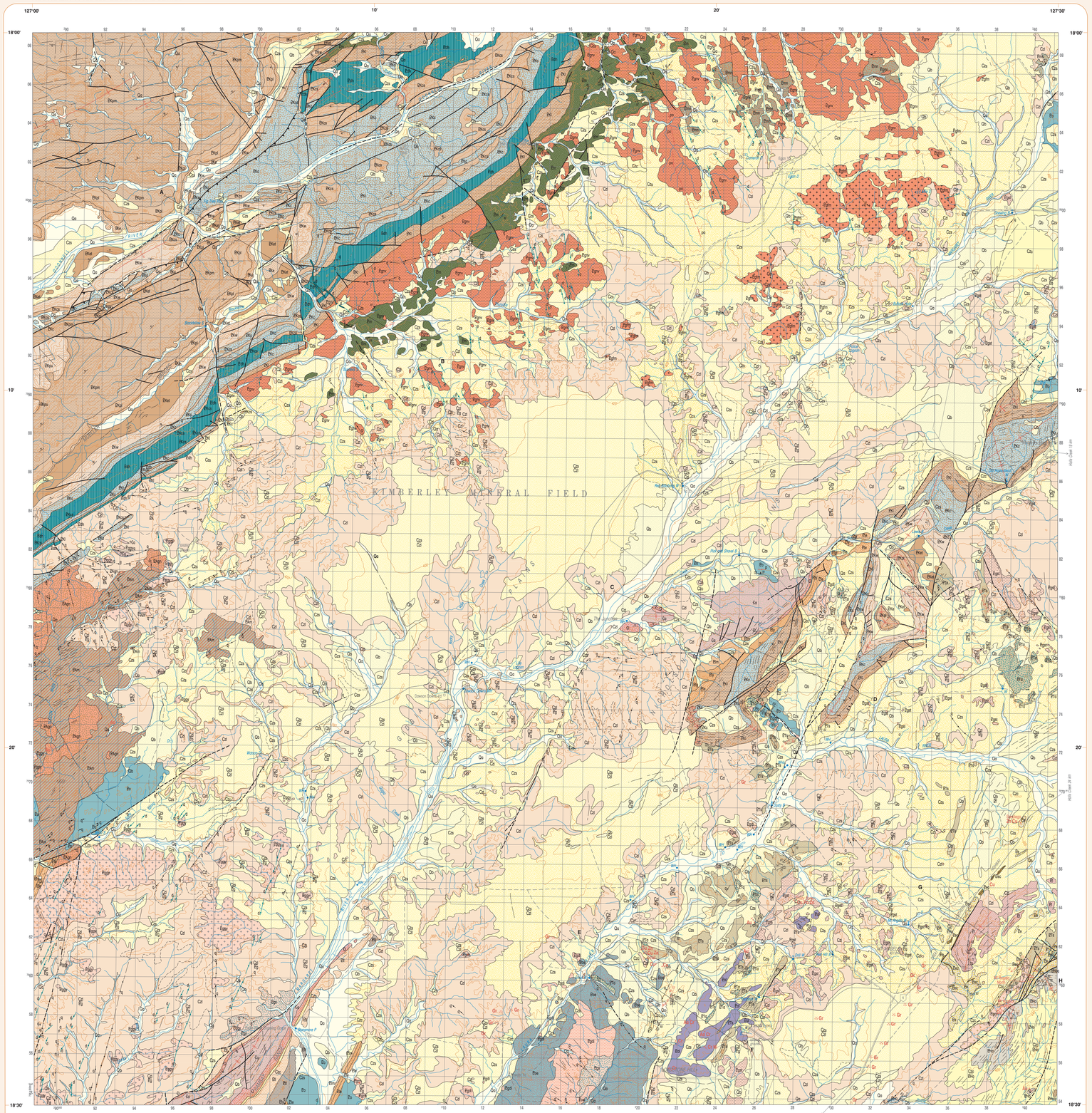
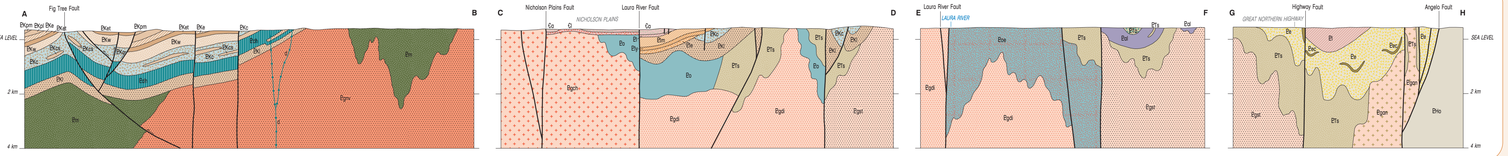
ANGELO

