# PIS Pisant Land System

Undulating land in the catchment of Pisant Creek between Gladstone and Caltowie

**Area**: 150.3 km$^2$

**Annual rainfall** 435 – 520 mm average

**Geology**: The underlying rocks are siltstones and minor interbedded dolomites of the Saddleworth Formation. These are veneered by wind deposited carbonates which are mainly soft but may be hardened to rubbly or sheet rock forms. The landscape has been extensively dissected by stream action and the valleys between the basement rock highs have been infilled with fine to medium grained locally derived outwash sediments. These are also capped by carbonates. There are isolated deposits of Tertiary age sands (varying from unconsolidated clayey sand to sandy clay to indurated sandstone), overlying the basement rocks. These are the remnants of a much larger blanket of sediments most of which have been stripped off. In places the sandy sediments have been altered to hard silcretes.

**Topography**: The land system includes much of the catchment area of Pisant Creek. The topography is mostly undulating with gently sloping rises and low hills formed on basement rocks and Tertiary deposits. Slopes are generally in the range 3-10%. There are occasional higher and steeper hills formed on more resistant rock strata. Yangya Hill is the most notable of these. Between the basement rock highs are valleys up to two km wide with slopes of up to 5%. Watercourses in these valleys flow into Pisant Creek which itself flows in a south westerly direction to join the Rocky River at Gladstone. Many watercourses in the Land System are eroded.

**Elevation:** Yangya Hill (452 m) on the eastern side is the highest point. The lowest point is 210 m where Pisant Creek leaves the system south west of Gladstone.

**Relief**: Relief is generally less than 50 m, with the exception of Yangya Hill which rises 100 m above the surrounding land.

**Soils**: The main soils: loamy to sandy loamy texture contrast and gradational soils with red clayey subsoils. Depth is variable depending on underlying material (rock or sediment). Shallow calcareous loams are common on rising ground, and deep calcareous and non-calcareous loams to sandy loams are common on lower slopes and flats.

Main soils

*Soils formed on rises over basement rock*

**A2** Shallow calcareous loam
**D1** Loam over friable red clay on rock

*Soils formed on lower slopes over alluvium*

**D2b** Loam over well structured red clay
**C3a** Gradational red loam

Minor soils

*Soils formed on rises over basement rock*

**C2** Gradational loam over rubble
**L1a/B3** Shallow stony loam to sandy loam
**L1b** Shallow stony loam with carbonate

*Soils formed on lower slopes over alluvium*

**A6** Calcareous loam
**C3b** Gradational red loam over rubble
**M4** