SECTION 4 95

FIGURE

SECTION 4

DELINEATION OF MINERAL ASSESSMENT TRACTS

M. Scott

In this section the data on geology, geophysics and mineral occurrences presented earlier in the report are integrated in Part 1 of the USGS three-part resource assessment process to delineate areas in which the geology is permissive for the existence of deposits of one or more types. These areas, called assessment tracts, are based on geological criteria derived from deposit models. Tracts may or may not contain known occurrences. Areas are only excluded from tracts when they are considered to have negligible probability of having an occurrence. This judgement is based on the geology, and in this report, where potential host rocks are buried by >350m of overlying cover.

Designation of a tract as permissive does not imply any special favourability for the existence of a deposit nor does it address the likelihood that a deposit will be discovered if it exists. The probability of discovery of deposits involves a large number of uncertainties such as future economic conditions, development of new exploration methods, depth and type of cover, motivation of explorers, and land access, all of which are beyond the scope of this study.

The following text describes the criteria used for tract delineation. Deposit types, as yet to be discovered in Yarrol that may be economically significant and are associated with depositional environments found within the Province have been included. Figures included depict permissive tracts and thematic geology, the latter reflecting rocks grouped to depict similar environments that may be favourable for the formation of mineral deposits.

INTRUSIVE RELATED DEPOSITS

Tract 1

Pluton-related deposits include all deposits for which a genetic relationship with an igneous intrusion can be inferred. Deposits may occur within the related pluton as in a porphyry deposit, at or near the intrusive contact as in skarn deposits, or at some distance from the contact as with replacement and vein deposits. Although these different deposit types typically represent different parts of large plutonic-hydrothermal systems and are therefore genetically related, they are considered separately because (1) the various types have different grade and tonnage distributions and (2) every hydrothermal system does not exhibit all related deposit types.

Whilst preferred relationships may exist between pluton age and/or the geochemistry of plutons and certain deposit types, there is insufficient age data on mineralisation for the Yarrol Province to establish this definitively. There is, however, a general tendency of different types of pluton-related deposits to occur together. The permissive tract for intrusive related deposits (Tract 1) has been defined as all intrusive bodies and the area extending 5km outward from the actual or interpreted boundary of any pluton. In a few places, mineral occurrences that resemble polymetallic vein or skarn deposits (The Barrimoon Group on the Monto sheet and Mount Grim on the Biloela sheet) are situated in areas in which no outcrop or geophysical expression of a pluton is known. These areas are included in Tract 1 as an area of 5km radius around the occurrence.

Within Tract 1 a number of subsets have been identified where key features of a deposit type enable a more restricted definition, for example, carbonate-bearing and calcareous sedimentary rocks are identified as a subset within Tract 1 for potential skarn and replacement deposits.

Porphyry-type Deposits

A generalised Cu-Au-Mo model was used for this assessment and includes such variants as copper-molybdenum and copper-gold porphyries, as well as porphyry copper-skarn-related deposits. A generalised model was used because of the inability to distinguish a number of the porphyry systems in the assessment area as either Cu-Au or Cu-Mo.

The following are key features for the Cu-Au-Mo porphyry-type (sourced from USGS Bulletin 1693, Cox & Singer, 1986):

- They are typically associated with large plutonic to batholithic intrusions immobilised at levels of 2–4 km. Related dykes and intrusive breccia bodies can be emplaced at shallower levels. Host rocks are coarse-grained to porphyritic. Volcanic-type, high-level deposits are associated with multiple intrusions in subvolcanic settings of small stocks, sills, dykes and diverse types of intrusive breccias.

- Virtually any type of country rock can be mineralised.

- The composition of associated intrusives/extrusives range from quartz diorite to granodiorite and quartz monzonite with dacite, andesite flows and tuffs may be coeval with intrusive rocks. The inclusion of alkalic Cu-Au porphyries in this grouping extends the compositional range to include syenite to monzonite with coeval high-K, low-Ti volcanic rocks (shoshonites).

- Commonly there is multiple emplacement of successive intrusive phases. Local swarms of dykes, many with associated breccias, and fault zones are sites of mineralisation.

The definition of permissive ground for the porphyry-type model is derived from the key features, recognising the limitations of regional scale data and the inclusive nature of tract definitions (that is areas are only excluded from tracts when they are considered to have negligible probability of having an occurrence).

Subset A of Tract 1 — permissive for Cu-Au-Mo porphyry deposits — is defined by:

- All granitoid plutons (calcalkaline and alkaline; outcropping and interpreted bodies) and a 1km buffer zone.

- As it is possible that porphyry deposits exist below alteration zones in volcanic rocks, the same tracts delineated for epithermal deposits are included in Subset A.

- Known occurrences.

Figure 19 shows Subset A — Tract 1.

Skarn Deposits

Potentially, skarn deposits can be large and high grade and can contain significant quantities of precious metals, particularly silver. Copper and polymetallic (Au-Cu-Fe) skarns are relatively numerous in the Yarrol Province, with >30 known occurrences. Polymetallic skarns are associated with granitic phases of the Glassford Igneous Complex on the Monto sheet. Iron skarns are associated with both gabbroic and granitic intrusives. Skarns with gold as the principal commodity are the least common and are generally associated with more mafic rocks such as diorites and gabbros.

Key features for skarns (sourced from Theodore & others, 1991; Meinert, 1993):

1. Copper skarns:

- Deposits are characterised by chalcopyrite associated with magnetite and/or pyrrhotite. A variety of other mineral ores may be significant locally.

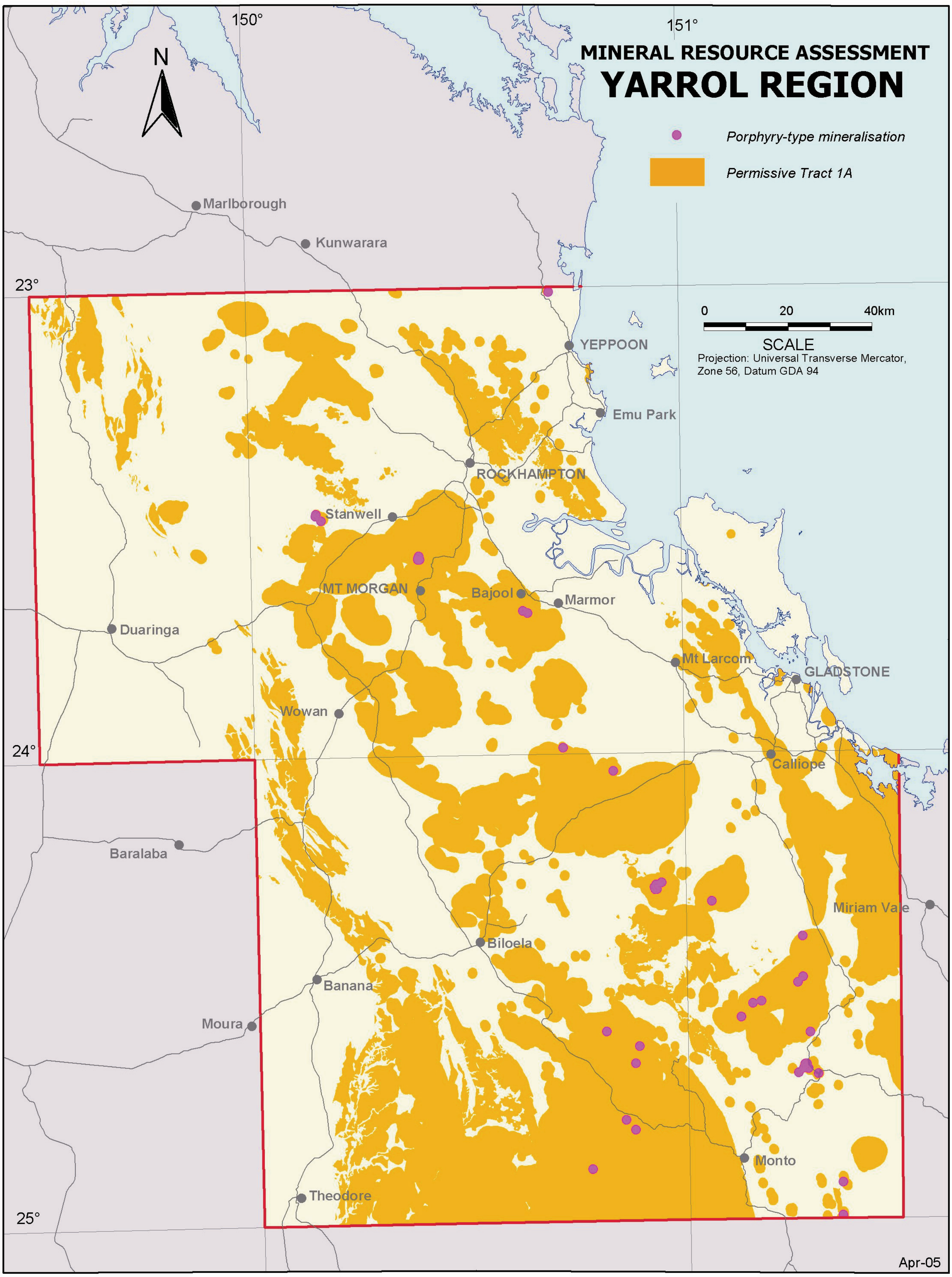
- Form in both island arcs and continental margin environments.

- Are associated with porphyritic stocks, dykes and breccia pipes of quartz diorite, granodiorite, monzogranite and tonalite composition, intruding carbonate rocks, calcareous volcanics or tuffs.

