

12.  Responsible Agency (if different from 11.)

     Agency                  : IESSG
     Preferred Abbreviation  : IESSG
     Mailing Address         : University of Nottingham
                             : University Park
                             : Nottingham NG72RD
                             : UK
     Primary Contact
       Contact Name          : Richard Bingley
       Telephone (primary)   : +44 (0)115 9513932
       Telephone (secondary) : +44 (0)115 9513880
       Fax                   : +44 (0)115 9513881
       E-mail                : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name          : IESSG Experimental Officers
       Telephone (primary)   : +44 (0)115 9513921
       Telephone (secondary) : +44 (0)115 9513880
       Fax                   : +44 (0)115 9513881
       E-mail                : iessg@nottingham.ac.uk
     Additional Information  : LIVE is operated by the IESSG for the
                             : Proudman Oceanographic Laboratory and
                             : the UK Department for the Environment, Food
                             : and Rural Affairs (DEFRA)

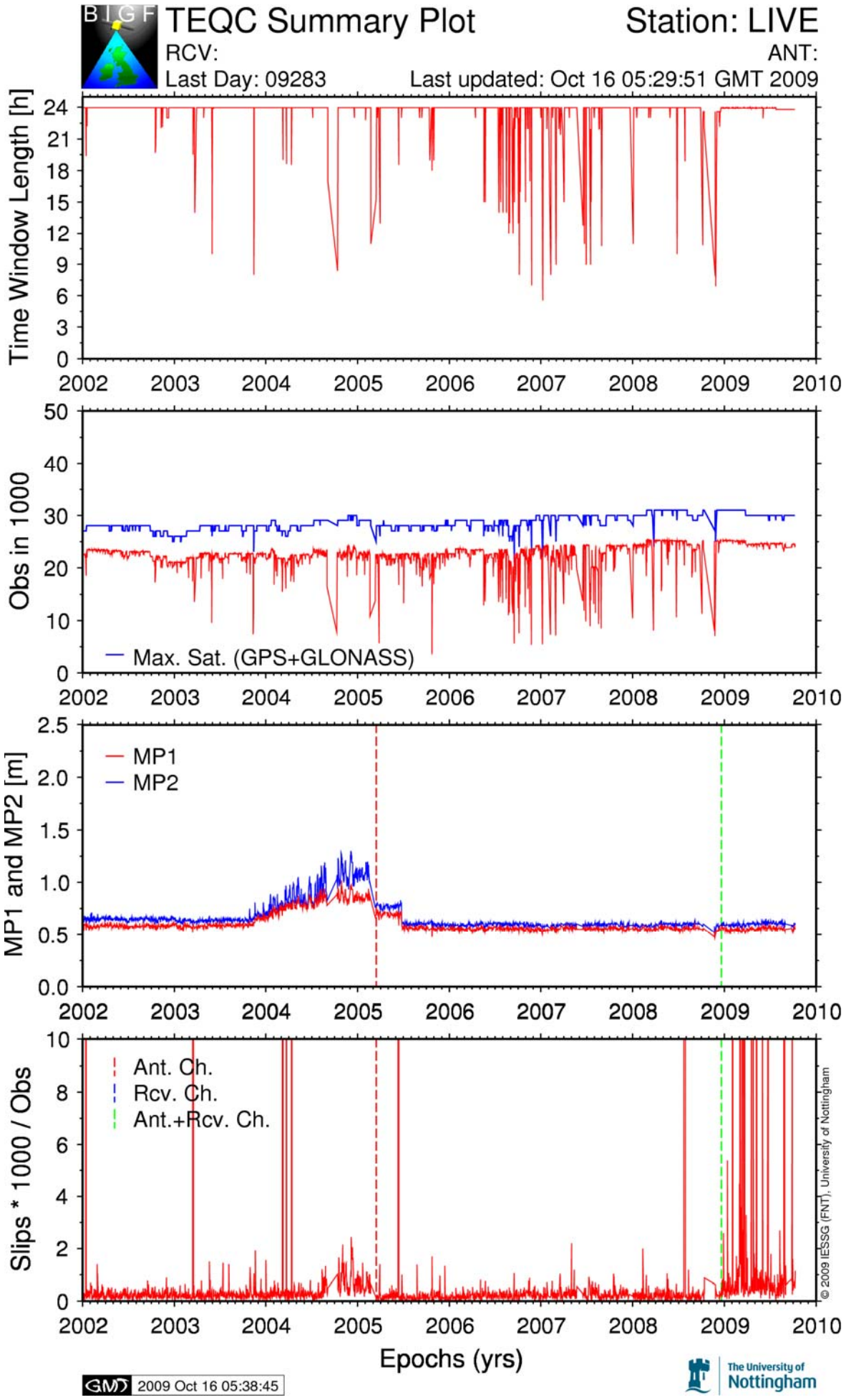

13.  More Information

     Primary Data Center     :
     Secondary Data Center   :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map              : Y
       Site Diagram          : Y
       Horizon Mask          : Y
       Monument Description  : Y
       Site Pictures         : Y
     Additional Information  : (multiple lines)
     Antenna Graphics with Dimensions
```

ASH700936F_C



ARP: Antenna Reference Point
L1 : L1 Phase Center **L2 : L2 Phase Center**
TCR: Top of Chokering **BCR: Bottom of Chokering**


TEQC Summary Plot
Station: LIVE
RCV:
ANT:
Last Day: 09283
Last updated: Oct 16 05:29:51 GMT 2009
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS+GLONASS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
Epochs (yrs)
2009 Oct 16 05:38:45
© 2009 IESSG (FNT), University of Nottingham
The University of Nottingham

Lowestoft

```
     LOWE Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2008-12-17
     Report Type              : UPDATE
     If Update:
      Previous Site Log       : lowe_20011212.log
      Modified/Added Sections : 3.2, 3.3


1.   Site Identification of the GNSS Monument

     Site Name                : Lowestoft Tide Gauge
     Four Character ID        : LOWE
     Monument Inscription     :
     IERS DOMES Number        : 13232M001
     CDP Number               : (A4)
     Monument Description     : STEEL BRACKET AND CARBON FIBRE PIPE
       Height of the Monument : 0.80m
       Monument Foundation    : BUILDING
       Foundation Depth       : (m)
     Marker Description       : TOP OF 40mm DIA THREAD ON STEEL BRACKET
     Date Installed           : 1999-02-12T12:00Z
     Geologic Characteristic  : ALLUVIUM
       Bedrock Type           : SEDIMENTARY (CRAG)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted on the side
                              : wall of a two storey brick office
                              : building, adjacent to the tide gauge
                              : building, so that the antenna is raised
                              : above the roof
                              : The GPS antenna is located on the monument
                              : which consists of a 0.8m carbon fibre pipe
                              : mounted on a steel bracket.
                              : The GPS antenna is attached to the carbon fibre
                              : pipe using a 5/8" thread.
                              : The carbon fibre pipe is attached to the steel
                              : bracket using a 40 mm diameter thread.
                              : The male part of the 40mm diameter thread is on
                              : the steel bracket and has a domed head, which
                              : serves as the survey marker.


2.   Site Location Information

     City or Town             : Lowestoft
     State or Province        : Suffolk
     Country                  : England
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       : 3891549.7
       Y coordinate (m)       : 118910.8
       Z coordinate (m)       : 5035092.8
       Latitude (N is +)      : +522823.60
       Longitude (E is +)     : +0014500.70
       Elevation (m,ellips.)  : 53.8
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 03141
     Firmware Version         : 1F50
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-02-13T00:00Z
```

```
     Date Removed             : 1999-08-15T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 03141.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRS1F50 and
                              : CGHOSE v5.4.00 CGRS1F50.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.2  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 03141
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-08-17T00:00Z
     Date Removed             : 2008-12-16T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : The full receiver serial number is LP 03141.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00 and
                              : CGHOSE v6.0.00 CGRSCD00.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.3  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 03141
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 2008-12-17T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : The full receiver serial number is LP 03141.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00.
                              : Conversion to RINEX using TEQC 2008Oct2.

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH700936F_C    SNOW
     Serial Number            : 14769
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.7620
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 1999-02-13T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR 14769.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)
```

```
5.   Surveyed Local Ties

5.x  Tied Marker Name          :
     Tied Marker Usage         : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number    : (A4)
     Tied Marker DOMES Number  : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                  : (m)
       dy (m)                  : (m)
       dz (m)                  : (m)
     Accuracy (mm)             : (mm)
     Survey method             : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured             : (CCYY-MM-DDThh:mmZ)
     Additional Information    : (multiple lines)


6.   Frequency Standard

6.1  Standard Type             : INTERNAL
       Input Frequency         : (if external)
       Effective Dates         : 1999-02-13/CCYY-MM-DD
       Notes                   : (multiple lines)

6.x  Standard Type             : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency         : (if external)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)


7.   Collocation Information

7.x  Instrumentation Type      : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                  : (PERMANENT/MOBILE)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model    : NONE
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy (% rel h)      : (% rel h)
       Aspiration              : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)

8.1.x Humidity Sensor Model    :
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy (% rel h)      : (% rel h)
       Aspiration              : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)

8.2.1 Pressure Sensor Model    : NONE
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy                : (hPa)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)

8.2.x Pressure Sensor Model    :
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy                : (hPa)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
```

```
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Associated British Ports
     Preferred Abbreviation   : (A10)
     Mailing Address          : Port House
                              : Lowestoft
                              : Suffolk NR32 1BG
                              : UK
     Primary Contact
       Contact Name           : Harbour Master
```

```
      Telephone (primary)    :
      Telephone (secondary)  :
      Fax                    :
      E-mail                 :
    Secondary Contact
      Contact Name           :
      Telephone (primary)    :
      Telephone (secondary)  :
      Fax                    :
      E-mail                 :
    Additional Information   : (multiple lines)


12.  Responsible Agency (if different from 11.)

    Agency                   : IESSG
    Preferred Abbreviation   : IESSG
    Mailing Address          : University of Nottingham
                             : University Park
                             : Nottingham NG72RD
                             : UK
    Primary Contact
      Contact Name           : Richard Bingley
      Telephone (primary)    : +44 (0)115 9513932
      Telephone (secondary)  : +44 (0)115 9513880
      Fax                    : +44 (0)115 9513881
      E-mail                 : richard.bingley@nottingham.ac.uk
    Secondary Contact
      Contact Name           : IESSG Experimental Officers
      Telephone (primary)    : +44 (0)115 9513921
      Telephone (secondary)  : +44 (0)115 9513880
      Fax                    : +44 (0)115 9513881
      E-mail                 : iessg@nottingham.ac.uk
    Additional Information   : LOWE is operated by the IESSG for the
                             : Proudman Oceanographic Laboratory and
                             : the UK Department for the Environment, Food
                             : and Rural Affairs (DEFRA)


