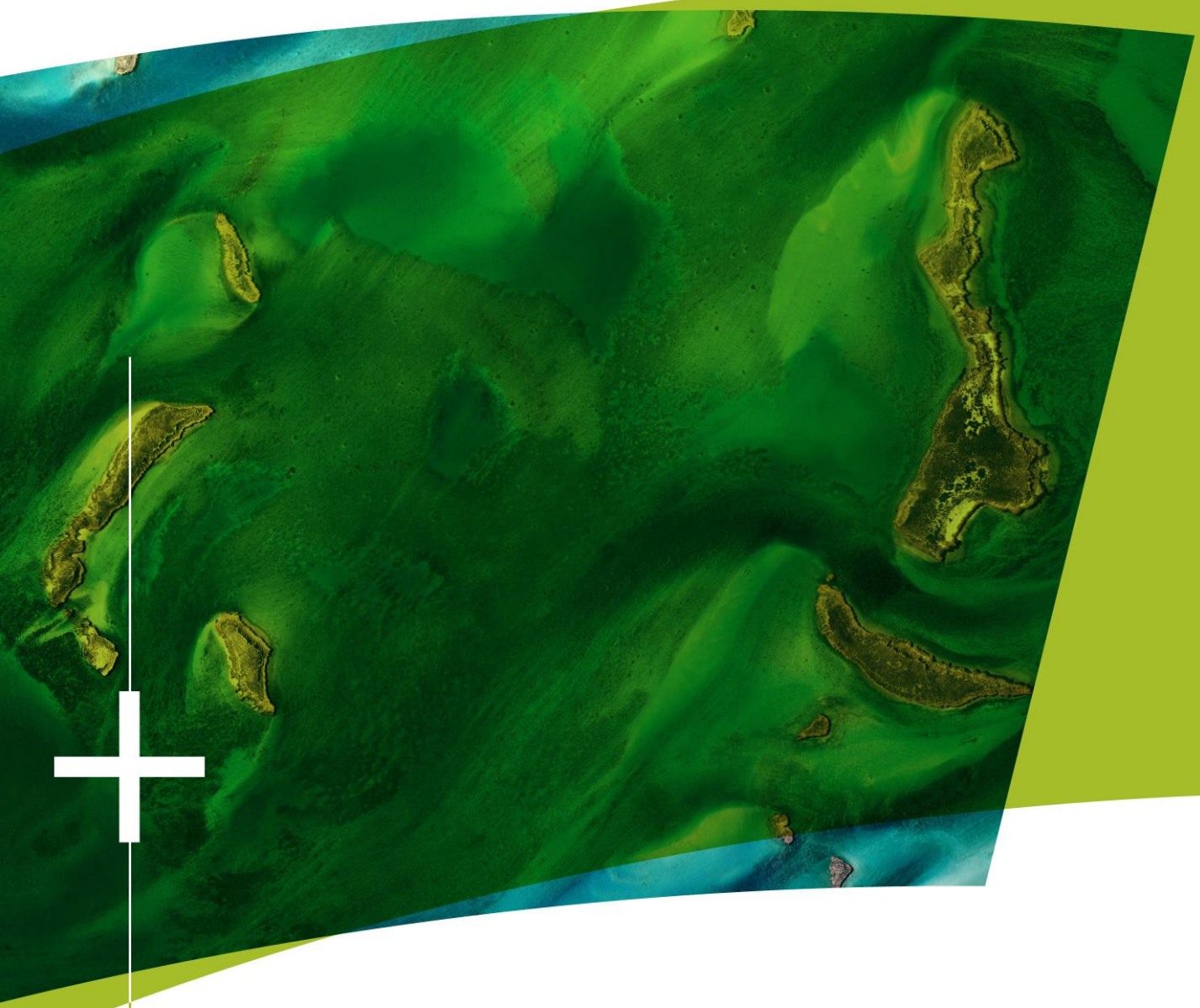
GOVERNMENT OF WESTERN AUSTRALIA

Landgate



Australian Height Datum 1971 and its modification around Perth

1/10/2018 Landgate

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1 Australian Height Datum (AHD)

The Australian Height Datum 1971 (AHD71) is the surface derived from the simultaneous adjustment of 757 sections of two-way levelling, holding 30 tide gauges at various locations around the Australian coast fixed at their mean sea level values.

2 Datum Modification in Perth Metro Zone

The Fremantle tide gauge observed mean sea level value (1966-1968) disagreed by 0.040m from the already well established "State MSL" datum (derived in 1948).

To cause minimal disruption in the adoption of AHD71, Benchmarks in the 'Metro Zone' retained the original State MSL values. The 0.040m discrepancy was managed by creating a 'Buffer Zone' in the State levelling network.