- Deposits may occur hundreds of metres from an intrusive.

- Copper skarns are broadly separable into those associated with strongly altered copper-porphyry systems, and those associated with barren, generally unaltered stocks; a continuum probably exists between these two types.

Figure 19 - Permissive Tract 01 Subset A - Porphyry-type Mineralisation



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2. Iron skarns:

- Contain magnetite and hematite
- Form in island and continental margin arc settings. Calcic iron skarns are associated with oceanic island arcs and rifted continental margins whereas magnesian iron skarns are associated with synorogenic continental margins.
- Calcic iron skarns are associated with large to small stocks and dykes of gabbro to syenite (mostly gabbro-diorite) that intrude limestone, calcareous clastic sedimentary rocks, tuffs or mafic volcanics at a high to intermediate structural level.
- Magnesian iron skarns are associated with small stocks, dykes and sills of granodiorite to granite that intrude dolomite and dolomitic sedimentary rocks.

3. Lead-zinc skarns:

- Typically form more distally to mineralising intrusive rocks (100–1000m from the source intrusions) than copper or iron skarns and are characterised by sphalerite and galena ore minerals.
- Occur in continental margins where they are associated with late orogenic plutonism. Some are also found in oceanic island arcs.
- Occur at a wide range of depths, from high-level breccia pipes to deep-level batholiths. Associated intrusive rocks are granodiorite to leucogranite, diorite to syenite (mostly quartz monzonite) which tend to be in the form of small stocks, sills and dykes.
- May form as small distal mineralised occurrences related to other skarns (notably Cu, Fe and W skarns), as well as some porphyry systems.

4. Gold skarns:

- Form in orogenic zones and in backarc environments. Most economic gold skarns are related to subduction beneath continental crust and are associated with reduced plutons.
- Are associated with high to intermediate level stocks, sills and dykes of gabbro, quartz diorite or granodiorite that intrude carbonate, calcareous clastic or volcaniclastic rocks.
- Gold grade is >1g/t and may also contain economic amounts of base metals and other commodities.
- There is a worldwide spatial and temporal association between porphyry copper provinces and gold skarns.

In the absence of consistent difference in the key features of Cu, Au and Fe skarns, with the exception of their dominant ore minerals, the various skarn types have been combined along with polymetallic replacement deposits. Polymetallic replacement deposits have been included because distal lead zinc skarns both consist of replacement lenses containing sphalerite and galena and share the same geological environment. They differ mainly in that skarn deposits contain metasomatic calc-silicate minerals and generally occur closer to the associated pluton.

A single Subset B within Tract 1 has been identified as permissive for skarn mineralisation.

Subset B of Tract 1 — permissive for skarn and polymetallic replacement deposits — is defined by:

- Close proximity to a magmatic-hydrothermal centres, as well-mineralised skarns are rarely more than a few hundred metres from the mineralising intrusions. A 1km buffer about the interpretative/actual boundaries of all intrusive bodies in the assessment area was used to include distal Pb-Zn deposits.
- The presence of carbonate sequences, volcanics or calcareous tuffs and sediments within the buffer zone.
- Known skarn occurrences

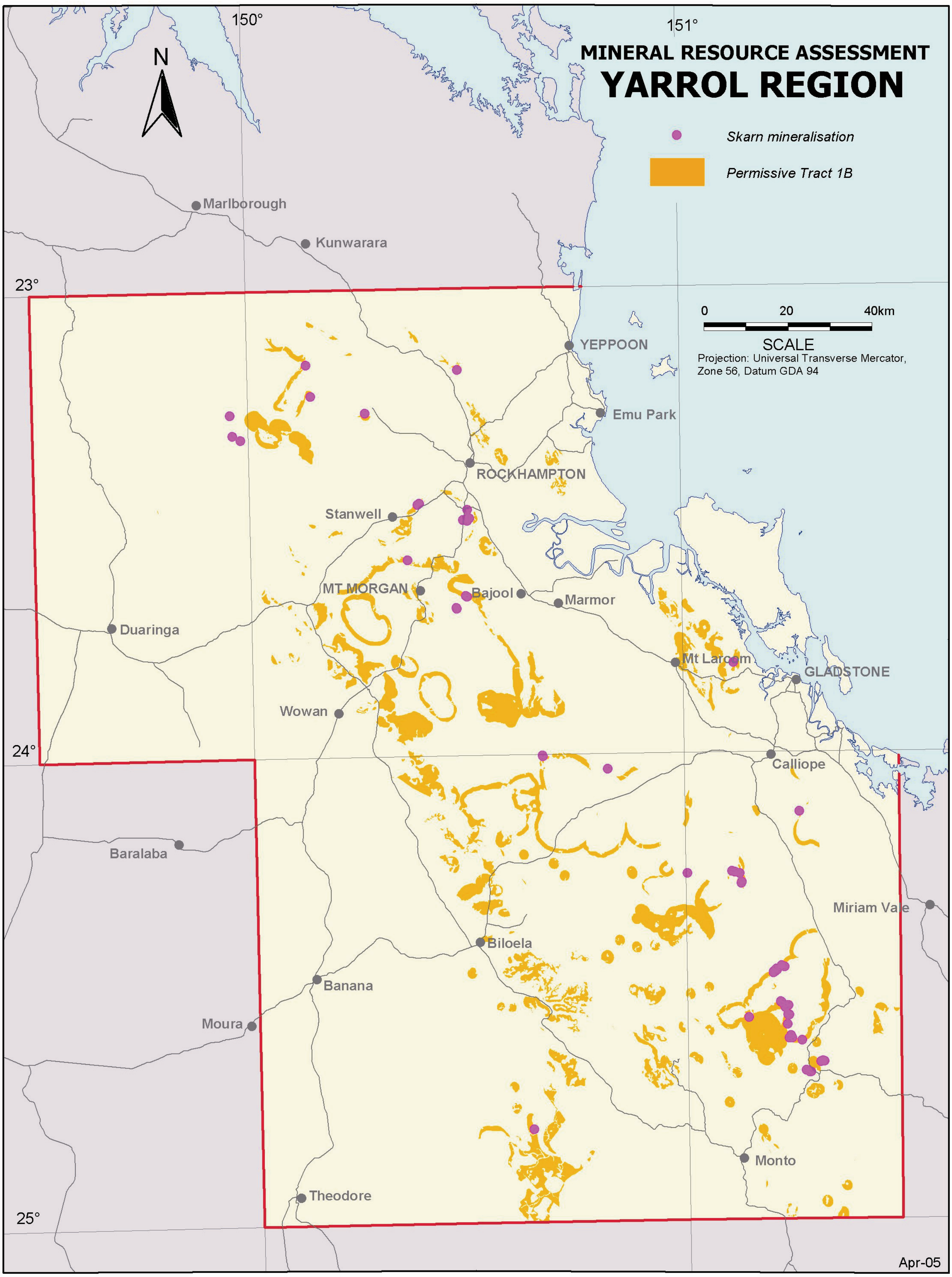
Figure 20 shows Subset B — Tract 1.

Carlin-type Gold Deposits

This type of deposit is associated with the selective replacement of carbonaceous carbonate rocks adjacent to and along faults or bedding.

The delineation of the tract permissive for carbonate-hosted disseminated gold-silver (Carlin-type) deposits is not well constrained

Figure 20 - Permissive Tract 01 Subset B - Skarn Mineralisation



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because of the lack of agreement about the genetic association of mineralisation. Some models propose a close association in time and space with igneous activity (Bettles, 2002), while others do not. Berger & Henley (1989) point to tectonic stacking of marine sedimentary rocks and the creation of reservoirs of connate water as the mechanism for formation of Carlin-type deposits.

In this report Subset C of Tract 1 — permissive for Carlin-type deposits — is defined by:

- Calcareous/dolomitic host rocks with a clastic component to provide siliciclastic trap (eg slope to basin turbidites adjacent platform carbonates)

Figure 21 shows Subset C — Tract 1.

Despite the ambiguity in features of Carlin-type models, crustal structures are likely to be critical in the development of economic mineralisation. Based on an assumed relationship between crustal thickening and mineralisation, all calcareous sedimentary rocks pre-Hunter–Bowen Orogen would be defined as permissive in the Yarrol Province. Favourable areas within such a broad tract could be defined by using a spatial association to major thrust faults.

Intrusive Related Polymetallic and Gold-bearing Quartz/Calcite Veins

Polymetallic veins are the most abundant metallic mineral occurrence in the Yarrol Province. Sulphide-rich veins containing sphalerite, galena, silver and sulphosalt minerals in carbonate and quartz gangue, occur throughout Tract 1. This type of vein deposit can occur in virtually any tectonic settings except oceanic, and can be hosted in virtually any type of rock. Most commonly, however, the veins are hosted by thick sequences of clastic metasediments or by intermediate to felsic volcanics that have been deformed and intruded by igneous rocks. Veins commonly crosscut volcanic sequences and follow volcano-tectonic structures, such as caldera ring-faults or radial faults. In some cases veins may cut older intrusions. In many examples veins are associated with dykes that follow structures. Regional faults, fault sets, shears and fractures are an important ore control.

Delineation of the tract permissive for intrusive-related polymetallic and gold-bearing veins is not well defined, because the deposits can occur in a wide variety of types and ages of host rock and the structures that control the distribution of deposits are often only locally significant. An analysis of preferred structural controls and common characteristics of intrusive-related vein occurrence clusters for the Yarrol Province is required to further refine the broad tract identified in this report.