13.  More Information

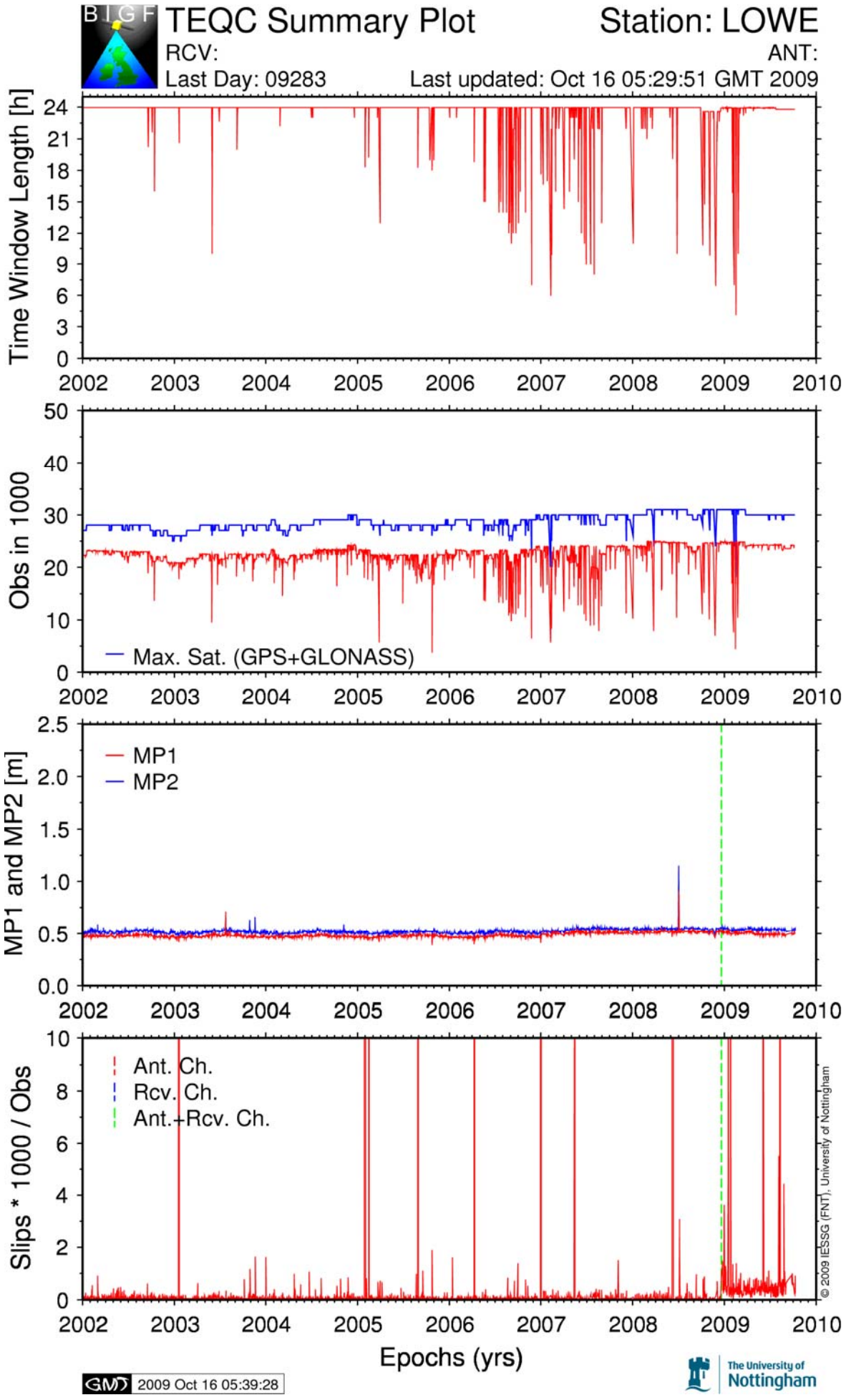
    Primary Data Center      :
    Secondary Data Center    :
    URL for More Information : http://www.bigf.ac.uk
    Hardcopy on File
      Site Map               : Y
      Site Diagram           : Y
      Horizon Mask           : Y
      Monument Description   : Y
      Site Pictures          : Y
    Additional Information   : (multiple lines)
    Antenna Graphics with Dimensions

ASH700936F_C


                      +---------+
                     /     +     \                      <--  0.1280 L2
                    |      +      |                     <--  0.1100 L1
    +-----------------+------------+-----------------+   <--  0.1008 TCR
    |                                                 |
    |                                                 |
    |                                                 |
    |                                                 |
  +-+-------------------------------------------------+-+ <--  0.0378
  +-------------------+------------+--------------------+ <--  0.0348 BCR
                      |            |
                      |            |
                      +------x-----+                     <--  0.0000 BPA=ARP

  <--                     0.3794                     -->


   ARP: Antenna Reference Point
   L1 : L1 Phase Center                  L2 : L2 Phase Center
   TCR: Top of Chokering                 BCR: Bottom of Chokering
```


TEQC Summary Plot
Station: LOWE
RCV:
ANT:
Last Day: 09283
Last updated: Oct 16 05:29:51 GMT 2009
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS+GLONASS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
Epochs (yrs)
2009 Oct 16 05:39:28
© 2009 IESSG (FNT), University of Nottingham
The University of Nottingham

Lerwick

```
     LWTG Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2009-06-04
     Report Type              : UPDATE
     If Update:
      Previous Site Log       : lwtg_20081210.log
      Modified/Added Sections : 1, 2


1.   Site Identification of the GNSS Monument

     Site Name                : Lerwick Tide Gauge
     Four Character ID        : LWTG
     Monument Inscription     :
     IERS DOMES Number        : 19159M001
     CDP Number               : (A4)
     Monument Description     : STEEL PLATE AND CARBON FIBRE PIPE
       Height of the Monument : 3.0m
       Monument Foundation    : PIER/BREAKWATER
       Foundation Depth       : (m)
     Marker Description       : TOP OF 40mm DIA THREAD ON STEEL PLATE
     Date Installed           : 2005-08-17T15:00Z
     Geologic Characteristic  : BEDROCK
       Bedrock Type           : SEDIMENTARY (SANDSTONE)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted adjacent to the
                              : tide gauge building, which is located on a
                              : stone pier/breakwater, built in 1913.
                              : The GPS antenna is located on the monument
                              : which consists of a 3m carbon fibre pipe mounted
                              : on a steel plate, which is fixed to a concrete
                              : plinth on top of the pier/breakwater stone wall.
                              : The GPS antenna is attached to the carbon fibre
                              : pipe using a 5/8" thread.
                              : The carbon fibre pipe is attached to the steel
                              : plate using a 40 mm diameter thread.
                              : The male part of the 40mm diameter thread is on
                              : the steel plate and has a domed head, which
                              : serves as the survey marker.


2.   Site Location Information

     City or Town             : Lerwick
     State or Province        : Shetland
     Country                  : Scotland
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       : 3181624
       Y coordinate (m)       :  -63327
       Z coordinate (m)       : 5509084
       Latitude (N is +)      : +600914.60
       Longitude (E is +)     : -010824.97
       Elevation (m,ellips.)  :      51.6
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 13838
     Firmware Version         : CJ00
     Elevation Cutoff Setting : 5
     Date Installed           : 2005-08-19T00:00Z
     Date Removed             : 2006-09-19T23:59Z
```

```
     Temperature Stabiliz.    : NONE
     Additional Information   : Receiver is an Ashtech Micro-Z.
                              : Full receiver serial number is ZR2 2001 3838.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v1.1.00 (2001).
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.2  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 13833
     Firmware Version         : CK00
     Elevation Cutoff Setting : 5
     Date Installed           : 2006-10-10T11:00Z
     Date Removed             : 2008-12-09T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Receiver is an Ashtech Micro-Z.
                              : Full receiver serial number is ZR2 2001 3833.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v1.1.00 (2001).
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.3  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 13833
     Firmware Version         : CK00
     Elevation Cutoff Setting : 5
     Date Installed           : 2008-12-10T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : Receiver is an Ashtech Micro-Z.
                              : Full receiver serial number is ZR2 2001 3833.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v2.2.00 (Feb 1, 2005).
                              : Conversion to RINEX using TEQC 2008Oct2.

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH701945C_M    SNOW
     Serial Number            : 14803
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   3.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 2005-08-19T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR5 2001 4803.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)
```

```
5.   Surveyed Local Ties

5.x  Tied Marker Name          :
     Tied Marker Usage         : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number    : (A4)
     Tied Marker DOMES Number  : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                  : (m)
       dy (m)                  : (m)
       dz (m)                  : (m)
     Accuracy (mm)             : (mm)
     Survey method             : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured             : (CCYY-MM-DDThh:mmZ)
     Additional Information    : (multiple lines)


6.   Frequency Standard

6.1  Standard Type             : INTERNAL
       Input Frequency         : (if external)
       Effective Dates         : 2005-08-19/CCYY-MM-DD
       Notes                   : (multiple lines)

6.x  Standard Type             : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency         : (if external)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)


7.   Collocation Information

7.x  Instrumentation Type      : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                  : (PERMANENT/MOBILE)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model    : NONE
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy (% rel h)      : (% rel h)
       Aspiration              : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)

8.1.x Humidity Sensor Model    :
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy (% rel h)      : (% rel h)
       Aspiration              : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)

8.2.1 Pressure Sensor Model    : NONE
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy                : (hPa)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)

8.2.x Pressure Sensor Model    :
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy                : (hPa)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
```

```
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Lerwick Port Authority
     Preferred Abbreviation   :
     Mailing Address          : Albert Building
                              : Lerwick
                              : Shetland ZE1 0LL
                              : UK
     Primary Contact
       Contact Name           : Harbour Master
```

```
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           :
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Additional Information   : (multiple lines)


12.  Responsible Agency (if different from 11.)

     Agency                   : IESSG
     Preferred Abbreviation   : IESSG
     Mailing Address          : University of Nottingham
                              : University Park
                              : Nottingham NG72RD
                              : UK
     Primary Contact
       Contact Name           : Richard Bingley
       Telephone (primary)    : +44 (0)115 9513932
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name           : IESSG Experimental Officers
       Telephone (primary)    : +44 (0)115 9513921
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : iessg@nottingham.ac.uk
     Additional Information   : LWTG is operated by the IESSG for the
                              : Proudman Oceanographic Laboratory and
                              : the UK Department for the Environment, Food
                              : and Rural Affairs (DEFRA)