This 'Buffer Zone' is located outside the 'Metro Zone' and used to gradually distribute the 0.040m discrepancy as shown in Appendix A and B.

3 Buffer Zone

Misclosures in the levelling network may exceed specifications when working in the 'Buffer Zone' or between zones. When transferring heights in the Buffer Zone attention needs to be paid to how the 0.040m was distributed. The levelling network can then be design and assessed accordingly.

4 Metro and Buffer Zones KML

For convenience we are providing the KML file of the 'Metro Zone', 'Buffer Zone' and the levelling lines (Figure 1). The extent of the zones defined in the KML layers is based on the Perth Metropolitan & Buffer Zones report in The Australian Height Datum (Appendix A). Please note, there are a few instances of differences between the two reports (Appendix A and B) at the southern extent.

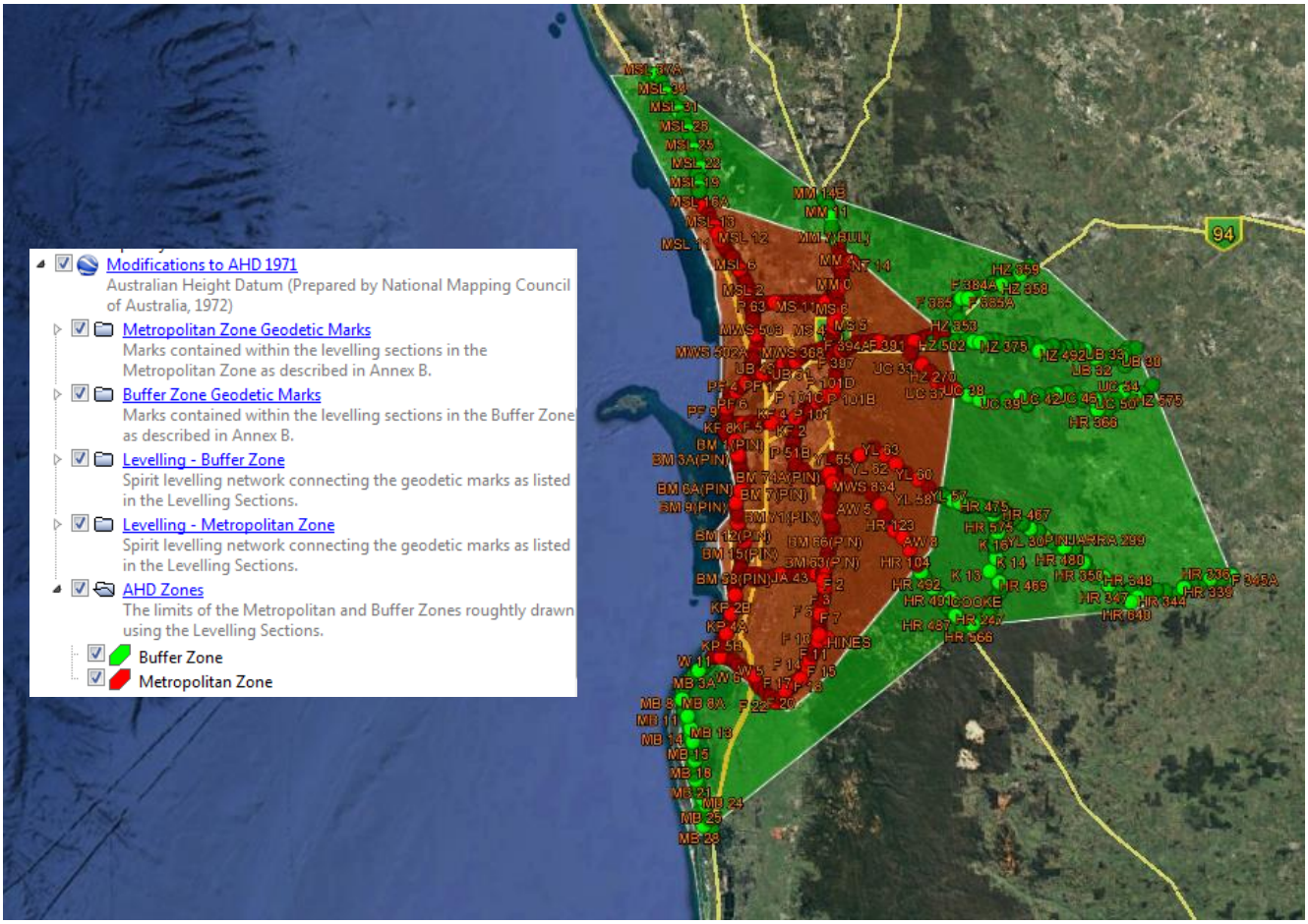


Figure 1. The kml file of Metro and Buffer Zones including leveling lines (as in Appendix A) is accessible from our website

Appendix A

Perth Metropolitan & Buffer Zones as reported in The Australian Height Datum (A.H.D), National Mapping Council of Australia, Canberra 1972, Annex A, pages 1-2.