Subset D of Tract 1 — permissive for polymetallic and gold-bearing veins — is defined by:

- Gross proximity to a magmatic-hydrothermal centre. The 5km buffer is used.

Figure 22 shows Subset D — Tract 1.

Ultramafic/PGE (platinum-group elements)

PGE (Platinum-group elements: osmium, iridium, ruthenium, rhenium, platinum and palladium) typically occur as pods or layers in ultramafic rocks. Layers form due to convection processes and gravity settling in mafic intrusive magmas. The ultramafic hosts generally range in composition from peridotite (olivine and pyroxene) at the base, through gabbro (olivine, pyroxene, and plagioclase) to anorthosite (mostly plagioclase) at the top, although not all compositions are always present. PGE minerals form in the early stages of crystallisation and accumulate in the peridotite layers.

The Yarrol Province has several ultramafic bodies, which have to date been unsuccessfully explored for PGE, for example the Bucknalla Gabbro (Carrigg & others, 1989; Hoatson & Glaser, 1989).

Subset E of Tract 1 — permissive for PGE — is defined by:

- Ultramafic bodies and magnetic interpretation of mafic bodies.

Figure 23 shows Subset E — Tract 1.

Podiform Chromite

Podiform chromite forms within ultramafic rocks during crystal fractionation of basaltic liquid at an oceanic spreading centre. Occurrences of podiform chromite are present in the Rockhampton sheet where chromite has

Figure 21 - Permissive Tract 01 Subset C - Carlin-style Replacement Mineralisation

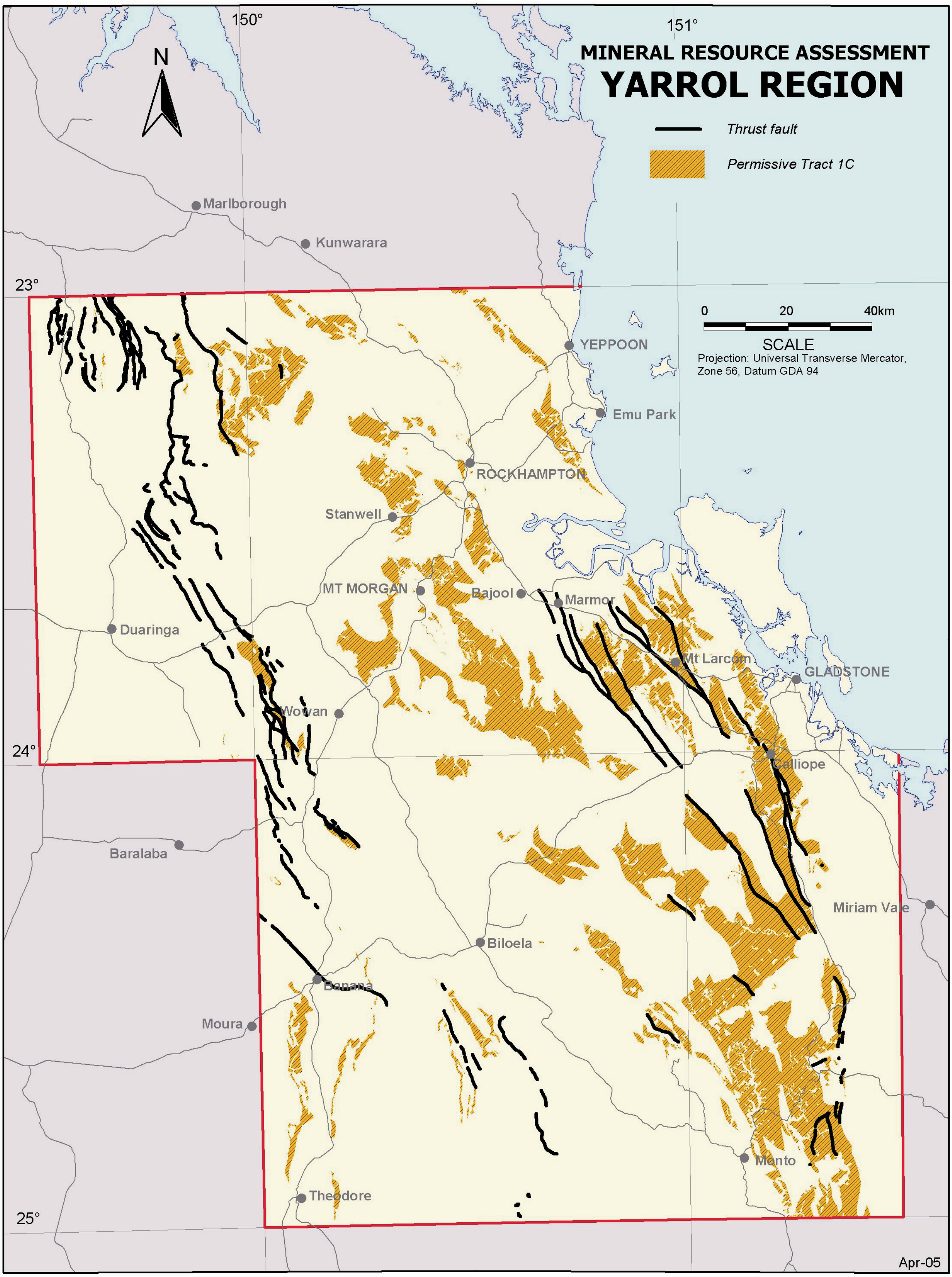

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Figure 22 - Permissive Tract 01 Subset D - Intrusive Related Polymetallic & Au Vein Mineralisation

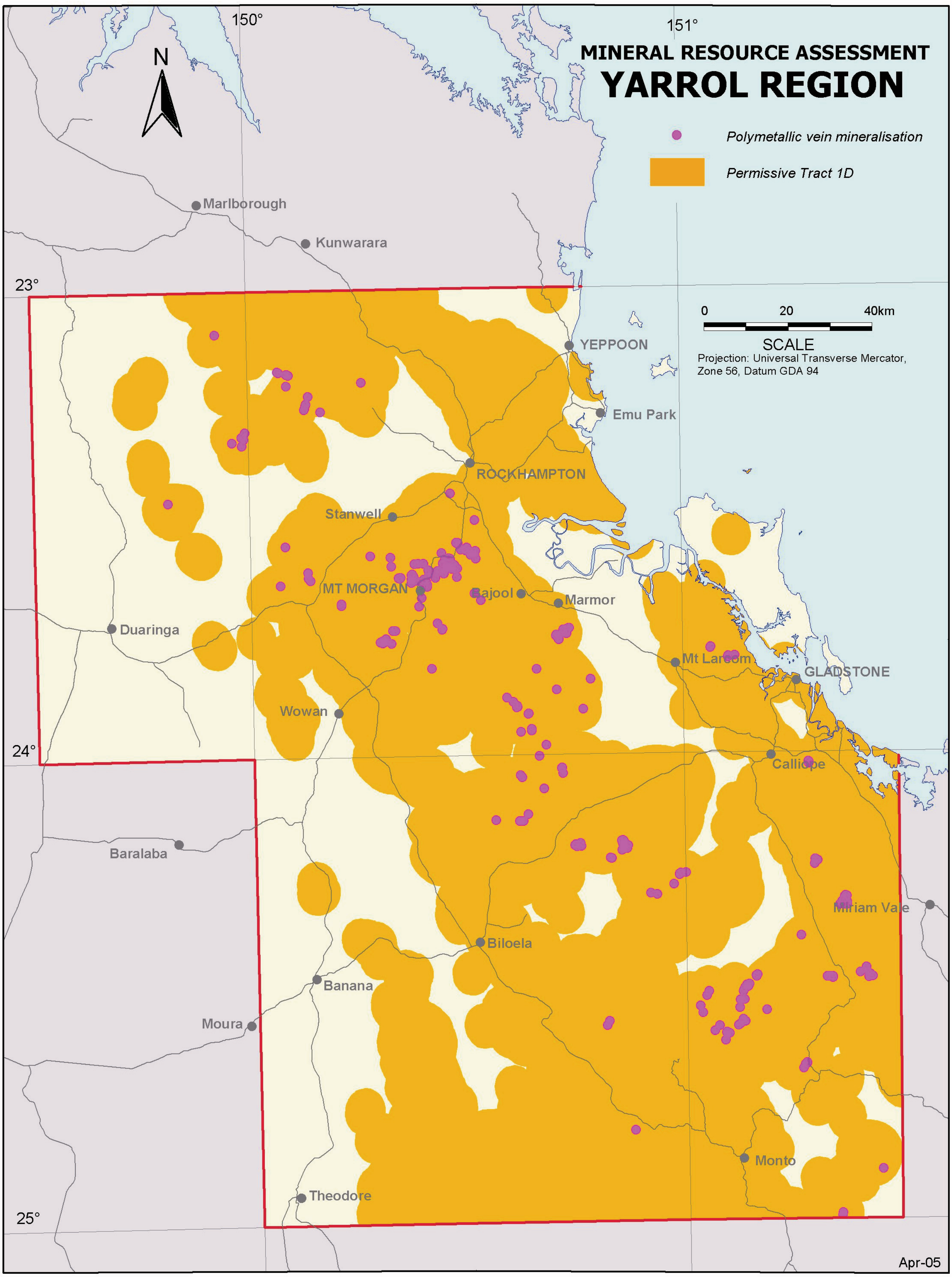

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Figure 23 - Permissive Tract 01 Subset E - Ultramafic / Platinum Group Elements (PGE) Mineralisation