13.  More Information

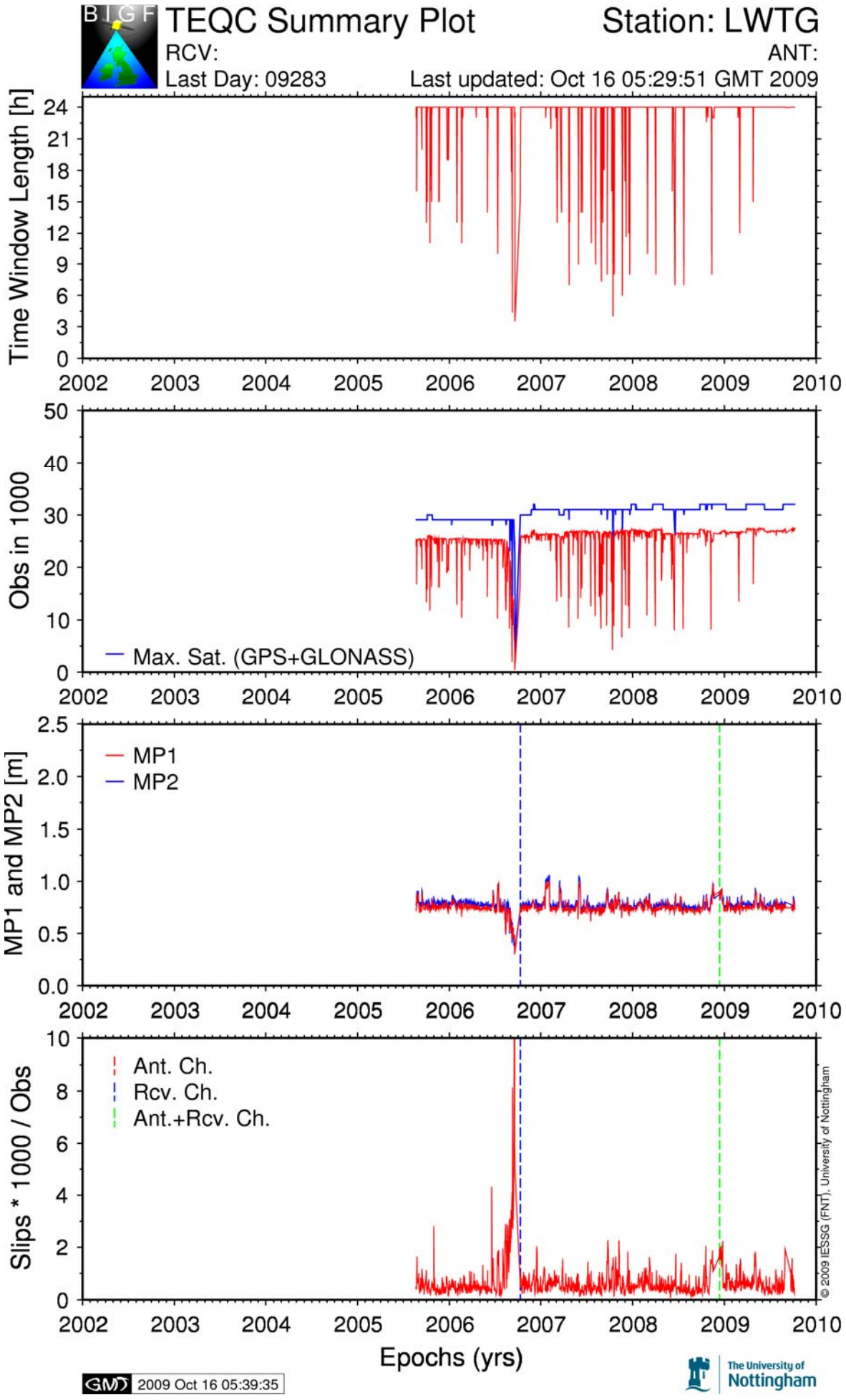
     Primary Data Center      :
     Secondary Data Center    :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map               : Y
       Site Diagram           : Y
       Horizon Mask           : Y
       Monument Description   : Y
       Site Pictures          : Y
     Additional Information   : (multiple lines)
     Antenna Graphics with Dimensions

ASH701945C_M

                      -----
                    /     +     \                      <--  0.128  L2
                   |      +      |                     <--  0.110  L1
  +------------------------------------------------+    <--  0.102  TCR
  |                                                |
  |                                                |
  |                                                |
  |                                                |
+-+------------------------------------------------+-+  <--  0.038
+------------------+-------------+------------------+  <--  0.035  BCR
                   |             |
                  =|             |
                   +------x------+                     <--  0.000  BPA=ARP

<--                    0.381                      -->


   ARP: Antenna Reference Point
   L1 : L1 Phase Center                 L2 : L2 Phase Center
   TCR: Top of Chokering                BCR: Bottom of Chokering
```


TEQC Summary Plot
Station: LWTG
RCV:
ANT:
Last Day: 09283
Last updated: Oct 16 05:29:51 GMT 2009
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS+GLONASS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
2002 2003 2004 2005 2006 2007 2008 2009 2010
Epochs (yrs)
GMT 2009 Oct 16 05:39:35
© 2009 IESSG (FNT), University of Nottingham
The University of Nottingham

Newlyn

```
     NEWL Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2009-08-10
     Report Type              : UPDATE
     If Update:
      Previous Site Log       : newl_20090604.log
      Modified/Added Sections : 3.3, 3.4


1.   Site Identification of the GNSS Monument

     Site Name                : Newlyn Tide Gauge
     Four Character ID        : NEWL
     Monument Inscription     :
     IERS DOMES Number        : 13273M103
     CDP Number               : (A4)
     Monument Description     : STEEL PLATE AND CARBON FIBRE PIPE
       Height of the Monument : 3.0m
       Monument Foundation    : LIGHTHOUSE
       Foundation Depth       : (m)
     Marker Description       : TOP OF 40mm DIA THREAD ON STEEL PLATE
     Date Installed           : 1998-09-29T12:00Z
     Geologic Characteristic  : BEDROCK
       Bedrock Type           : SEDIMENTARY (SANDSTONE)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted on the
                              : observation platform of a steel
                              : lighthouse adjacent to the tide gauge
                              : building, which is located at the end
                              : of a stone pier, which is founded
                              : on the Sandstone bedrock
                              : The GPS antenna is located on the monument
                              : which consists of a 3m carbon fibre pipe mounted
                              : on a steel plate, which is fixed to the
                              : observation platform.
                              : The GPS antenna is attached to the carbon fibre
                              : pipe using a 5/8" thread.
                              : The carbon fibre pipe is attached to the steel
                              : plate using a 40 mm diameter thread.
                              : The male part of the 40mm diameter thread is on
                              : the steel plate and has a domed head, which
                              : serves as the survey marker.


2.   Site Location Information

     City or Town             : Newlyn
     State or Province        : Cornwall
     Country                  : England
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       : 4079954.1
       Y coordinate (m)       : -395930.4
       Z coordinate (m)       : 4870196.8
       Latitude (N is +)      : +500610.90
       Longitude (E is +)     : -0053234.04
       Elevation (m,ellips.)  : 64.5
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 02964
     Firmware Version         : 1F50
```

```
     Elevation Cutoff Setting : 5
     Date Installed           : 1998-09-30T00:00Z
     Date Removed             : 1999-08-15T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 02964.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRS1F50 and
                              : CGHOSE v5.4.00 CGRS1F50
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0)

3.2  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 02964
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-08-17T00:00Z
     Date Removed             : 2008-12-16T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 02964.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00 and
                              : CGHOSE v6.0.00 CGRSCD00.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.3  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 02964
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 2008-12-17T00:00Z
     Date Removed             : 2009-07-24T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 02964.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00.
                              : Conversion to RINEX using TEQC 2008Oct2.

3.4  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 10206
     Firmware Version         : CK00
     Elevation Cutoff Setting : 5
     Date Installed           : 2009-08-07T12:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is ZR 2001 0206.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v2.2.00 (Feb 1, 2005).
                              : Conversion to RINEX using TEQC2008Oct2.

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH700936D_M    SNOW
     Serial Number            : 15402
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   2.9650
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 1998-09-30T00:00Z
     Date Removed             : 2001-01-17T23:59Z
     Additional Information   : Full antenna serial number is CR 15042.
                              : Antenna cable damaged in 2001-01
```

```
4.2  Antenna Type             : ASH700936D_M    SNOW
     Serial Number            : 15402
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   2.9650
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 2001-02-09T00:00Z
     Date Removed             : 2008-05-16T23:59Z
     Additional Information   : Full antenna serial number is CR 15042.
                              : New antenna cable installed on 2001-02-08.

4.3  Antenna Type             : ASH700936D_M    SNOW
     Serial Number            : 15402
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   2.9650
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 2008-05-17T00:00Z
     Date Removed             : 2008-05-28T23:59Z
     Additional Information   : Full antenna serial number is CR 15042.
                              : Monument location and stability were affected
                              : by scaffolding put in place during repair
                              : work to the lighthouse.
                              : The scaffolding was put in place on 2008-05-17
                              : and adjusted on 2008-05-28, in an attempt
                              : for it to have less effect on the monument.
                              : It is advisable, therefore, not to use data
                              : from this period.

4.4  Antenna Type             : ASH700936D_M    SNOW
     Serial Number            : 15402
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   2.9650
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 2008-05-29T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR 15042.
                              : As a result of the repair work to the
                              : lighthouse, the GPS time series suggest that
                              : the survey marker was displaced by about
                              : 6 to 9mm to the South, 2 to 3mm to the
                              : West and 3mm down from its previous location.
                              : For long term studies, it is advisable to
                              : allow for a coordinate offset in the time
                              : series between 2008-05-16 and 2008-05-29.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties
```

```
5.x  Tied Marker Name          :
     Tied Marker Usage         : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number    : (A4)
     Tied Marker DOMES Number  : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                  : (m)
       dy (m)                  : (m)
       dz (m)                  : (m)
     Accuracy (mm)             : (mm)
     Survey method             : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured             : (CCYY-MM-DDThh:mmZ)
     Additional Information    : (multiple lines)


6.   Frequency Standard

6.1  Standard Type             : INTERNAL
       Input Frequency         : (if external)
       Effective Dates         : 1998-09-30/CCYY-MM-DD
       Notes                   : (multiple lines)

6.x  Standard Type             : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency         : (if external)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)


7.   Collocation Information

7.x  Instrumentation Type      : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                  : (PERMANENT/MOBILE)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model    : NONE
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy (% rel h)      : (% rel h)
       Aspiration              : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)

8.1.x Humidity Sensor Model    :
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy (% rel h)      : (% rel h)
       Aspiration              : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)

8.2.1 Pressure Sensor Model    : NONE
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy                : (hPa)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)

8.2.x Pressure Sensor Model    :
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy                : (hPa)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)
```

```
8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Newlyn Pier and Harbour Commissioners
     Preferred Abbreviation   : NPHC
     Mailing Address          : Newlyn
                              : Penzance
                              : Cornwall
                              : UK

     Primary Contact
       Contact Name           : Andrew Munson (Harbour Master)
       Telephone (primary)    :
```

```
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           : Richard Turner (Tide Gauge)
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Additional Information   : (multiple lines)


12.  Responsible Agency (if different from 11.)

     Agency                   : IESSG
     Preferred Abbreviation   : IESSG
     Mailing Address          : University of Nottingham
                              : University Park
                              : Nottingham NG72RD
                              : UK
     Primary Contact
       Contact Name           : Richard Bingley
       Telephone (primary)    : +44 (0)115 9513932
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name           : IESSG Experimental Officers
       Telephone (primary)    : +44 (0)115 9513921
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : iessg@nottingham.ac.uk
     Additional Information   : NEWL is operated by the IESSG for the
                              : Proudman Oceanographic Laboratory and
                              : the UK Department of Environment, Flooding
                              : and Rural Affairs (DEFRA)


