Australian Government
Geoscience Australia

Geodetic Connections to Tide Gauge at Burnie

RESULTS OF LEVELLING

Bench Mark Name	SPM 9087	SPM 9088	SPM 9336	SPM 9075	SPM 8857	SPM 9076	SPM 9337	SPM 9338	SPM 8391	8391 RM1	8391 RM2	8391 RM3	8391 RM4	8391 RM5	ST 1139	SPM 9089	BPA 15	SPM 11090	11090 RM1	ST 1164	ST 1164 RM1
AHD Ht (m) Oct 1992	3.062	5.361	5.801	4.906	3.553	6.854	4.608	3.790	3.279	3.949	-	-	-	-	-	-	-	-	-	-	-
AHD Ht (m) Sep 1993	3.062	5.361	5.801	4.906	3.553	6.852	4.607	3.789	3.277	3.948	-	-	-	-	-	14.646	-	-	-	-	-
AHD Ht (m) Jan 1995	3.062	5.361	5.800	4.904	3.553	6.853	4.608	3.789	3.279	3.949	-	-	-	-	-	14.646	-	-	-	-	-
AHD Ht (m) Apr 1996	3.062	5.361	5.801	4.904	3.552	6.852	4.607	3.778	3.277	3.946	-	-	-	-	-	14.646	3.983	-	-	-	-
AHD Ht (m) Jul 1997	3.062	5.362	5.801	4.906	3.553	6.853	4.609	3.780	3.280	3.950	-	-	-	-	-	-	-	-	-	-	-
AHD Ht (m) Jun 1998	3.062	5.362	5.801	4.906	3.553	6.853	4.609	3.779	3.279	3.949	-	-	-	-	-	-	-	-	-	-	-
AHD Ht (m) Aug 1998	-	-	-	-	-	-	-	3.779	3.275	-	-	-	-	-	-	-	3.986	-	-	-	-
AHD Ht (m) July 1999	-	-	-	-	-	-	-	-	-	-	4.122	-	-	-	4.615	-	-	-	-	-	-
AHD Ht (m) Nov 2000	3.062	5.362	5.802	4.907	3.554	6.856	4.611	3.780	3.277	-	4.122	-	-	-	-	-	3.987	-	-	-	-
Comments	Brass Lands disc in concrete mooring block. DATUM FOR HEIGHTS	Brass Lands disc in concrete headwall of small culvert	Domed Stainless steel rod in dolerite	Brass Lands disc in dolerite	Brass Lands disc in concrete gantry foundation	Brass Lands disc in dolerite	Domed stainless steel rod in concrete sea wall	Domed stainless steel rod in concrete sea wall	Brass Lands disc in concrete deck of wharf	NTF levelling fixture prior to 27/07/98	NTF levelling fixture 13/10/98 - 17/01/07	NTF levelling fixture 24/01/07 – 07/03/07	NTF levelling fixture after 07/03/07-July 2007	NTF levelling fixture after July 2007	Intersection of the centre of a 5/8 inch hole and the top face of a 200mm	Brass Lands disc in dolerite	Stainless steel bolt in concrete deck of mooring dolphin	Brass Lands disc in concrete deck of wharf	NTF levelling fixture after July 2008	Intersection of the centre of a 5/8 spigot and top face	Stainless Steel Pin attached to side of steel GNSS pilar

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AHD Ht (m) Feb 2002	3.062	5.362	5.802	4.903	3.551	6.851	4.606	3.777	3.276	-	4.122	-	-	-	-	-	3.984	-	-	-	-
AHD Ht (m) Sep 2002	-	-	-	-	-	-	-	-	-	-	4.122	-	-	-	4.615	-	-	-	-	-	-
AHD Ht (m) Apr 2003	3.062	5.362	5.801	4.902	3.551	6.852	4.609	3.778	3.277	-	4.123	-	-	-	-	14.645	-	-	-	-	-
AHD Ht (m) Nov 2006	3.062	5.363	5.802	4.904	3.552	6.583	4.609	3.776	3.275	-	4.121	-	-		-	-	-	-	-	-	-
AHD Ht (m) Mar 2007	-	-	-	-	-	-	-	3.775	3.275	-	-	4.110	4.121		-	-	-	-	-	-	-
AHD Ht (m) Aug 2007	-	-	-	-	-	-	4.609	3.776	3.274	-	-	-	-	4.157	-	-	-	-	-	-	-
AHD Ht (m) Dec 2007	-	-	-	-	-	-	-	-	3.274	-	-	-	-	4.157	4.64	-	-	-	-	-	-
AHD Ht (m) Jan 2008	-	-	-	-	-	-	4.609	3.776	3.277	-	-	-	-	4.158		-	-	3.317	-	-	-
AHD Ht (m) July 2008	-	-	-	-	-	-	-	3.7760	-	-	-	-	-	-	-	-	-	3.3159	4.5950	5.3601	3.5499
AHD Ht (m) April 2009	-	-	-	4.904	-	-	4.609	3.776	-	-	-	-	-	-	-	-	-	3.317	-	-	3.551
Comments	Brass Lands disc in concrete mooring block. DATUM FOR HEIGHTS	Brass Lands disc in concrete headwall of small culvert	Domed Stainless steel rod in dolerite	Brass Lands disc in dolerite	Brass Lands disc in concrete gantry foundation	Brass Lands disc in dolerite	Domed stainless steel rod in concrete sea wall	Domed stainless steel rod in concrete sea wall	Brass Lands disc in concrete deck of wharf	NTF levelling fixture prior to 27/07/98	NTF levelling fixture 13/10/98 -17/01/07	NTF levelling fixture 24/01/07 – 07/03/07	NTF levelling fixture after 07/03/07-July 2007	NTF levelling fixture after July 2007	Intersection of the centre of a 5/8 inch hole and the top face of a 200mm diameter stainless steel	Brass Lands disc in dolerite	Stainless steel bolt in concrete deck of mooring dolphin	Brass Lands disc in concrete deck of wharf	NTC levelling fixture after July 2008	Intersection of the centre of a 5/8 spigot and top face of 300mm steel pillar	Stainless Steel Pin attached to side of steel GNSS pillar

