

REFERENCE

PHANEROzoic	Cenozoic	<div><div>Qa</div><div>Qk</div><div>Qn</div></div>	<div>Qa</div> <div>Qk</div> <div>Qn</div>
		<div><div>Cxk</div><div>Cxk</div><div>Cxp</div></div>	<div>Cxk</div> <div>Cxk</div> <div>Cxp</div>
		<div><div>K</div></div>	<div>K</div>
Mesozoic	Triassic		
Palaeozoic	Permian	<div><div>P</div></div>	<div>P</div>

Qa Alluvium—unconsolidated silt, sand, and gravel, in river channels  
Qk Underlain Quaternary deposits; includes colluvium, residual alluvium, eolian sand, and clay  
Qn Clay, mud, silt, and sand, tidal and supratidal deposits, mangroves, lagoons, and coastal dunes  
Cxp Undivided Cretaceous deposits; includes partly consolidated colluvium and alluvium, and siltstone and laterite  
Ck Carbonate—sheet carbonates; found along major drainage lines  
Cp ROSE RSHOUTE psilite limonite deposits; developed along palaeosol drainage lines

K Sandstone, conglomerate, siltstone, and mudstone; includes CALLAWA FORMATION, FREZER SANDSTONE, JARLEMI SILTSTONE, NANTARA FORMATION, PARIA FORMATION, MULLA SANDSTONE, and YARRAOLLA CONGLOMERATE

P Sandstone, conglomerate, siltstone, and mudstone; includes PATERSON FORMATION, GRANT GROUP, and POOLE SANDSTONE

Proterozoic	Yarner Supergroup	Barramundi Group	<div><div>Bs</div></div>	<div>Bs</div>	Quartz sandstone, siltstone, and mudstone; minor conglomerate
			<div><div>Bu</div></div>	<div>Bu</div>	Fine- to coarse-grained sandstone, siltstone, mudstone, and stromatolitic and non-stromatolitic dolomite; minor conglomerate
			<div><div>Bt</div></div>	<div>Bt</div>	Throssell Group: quartzitic and micaceous sandstone, siltstone, mudstone, conglomerate, stromatolitic and non-stromatolitic dolomite, and dolomite conglomerate; includes Lami Group Matarbury Hill
			<div><div>Bm</div></div>	<div>Bm</div>	Sandstone, siltstone, mudstone, conglomerate, chert, stromatolitic and non-stromatolitic dolomite, and dolomite sandstone, mudstone, and conglomerate
			<div><div>Bs</div></div>	<div>Bs</div>	Pebble to boulder conglomerate, pebbly sandstone, sandstone, siltstone, and mudstone
Proterozoic	Yarner Supergroup	Barramundi Group	<div><div>Bt</div></div>	<div>Bt</div>	Quartz sandstone, conglomerate, siltstone, and mudstone
			<div><div>Bs</div></div>	<div>Bs</div>	CAPRICORN FORMATION: conglomerate, ferruginous and quartzitic sandstone, ferruginous siltstone and mudstone, dolomite, and felsic volcanic rock
			<div><div>Bt</div></div>	<div>Bt</div>	Quartz sandstone, conglomerate, siltstone, and mudstone
			<div><div>Bs</div></div>	<div>Bs</div>	CAPRICORN FORMATION: conglomerate, ferruginous and quartzitic sandstone, ferruginous siltstone and mudstone, dolomite, and felsic volcanic rock
			<div><div>Bt</div></div>	<div>Bt</div>	Quartz sandstone, conglomerate, siltstone, and mudstone