13.  More Information

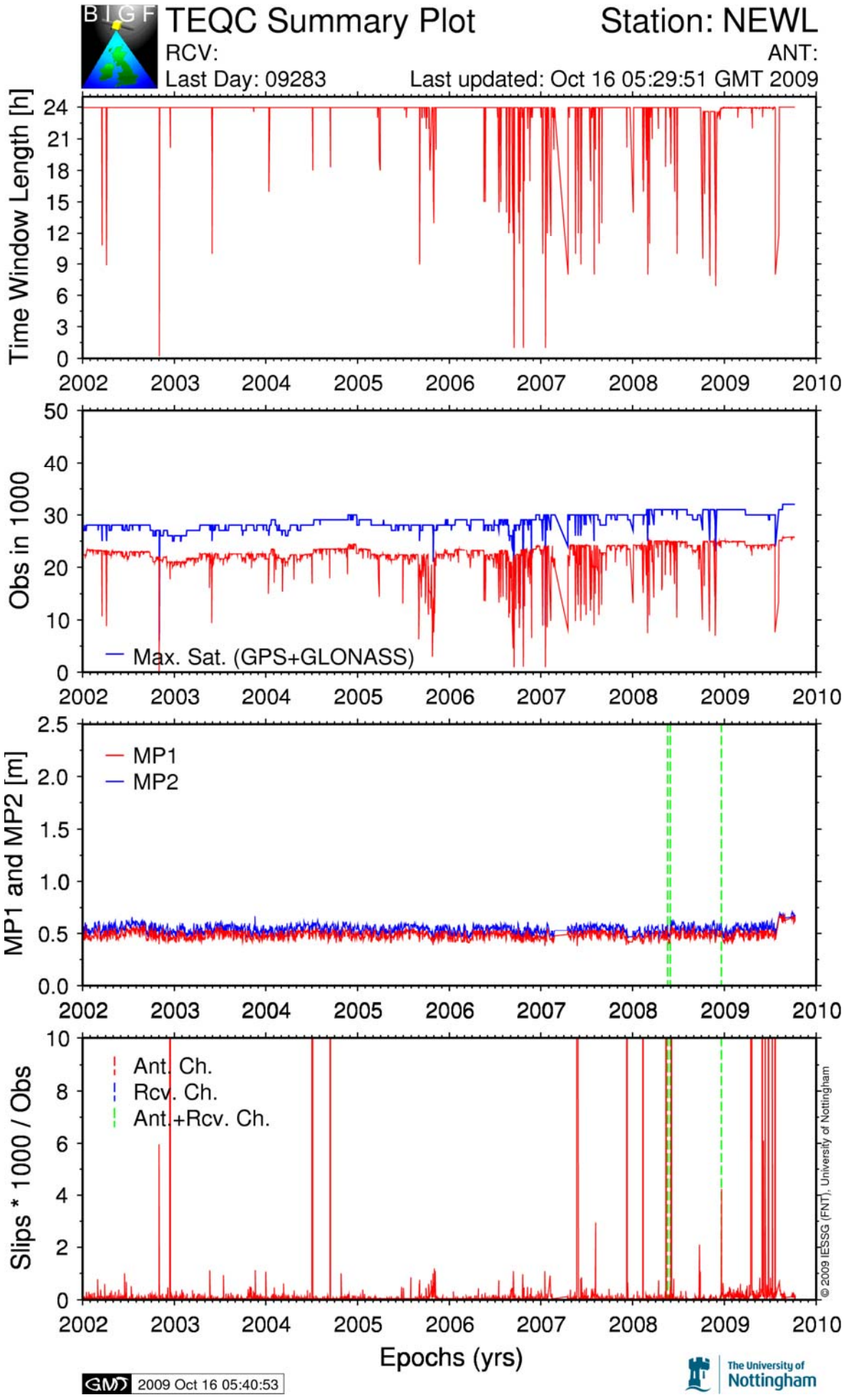
     Primary Data Center      : BKGE
     Secondary Data Center    :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map               : Y
       Site Diagram           : Y
       Horizon Mask           : Y
       Monument Description   : Y
       Site Pictures          : Y
     Additional Information   : (multiple lines)
     Antenna Graphics with Dimensions

ASH700936D_M

                      -----
                    /     +     \                      <--  0.128  L2
                   |      +      |                     <--  0.110  L1
  +-------------------------------------------------+   <--  0.102  TCR
  |                                                 |
  |                                                 |
  |                                                 |
  |                                                 |
+-+-------------------------------------------------+-+ <--  0.038
+-------------------+-------------+-------------------+ <--  0.035  BCR
                    |             |
                   =|             |
                    +------x------+                     <--  0.000  BPA=ARP

<--                     0.381                      -->


   ARP: Antenna Reference Point
   L1 : L1 Phase Center                 L2 : L2 Phase Center
   TCR: Top of Chokering                BCR: Bottom of Chokering
```


TEQC Summary Plot
Station: NEWL
RCV:
ANT:
Last Day: 09283
Last updated: Oct 16 05:29:51 GMT 2009
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS+GLONASS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
Epochs (yrs)
2009 Oct 16 05:40:53
© 2009 IESSG (FNT), University of Nottingham
The University of Nottingham

North Shields

```
     NSTG Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2008-12-10
     Report Type              : UPDATE
     If Update:
      Previous Site Log       : nstg_20031118.log
      Modified/Added Sections : 3.7, 3.8


1.   Site Identification of the GNSS Monument

     Site Name                : North Shields Tide Gauge
     Four Character ID        : NSTG
     Monument Inscription     :
     IERS DOMES Number        : 13216M001
     CDP Number               : (A4)
     Monument Description     : ALUMINIUM POLE
       Height of the Monument : 4.00m
       Monument Foundation    : QUAY
       Foundation Depth       : 2.4m
     Marker Description       : BOTTOM OF 5/8" THREAD ON 4m ALUMINIUM POLE
     Date Installed           : 1998-03-07T12:00Z
     Geologic Characteristic  : BOULDER CLAY
       Bedrock Type           : SEDIMENTARY (WESTPHALIAN)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted in the
                              : tide gauge building, which is located
                              : on a concrete quay, with piled
                              : foundations
                              : The GPS antenna is located on the monument
                              : which consists of a 4m aluminium pole, which is
                              : fixed to the concrete quay, in the tide gauge
                              : building.
                              : The GPS antenna is attached to the aluminium
                              : pole using a 5/8" thread.
                              : The male part of the 5/8" thread is on the
                              : aluminium pole and the bottom of the thread
                              : serves as the survey marker.


2.   Site Location Information

     City or Town             : North Shields
     State or Province        : Northumbria
     Country                  : England
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       : 3664792.2
       Y coordinate (m)       : -92117.3
       Z coordinate (m)       : 5201903.7
       Latitude (N is +)      : +550026.70
       Longitude (E is +)     : -0012623.53
       Elevation (m,ellips.)  : 56.9
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : ??????
     Firmware Version         : 1I00
     Elevation Cutoff Setting : 5
     Date Installed           : 1998-03-15T00:00Z
     Date Removed             : 1998-08-23T23:59Z
     Temperature Stabiliz.    : NONE
```

```
     Additional Information   : Full receiver serial number not known.
                              : Not continuous operation.
                              : Download using HOSE?
                              : Conversion to RINEX using ASHTORIN
                              : (with codephase smoothing).

3.2  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 982
     Firmware Version         : 1I00
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-08-10T00:00Z
     Date Removed             : 1999-08-13T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number not known.
                              : Not continuous operation.
                              : Download using HOSE?
                              : Conversion to RINEX using ASHTORIN
                              : (with codephase smoothing).

3.3  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : ??????
     Firmware Version         : 1L00
     Elevation Cutoff Setting : 5
     Date Installed           : 1999-12-03T00:00Z
     Date Removed             : 1999-12-09T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number not known.
                              : Not continuous operation.
                              : Download using HOSE?
                              : Conversion to RINEX using ASHTORIN
                              : (with codephase smoothing).

3.4  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 00111
     Firmware Version         : 1L00
     Elevation Cutoff Setting : 5
     Date Installed           : 2000-02-12T00:00Z
     Date Removed             : 2000-10-15T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 00111.

3.5  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 00111
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 2001-05-15T00:00Z
     Date Removed             : 2002-04-03T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 00111.
                              : Operation using a direct modem connection
                              : Download using CGREMOTE v5.4.00 CGRSCD00 and
                              : CGHOSE v6.0.00 CGRSCD00.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.6  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 01845
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 2002-04-05T00:00Z
     Date Removed             : 2002-05-16T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 01845.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00 and
                              : CGHOSE v6.0.00 CGRSCD00.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.7  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 00111
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 2002-05-18T00:00Z
```

```
     Date Removed             : 2008-12-09T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 00111.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00 and
                              : CGHOSE v6.0.00 CGRSCD00.
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.8  Receiver Type            : ASHTECH Z-XII3
     Satellite System         : GPS
     Serial Number            : 00111
     Firmware Version         : CD00
     Elevation Cutoff Setting : 5
     Date Installed           : 2008-12-10T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is LP 00111.
                              : Operation using a direct modem connection.
                              : Download using CGREMOTE v5.4.00 CGRSCD00.
                              : Conversion to RINEX using TEQC 2008Oct2.

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH700936B_M
     Serial Number            : ?????
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : NONE
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     :
     Date Installed           : 1998-03-15T00:00Z
     Date Removed             : 1998-08-23T23:59Z
     Additional Information   : Full antenna serial number is not known.

4.2  Antenna Type             : ASH700936B_M    SNOW
     Serial Number            : 146
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     :
     Date Installed           : 1999-08-10T00:00Z
     Date Removed             : 1999-08-13T23:59Z
     Additional Information   : Full antenna serial number is not known.

4.3  Antenna Type             : ASH700936B_M    SNOW
     Serial Number            : ?????
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     :
     Date Installed           : 1999-12-03T00:00Z
     Date Removed             : 1999-12-09T23:59Z
     Additional Information   : Full antenna serial number is not known.
```

```
4.4  Antenna Type             : ASH700936B_M    SNOW
     Serial Number            : 13570
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     :
     Date Installed           : 2000-02-12T00:00Z
     Date Removed             : 2000-10-15T23:59Z
     Additional Information   : Full antenna serial number is CR 13570.

4.5  Antenna Type             : ASH700936B_M    SNOW
     Serial Number            : 13570
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     : 10m
     Date Installed           : 2001-05-15T00:00Z
     Date Removed             : 2001-06-12T12:59Z
     Additional Information   : Full antenna serial number is CR 13570.

4.6  Antenna Type             : ASH700936B_M    SNOW
     Serial Number            : 13570
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     : 30m
     Date Installed           : 2001-06-12T13:00Z
     Date Removed             : 2002-03-11T23:59Z
     Additional Information   : Full antenna serial number is CR 13570.

4.7  Antenna Type             : ASH701945C_M    SNOW
     Serial Number            : 10213
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     : 30m
     Date Installed           : 2002-03-13T00:00Z
     Date Removed             : 2002-04-03T23:59Z
     Additional Information   : Full antenna serial number is CR5 2001 0213.

4.8  Antenna Type             : ASH700936B_M    SNOW
     Serial Number            : 13570
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     : 30m
     Date Installed           : 2002-04-05T00:00Z
     Date Removed             : 2003-10-20T15:59Z
     Additional Information   : Full antenna serial number is CR 13570.

4.9  Antenna Type             : ASH700936B_M    SNOW
     Serial Number            : 13570
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
```

```
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     : 30m
     Date Installed           : 2003-10-20T16:00Z
     Date Removed             : 2003-11-18T10:00Z
     Additional Information   : Full antenna serial number is CR 13570.
                              : Antenna cable replaced.