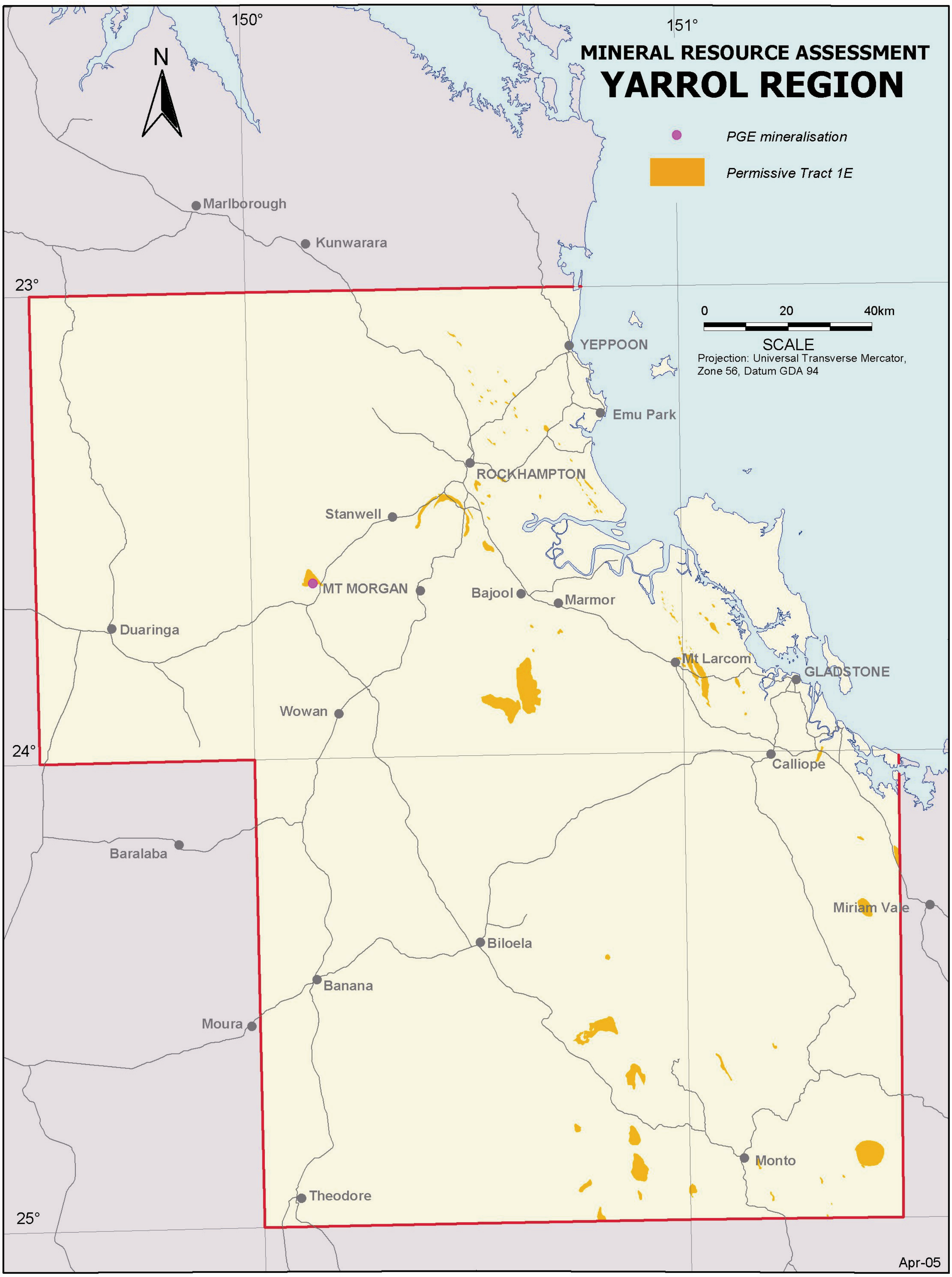

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Figure 24 - Permissive Tract 01 Subset F - Podiform Chromite Mineralisation

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been mined at Elgalla, Balnagowan Surface and Balnagowan Lode.

Subset F of Tract 1— permissive for Podiform Chromite — is defined by:

- Presence of oceanic, lower crustal and upper mantle ultramafic rocks.

Figure 24 shows Subset F — Tract 1.

DEPOSITS UNRELATED TO IGNEOUS INTRUSIONS

Epithermal Deposits — Tract 2

Quartz adularia and quartz alunite type epithermal gold and silver deposits (Cox & Singer, 1986) are grouped together in Tract 2. Both deposit types consist of veins, stockworks, breccias and disseminations that follow faults and fractures in or near subaerial felsic to mafic lava flows, pyroclastic rocks, breccias and subvolcanic intrusions. Whilst there is only one epithermal occurrence that has been identified in the Yarrol Province, active volcanism and extensive faulting and fracturing, key factors in controlling the distribution of epithermal deposits, are evident in the region. Synvolcanic extensional deformation, important to epithermal mineralisation because it provides fracture permeability at the same time that the hydrothermal systems related to volcanism is active and circulating (Cox & others, 1996) occurred in the Yarrol Province during Permian, Triassic and Cretaceous periods.

Tract 2 — permissive for both quartz-adularia and quartz-alunite epithermal deposits is defined by:

- Volcanic island, continental-margin arc and backarc settings

- Spatial and temporal association with felsic to intermediate sub-aerial volcanic rocks and sub-volcanic intrusions, particularly on the margins of calderas

- Extensional tectonic regime

- Presence of known epithermal occurrences.

Rock units that form Tract 2 include the Permian Camboon Volcanics and the Cretaceous Mount Salmon Volcanics. These units contain calc-alkaline volcanics (dacite, quartz latite, rhyodacite, rhyolite, ignimbrite and tuff) that are interpreted as forming within extensional settings. These units are also spatially associated (underlying/adjacent) with marine sediments that are potential sources for saline fluids. The Permian Mount Benmore Volcanics and the Triassic Winterbourne Volcanics also form part of Tract 2. The Mount Benmore Volcanics are known to host epithermal prospects north of the assessment area in the St Lawrence and Mackay 1:250 000 sheets (eg Waitara), and are similar to rocks that host the Cracow deposit and other small epithermal prospects in the Rannes area, on the Banana sheet. Interpretations of the Triassic Winterbourne Volcanics made by the GSQ (Yarrol Team, 1997) suggest a possible subsurface caldera structure in the Kroombit area that could offer a target for epithermal mineralisation, especially in the lower rhyolitic flows and vent breccias adjacent to domes. Traces of gold have been noted in panned concentrates towards the headwaters of Dry, Palm Tree, Kroombit and Three Moon Creeks. Triassic volcanic units identified in the Yarrol Province are considered to have insufficient extent to warrant inclusion in Tract 2.

Figure 25 shows Tract 2.

Lateritic Nickel — Tract 3

Two types of deposits are known in the Yarrol Province that are formed as a result of late diagenetic sedimentary processes. These are lateritic nickel (Tract 3) and Kunawarra-type magnesite (Tract 4).

The Yarrol Province has experienced conditions necessary for the development of lateritic deposits, that is: 1. high rates of chemical weathering (in a warm-humid palaeoclimate), 2. relatively low rates of physical erosion, and 3. sufficient uplift to expose ultramafic rocks to weathering.

Tract 3 — permissive for lateritic nickel — is defined by:

- Presence of serpentinite, serpentinised ultramafics and ultramafics with overlying weathering profiles

- Presence of known lateritic nickel occurrences.

Figure 26 shows Tract 3.

Figure 25 - Permissive Tract 02 - Epithermal Mineralisation

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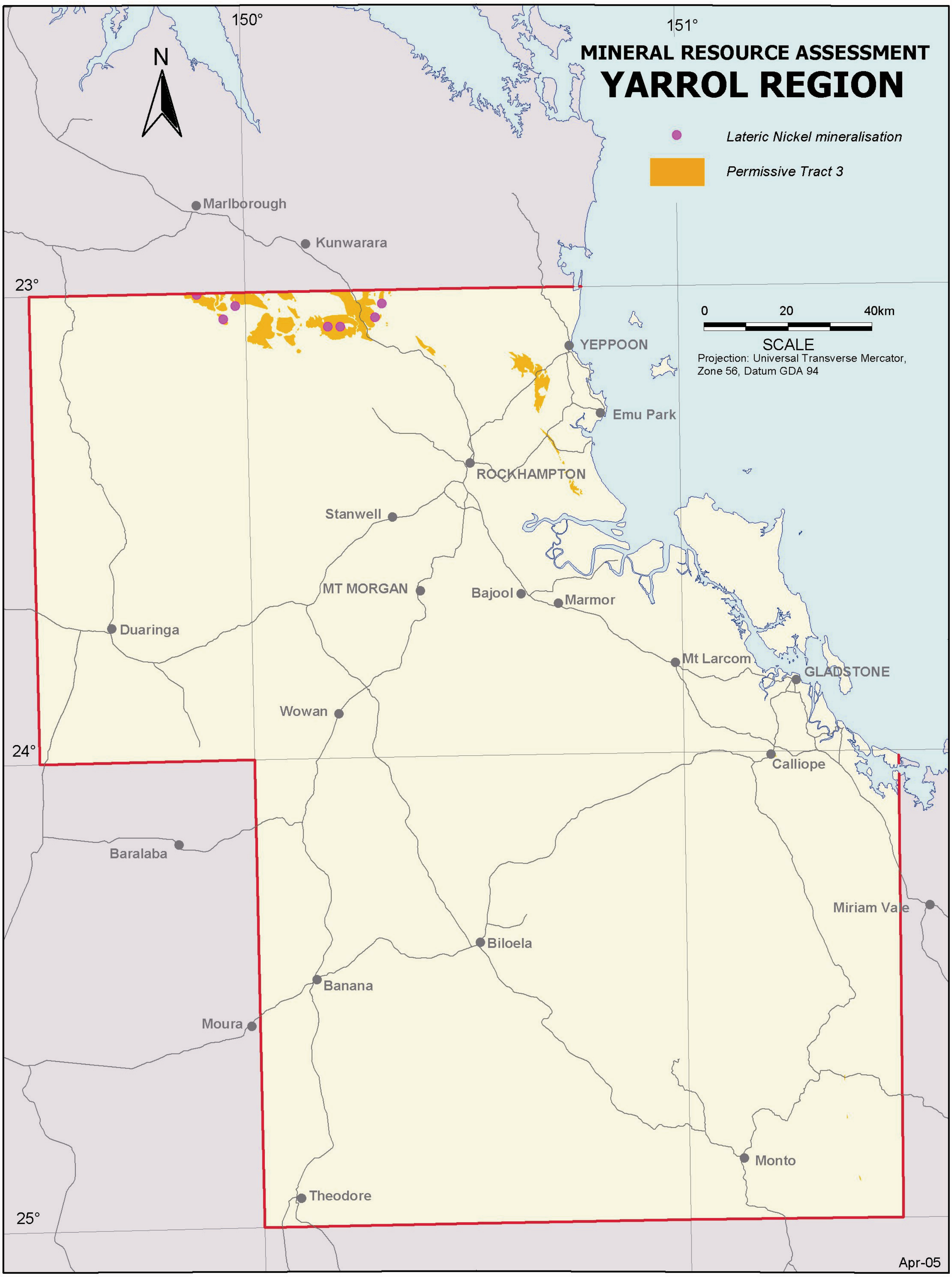
Figure 26 - Permissive Tract 03 - Lateritic Nickel Mineralisation



