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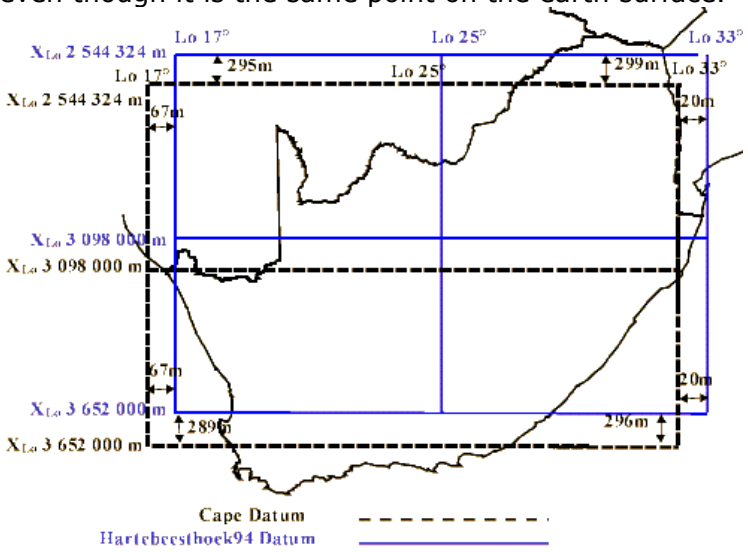
The Co-Ordinate Delusion:

I often hear people talk about the "old South African co-ordinate system" as LO co-ordinates versus GPS or WGS84 co-ordinates. The referral to LO in this context is actually incorrect. To clarify my statement I need to give you a very condensed background.

Prior to 01 January 1999, the co-ordinate reference system used in South Africa as the foundation for most surveying, engineering and geo-referenced projects and programs, was the Cape Datum. This Datum was referenced to the Modified Clarke 1880 ellipsoid and had its origin point at Buffelsfontein, near Port Elizabeth. The Cape Datum was based on the work of HM Astronomers: Sir Thomas Maclear, (1833 - 1870), and Sir David Gill, (1879 - 1907), whose initial geodetic objectives were to verify the size and shape of the Earth in the Southern Hemisphere and later to provide geodetic control for topographic maps and navigation charts.

Since 01 January 1999, the official co-ordinate system for South Africa is based on the World Geodetic System 1984 ellipsoid, commonly known as WGS84, with the ITRF91 (epoch 1994.0) co-ordinates of the Hartbeeshoek Radio Astronomy Telescope used as the origin of this system. This new system is known as the Hartebeesthoek94 Datum and was developed for use by Global Positioning Systems (GPS).

Plainly put the Cape Datum is a older mathematical model than the WGS84 Datum and if you plot the position of a point on the earth surface in each datum respectively, the position of the point will differ by approximately 300m even though it is the same point on the earth surface.