4.10 Antenna Type             : ASH700936B_M    SNOW
     Serial Number            : 13570
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       :
     Antenna Cable Length     : 30m
     Date Installed           : 2003-11-18T11:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR 13570.
                              : Antenna cable replaced.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties

5.x  Tied Marker Name         :
     Tied Marker Usage        : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number   : (A4)
     Tied Marker DOMES Number : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                 : (m)
       dy (m)                 : (m)
       dz (m)                 : (m)
     Accuracy (mm)            : (mm)
     Survey method            : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured            : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


6.   Frequency Standard

6.1  Standard Type            : INTERNAL
       Input Frequency        : (if external)
       Effective Dates        : 1998-03-22/CCYY-MM-DD
       Notes                  : (multiple lines)

6.x  Standard Type            : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency        : (if external)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


7.   Collocation Information

7.x  Instrumentation Type     : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                 : (PERMANENT/MOBILE)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)
```

```
8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.1.x Humidity Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.1 Pressure Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.x Pressure Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
```

```
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Port of Tyne Authority
     Preferred Abbreviation   :
     Mailing Address          : Neville House
                              : Bell Street
                              : North Shields NE30 1LJ
                              : UK
     Primary Contact
       Contact Name           : Port Control
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           : Martin Robertson
       Telephone (primary)    : +44 (0)191 2227834
       Telephone (secondary)  : +44 (0)191 2226445
       Fax                    : +44 (0)191 2228691
       E-mail                 : Martin.Robertson@newcastle.ac.uk
     Additional Information   : (multiple lines)


12.  Responsible Agency (if different from 11.)

     Agency                   : IESSG
     Preferred Abbreviation   : IESSG
     Mailing Address          : University of Nottingham
                              : University Park
                              : Nottingham NG72RD
                              : UK
     Primary Contact
       Contact Name           : Richard Bingley
       Telephone (primary)    : +44 (0)115 9513932
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name           : IESSG Experimental Officers
       Telephone (primary)    : +44 (0)115 9513921
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : iessg@nottingham.ac.uk
     Additional Information   : NSTG is operated jointly by the
                              : University of Newcastle-upon-Tyne and
                              : the IESSG for the
                              : Proudman Oceanographic Laboratory and
                              : the UK Department for the Environment, Food
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                            : and Rural Affairs (DEFRA)

13.  More Information

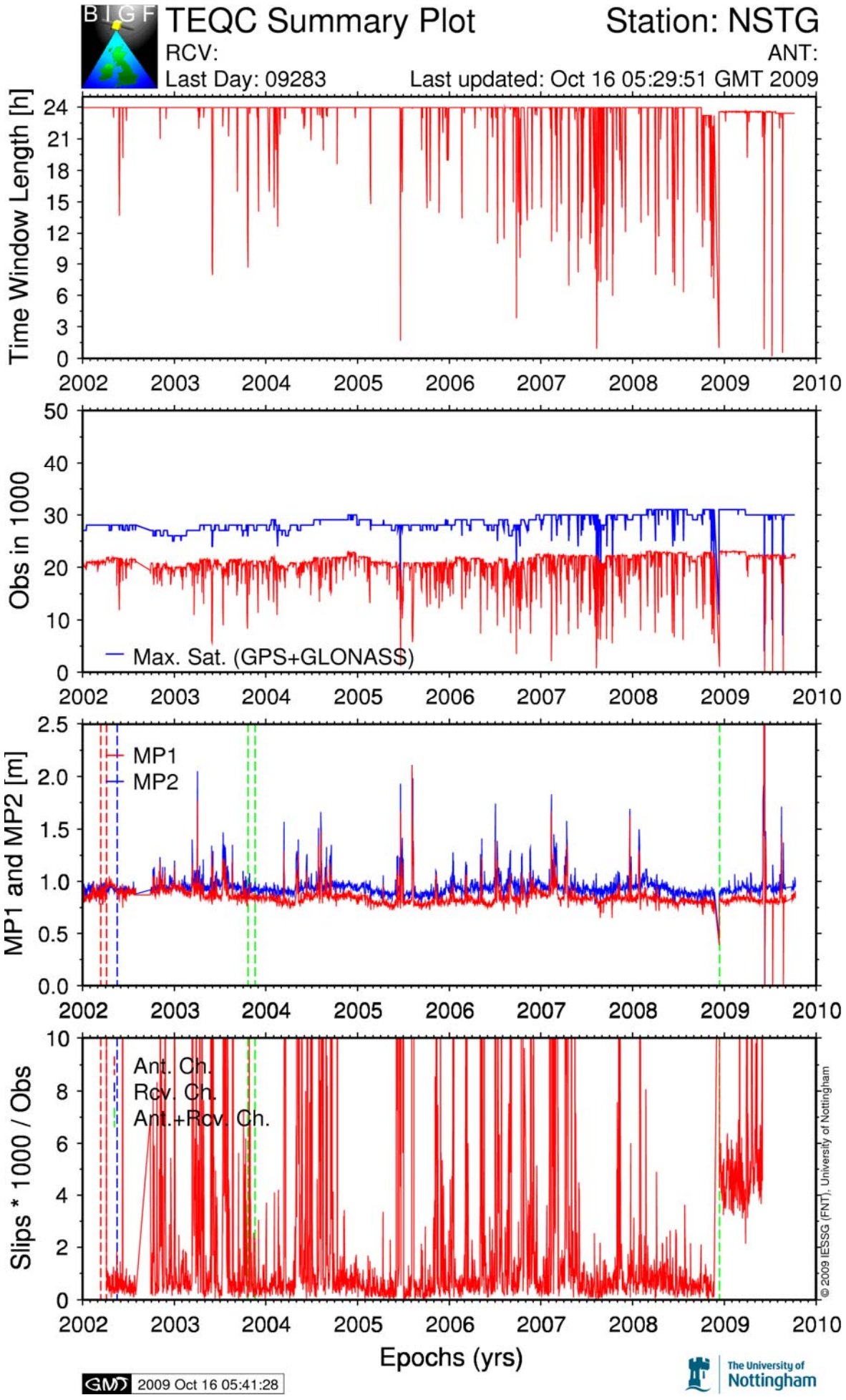
     Primary Data Center      :
     Secondary Data Center    :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map               : Y
       Site Diagram           : Y
       Horizon Mask           : Y
       Monument Description   : Y
       Site Pictures          : Y
     Additional Information   : (multiple lines)
     Antenna Graphics with Dimensions

ASH700936B_M

                        -----
                      /     +     \                       <--  0.128  L2
                     |      +      |                      <--  0.110  L1
   +-------------------------------------------------+    <--  0.102  TCR
   |                                                 |
   |                                                 |
   |                                                 |
   |                                                 |
+-+-------------------------------------------------+-+  <--  0.038
+-------------------+-------------+-------------------+  <--  0.035  BCR
                     |             |
                    =|             |
                     +------x------+                      <--  0.000  BPA=ARP

<--                       0.381                       -->


   ARP: Antenna Reference Point
   L1 : L1 Phase Center                  L2 : L2 Phase Center
   TCR: Top of Chokering                 BCR: Bottom of Chokering
```


TEQC Summary Plot
Station: NSTG
RCV:
ANT:
Last Day: 09283
Last updated: Oct 16 05:29:51 GMT 2009
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS+GLONASS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
Epochs (yrs)
2009 Oct 16 05:41:28
© 2009 IESSG (FNT), University of Nottingham
The University of Nottingham

Portsmouth

```
     PMTG Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2009-06-17
     Report Type              : UPDATE
     If Update:
      Previous Site Log       : pmtg_20081210.log
      Modified/Added Sections : 3.1, 3.2, 3.3, 3.4


1.   Site Identification of the GNSS Monument

     Site Name                : Portsmouth Tide Gauge
     Four Character ID        : PMTG
     Monument Inscription     :
     IERS DOMES Number        : 13289M003
     CDP Number               : (A4)
     Monument Description     : STEEL BRACKET
       Height of the Monument : 1.5m
       Monument Foundation    : BUILDING
       Foundation Depth       : (m)
     Marker Description       : TOP OF 5/8" THREAD ON 1.5m STEEL POLE/BRACKET
     Date Installed           : 2001-09-25T12:00Z
     Geologic Characteristic  : ALLUVIUM
       Bedrock Type           : SEDIMENTARY (BAGSHOT BEDS)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted on the North end
                              : wall of a single storey brick building,
                              : which houses the tide gauge equipment,
                              : so that the antenna is raised above the
                              : roof apex.
                              : The GPS antenna is located on the monument
                              : which consists of a steel bracket with a 1.5m
                              : pole.
                              : The GPS antenna is attached to the steel pole
                              : using a 5/8" thread.
                              : The antenna height is taken as 0.000m (ie the
                              : survey marker is on the pole and is coincident
                              : with the GPS ARP).


2.   Site Location Information

     City or Town             : Portsmouth
     State or Province        : Hampshire
     Country                  : England
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       : 4038372.3
       Y coordinate (m)       : -78330.6
       Z coordinate (m)       : 4919718.8
       Latitude (N is +)      : +504808.36
       Longitude (E is +)     : -0010640.33
       Elevation (m,ellips.)  : 55.4
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 10206
     Firmware Version         : CJ00
     Elevation Cutoff Setting : 5
     Date Installed           : 2001-09-25T00:00Z
     Date Removed             : 2005-10-19T11:00Z
     Temperature Stabiliz.    : NONE
```

```
     Additional Information   : Receiver is an Ashtech Micro-Z.
                              : Full receiver serial number is ZR 2001 0206.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v1.1.00 (2001).
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.2  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 10206
     Firmware Version         : CJ00
     Elevation Cutoff Setting : 5
     Date Installed           : 2005-10-20T00:00Z
     Date Removed             : 2006-05-11T11:00Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Receiver is an Ashtech Micro-Z.
                              : Full receiver serial number is ZR 2001 0206.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v1.1.00 (2001).
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).
                              : Receiver malfunction, with receiver not tracking
                              : any satellites below 20 degrees elevation
                              : and not tracking on all channels.
                              : It is advisable, therefore, not to use data
                              : from this period.

3.3  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 39007
     Firmware Version         : CQ00
     Elevation Cutoff Setting : 5
     Date Installed           : 2006-05-11T12:00Z
     Date Removed             : 2008-12-09T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Receiver is an Ashtech Micro-Z.
                              : Full receiver serial number is UC1 2003 39007.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v1.2.00 (2002).
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).
                              : As a result of the receiver malfunction and the
                              : resultant receiver change, for long term studies,
                              : it may be necessary to allow for a coordinate
                              : offset in the time series between 2005-10-19
                              : and 2006-05-11.

3.4  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 39007
     Firmware Version         : CQ00
     Elevation Cutoff Setting : 5
     Date Installed           : 2008-12-10T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : Receiver is an Ashtech Micro-Z.
                              : Full receiver serial number is UC1 2003 39007.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v2.2.00 (Feb 1, 2005).
                              : Conversion to RINEX using TEQC 2008Oct2.