Proterozoic	Wolfe Group	<div><div>Bt</div></div>	<div>Bt</div>	ASHBURTON FORMATION: mudstone, siltstone, thin- and thick-bedded sandstone, minor banded iron-formation, conglomerate, mafic and felsic volcanic rocks, and dolomite; metamorphosed
		<div><div>Bt</div></div>	<div>Bt</div>	JUNE HILL VOLCANICS: mafic lava, pillow lava, and volcanoclastic rock; includes intermediate and felsic volcanic rock, sandstone, and dolomite; metamorphosed
		<div><div>Bt</div></div>	<div>Bt</div>	DUCK CREEK DOLOMITE: thin- to thick-bedded dolomite; local stromatolitic dolomite; minor chert and argillite; metamorphosed
		<div><div>Bt</div></div>	<div>Bt</div>	MOUNT MURPHY FORMATION: ferruginous sandstone and conglomerate, mudstone, siltstone, and dolomite; metamorphosed
		<div><div>Bt</div></div>	<div>Bt</div>	CHEELA SPRINGS BASALT: amygdaloidal basalt and mafic volcanoclastic rock; metamorphosed
Proterozoic	Wolfe Group	<div><div>Bt</div></div>	<div>Bt</div>	BEASLEY RIVER QUARTZITE: fine- to coarse-grained quartz sandstone, conglomerate, mudstone, and siltstone; metamorphosed
		<div><div>Bt</div></div>	<div>Bt</div>	PILBARA CHERT BRECCIA: chert breccia and banded chert; overlies CARAWINE DOLOMITE
		<div><div>Bt</div></div>	<div>Bt</div>	ASHBURTON FORMATION: mudstone, siltstone, thin- and thick-bedded sandstone, minor banded iron-formation, conglomerate, mafic and felsic volcanic rocks, and dolomite; metamorphosed
		<div><div>Bt</div></div>	<div>Bt</div>	JUNE HILL VOLCANICS: mafic lava, pillow lava, and volcanoclastic rock; includes intermediate and felsic volcanic rock, sandstone, and dolomite; metamorphosed
		<div><div>Bt</div></div>	<div>Bt</div>	DUCK CREEK DOLOMITE: thin- to thick-bedded dolomite; local stromatolitic dolomite; minor chert and argillite; metamorphosed

Proterozoic	Hamersley Group	Ture Creek Group	<div><div>Bt</div></div>	<div>Bt</div>	Mudstone, siltstone, sandstone, and conglomerate; local stromatolitic dolomite and basalt; metamorphosed
			<div><div>Bt</div></div>	<div>Bt</div>	Undivided Hamersley Group; metamorphosed
			<div><div>Bt</div></div>	<div>Bt</div>	BOOLEGEBA IRON FORMATION: fine-grained, finely laminated iron-formation; mudstone, siltstone, and chert; metamorphosed
			<div><div>Bt</div></div>	<div>Bt</div>	WOONGARRA BRIOULITE: rhyolite, rhyodolite, rhyolitic breccia, and banded iron-formation; metamorphosed
			<div><div>Bt</div></div>	<div>Bt</div>	WELU WOLU FORMATION: banded iron-formation (often papillae); mudstone, siltstone, and numerous dolomite sills; metamorphosed
Proterozoic	Hamersley Group	Ture Creek Group	<div><div>Bt</div></div>	<div>Bt</div>	BROCKMAN IRON FORMATION: banded iron-formation, chert, mudstone, and siltstone; metamorphosed
			<div><div>Bt</div></div>	<div>Bt</div>	MOUNT MURPHY BASALT: amygdaloidal basalt and mafic volcanoclastic rock; metamorphosed
			<div><div>Bt</div></div>	<div>Bt</div>	WITTENBOM FORMATION: thin- to medium-bedded dolomite, dolomite mudstone, chert, and felsic to mafic volcanic sandstone; metamorphosed
			<div><div>Bt</div></div>	<div>Bt</div>	CARAWINE DOLOMITE: thin- to thick-bedded dolomite, stromatolitic dolomite, and chert; metamorphosed
			<div><div>Bt</div></div>	<div>Bt</div>	MARRA MARRA IRON FORMATION: chert, banded iron-formation, mudstone, and siltstone; metamorphosed

SOUTHERN PILBARA

Proterozoic	Fortescue Group	<div><div>Ar</div></div>	<div>Ar</div>	JERRINAH FORMATION: carbonaceous mudstone and siltstone, thin-bedded sandstone, chert, felsic volcanoclastic rock, basalt, and dolomite; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	Pillowed and massive basalt flows, and basaltic breccia; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	Undivided BOONGAL PYRADE and BUNINAH FORMATIONS in the Wyloo Dome; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	BUNINAH FORMATION: pillowed and massive basaltic flows, basaltic breccia, and basaltic volcanoclastic sandstone; minor chert, amygdaloidal basalt flow occur in upper parts of formation; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	Quartzolite conglomerate and sandstone, mudstone, and siltstone; metamorphosed
Proterozoic	Fortescue Group	<div><div>Ar</div></div>	<div>Ar</div>	PyraDE FORMATION: pyroxene spinifex-textured basaltic flows and pillow lava, mafic volcanoclastic rock, minor chert, local komatiite; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	BOONGAL FORMATION: pillowed and massive basaltic flows, basaltic breccia, basaltic volcanoclastic sandstone, and argillite; minor chert; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	HARDEY FORMATION: argillite, sandstone, pebbly sandstone, conglomerate, basaltic flows and breccia, and basaltic volcanoclastic sandstone; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	Basaltic flows and associated volcanoclastic rock; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	Basaltic flows and associated volcanoclastic rock; metamorphosed
Proterozoic	Fortescue Group	<div><div>Ar</div></div>	<div>Ar</div>	Massive quartz-kalder porphyry, medium- to thick-bedded porphyritic felsic breccia, and silt- and sand-sized felsic volcanoclastic rock; metamorphosed; includes Bambo Creek Member, Koolberran Volcanic Member, Warram Member, and Spinnery Porphyry
		<div><div>Ar</div></div>	<div>Ar</div>	Basaltic breccia; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	Quartzolite sandstone, conglomerate, mudstone, and siltstone; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	Felsic volcanic rock; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	BELLARY FORMATION: argillite, felsophitic sandstone, conglomerate, and basaltic flows and pillow lava; metamorphosed

