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### Geodetic Connections to Tide Gauge at Casey

BENCH MARK NAME	MSL HEIGHT (m) <sup>1</sup>						COMMENTS
	1990/91 <sup>2</sup>	1993 <sup>3</sup>	1998/99 <sup>4</sup>	Oct 2001 <sup>5</sup>	Mar 2006 <sup>5</sup>	Feb 2009 <sup>5</sup>	
AUS100		40.882		40.8798	-	40.8824	ARGN permanent GPS mark
AUS100 RM1		40.111		40.1098	40.1076	40.1115	ARGN permanent GPS mark, RM1
AUS100 RM2		39.783		39.7814	-	39.7837	ARGN permanent GPS mark, RM2
AUS100 RM3		41.561		41.5572	--	41.5604	ARGN permanent GPS mark, RM3
BM5		38.545		38.5491	38.5489	38.5497	
AUS396				26.8843	-	26.8830	
AUS394				29.3789	-	-	
AUS395				19.3345	19.3335	19.3327	
ISTS B052	20.469	20.464			-	20.4683	Casey Pageos mark
WHF1 <sup>7</sup>			2.269	2.2704	-	-	
HBM4			2.418	2.4247	2.4240	2.4242	
HBM1	7.171		7.171	7.1710	7.1710	7.1710	
HBM2	5.518			5.5172	5.5172	5.5171	
HBM3 <sup>6</sup>	1.968	1.968	1.968	1.9734	-	-	
AUS299 TGBM				2.0526	-	-	Tide gauge benchmark
TG RM					1.7261	1.7260	RM for Tide Gauge on Casey wharf
AUS2027					1.4615	-	Secondary TGBM
AUS2028					1.9401	-	Primary TGBM, replace AUS299
AUS2009						1.7500	Replaced AUS2027
AUS2010						2.2117	Replaced AUS2028



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A number of [survey marks in the Casey area](#) are used to connect the tide gauge bench mark to the permanent Casey GPS tracker ([AUS100](#)), using both GPS and conventional optical levelling techniques. Connections from the tide gauge benchmark to the tide gauge are held by [Antarctic Division](#).

Notes:

- <sup>1</sup> The MSL heights are based on a MSL height for HBM1 as shown on the RAN Hydrographic Service Bench Mark Report (5 February 1991).
- <sup>2</sup> Class LC\* optical levelling, using Aluminium staves, by Lt Slade (RAN). All values corrected for thermal expansion/contraction of the staves (King 2000).
- <sup>3</sup> Class LC\* optical levelling, using Aluminium staves and Sokkisha B2 Level, by John Hyslop (AUSLIG) (see fieldbook W0010).
- <sup>4</sup> Class LC\* optical levelling, using Aluminium staves, by King & Manson (Antarctic Division). All values corrected for thermal expansion/contraction of the staves (King 2000).
- <sup>5</sup> Class L2A\* levelling, using the "Leap-Frog" EDM Height Traversing., by Gary Johnston (Geoscience Australia) using a Leica TC2003 Total Station - see [Technical Report 5](#).
- <sup>6</sup> In October 2001, HBM3 was found leaning, and the height cannot be reliably compared to previous results.
- <sup>7</sup> Although the mark connected to in October 2001 is probably WHF1, it was not positively identified.
- <sup>8</sup> In October 2001, GPS observations were made between AUS100 and AUS299. The resulting difference in height, corrected for geoid ellipsoid separation, was 38.8251 metres, compared to 38.8272 from the Total Station levelling - a difference of only 2 mm from the two independent techniques. See [Technical Report 8](#) for more details.
- <sup>9</sup> During the 1995/96 Antarctic Summer, a Platypus Engineering bottom-mounted tide gauge was installed in the previously placed tide gauge mooring
- See [ICSM Special Publication 1, "Standard Practice for Control Surveys"](#) for an explanation of optical levelling standards.
  - King, M (2000), "Report on Temperature Corrections for Levelling Observations made at Australia's Antarctic Bases", An internal report prepared for the Australian Antarctic Division. Prepared June 2000, Revised November 2000.