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH701945C_M    SNOW
     Serial Number            : 10214
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   0.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
```

```
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 2001-09-25T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR5 2001 0214.
                              : The antenna radome is painted black.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties

5.x  Tied Marker Name         :
     Tied Marker Usage        : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number   : (A4)
     Tied Marker DOMES Number : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                 : (m)
       dy (m)                 : (m)
       dz (m)                 : (m)
     Accuracy (mm)            : (mm)
     Survey method            : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured            : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


6.   Frequency Standard

6.1  Standard Type            : INTERNAL
       Input Frequency        : (if external)
       Effective Dates        : 2001-09-26/CCYY-MM-DD
       Notes                  : (multiple lines)

6.x  Standard Type            : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency        : (if external)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


7.   Collocation Information

7.x  Instrumentation Type     : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                 : (PERMANENT/MOBILE)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.1.x Humidity Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
```

```
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.1 Pressure Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.x Pressure Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)
```

```
9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Queen's Harbour Master
     Preferred Abbreviation   :
     Mailing Address          : HM Naval Base
                              : Portsmouth
                              : Hampshire
                              : UK
     Primary Contact
       Contact Name           : CPO Surveyor for Queen's Harbour Master
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           :
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Additional Information   : (multiple lines)

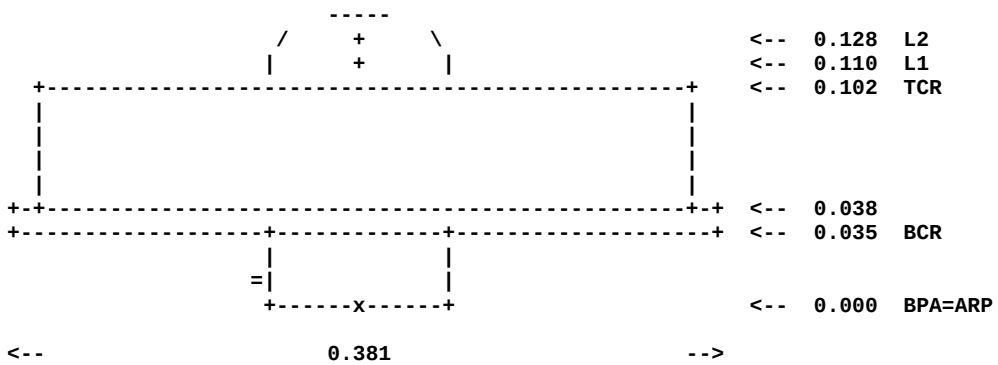

12.  Responsible Agency (if different from 11.)

     Agency                   : IESSG
     Preferred Abbreviation   : IESSG
     Mailing Address          : University of Nottingham
                              : University Park
                              : Nottingham NG72RD
                              : UK
     Primary Contact
       Contact Name           : Richard Bingley
       Telephone (primary)    : +44 (0)115 9513932
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name           : IESSG Experimental Officers
       Telephone (primary)    : +44 (0)115 9513921
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : iessg@nottingham.ac.uk
     Additional Information   : PMTG is operated by the IESSG for the
                              : Proudman Oceanographic Laboratory and
                              : the UK Department for the Environment, Food
                              : and Rural Affairs (DEFRA)

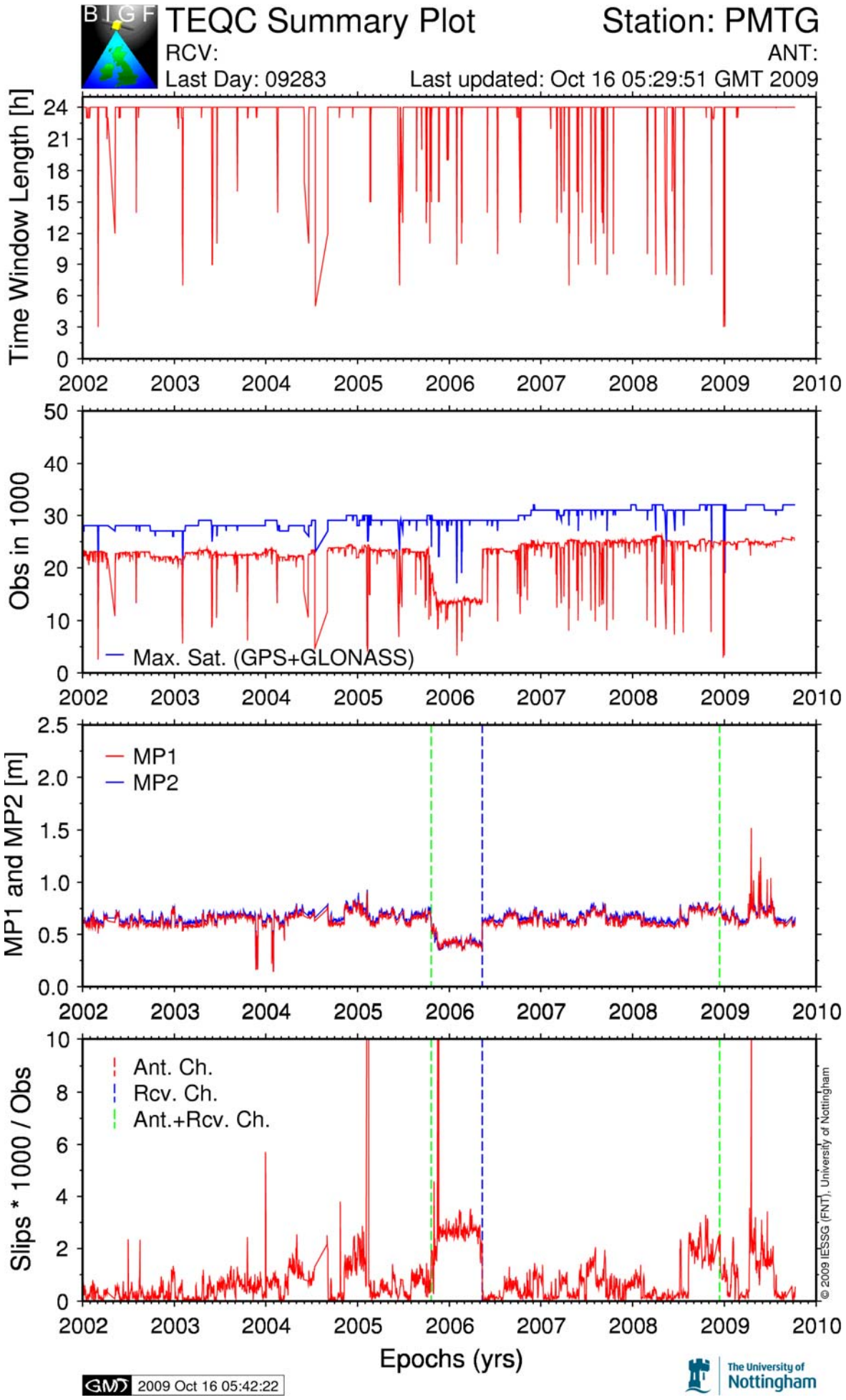

13.  More Information

     Primary Data Center      :
     Secondary Data Center    :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map               : Y
       Site Diagram           : Y
       Horizon Mask           : Y
       Monument Description   : Y
       Site Pictures          : Y
     Additional Information   : (multiple lines)
     Antenna Graphics with Dimensions
```

ASH701945C_M



ARP: Antenna Reference Point
L1 : L1 Phase Center **L2 : L2 Phase Center**
TCR: Top of Chokering **BCR: Bottom of Chokering**


TEQC Summary Plot
Station: PMTG
RCV:
ANT:
Last Day: 09283
Last updated: Oct 16 05:29:51 GMT 2009
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS+GLONASS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
© 2009 IESSG (FNT), University of Nottingham
Epochs (yrs)
2009 Oct 16 05:42:22
The University of Nottingham

Sheerness

```
     SHEE Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2009-08-10
     Report Type              : UPDATE
     If Update:
      Previous Site Log       : shee_20081202.log
      Modified/Added Sections : 3.3, 3.4


1.   Site Identification of the GNSS Monument

     Site Name                : Sheerness Tide Gauge
     Four Character ID        : SHEE
     Monument Inscription     :
     IERS DOMES Number        : 13236M001
     CDP Number               : (A4)
     Monument Description     : STEEL BRACKET
       Height of the Monument : 0.16m
       Monument Foundation    : ROOF
       Foundation Depth       : (m)
     Marker Description       : TOP OF 5/8" THREAD ON STEEL BRACKET
     Date Installed           : 1997-03-05T12:00Z
     Geologic Characteristic  : ALLUVIUM (CLAY, SILT, PEAT)
       Bedrock Type           : SEDIMENTARY (CHALK)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted on the concrete
                              : slab roof of the tide gauge building,
                              : which is a single storey brick building
                              : located on a jetty with piled foundations.
                              : The GPS antenna is located on the monument
                              : which consists of a 0.16m high steel bracket
                              : fixed to the concrete roof of the tide gauge
                              : building.
                              : The GPS antenna is attached to the steel bracket
                              : using a 5/8" thread.
                              : The male part of the 5/8" thread is on the steel
                              : bracket and has a domed top, which serves as the
                              : survey marker.


2.   Site Location Information

     City or Town             : Sheerness
     State or Province        : Isle of Sheppey
     Country                  : England
     Tectonic Plate           : EURASIAN
     Approximate Position (ITRF)
       X coordinate (m)       : 3983074.5
       Y coordinate (m)       : 51683.0
       Z coordinate (m)       : 4964639.6
       Latitude (N is +)      : +512644.44
       Longitude (E is +)     : +0004436.27
       Elevation (m,ellips.)  : 53.3
     Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : TRIMBLE 4000SSI
     Satellite System         : GPS
     Serial Number            : 16407
     Firmware Version         : 7.21
     Elevation Cutoff Setting : 15
     Date Installed           : 1997-03-26T00:00Z
     Date Removed             : 1999-08-19T23:59Z
     Temperature Stabiliz.    : NONE
```

```
     Additional Information   : Full receiver serial number is 3628A16407.
                              : Operation using a direct modem connection.
                              : Download using RFILE v2.31 [21-MAR-97 TEST].
                              : Conversion to RINEX using DAT2RIN v2.20b.

3.2  Receiver Type            : TRIMBLE 4000SSI
     Satellite System         : GPS
     Serial Number            : 16407
     Firmware Version         : 7.29
     Elevation Cutoff Setting : 15
     Date Installed           : 1999-08-21T00:00Z
     Date Removed             : 2008-11-13T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is 3628A16407.
                              : Operation using a direct modem connection.
                              : Download using RFILE v2.35 (20 DEC 99).
                              : Conversion to RINEX using DAT2RIN v2.35a.

3.3  Receiver Type            : TRIMBLE 4000SSI
     Satellite System         : GPS
     Serial Number            : 16420
     Firmware Version         : 7.32
     Elevation Cutoff Setting : 15
     Date Installed           : 2008-12-02T11:00Z
     Date Removed             : 2009-08-09T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is 3628A16420.
                              : Operation using a direct modem connection.
                              : Download using RFILE v2.35 (20 DEC 99).
                              : Conversion to RINEX using DAT2RIN v2.35a.

3.4  Receiver Type            : TRIMBLE 4000SSI
     Satellite System         : GPS
     Serial Number            : 16420
     Firmware Version         : 7.32
     Elevation Cutoff Setting : 15
     Date Installed           : 2009-08-10T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : Full receiver serial number is 3628A16420.
                              : Operation using a direct modem connection.
                              : Download using RFILE v2.35 (20 DEC 99).
                              : Conversion to RINEX using TEQC2008Oct2.