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Kunwarara-type Magnesite — Tract 4

Tract 4 is defined using characteristics of the Kunwarara magnesite deposit, the largest known deposit of magnesite in Australia. The Kunwarara deposit is used because of its location, 60km north-west of Rockhampton. This deposit is situated in extensive flat lying sheets of loosely consolidated fresh water sediments that were deposited during the late Tertiary and Quaternary. Sheet-like magnesite deposits have developed within the upper portions of these sediments due to weathering and erosion of nearby serpentinite and subsequent enrichment through diagenesis. A critical mass of serpentinite is required to support the development of an economic magnesite deposit, however, there is insufficient published information on this criteria for its application.

Tract 4 — permissive for diagenetic magnesite — is defined by:

- Upper Tertiary to Quaternary terrestrial sedimentary sequences and sediments
- Spatial association with outcropping serpentinite; a 10km buffer is applied.

Figure 27 shows Tract 4.

Low-sulfide Gold-Quartz/Calcite, Turbidite hosted Gold Vein, and Listwanites — Tracts 5 and 6

Low-sulphide gold-quartz veins (LSAUQ) and metamorphic-related mesothermal veins (MESMET) do occur in rocks of the accreted margin in the Yarrol Province, mainly in metavolcanic rocks, although no major deposits of this type, such as occurs in central Victoria (Ballarat) are known. However, as there are some major through-going shear zones in the area there is potential for undiscovered deposits to have significant tonnages.

Tract 5 — permissive for Low-sulphide gold-quartz veins and metamorphic-related mesothermal veins — is defined by:

- Deformed metamorphic terranes
- Presence of known LSAUQ occurrences.

An association with major regional faults/shear zones, with the location of occurrences in secondary faults and/or near hinge zones of folds is anticipated but requires detailed analyses beyond the scope of the current study.

Rock types that fit the definition of Tract 5 are regionally metamorphosed and accretionary rock units including the: Calliope beds, Erebus beds, Craigilee beds, Marble Waterhole beds, Mount Dick beds, Mount Warner Volcanics, Raspberry Creek Formation, Ginger Creek member, Doonside Formation, Balnagowan Volcanic member, Shoalwater Formation and the Wandilla Formation.

Figure 28 shows Tracts 5 and 6.

Listwanites are defined separately in Tract 6 because of their specific association with serpentinite and proximal Palaeozoic metasediments. A 1km buffer has been applied to serpentinite units to include proximal metasediments.

Basaltic Copper — Tract 7

Copper occurrences, in the form of copper sulphides infilling amygdules ,and voids in flow-top breccia lavas, are associated with an occurrence in the Mount Hoopbound Formation and another in the Calliope beds. Several occurrences have been identified in the Alton Downs Basalt, the Mount Benmore Volcanics and in the Camboon Volcanics in the Theodore area where native copper mineralisation is associatedwith water table fluctuations within the soil profile (Withnall & others, in preparation).

Tract 7 is defined by the extent of these rock units.

Figure 29 Shows Tract 7.

Gold on Low-Angle Faults — Tract 8

Models for the occurrence of gold on low-angle faults (Bouley, 1986) or detachment-fault-related deposits (Long, 1992) are based on deposits known in Arizona and California respectively. These deposits are typically small and have gold associated with minor copper, hematite and chlorite.

The Yarrol Province includes a major north-easterly trending thrust zone which has gold mineralisation and no obvious plutonic sources. Tract 8 is delineated by a 1km buffer

Figure 27 - Permissive Tract 04 - Kunwarara-type Magnesite Mineralisation

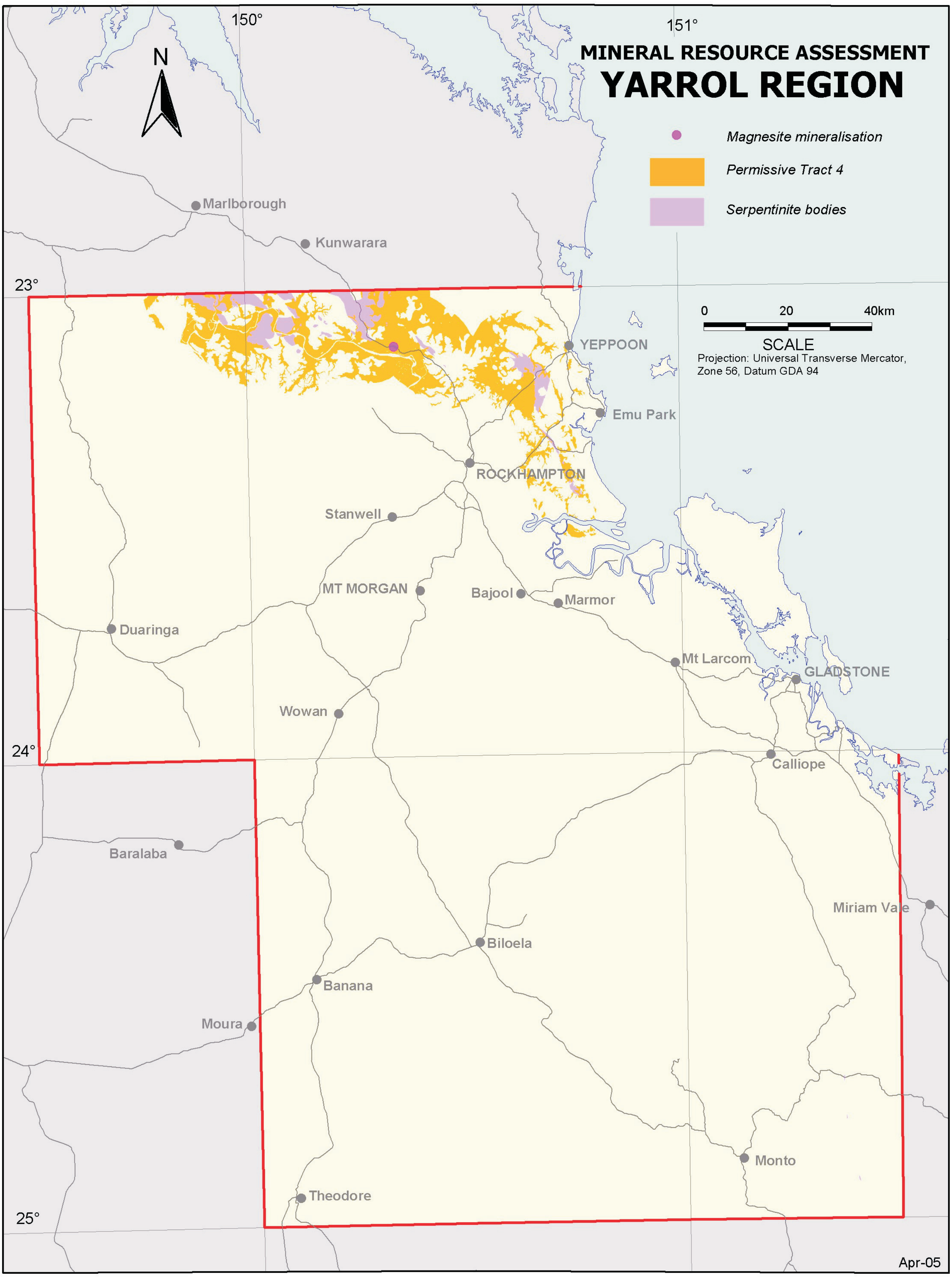

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Figure 28 - Permissive Tract 05 & 06 - Low-sulphide Gold-Quartz veins / Listwanite Mineralisation

