

**Certificate of Verification of a Reference Standard of Measurement in Accordance with
Regulation 13 of the National Measurement Regulations 1999 (Cth) in Accordance with the
National Measurement Act 1960 (Cth)**

Description of standard of measurement:

Baseline Name: MACKAY **Calibration Identification:** QLD.MACK2.210907

Electronic Distance Measurement Baseline consisting of 7 concrete pillars. Baseline is located adjacent to Lagoon St (Mackay Bypass Rd), in the Mackay Regional Botanic Gardens.

Permanent Distinguishing Marks: Numerals 0 to 6 marked on concrete pillars. See also Mark ID as stated in the table below.

Client: Queensland Department of Resources
Client Address: Refer to signatory contact details below **Postal Address:**
Contact Name: **Contact Number:**

Date of Verification: 7th September 2021

Period of Verification: 2 years (on the condition that baseline monuments remain undisturbed)

Date of Expiry of Certificate: 7th September 2023

Values of Standard of Measurement:

The base linear distances herein are from Station 0 and have been established by point to point measurement, corrected for slope, offset and datum plane. The base alignment is from Station 0 to Station 6. Negative offsets are to the left of the line viewed from Station 0. Datum Plane is based on Reduced Level (RL): 0 metres.

Station	Mark ID	Reduced Level (m)	Offset (m)	Distance (m)	Uncertainty (m)*
0	753178	13.421	0.000	N/A	N/A
1	202585	13.409	-0.558	20.686	0.0006
2	202586	13.226	-1.321	142.099	0.0007
3	202587	13.220	-1.801	364.594	0.0010
4	202588	13.672	-1.633	637.675	0.0014
5	753263	12.962	-0.803	809.573	0.0016
6	202589	13.138	0.000	880.338	0.0017

* The stated uncertainty applies only to the distances in the table above. Distances are from Station 0.

Test Method: CBD/041230.LTOLE_Baseline_Calibration_Procedure


Testing performed as per stated procedures. Distances measured using a Leica TS60 total station and atmospheric conditions measured using three Delta OHM HD31 Multifunction Loggers. All equipment is calibrated by NATA accredited laboratories.

Test Conditions: Measurements performed on the date of verification between 8 am and 12 pm under mostly fine conditions. Average ambient atmospheric conditions during the measurements are as follows:
Temperature 22.3 °C **Pressure 1023.6 hPa** **Relative humidity 41.0 %**

Uncertainty of the Value(s): $\pm (0.5 + 1.3 \times 10^{-3} \times L)$ mm (Where L is length in m)

This uncertainty has been calculated in accordance with the principles in JCGM 100: 2008 *Evaluation of Measurement Data — Guide to the Expression of Uncertainty in Measurement*, and give intervals estimated to have a confidence level of 95% at the time of verification. Unless otherwise stated, a coverage factor (k) of 2.0 has been used. The uncertainties apply at the time of measurement only and take no account of any movement or other effects that may apply afterwards. When estimating the uncertainty at any later time, other relevant information should also be considered, including, where possible, the history of the stability of the baseline.

Verifying Authority: Queensland Department of Resources

Signature:  **Signatory:** Isaac Aaron Stiller
Position: QLD State EDM Calibration Officer
Date of Issue: 15 September 2021

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Being a person with powers delegated by the Director General of the Queensland Department of Resources, appointed as a verifying authority under Regulations 71 and 73 of the *National Measurement Regulations 1999* (Cth) in accordance with the *National Measurement Act 1960* (Cth), I hereby certify that the above standard is verified as a reference standard of measurement in accordance with the Regulations by the above named authority. Accredited for compliance with AS ISO/IEC 17025:2018. The measurements used to produce this report are from equipment calibrated by the National Measurement Institute and other NATA accredited facilities. The results of the tests and/or calibrations included in this document are consequently traceable to SI units through Australian/National standards.