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AHD Ht (m) June 2009	-	5.3613	-	4.9035	-	-	4.6091	3.7762	-	-	-	-	-	-	-	-	-	3.3163	-	-	3.5499
AHD Ht (m) Nov 2011							4.6091	3.7759										3.3160	4.5971		3.5497
AHD Ht (m) Aug 2013							4.6091	3.7751										3.3158	4.5972		3.5501
Comments	Brass Lands disc in concrete mooring block. DATUM FOR HEIGHTS	Brass Lands disc in concrete headwall of small culvert	Domed Stainless steel rod in dolerite	Brass Lands disc in dolerite	Brass Lands disc in concrete gantry foundation	Brass Lands disc in dolerite	Domed stainless steel rod in concrete sea wall	Domed stainless steel rod in concrete sea wall	Brass Lands disc in concrete deck of wharf	NTF levelling fixture prior to 27/07/98	NTF levelling fixture 13/10/98 -17/01/07	NTF levelling fixture 24/01/07 – 07/03/07	NTF levelling fixture after 07/03/07-July 2007	NTF levelling fixture after July 2007	Intersection of the centre of a 5/8 inch hole and the top face of a 200mm diameter stainless steel	Brass Lands disc in dolerite	Stainless steel bolt in concrete deck of mooring dolphin	Brass Lands disc in concrete deck of wharf	NTC levelling fixture after July 2008	Intersection of the centre of a 5/8 spigot and top face of 300mm steel pillar	Stainless Steel Pin attached to side of steel GNSS pillar

NOTES:

1. Prior to 2006 all levelling has been carried out using a Wild NA2 level with parallel plate micrometer and rigid Invar staffs. In Nov 2006 a leica DNA03 digital level and invar staffs were used
2. The 11mm subsidence of SPM9338 detected on 02/04/1996 can be attributed to reclamation work being carried out in the vicinity of the mark at that time.
3. The apparent 4mm subsidence of SPM8391 detected on 26/08/1998 has been caused by damage to the mark. The central brass bolt used as a levelling point has been sheared off.
4. Sometime between 17-24 January 2007 the top of the steel pile supporting the tide gauge was knocked sideways. The pile was restored to a vertical position on 07/03/2007. The height of the leveling fixture was found to have been restored to the same height as that measured on 1/11/2006.
5. Sometime in mid July 2007 the steel pile and tide gauge was damaged and knocked significantly by a large tug which had come loose from the adjoining wharf in bad weather. Both structures were temporally stabilised in December 2007. The height of the levelling fixture (8391 RM5) was found to have increased by 0.037 m from the previous determination (8391 RM4).
6. Due to the damage on mark SPM8931 (see note 3.), a secondary bench mark was placed in January 2008 - SPM11090. This new mark will become the fundamental tide gauge bench mark.
7. During the week of the 16 June 2008 the existing tide gauge (SPM8391 – RM5) and associated supports including the GPS monument (ST1139) was removed to enable a new gauge and GPS pylon to be established.
8. In July 2008 NTC replaced the existing tide gauge with a new more stable platform and adjacent GNSS pillar. As a result the existing tide gauge has been relocated and a new NTC fixture established (11090 RM1).
9. In addition to the relocation of the tide gauge a new GNSS pillar has been established, with a GNSS antenna located on top. Therefore two additional marks have been created – ST1164 Intersection of the centre of a 5/8 spigot and top face of 300mm steel pillar and 1164RM1 - Stainless Steel Pin attached to side of steel GNSS pillar.

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10. In July of 2008 Geoscience Australia observed orthometric height differences between all new marks and existing surrounding BMs. Work was completed using EDM height traversing methodologies.
11. Data for June 2009 derived from an orthometric level connection to L2A standards between ST1164 RM1 and the bench mark on the CORS pillar at Round Hill Point (RHPT BM) performed by the Department of Primary Industries Parks Water and Environment.
12. Department of Primary Industries Parks Water and Environment performed L2A orthometric leveling in November 2011 but the weather conditions (bright sunlight reflecting from the water) resulted in some observation anomalies between back and forward level runs. SPM9337 adopted as RL datum point.
13. Department of Primary Industries Parks Water and Environment performed L2A orthometric leveling 28 August 2013. SPM9337 adopted as RL datum point