SOUTHERN AND NORTHERN PILBARA

Proterozoic	Fortescue Group	<div><div>Ar</div></div>	<div>Ar</div>	JERRINAH FORMATION: carbonaceous mudstone and siltstone, thin-bedded sandstone, chert, felsic volcanoclastic rock, basalt, and dolomite; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	Pillowed and massive basalt flows, and basaltic breccia; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	Undivided BOONGAL PYRADE and BUNINAH FORMATIONS in the Wyloo Dome; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	BUNINAH FORMATION: pillowed and massive basaltic flows, basaltic breccia, and basaltic volcanoclastic sandstone; minor chert, amygdaloidal basalt flow occur in upper parts of formation; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	Quartzolite conglomerate and sandstone, mudstone, and siltstone; metamorphosed
Proterozoic	Fortescue Group	<div><div>Ar</div></div>	<div>Ar</div>	PyraDE FORMATION: pyroxene spinifex-textured basaltic flows and pillow lava, mafic volcanoclastic rock, minor chert, local komatiite; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	BOONGAL FORMATION: pillowed and massive basaltic flows, basaltic breccia, basaltic volcanoclastic sandstone, and argillite; minor chert; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	HARDEY FORMATION: argillite, sandstone, pebbly sandstone, conglomerate, basaltic flows and breccia, and basaltic volcanoclastic sandstone; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	Basaltic flows and associated volcanoclastic rock; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	Basaltic flows and associated volcanoclastic rock; metamorphosed
Proterozoic	Fortescue Group	<div><div>Ar</div></div>	<div>Ar</div>	Massive quartz-kalder porphyry, medium- to thick-bedded porphyritic felsic breccia, and silt- and sand-sized felsic volcanoclastic rock; metamorphosed; includes Bambo Creek Member, Koolberran Volcanic Member, Warram Member, and Spinnery Porphyry
		<div><div>Ar</div></div>	<div>Ar</div>	Basaltic breccia; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	Quartzolite sandstone, conglomerate, mudstone, and siltstone; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	Felsic volcanic rock; metamorphosed
		<div><div>Ar</div></div>	<div>Ar</div>	BELLARY FORMATION: argillite, felsophitic sandstone, conglomerate, and basaltic flows and pillow lava; metamorphosed

<div><div>Ar</div></div>	<div>Ar</div>	Feldspar porphyry; metamorphosed
<div><div>Ar</div></div>	<div>Ar</div>	Granite to granodiorite; variably foliated

Ar Rhyolite and dacite flows, and associated volcanoclastic rocks; metamorphosed  
As Sedimentary rock, undivided; includes algalinitic and polystratoclastic, pebbly sandstone, mudstone, siltstone, and chert; metamorphosed  
Ac Chert; metamorphosed  
Asi Banded iron-formation, chert, and papillae; metamorphosed  
Ab Basaltic and andesite flows, and associated volcanoclastic rocks; metamorphosed  
Au Ultramafic rock, undivided; includes metamorphosed peridotite, dunite, pyroxene peridotite, and serpentinite, talc and amphibole schist

INTRUSIVE ROCKS

Di Diabase dykes, sills, and small intrusions (various ages)

Bp Granite, biotite-bearing and mainly coarse-grained; contains mafic xenoliths; intruded into Wyloo Group

Bp Hornblende monzogranite and porphyry (age uncertain, but post-dates 2660 Ma)