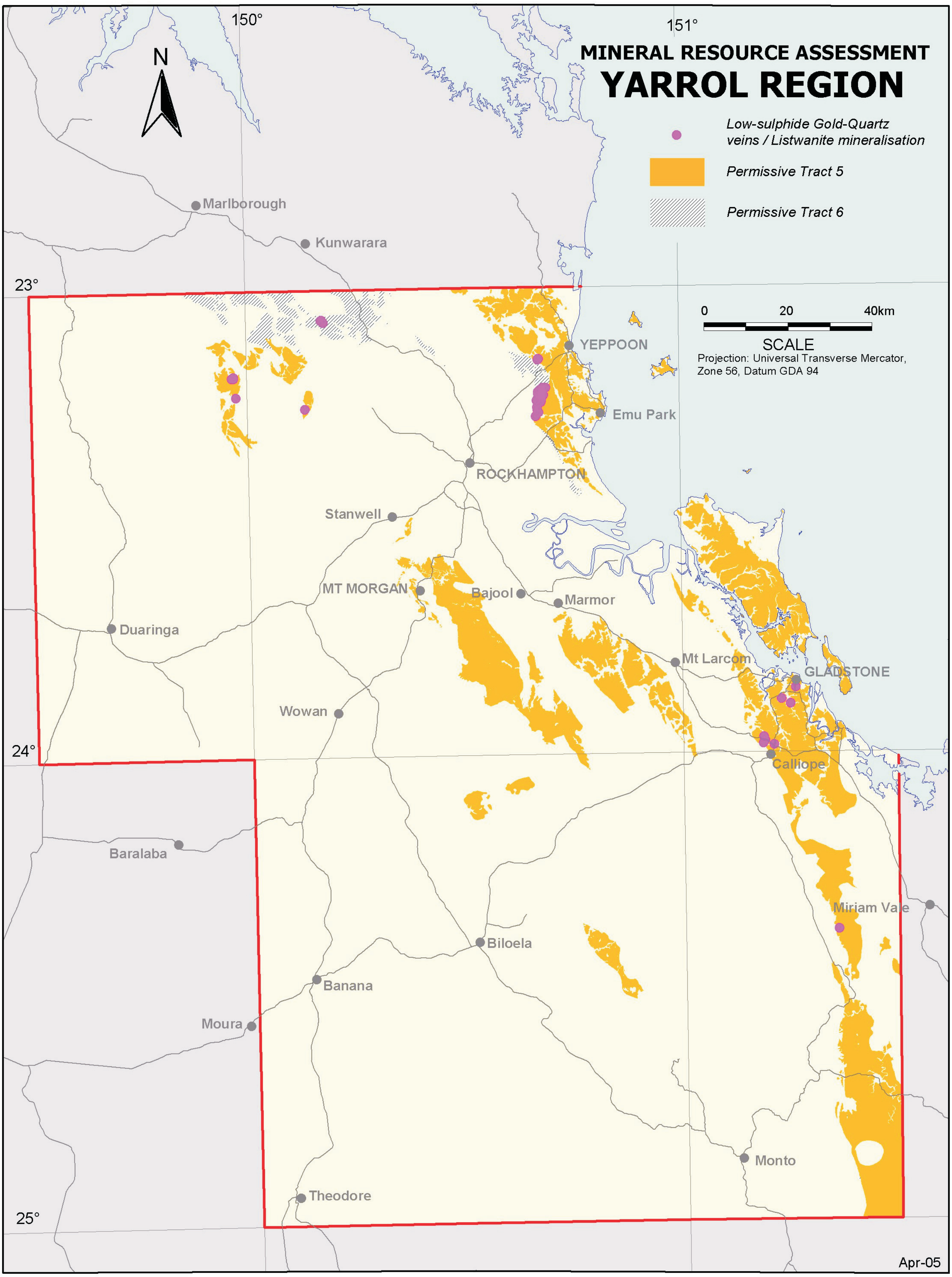

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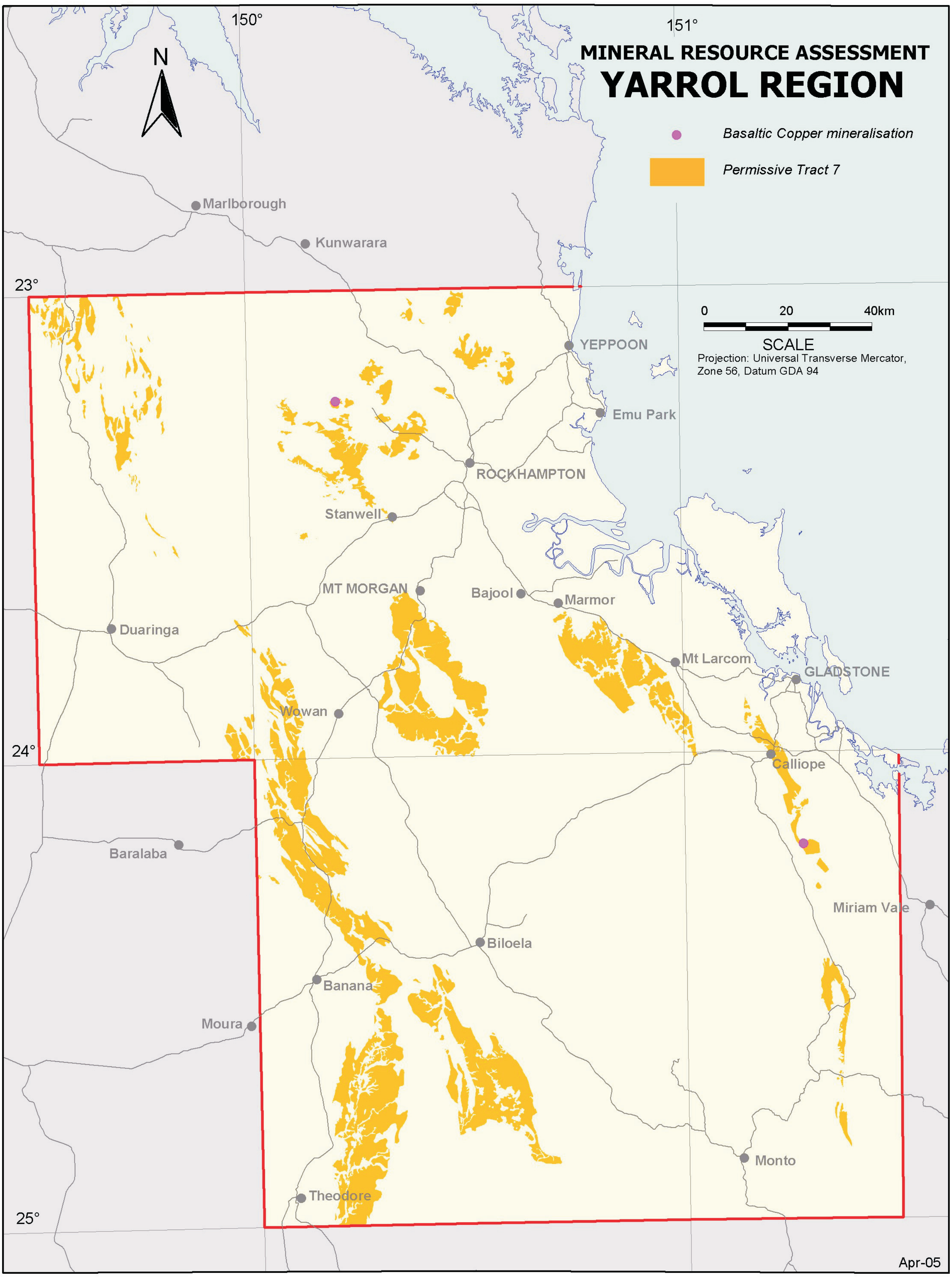
Figure 29 - Permissive Tract 07 - Basaltic Copper Mineralisation



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surrounding identified and interpreted thrust faults located in the Erebus beds, Mount Alma Formation, Calliope beds and Doonside Formation and on the location of what are considered to be possible occurrences.

Figure 30 shows Tract 8.

Marine Volcanic Deposits — Tracts 9, 10 and 11

Volcanogenic-hosted Massive Sulphides (VMS)

The various marine volcanic environments present in the Yarrol Province (backarc, rifted island arc, island arc, arc/forearc) means that the area has significant potential for VMS mineralisation. VMS occurrences in Yarrol are not well documented and in some cases occurrence descriptions may represent the stringer/stockwork zones of VMS systems.

Cu-Zn VMS subtype — Tract 9

The Cu-Zn VMS subtype is characterised by thin sheet-like bodies of massive well-laminated pyrite, pyrrhotite and chalcopyrite within thinly laminated clastic sediments and mafic tuffs. Deposits are typically associated with submarine basalt flows.

Tract 9 — permissive for Cu-Zn VMS subtype is defined by:

- Backarc basin, rifted continental margin, fore-arcs and spreading ridges proximal to continents.
- An association with basaltic volcanism principally tholeiitic, cherty exhalites, marine clastic sediments (turbiditic) with minor limestone, local intermediate to felsic volcanics, and mafic intrusives.
- Presence of known Cu-Zn VMS occurrences.

The Rookwood Volcanics are the principal host for known VMS mineralisation in the Yarrol Province. The Develin Creek discovery ~80km north-west of Rockhampton (Milburn, 1993) is an example. Here, typical ophiolite units are absent with the exception of pillow basalts, and whilst originally described in company reports as a Cyprus type VMS prospect, occurrences in this area are now considered more likely to be of the Cu-Zn subtype because of their lower grades and smaller tonnages. Other occurrences of suspected Cu-Zn VMS subtypes are identified in Three Moon Conglomerate and Owl Gully Volcanics. Also included in Tract 9 are proximal arc/forearc basin units that contain significant volcanics: Balaclava Formation, Lochenbar beds and Mount Hoopbound Formation.