AUSTRALIA 1 : 100 000 GEOLOGICAL SERIES — **GEOLOGICAL SURVEY OF WESTERN AUSTRALIA** — **SHEET 4361**



DIAGRAMATIC SECTIONS



PHANEROZOIC

CAINOZOIC — QUATERNARY

Qo — Alluvium—unconsolidated silt, sand, and gravel

Qb — Black soil—clay and silt

Czs — Colluvium and alluvium—partly consolidated silt, sand, and gravel; adjacent to drainage; sand plain on laterite surface

Czc — Colluvium—partly consolidated scree and valley-fill deposits

Czl — Laterite—massive and pisolitic ferruginous duricrust; forms plateaus overlying weathered rock (Eg—granitoid, EA—Amherst Metamorphics, ET—Tickalara Metamorphics); steep breakaways commonly form at the margins

q — Quartz veins, of various ages; youngest generation postdates Cambrian units

PALAEOZOIC — CAMBRIAN

Co — **ANTRIM PLATEAU VOLCANICS:** dark grey vesicular and amygdaloidal basalt; generally deeply weathered

Cl — **LALLY CONGLOMERATE:** medium- to coarse-grained quartz sandstone, and cobble conglomerate

PROTEROZOIC

c. 670 Ma — Lissel Downs Group

Ely — **LUBBOCK FORMATION:** grey, green, or purple siltstone and shale; interbedded with fine- and medium-grained quartz wacke

Elt — **TEAN FORMATION:** feldspathic sandstone, quartz wacke, quartz sandstone, pebble conglomerate, siltstone, and shale; minor dolomite

Elm — **McALLY SHALE:** black, grey, and green shale; minor siltstone and fine to very fine-grained sandstone

Ely — **YURABI FORMATION:** foggy to blocky quartz sandstone and feldspathic sandstone; grey and purple siltstone, shale, dolomitic siltstone, and sandy dolomite

Ele — **EGAN FORMATION:** tillite, oricas, dolomite, limestone, sandstone, siltstone, and shale

d — Dolerite dyke

po — Andesite to rhyolite porphyry dyke; coarse phenocrysts of K-feldspar, quartz, and plagioclase

c.1800 Ma

Eldh — **HART DOLERITE:** dark grey dolerite

Kimberley Group

Elkpu — **PENTECOST SANDSTONE:** Upper unit: medium- to coarse-grained quartz sandstone and pebbly quartz sandstone

Elkpm — Middle unit: white, fine- to coarse-grained quartz sandstone; purple, fine-grained sandstone, siltstone, and shale

Elkpl — Lower unit: quartz sandstone and siltstone

Elkv — **ELGEE SILTSTONE:** red-brown and grey siltstone and shale; minor quartz sandstone

Elkwt — **Tarrara Member:** arenaceous dolomite, sandy dolomite, oolitic dolomite, shale, micaceous siltstone, and fine-grained sandstone

Elkw — **WARTON SANDSTONE:** white to purple, massive to blocky, quartz sandstone; minor feldspathic sandstone

Elkc — **CARSON VOLCANICS:** green to black basalt, amygdaloidal basalt, and basaltic volcaniclastic rocks; interbedded quartz sandstone, feldspathic sandstone, and laminated siltstone and mudstone

Elkca — Pale yellow-brown, laminated to massive, quartz- and felspar-rich sandstone and siltstone

Elkl — **KING LEOPOLD SANDSTONE:** white to pale brown, medium- to coarse-grained quartz sandstone and pebbly quartz sandstone

El — **WOOLA BULLA FORMATION:** lithic quartz sandstone and granule to pebble conglomerate; minor argillite

KIMBERLEY BASIN

c.1820 Ma

Egm — Egp — Egg — Egc — Egy

Egm — **MOUNT CHRISTINE GRANITOID:** coarsely porphyritic to medium-grained biotite monzogranite