Ar Medium- to coarse-grained dolerite intruded into Fortescue Group; metamorphosed

Ar Layered sills intruded into Fortescue Group in southern Pilbara; sills generally consist of a coarse-grained pyroxenite base, overlain by leucocratic gabbro or dolerite; local basal serpentinite; metamorphosed

Ar DOOYA DOOYA DOLOMITE: fine- to medium-grained dolerite; metamorphosed

Ar GILEY GRANOPHYRE: fine- to medium-grained gabbro, commonly porphyritic; includes hybrid rocks; metamorphosed

Ar Gabbro containing quench-textured, acicular pyroxene crystals; metamorphosed

Ar Hornblende monzogranite and porphyry; metamorphosed

Ar Massive quartz-kalder porphyry, medium- to thick-bedded porphyritic felsic breccia, and silt- and sand-sized felsic volcanoclastic rock; metamorphosed; includes Bambo Creek Member, Koolberran Volcanic Member, Warram Member, and Spinnery Porphyry

Ar Black Range Dolerite suite: dolerite, medium- to coarse-grained gabbro; weakly metamorphosed

Ar Black Range Dolerite suite: dolerite and gabbro; weakly metamorphosed

Ar Diabase dykes and sills; metamorphosed

Ar Rhyolite and dacite flows, and associated volcanoclastic rocks; metamorphosed

Ar Sedimentary rock, undivided; includes algalinitic and polystratoclastic, pebbly sandstone, mudstone, siltstone, and chert; metamorphosed

Ar Chert; metamorphosed

Ar Banded iron-formation, chert, and papillae; metamorphosed

Ar Basaltic and andesite flows, and associated volcanoclastic rocks; metamorphosed

Ar Ultramafic rock, undivided; includes metamorphosed peridotite, dunite, pyroxene peridotite, and serpentinite, talc and amphibole schist

Ar Feldspar porphyry; metamorphosed

Ar Granite to granodiorite; variably foliated

Ar Porphyritic granite; foliated

Ar Alkal feldspar granite; metamorphosed

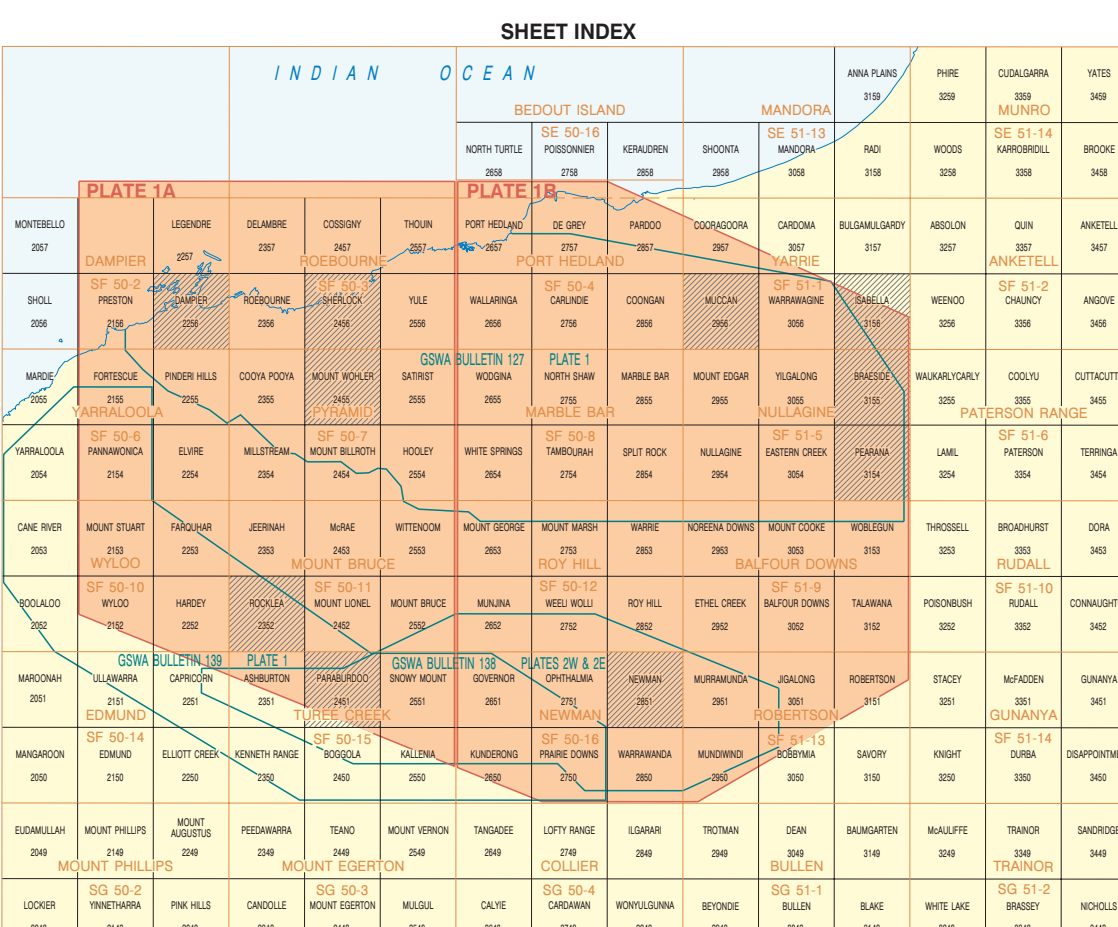
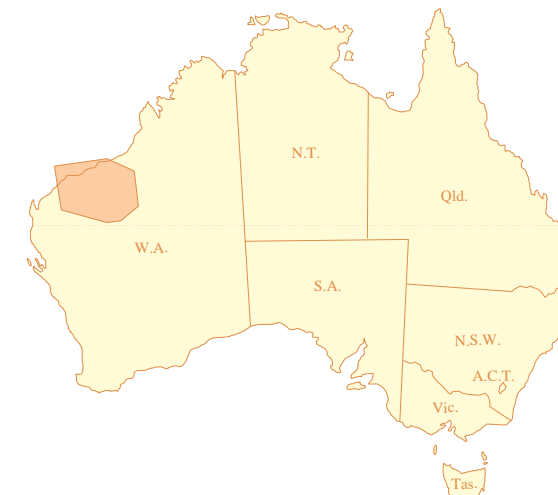
Ar Folded, gneissic, or magmatic biotite monzogranite, granodiorite, and tonalite; metamorphosed