PERTH METROPOLITAN AND BUFFER ZONES

Levelling Sections in the Metropolitan Zone

PRIMARY SECTIONS	LIMITING BENCH MARKS		
113 - 114	BM 748A	to	NMVF 6
113 - 159	BM 748A	to	F 397
113 - 200	BM 748A	to	KP 7
126 - 159	F 397	to	MM 7
159 - 172	F 397	to	F 389A
SUPPLEMENTARY SECTIONS			
113 - 871	BM 748A	to	P 71
159 - 871	F 397	to	P 71
837 - 842	MS 19	to	MSL 17
841 - 842	MS 19	to	MS 9
842 - 1004	MS 19	to	PF 2
855 - 860	F 391	to	UC 37
871 - 872	P 71	to	MWS 831
872 - 873	MWS 831	to	YL 58
872 - 874	MWS 831	to	F 1
872 - 875	MWS 831	to	AW 10
874 - 876	F 1	to	F 22
874 - 883	F 1	to	BM 53
876 - 884	F 22	to	KP 7

Levelling Sections in the Buffer Zone

PRIMARY SECTIONS			
113 - 200	KP 7	to	MB 29
126 - 159	MM 7	to	MM 14
159 - 172	F 389A	to	F 379
SUPPLEMENTARY SECTIONS			
837 - 842	MSL 17	to	MSL 37
854 - 859	F 389A	to	F 365
855 - 860	UC 37	to	F 362
861 - 873	YL 58	to	YL 54
872 - 873	YL 58	to	YL 54
872 - 875	AW 10	to	AW 16
873 - 875	YL 54	to	AW 16