Egd — **DILLINGER MONZOGRANITE:** medium- to fine-grained, locally porphyritic, leucocratic biotite monzogranite; minor syenogranite; abundant mafic inclusions adjacent to contacts with gabbro

Egg — **GRIMPY MONZOGRANITE:** weakly porphyritic, fine-grained biotite monzogranite

Egd — **LOADSTONE MONZOGRANITE:** weakly porphyritic biotite monzogranite and syenogranite; minor microgranodiorite

Egc — Granitoid rocks rich in inclusions of angular, rounded and flattened, mafic rock

Eb — Undivided porphyritic to even-grained, medium- to fine-grained gabbro; quartz gabbro, and tonalite; extensively veined by granitoid rocks locally

Ebe — **EMALL GABBRO:** medium to fine-grained gabbro; quartz gabbro, and tonalite; extensively veined by the DILLINGER MONZOGRANITE; opfile, quartz-feldspar porphyry, and pegmatite

Egpm — **ANGELO MICROGRANITE:** sheared medium- to fine-grained porphyritic microgranite, disseminated malachite locally present

c.1840 Ma

Ek — Ekc

Ek — **KOONGIE PARK FORMATION:** metamorphosed felsic volcanic and volcaniclastic rocks; minor chert, banded iron-formation, and carbonate

Ekc — Metamorphosed chert; banded, and locally iron-rich

Veins and dykes: p—muscovite-rich pegmatite; g—medium- to fine-grained granitoid dyke; o—opfile dyke

Amherst Metamorphics

Ekgn — Ekm

Ekgn — Inclusion-rich, biotite-hornblende granodiorite gneiss, and garnet-cordierite-andalusite-sillimonite-biotite monzogranite gneiss; inclusions of metasedimentary and mafic igneous rocks; metamorphosed, possible equivalent of NEVILLE GRANODIORITE

Ekm — Medium- to high-grade metasedimentary rocks, and granitoid rocks; quartz-muscovite-biotite-andalusite-garnet-cordierite-K-feldspar-plagioclase granofels and schist; metamorphosed equivalents of MARBOO FORMATION

c.1860 Ma

Egkm — Egnv — Box Inlet Inlier

Egkm — **GADWING GRANODIORITE:** coarsely porphyritic, biotite-hornblende granodiorite and tonalite; contains mafic inclusions

Egnv — **NEVILLE GRANODIORITE:** medium- to fine-grained biotite granodiorite and tonalite; minor monzogranite; metasedimentary rock inclusions are abundant adjacent to contacts with metasedimentary rock

Eul — **LAMBOO ULTRAMAFICS:** partly serpentinized ultramafic and mafic intrusive rocks

Tickalara Metamorphics

ETs — ETm

ETs — Metamorphosed interbedded psammite and pelite; minor metamorphosed felsic and mafic volcaniclastic rocks; includes carbonate locally

ETm — Metamorphosed basaltic volcanic and volcaniclastic rocks; minor metasiltarite sills, thin interbedded metapelite, and metamorphosed carbonate and chert lenses

Halls Creek Group

c.1890 Ma

EHo — EHmg — **OLYMPIO FORMATION:** very low- to low-grade, thin- to medium-bedded mudstone, siltstone, turbiditic quartz wacke, greywacke, and volcanic sandstone

Metamorphosed thick-bedded, turbiditic quartzitic sandstone, and minor pelite

>1890 Ma

Em — Emg — Emm

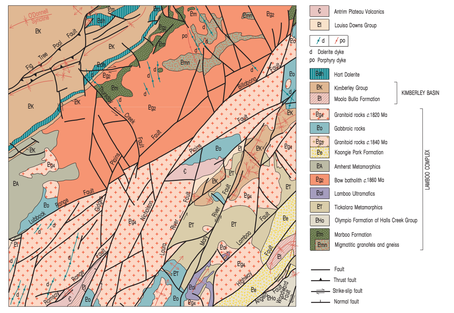
Em — **MARBOO FORMATION:** low-grade, turbiditic metasandstone; quartz-chlorite-muscovite phyllite; narrow zones of medium- to high-grade quartz-muscovite-biotite-andalusite-cordierite hornfels occur adjacent to granitoid intrusions

Emg — Medium-grade, quartz-muscovite-biotite-sillimonite-andalusite(-cordierite) schist (possibly after hornfels)