Figure 31 shows Tract 9.

Zn Pb (Cu) VMS type (Kuroko) — Tract 10

Kuroko VMS deposits are associated with volcanic rocks of intermediate to felsic composition (Cox & Singer, 1986). They contain lenses of massive pyrite-chalcopyrite and sphalerite-galena-barite interbedded with marine volcanic and sedimentary rocks. These lenses commonly overlie pipelike stockworks of pyrite-chalcopyrite veinlets interpreted as representing feeder zones for the submarine exhalations that form the stratiform deposits. Gold and silver are locally found in the stockworks and in the zinc-lead-rich lenses.

The most significant VMS deposits in the Yarrol Province are Kuroko deposits. These are the Mount Morgan mine, hosted in a roof pendant of Middle Devonian Capella Creek Group in Mount Morgan Trondhjemite and the Mount Chalmers orebody, located in brecciated volcanics and volcanoclastics of the Ellrott Formation, part of the Berserker Group.

Tract 10 — permissive for Kuroko VMS — is defined by:

- Island-arc volcanic rocks or back-arcs settings
- An association with felsic volcanism
- Stratigraphic positions involving either a change in the character of volcanism or a hiatus in volcanism
- Presence of known Kuroko VMS occurrences.

The Middle Devonian Capella Creek Group (Mount Morgan Mine Corridor sequence, Mount Warner Volcanics, Raspberry Creek Formation, Mount Dick beds) and Marble Waterhole beds represent primitive oceanic island arc volcanism. Preliminary deposit model classification has suggested possible VMS occurrences in the Mount Dick beds. The Ginger Creek member, that has basaltic to andesitic lavas and a similar tectonic environment to the Mount Dicks beds, is

Figure 30 - Permissive Tract 08 - Gold on Low-angle Faults

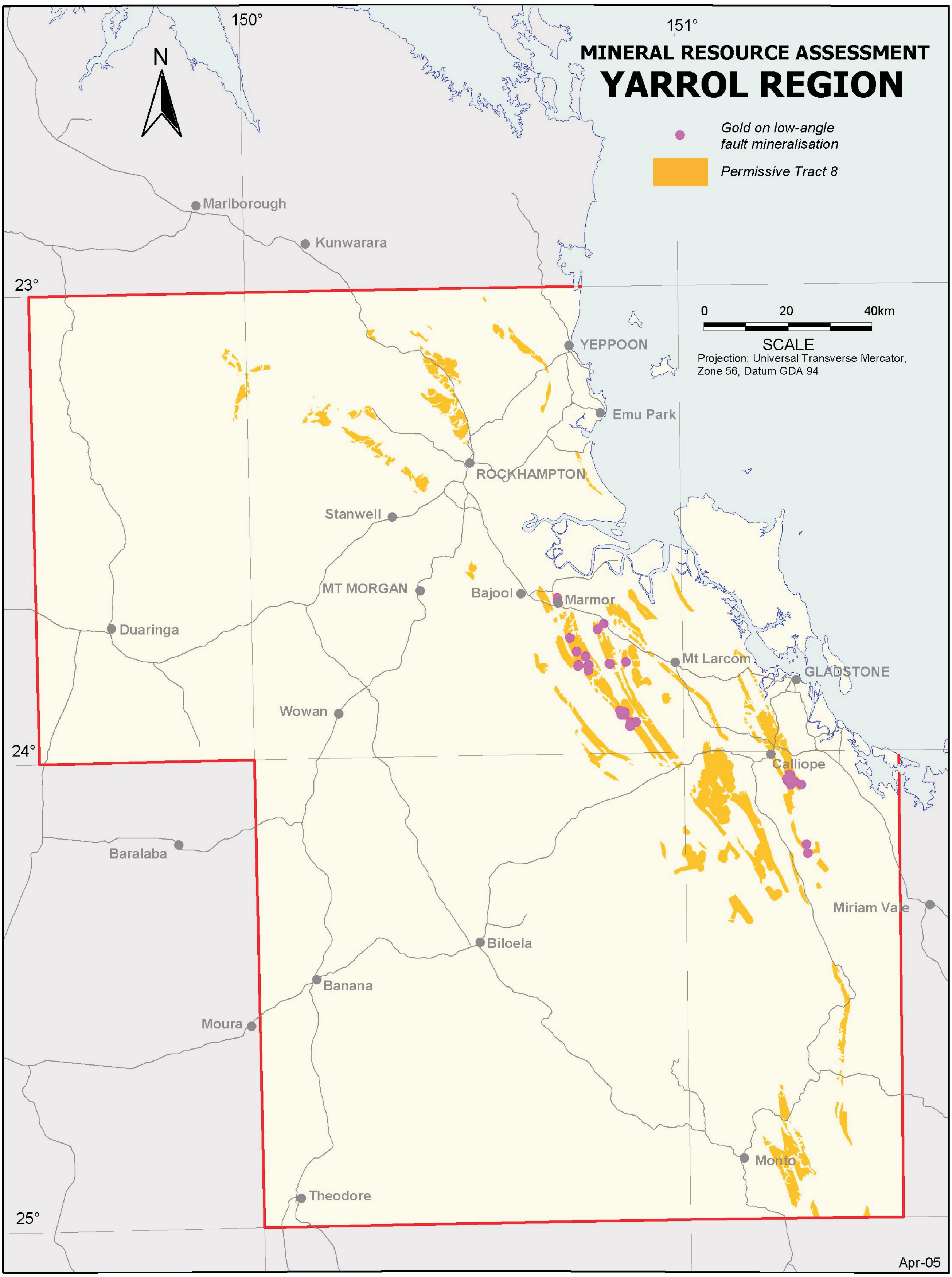

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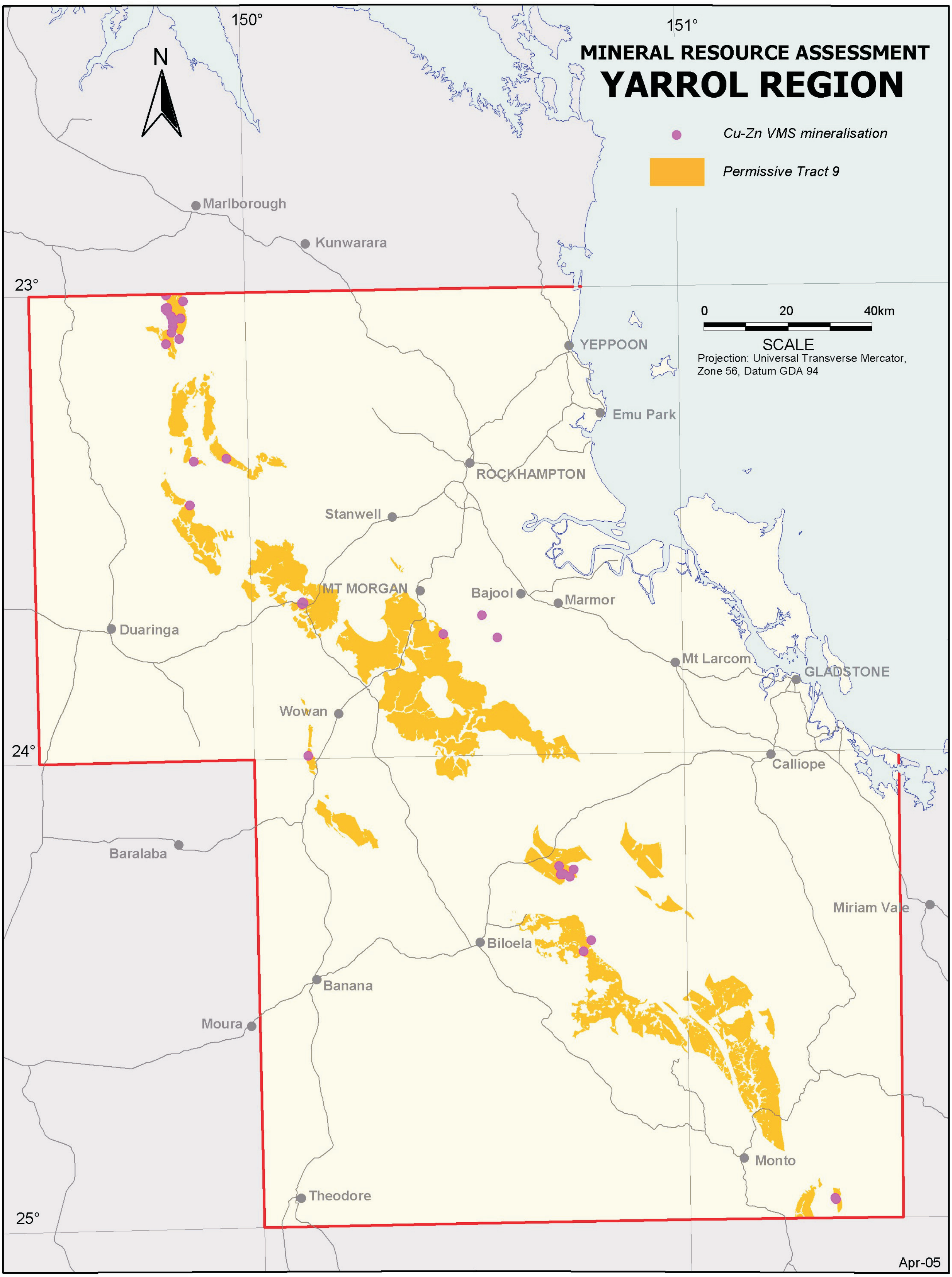
Figure 31 - Permissive Tract 09 - Cu-Zn VMS subtype Mineralisation



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included along with the Capella Creek Group and the Marble Waterhole beds in Tract 10. The Craigilee beds have significant felsic volcanics with evidence locally of felsic domes and mass flow volcaniclastics. Volcanics in this unit exhibit a change in composition from felsic to mafic.

