

Former *Annual New Zealand Notice to Mariners, No. 18*, published 1 July 2021 is cancelled. Additions and amendments to the former notice are indicated by sidelines.

Authority: Toitū Te Whenua Land Information New Zealand

**Please also refer to:** Chapter 2 of the Admiralty publication *The Mariner's Handbook* (NP100).

The Global Positioning System (GPS) is one of a number of Global Navigation Satellite Systems (GNSS) that are either fully operational or are in the process of being developed. This notice is specific to the use of GPS. If another GNSS such as GLONASS, Galileo, QZ55 or BeiDou is being used, the user should seek advice as to the significance of the issues detailed below relative to that system.

### Status

1. The Global Positioning System (GPS) constellation is complete and available for civil use. GPS has a baseline constellation of 24 satellites, but up to 31 satellites may be operational at one time.
2. Mariners are advised to use GPS with the same caution they apply to other aids to navigation and to ensure that positions are checked by all available means.

### Derived Positions and Charts

3. GPS is referenced to the World Geodetic System 1984 (WGS84) datum. This datum relates positions on the Earth's surface, or in space, to a mathematically defined figure, in this case the WGS84 spheroid (often referred to as an ellipsoid), which is used to approximate, or to model, the complex shape of the Earth. Its origin is the Earth's centre of mass and it provides positional reference throughout the world. WGS84 is referred to as a global, geocentric geodetic datum. The current New Zealand Geodetic Datum 2000 (NZGD2000) is an example of a geocentric datum that is closely aligned with WGS 84.
4. Some local or regional geodetic datums, such as the obsolete New Zealand Geodetic Datum 1949 (NZGD49), use different, non-geocentric, spheroids which provide close approximation to the shape of the Earth over a selected area but become progressively less accurate beyond that region.

**It is essential** that the datum to which positions are referred is compatible with the datum used for the chart on which the position is to be plotted.

5. Charts referred to the WGS84 datum enable GPS positions derived in terms of WGS84 to be plotted directly. Note that the user must ensure that the GPS unit is set to display coordinates in terms of WGS84.
6. Some Pacific Island charts are referred to a datum other than WGS84 datum. The 'SATELLITE DERIVED POSITIONS' note provides latitude and longitude shift values which enable GPS-derived positions to be adjusted before plotting on the chart.
7. For some remaining Pacific Island charts the satellite derived position shift cannot be determined. Most of these charts have a 'SATELLITE DERIVED POSITIONS' note stating this. These are charts for which insufficient details of the horizontal datum are known. It is important to note that in the worst cases, such as isolated oceanic islands or charts of great antiquity, chart latitude and longitude may be several kilometres different from those derived from GPS. Internal positional discrepancies in such charts are the result of horizontal control inconsistencies within, and between, sources of data used in their compilation. These discrepancies **MAY BE SIGNIFICANT TO NAVIGATION**. Mariners are therefore advised to make greater use of classical methods of observational position fixing when close to the shore or navigating in the vicinity of dangers. The relative positions of features may be more reliable for navigation than the use of unadjusted satellite derived positions on a chart whose horizontal datum cannot be defined.

### Chart Scale

8. Positions plotted on, or extracted from a chart will contain an element of imprecision related to the scale of the chart. Thus, for example, at a scale of 1:500,000, a chart user who is capable of plotting to a precision of 0.2 millimetres must appreciate that this represents approximately 100 metres on the ground. However the same plotting precision on a chart at scale 1: 25,000 represents about five metres on the ground.
9. Thus a datum shift of, say, ten metres would not be plottable at the smaller scale in the example (the chart could effectively be said to be on WGS84) but would be plottable (and therefore significant) at the larger scale. This explains why in cases where the datum is undefined and unlikely to be significantly different to WGS84, some Pacific Island small and medium scale approach charts are referenced to the WGS84, while the horizontal datum is undefined on the associated larger scale port plans.