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : TRM29659.00     NONE
     Serial Number            : 66923
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :  -0.0070
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : NONE
     Radome Serial Number     :
     Antenna Cable Type       : TRIMBLE 14553-00
     Antenna Cable Length     : 10m
     Date Installed           : 1997-03-26T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is 0220066923.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
```

```
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties

5.x  Tied Marker Name         :
     Tied Marker Usage        : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number   : (A4)
     Tied Marker DOMES Number : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                 : (m)
       dy (m)                 : (m)
       dz (m)                 : (m)
     Accuracy (mm)            : (mm)
     Survey method            : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured            : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


6.   Frequency Standard

6.1  Standard Type            : INTERNAL
       Input Frequency        : (if external)
       Effective Dates        : 2001-03-27/CCYY-MM-DD
       Notes                  : (multiple lines)

6.x  Standard Type            : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency        : (if external)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


7.   Collocation Information

7.x  Instrumentation Type     : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                 : (PERMANENT/MOBILE)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.1.x Humidity Sensor Model   :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy (% rel h)     : (% rel h)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.1 Pressure Sensor Model   : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.2.x Pressure Sensor Model   :
```

```
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (hPa)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Medway Ports
```

```
     Preferred Abbreviation   : (A10)
     Mailing Address          : Sheerness Docks
                              : Sheerness
                              : Kent ME121RX
                              : UK
     Primary Contact
       Contact Name           : Mike Hillier
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Secondary Contact
       Contact Name           : Phillip Woodgate
       Telephone (primary)    :
       Telephone (secondary)  :
       Fax                    :
       E-mail                 :
     Additional Information   : (multiple lines)


12.  Responsible Agency (if different from 11.)

     Agency                   : IESSG
     Preferred Abbreviation   : IESSG
     Mailing Address          : University of Nottingham
                              : University Park
                              : Nottingham NG72RD
                              : UK
     Primary Contact
       Contact Name           : Richard Bingley
       Telephone (primary)    : +44 (0)115 9513932
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name           : IESSG Experimental Officers
       Telephone (primary)    : +44 (0)115 9513921
       Telephone (secondary)  : +44 (0)115 9513880
       Fax                    : +44 (0)115 9513881
       E-mail                 : iessg@nottingham.ac.uk
     Additional Information   : SHEE is operated by the IESSG for the
                              : Environment Agency of England and Wales


13.  More Information

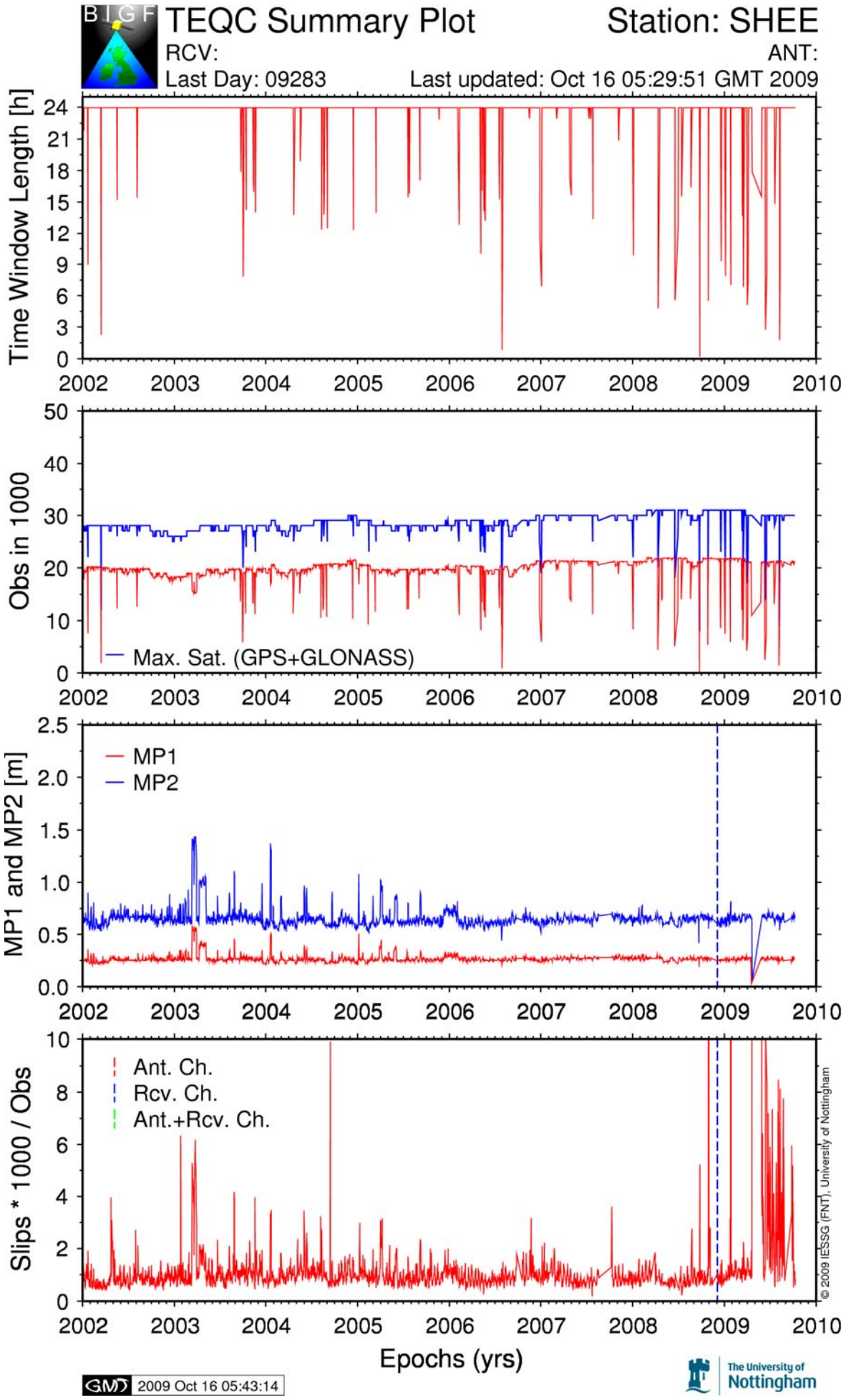
     Primary Data Center      :
     Secondary Data Center    :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map               : Y
       Site Diagram           : Y
       Horizon Mask           : Y
       Monument Description   : Y
       Site Pictures          : Y
     Additional Information   : (multiple lines)
     Antenna Graphics with Dimensions

TRM29659.00

                      -----
                    /     +     \                      <--  0.128  L2
                   |      +      |                     <--  0.110  L1
  +-------------------------------------------------+   <--  0.102  TCR
  |                                                 |
  |                                                 |
  |                                                 |
  |                                                 |
+-+-------------------------------------------------+-+ <--  0.038
+-------------------+-------------+-------------------+ <--  0.035  BCR
                    |             |
                  =|             |
                    +------x------+                     <--  0.000  BPA=ARP

<--                      0.381                      -->


   ARP: Antenna Reference Point
   L1 : L1 Phase Center                L2 : L2 Phase Center
   TCR: Top of Chokering               BCR: Bottom of Chokering
```


TEQC Summary Plot
Station: SHEE
RCV:
ANT:
Last Day: 09283
Last updated: Oct 16 05:29:51 GMT 2009
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS+GLONASS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
Epochs (yrs)
2009 Oct 16 05:43:14
© 2009 IESSG (FNT), University of Nottingham
The University of Nottingham

Stornoway

```
     SWTG Site Information Form (site log)
     International GPS Service
     See Instructions at:
       ftp://igscb.jpl.nasa.gov/pub/station/general/sitelog_instr.txt

0.   Form

     Prepared by (full name)  : Richard Bingley
     Date Prepared            : 2009-06-04
     Report Type              : UPDATE
     If Update:
      Previous Site Log       : swtg_20081210.log
      Modified/Added Sections : 1, 2


1.   Site Identification of the GNSS Monument

     Site Name                : Stornoway Tide Gauge
     Four Character ID        : SWTG
     Monument Inscription     :
     IERS DOMES Number        : 19158M001
     CDP Number               : (A4)
     Monument Description     : STEEL PLATE AND CARBON FIBRE PIPE
       Height of the Monument : 2.0m
       Monument Foundation    : WHARF
       Foundation Depth       : (m)
     Marker Description       : TOP OF 40mm DIA THREAD ON STEEL PLATE
     Date Installed           : 2005-09-01T15:00Z
     Geologic Characteristic  : BEDROCK
       Bedrock Type           : SEDIMENTARY (SANDSTONE)
       Bedrock Condition      : (FRESH/JOINTED/WEATHERED)
       Fracture Spacing       : (1-10 cm/11-50 cm/51-200 cm/over 200 cm)
       Fault zones nearby     : (YES/NO/Name of the zone)
         Distance/activity    : (multiple lines)
     Additional Information   : The monument is mounted about 20m from the
                              : tide gauge building, and located on No 2 Wharf.
                              : The GPS antenna is located on the monument
                              : which consists of a 2m carbon fibre pipe mounted
                              : on a steel plate, which is fixed to the concrete
                              : of the Wharf.
                              : The GPS antenna is attached to the carbon fibre
                              : pipe using a 5/8" thread.
                              : The carbon fibre pipe is attached to the steel
                              : plate using a 40 mm diameter thread.
                              : The male part of the 40mm diameter thread is on
                              : the steel plate and has a domed head, which
                              : serves as the survey marker.

2.   Site Location Information

     City or Town             : Stornoway
     State or Province        : Isle of Lewis
     Country                  : Scotland
     Tectonic Plate           : EURASIAN
     Approximate Position
       X coordinate (m)       : 3347545
       Y coordinate (m)       : -374833
       Z coordinate (m)       : 5398005
       Latitude (N is +)      : +581227.31
       Longitude (E is +)     : -062320.21
       Elevation (m,ellips.)  :      60.1
      Additional Information   : (multiple lines)


3.   GNSS Receiver Information

3.1  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 13830
     Firmware Version         : CJ00
     Elevation Cutoff Setting : 5
     Date Installed           : 2005-09-02T00:00Z
     Date Removed             : 2006-10-25T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Receiver is an Ashtech Micro-Z.
```

```
                              : Full receiver serial number is ZR2 2001 3830.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v1.1.00 (2001).
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.2  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 08002
     Firmware Version         : CN00
     Elevation Cutoff Setting : 5
     Date Installed           : 2006-10-27T00:00Z
     Date Removed             : 2008-12-09T23:59Z
     Temperature Stabiliz.    : NONE
     Additional Information   : Receiver is an Ashtech Micro-Z.
                              : Full receiver serial number is UC1 2004 08002.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v1.1.00 (2001).
                              : Conversion to RINEX using ASRINEXO v2.9.7
                              : (with PR SMOOTH FLAG 0).

3.3  Receiver Type            : ASHTECH UZ-12
     Satellite System         : GPS
     Serial Number            : 08002
     Firmware Version         : CN00
     Elevation Cutoff Setting : 5
     Date Installed           : 2008-12-10T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Temperature Stabiliz.    : NONE
     Additional Information   : Receiver is an Ashtech Micro-Z.
                              : Full receiver serial number is UC1 2004 08002.
                              : Operation using a direct modem connection.
                              : Download using MicroManager Pro v2.2.00 (Feb 1, 2005).
                              : Conversion to RINEX using TEQC2008Oct2.

3.x  Receiver Type            : (A20, from rcvr_ant.tab; see instructions)
     Satellite System         : (GPS/GLONASS/GPS+GLONASS)
     Serial Number            : (A5)
     Firmware Version         : (A11)
     Elevation Cutoff Setting : (deg)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Temperature Stabiliz.    : (none or tolerance in degrees C)
     Additional Information   : (multiple lines)


4.   GNSS Antenna Information

4.1  Antenna Type             : ASH701945C_M    SNOW
     Serial Number            : 14802
     Antenna Reference Point  : BPA
     Marker->ARP Up Ecc. (m)  :   2.0000
     Marker->ARP North Ecc(m) :   0.0000
     Marker->ARP East Ecc(m)  :   0.0000
     Alignment from True N    : 0
     Antenna Radome Type      : SNOW
     Radome Serial Number     :
     Antenna Cable Type       : ASHTECH 100914 REVA
     Antenna Cable Length     : 30m
     Date Installed           : 2005-09-02T00:00Z
     Date Removed             : CCYY-MM-DDThh:mmZ
     Additional Information   : Full antenna serial number is CR5 2001 4802.