The Berserker Group (Chalmers Formation, Ellrott Rhyolite) represents felsic volcanism in an extensional backarc setting. Both the Craiglee beds and the Berserker Group are included in Tract 10. The Erebus and Calliope beds, contain primary volcanics, however both these units are predominantly volcaniclastic in nature and are not considered likely to host significant VMS mineralisation. They have not been included in Tract 10.

Changes in the character of volcanism is evident in the Late Devonian (~380Ma) with convergence and a change from island arc (Aleutian style) to continetal margin (Andian style).

Tract 10 is shown in Figure 32.

Volcanogenic Manganese — Tract 11

Stratabound manganese oxide minerals associated with chert and other deep sedimentary and volcanic rocks have been associated with Kuroko type VMS deposits (Cox & Singer, 1986). In the Yarrol Province small deposits of stratiform manganese oxides are found in the Wandilla and Doonside Formations of the accretionary wedge. Tract 11 combines the area identified as permissive for Kuroko type deposits (Tract 10) with the accretionary wedge Wandilla and Doonside Formations.

Tract 11 is shown in Figure 33.

Figure 32 - Permissive Tract 10 - Zn Pb (Cu) VMS Mineralisation

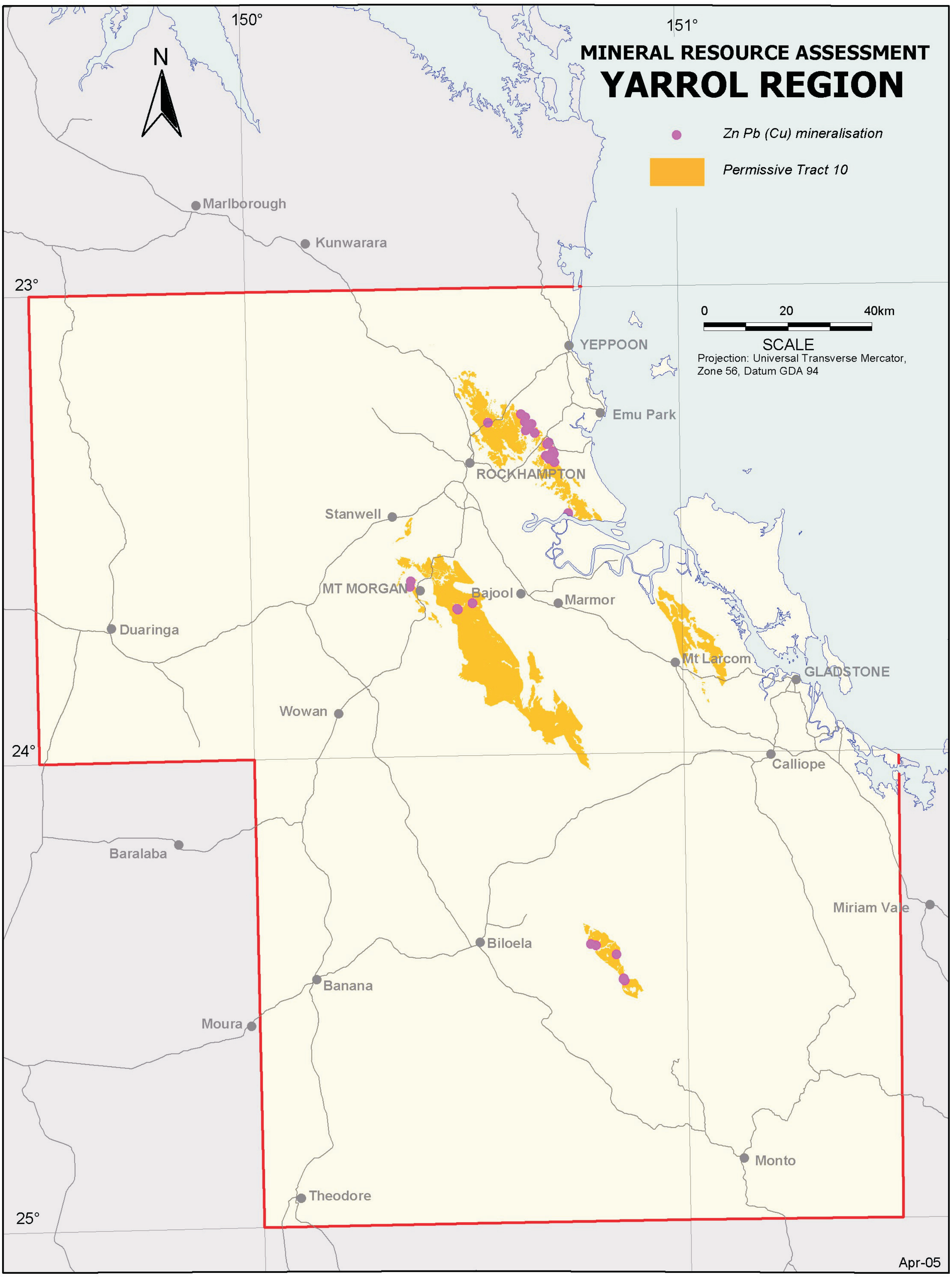

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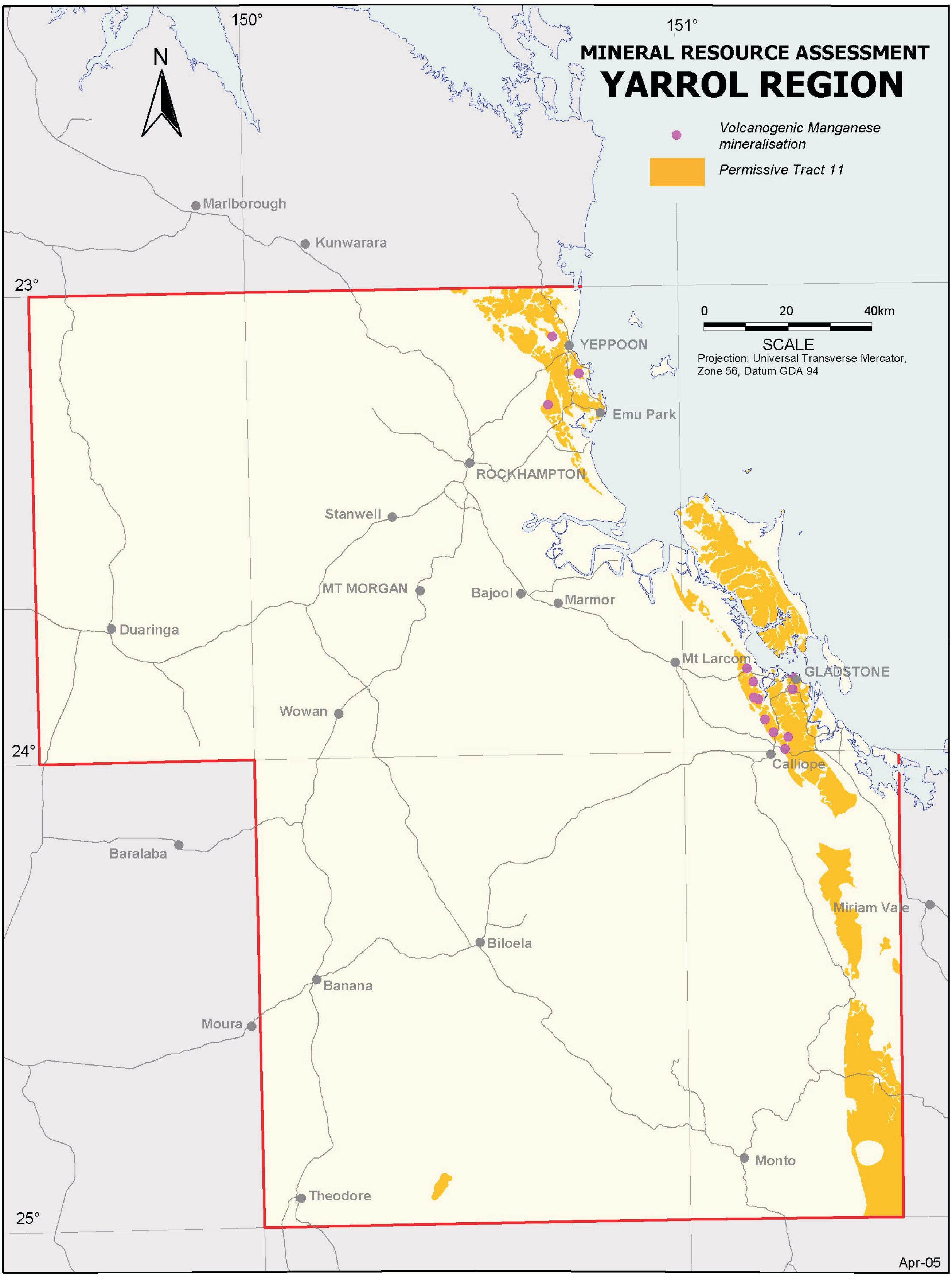
Figure 33 - Permissive Tract 11 - Volcanogenic Manganese Mineralisation



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