Emm — High-grade, migmatitic quartz-muscovite-biotite-sillimonite-andalusite-cordierite-K-feldspar-plagioclase granofels and gneiss

LAMBOO COMPLEX

TECTONIC SKETCH MAP



- Antrim Plateau Volcanics
- Louise Downs Group
- d / po
- d Dolerite dyke
- po Porphyry dyke
- Hart Dolerite
- Kimberley Group
- Moolo Bulla Formation — KIMBERLEY BASIN
- Granitoid rocks c.1820 Ma
- Gabbroic rocks
- Granitoid rocks c.1840 Ma
- Koongie Park Formation
- Amherst Metamorphics
- Bow batholith c.1860 Ma
- Lamboo Ultramafics
- Tickalara Metamorphics
- Olympio Formation of Halls Creek Group
- Marboo Formation
- Migmatitic granofels and gneiss — LAMBOO COMPLEX
- Fault
- Thrust fault
- Strike-slip fault
- Normal fault

Geological boundary

- accurate
- inferred

Fault

- accurate
- concealed
- reverse
- shear zone

Fold, showing direction of plunge

- anticline; inferred
- syncline; inferred

Small-scale folds showing strike and dip of axial surface, direction of plunge, and nature of vergence (S, Z, or M profile)

- D_2
- D_3

Bedding, showing strike and dip

- inclined
- vertical
- horizontal
- overturned
- strike and dip estimated from aerial photography
  - horizontal
  - 0 – 15°
  - 15 – 45°
  - 45 – 90°
- trend of bedding (also visible through surficial deposits)

Igneous layering

- inclined

Way-up indicator

- top of bed

Foliation, showing strike and dip

- D_1
  - inclined
  - vertical
- D_2
  - inclined
  - vertical

Strongly sheared rock

Cleavage, showing strike and dip

- D_1
  - inclined
  - vertical
- D_2
  - inclined
- D_3
  - inclined
  - vertical

Lineation, showing direction of plunge

- bedding—cleavage intersection

Air photo lineament

Highway with national route marker

Formed road

Track

Fence, generally with track

Homestead — Moolo Bulla

Building, yard

Microwave repeater station

Horizontal control, major

Contour line, 20 metre interval — 320

Watercourse, ephemeral

Bore

Well

Windpump

Dam

Tank

Spring

Waterhole

Quarry

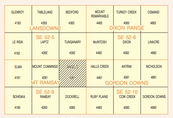
Prospect — Emull

Mineral occurrence

- Chromium — Cr
- Copper — Cu
- Gold — Au
- Lead — Pb
- Nickel — Ni
- Uranium — U
- Zinc — Zn

Industrial minerals

- Asbestos (amphibole) — As
- Gravel — Gr



1:100 000 maps shown in black
1:250 000 maps shown in brown

True north, grid north and magnetic north are shown diagrammatically for the centre of the map. Magnetic north is correct for 1993 and moves easterly by about 0.1° in 6 years.

PRODUCT OF THE NATIONAL GEOSCIENCE ACCORD

DEPARTMENT OF MINERALS AND ENERGY
HON. GEORGE CASH, J.P., M.L.C.
MINISTER FOR MINES
L. C. RANFORD, ACTING DIRECTOR GENERAL

PIETRO GLU
DIRECTOR, GEOLOGICAL SURVEY OF WESTERN AUSTRALIA

SCALE 1:100 000

1000 0 1 2 3 4 5 6 7 8 9 10
Metres — Kilometres

TRANSVERSE MERCATOR PROJECTION
Grid lines indicate 1000 metre interval of the Australian Map Grid Zone 52

Geology by: T.J. Griffin and I.M. Tyler, 1991–92

Edited by: C. Strong, and G. Luon

Cartography by: C. Bartlett, M. Prouse, and G. Luon of the Cartographic Services Branch, Surveys and Mapping Division, Department of Minerals and Energy, Western Australia

Compiled and produced using computer-assisted graphic applications, and available in digital form

Topographic base supplied by the Department of Land Administration and modified from geological field surveys

Published by and available from the Geological Survey of Western Australia, Department of Minerals and Energy, 100 Plain Street, East Perth, W.A., 6004

Printed by the State Print, Department of State Services, Western Australia

ANGELO

SHEET 4361 FIRST EDITION 1994

© Western Australia 1994