4.x  Antenna Type             : (A20 from rcvr_ant.tab; see instructions)
     Serial Number            : (A*, but note the first A5 is used in SINEX)
     Antenna Reference Point  : (BPA/BCR/XXX from "antenna.gra"; see instr.)
     Marker->ARP Up Ecc. (m)  : (F8.4)
     Marker->ARP North Ecc(m) : (F8.4)
     Marker->ARP East Ecc(m)  : (F8.4)
     Alignment from True N    : (deg; + is clockwise/east)
     Antenna Radome Type      : (A4 from rcvr_ant.tab; see instructions)
     Radome Serial Number     :
     Antenna Cable Type       : (vendor & type number)
     Antenna Cable Length     : (m)
     Date Installed           : (CCYY-MM-DDThh:mmZ)
     Date Removed             : (CCYY-MM-DDThh:mmZ)
     Additional Information   : (multiple lines)


5.   Surveyed Local Ties
```

```
5.x  Tied Marker Name          :
     Tied Marker Usage         : (SLR/VLBI/LOCAL CONTROL/FOOTPRINT/etc)
     Tied Marker CDP Number    : (A4)
     Tied Marker DOMES Number  : (A9)
     Differential Components from GNSS Marker to the tied monument (ITRS)
       dx (m)                  : (m)
       dy (m)                  : (m)
       dz (m)                  : (m)
     Accuracy (mm)             : (mm)
     Survey method             : (GPS CAMPAIGN/TRILATERATION/TRIANGULATION/etc)
     Date Measured             : (CCYY-MM-DDThh:mmZ)
     Additional Information    : (multiple lines)


6.   Frequency Standard

6.1  Standard Type             : INTERNAL
       Input Frequency         : (if external)
       Effective Dates         : 2005-09-02/CCYY-MM-DD
       Notes                   : (multiple lines)

6.x  Standard Type             : (INTERNAL or EXTERNAL H-MASER/CESIUM/etc)
       Input Frequency         : (if external)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)


7.   Collocation Information

7.x  Instrumentation Type      : (GPS/GLONASS/DORIS/PRARE/SLR/VLBI/TIME/etc)
       Status                  : (PERMANENT/MOBILE)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)


8.   Meteorological Instrumentation

8.1.1 Humidity Sensor Model    : NONE
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy (% rel h)      : (% rel h)
       Aspiration              : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)

8.1.x Humidity Sensor Model    :
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy (% rel h)      : (% rel h)
       Aspiration              : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)

8.2.1 Pressure Sensor Model    : NONE
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy                : (hPa)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)

8.2.x Pressure Sensor Model    :
       Manufacturer            :
       Serial Number           :
       Data Sampling Interval  : (sec)
       Accuracy                : (hPa)
       Height Diff to Ant      : (m)
       Calibration date        : (CCYY-MM-DD)
       Effective Dates         : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                   : (multiple lines)
```

```
8.3.1 Temp. Sensor Model      : NONE
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.3.x Temp. Sensor Model      :
       Manufacturer           :
       Serial Number          :
       Data Sampling Interval : (sec)
       Accuracy               : (deg C)
       Aspiration             : (UNASPIRATED/NATURAL/FAN/etc)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.1 Water Vapor Radiometer  : NONE
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.4.x Water Vapor Radiometer  :
       Manufacturer           :
       Serial Number          :
       Distance to Antenna    : (m)
       Height Diff to Ant     : (m)
       Calibration date       : (CCYY-MM-DD)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Notes                  : (multiple lines)

8.5.x Other Instrumentation   : (multiple lines)


9.  Local Ongoing Conditions Possibly Affecting Computed Position

9.1.x Radio Interferences     : (TV/CELL PHONE ANTENNA/RADAR/etc)
       Observed Degradations  : (SN RATIO/DATA GAPS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.2.x Multipath Sources       : (METAL ROOF/DOME/VLBI ANTENNA/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)

9.3.x Signal Obstructions     : (TREES/BUILDLINGS/etc)
       Effective Dates        : (CCYY-MM-DD/CCYY-MM-DD)
       Additional Information : (multiple lines)


10.  Local Episodic Effects Possibly Affecting Data Quality

10.1 Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)

10.x Date                     : (CCYY-MM-DDThh:mmZ)
     Event                    : (TREE CLEARING/CONSTRUCTION/etc)


11.  On-Site, Point of Contact Agency Information

     Agency                   : Stornoway Port Authority
     Preferred Abbreviation   :
     Mailing Address          : Amity House, Esplanade Quay
                              : Stornoway
                              : Isle of Lewis HS1 2XS
                              : UK
     Primary Contact
       Contact Name           : Deputy Harbour Master
       Telephone (primary)    :
       Telephone (secondary)  :
```

```
       Fax                   :
       E-mail                :
     Secondary Contact
       Contact Name          :
       Telephone (primary)   :
       Telephone (secondary) :
       Fax                   :
       E-mail                :
     Additional Information  : (multiple lines)


12.  Responsible Agency (if different from 11.)

     Agency                  : IESSG
     Preferred Abbreviation  : IESSG
     Mailing Address         : University of Nottingham
                             : University Park
                             : Nottingham NG72RD
                             : UK
     Primary Contact
       Contact Name          : Richard Bingley
       Telephone (primary)   : +44 (0)115 9513932
       Telephone (secondary) : +44 (0)115 9513880
       Fax                   : +44 (0)115 9513881
       E-mail                : richard.bingley@nottingham.ac.uk
     Secondary Contact
       Contact Name          : IESSG Experimental Officers
       Telephone (primary)   : +44 (0)115 9513921
       Telephone (secondary) : +44 (0)115 9513880
       Fax                   : +44 (0)115 9513881
       E-mail                : iessg@nottingham.ac.uk
     Additional Information  : LWTG is operated by the IESSG for the
                             : Proudman Oceanographic Laboratory and
                             : the UK Department for the Environment, Food
                             : and Rural Affairs (DEFRA)


13.  More Information

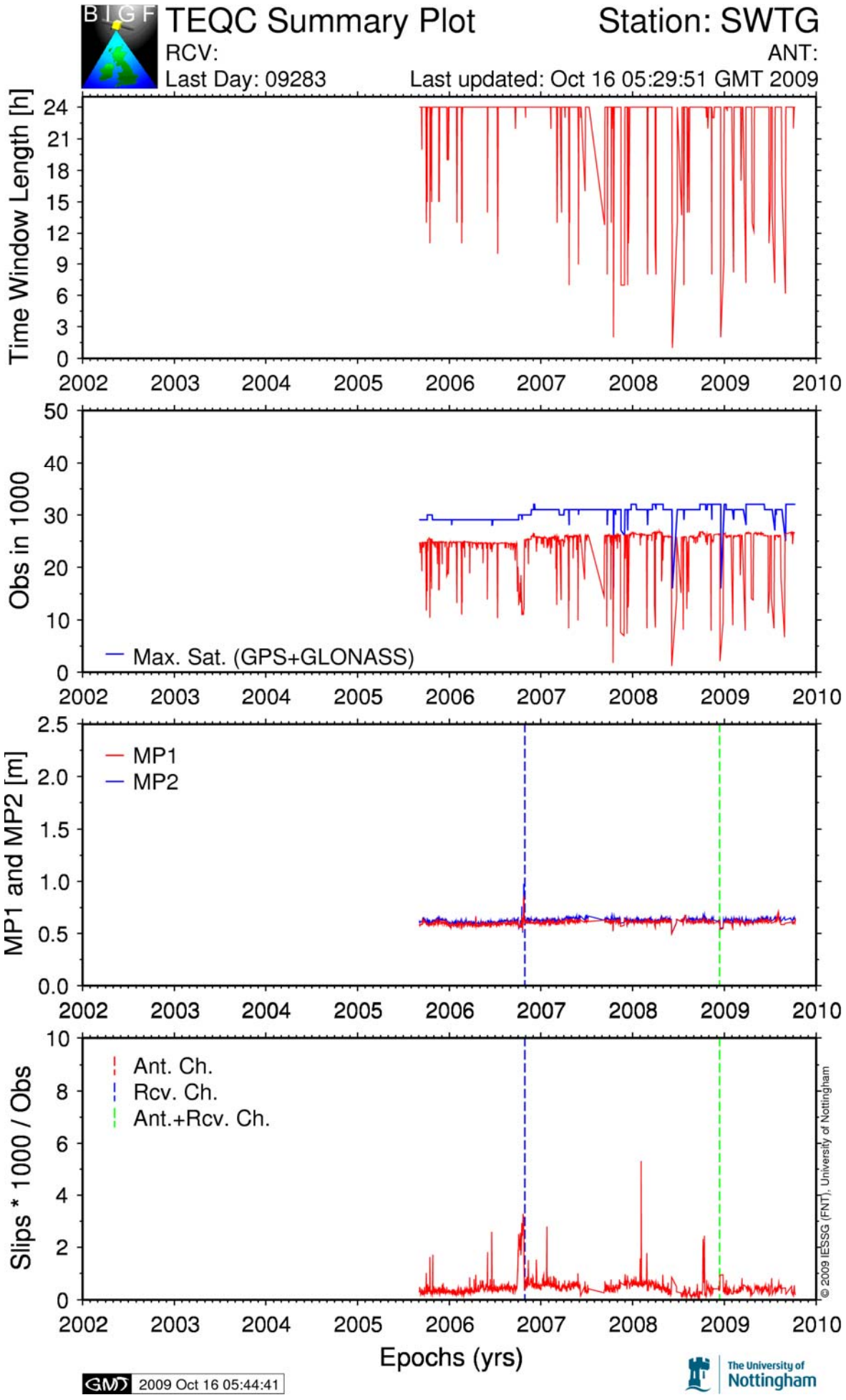
     Primary Data Center     :
     Secondary Data Center   :
     URL for More Information : http://www.bigf.ac.uk
     Hardcopy on File
       Site Map              : Y
       Site Diagram          : Y
       Horizon Mask          : Y
       Monument Description  : Y
       Site Pictures         : Y
     Additional Information  : (multiple lines)
     Antenna Graphics with Dimensions

ASH701945C_M

                      -----
                    /     +     \                      <--  0.128  L2
                   |      +      |                     <--  0.110  L1
  +------------------------------------------------+    <--  0.102  TCR
  |                                                |
  |                                                |
  |                                                |
  |                                                |
+-+------------------------------------------------+-+  <--  0.038
+-------------------+-------------+-------------------+  <--  0.035  BCR
                    |             |
                   =|             |
                    +------x------+                     <--  0.000  BPA=ARP

<--                      0.381                      -->


   ARP: Antenna Reference Point
   L1 : L1 Phase Center                 L2 : L2 Phase Center
   TCR: Top of Chokering                BCR: Bottom of Chokering
```


TEQC Summary Plot
Station: SWTG
RCV:
ANT:
Last Day: 09283
Last updated: Oct 16 05:29:51 GMT 2009
Time Window Length [h]
Obs in 1000
Max. Sat. (GPS+GLONASS)
MP1 and MP2 [m]
MP1
MP2
Slips * 1000 / Obs
Ant. Ch.
Rcv. Ch.
Ant.+Rcv. Ch.
Epochs (yrs)
2009 Oct 16 05:44:41
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