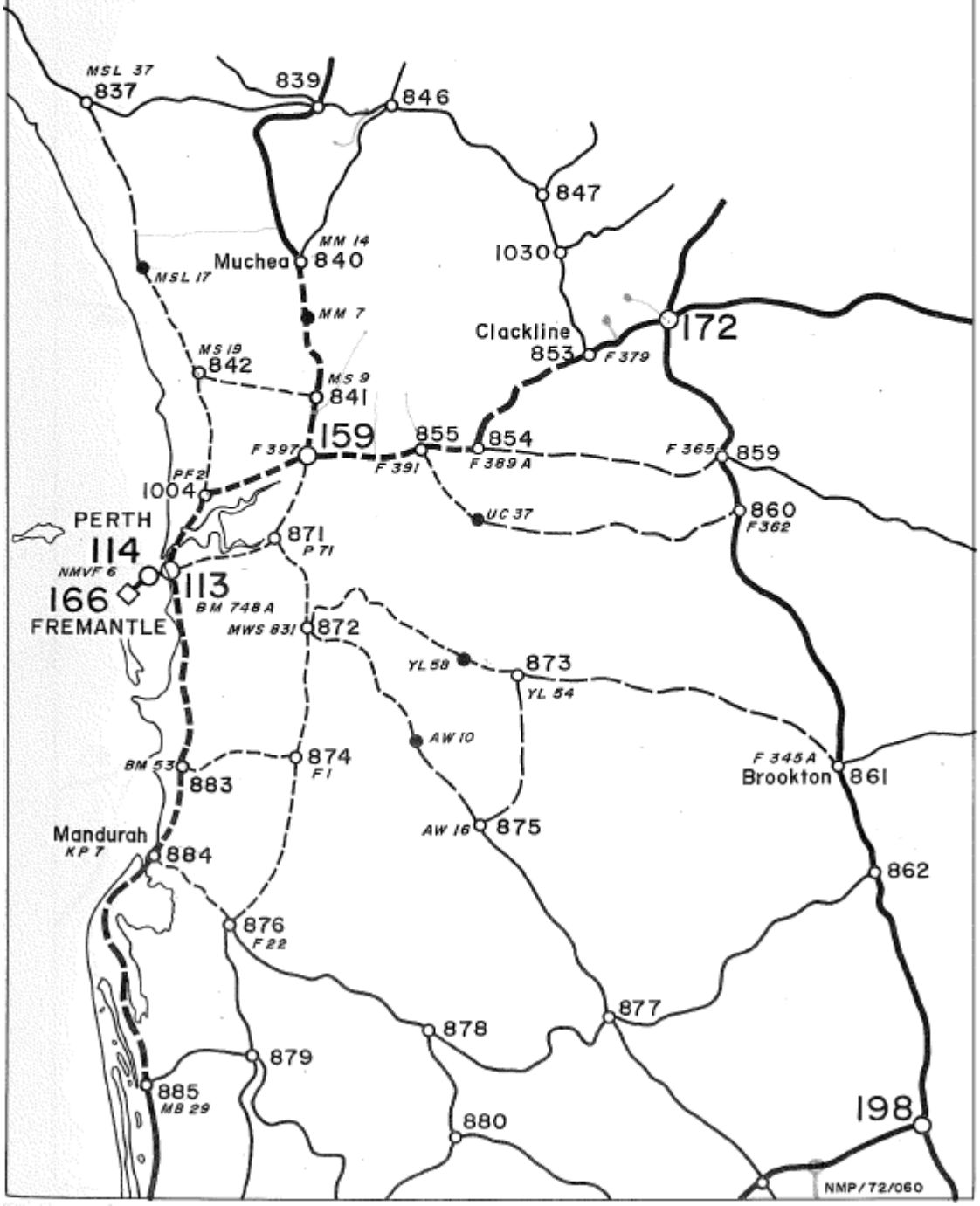
PERTH
METROPOLITAN & BUFFER ZONES

Traverses of original adjustment
Traverses influenced by Metropolitan Zone adjustment
Traverses influenced by Buffer Zone adjustment
Junction points
Bench marks at Junction Points
not at Junction Points

Primary
159

Supplementary
853

F 397
UC 37



Appendix B

Metro and Buffer zones and Costal Profile as reported in Tidal Information – Western Australian Coast, Public Works Department, Western Australia, September 1983, PWD WA 17574-2, page iv.

DATA

1.1 AHD.

Australian Height Datum is the surface derived from the simultaneous adjustment of 757 sections of two-way levelling, holding 30 tide gauges at various ports around the Australian coast fixed at their mean sea level values.

In W.A. the following ports were used: Eucla, Esperance, Albany, Bunbury, Fremantle, Geraldton, Carnarvon, Port Hedland, Broome and Wyndham. Observations for the determination of mean sea level were carried out from 01.01.1966 to 31.12.1968.

1.2 Modified AHD.

At Fremantle, the observed mean sea level value for the 1966/68 period was 0.716m above Low Water Mark Fremantle. However, this conflicted with the already well established datum of "State MSL" (2.48 feet or 0.756m, above LWM Fremantle) which was derived from 12 months tidal observations at Fremantle in 1948, and then carried and adjusted throughout the State.

So as to cause minimal disruption to existing values of BM's, the observed value of 0.716m was modified to 0.756m in the Metro Zone (see Figure 1) to retain the original State MSL datum. This action generated the problem of distributing the introduced discrepancy of 0.040m (ie. the difference between observed and modified AHD's) into the State levelling system outside the Metro Zone.

To overcome this, a Buffer Zone was created around the Metro Zone, and across this buffer, the datum was graded in order to distribute the 0.040m. (see Figure 2).

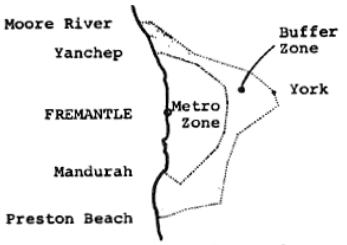


FIGURE 1.

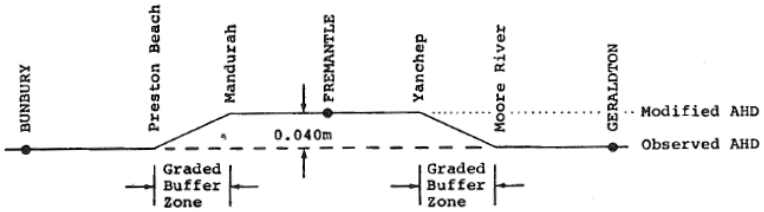


FIGURE 2. (Coastal Profile - not to scale)

1.3 AHD Inferred.

At locations along the coast where values of benchmarks reduced to AHD do not exist (or require checking), it is possible to establish this datum by a "water level transfer". Basically, this involves correlating a relatively short period of tidal observations at the remote location, with the same period of tides at a standard port (eg. Bunbury, Geraldton, Fremantle, etc) used in determining the 1966/68 mean sea level. From the relationship, the observed AHD at the standard port can be inferred at the remote location (eg. Greenhead, Cervantes, etc).

This inferred AHD surface which is an extension of the observed AHD at standard ports, is the SAME surface as the AHD carried into the remote location by land levelling. HOWEVER, a benchmark may have a different value when reduced to AHD as when reduced to AHD inferred. The reason for the discrepancy is primarily due to adjustments and errors in the network of land levels carried in. (see Figure 3 as an example).