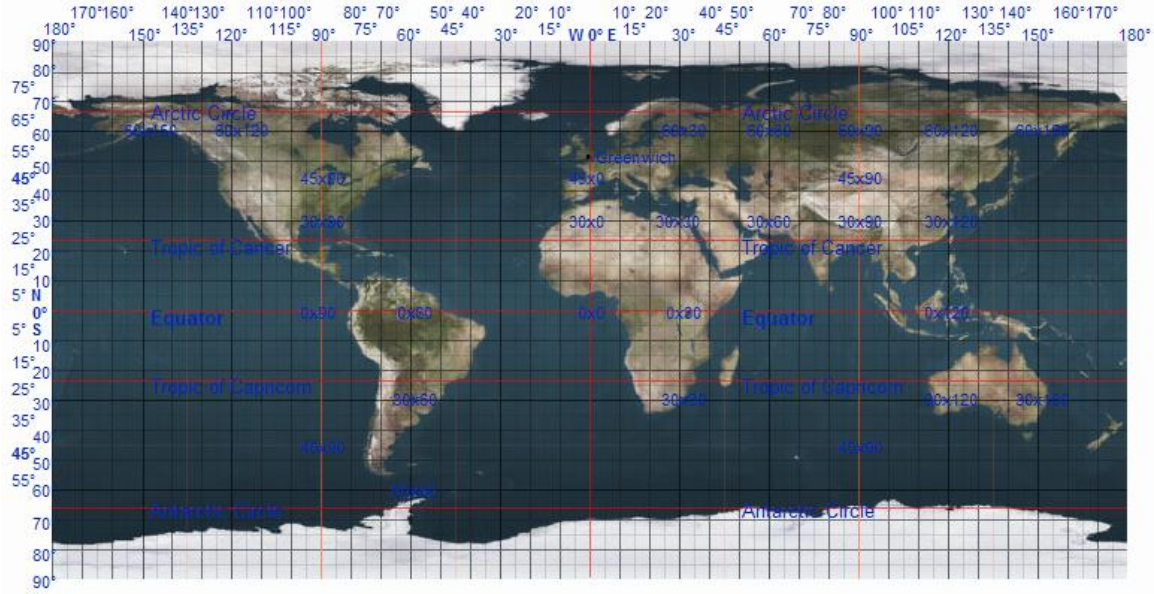


T SA 086 111 2783
T INT +27 21 975 7043
M +27 83 233 3784
F +27 86 654 1033
E info@mmsdesign.co.za

www.mmsdesign.co.za
P.O Box 3311, Durbanville, 7551, Cape Town, South Africa

Vat: 4600198727 Reg: 2001/070326/23 Tax Ref: 9289309149 Customs: 21087717

The referral to LO is actually referring to the meridian (or line of longitude) which is an imaginary arc on the Earth's surface from the North Pole to the South Pole that connects all locations running along it with a given longitude. The position of a point on the meridian is given by the latitude (the horizontal lines shown running east-to-west on maps). Each meridian is perpendicular to all circles of latitude at the intersection points. Each is also the same size, being half of a great circle on the Earth's surface and therefore measuring 20,003.93 km.



LO does therefore only refer to the central meridian closest to the position of the area to be mapped and can be used in relation to both Clark 1880 (Cape Datum) and WGS84 Hartbeeshoek 94 datum.

Plainly put (assuming I am referring to a co-ordinate in Cape Town where the central meridian is 19 deg. East of Greenwich) it is better to talk about the old South African Cape Datum co-ordinates as **CAPE LO19** and WGS84 co-ordinates as **WG LO19**.

The moral of the story is this: If you derive co-ordinates from any map or ortho photo, please make sure about the survey datum that was used otherwise you might just find that you end up 300m from where you thought you'd end up!

Remember that the difference between datums is not a mean shift, but rather a mathematical transformation. Model Maker Systems provides a free utility that will easily convert between different co-ordinate systems.

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Planning resources: Digital Imagery

In the planning and design phase of any irrigation project, one of the first and probably most important stages of any project is to get a true mapped representation of the area to be irrigated. This can be performed using various techniques and technologies. In the previous issue I explained how you can make use of Google Earth™ as resource to place a digital image as a backdrop to a vector based design using Model Maker Systems software. This method is only marginally accurate because of the image quality.

Google Earth™ imagery is a great resource because of it's free easily obtainable nature using the internet. The problem that exists is that Google Earth™ is not always up to date and often unavailable

in remote areas. Fortunately there are other resources available which are also free or very cheap to acquire, but not many designers know about it. In South Africa digital imagery (among various other formats) can be obtained from the Chief Directorate: Surveys & Mapping located in Mowbray, Cape Town.





One of the products supplied by them is digital orthophoto images which are obtained by digitally rectifying 1:10 000 scale aerial photographs. The digital orthophoto is a photographic image of the terrain - but more importantly, it is true to scale and therefore accurate distances and areas can be measured. Images are free if you provide your own 200GIG external hard drive, but can also be purchased on CD at minimal cost.

For a range of maps, aerial photography, survey services and computer data products for government departments, commerce, planning, administrative, educational, management and leisure use: http://w3sli.wcape.gov.za/

References: http://w3sli.wcape.gov.za/Surveys/Mapping/wgs84.htm
http://en.wikipedia.org/wiki/Longitude

Free Co-Ordinate Conversion utility: www.modelmaker.co.za/downloads