Ar Tonalite and granodiorite; foliated

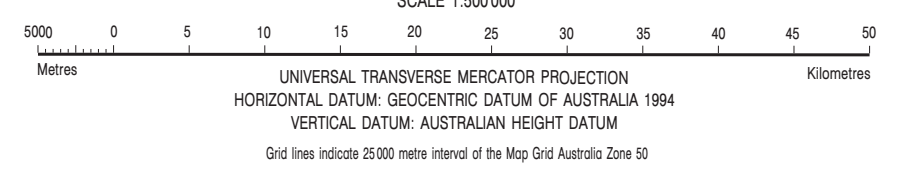
Ar Numerous greenstone xenoliths in foliated granitoid rock

SYMBOLS

Geological boundary	Mineral field boundary
Fault	Mineral field district boundary
exposed	Mining group
concealed	Mine or prospect from MINEX data (gold, unless otherwise indicated)
reverse	Closed mine or undeveloped deposit from MINEX data
Major fold, showing axial trace and generalized plunge direction	Closed mine or undeveloped deposit from published GSMA maps
anticline, exposed, concealed	Mining zone or ore stockpiles
syncline, exposed, concealed	Mineral occurrence
overturned anticline, exposed	Antimony
Bedding, showing strike and dip	Asbestos, chrysotile
horizontal	Asbestos, crocidolite
inclined	Baryte
vertical	Building or dimension stone
overturned	Chromium
strike and dip estimated from aerial photography	Chrysotile
0–10°	Copper
10–40°	Diamond
40–90°	Fluorite
Igneous breccia, showing strike and dip	Garnet
inclined	GSS
Isotopic age determination site with identification number	Iron
Fortescue Group only	Lead
Highway with national route marker	Limestone
Formed road	Lithium
Track	Manganese
Gas pipeline	Mica
Railway	Moisture
Airfield	Nickel
Landing ground	Niobium
Townsite	Potassium group element
population: less than 1000	Soft (solar evaporator)
1000–10000	Silver
greater than 10000	Tantalum
Homestead	Ti
Building	Titanium
National Park boundary	Tungsten
Reserve boundary	Uranium
Horizontal control, major	Vanadium
Watercourse	Zinc
Lighthouse	
Abandoned	



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GEOLOGICAL SURVEY OF WESTERN AUSTRALIA

BULLETIN 144 PLATE 1C

GEOLOGY OF THE  
FORTESCUE GROUP—EAST  
PILBARA CRATON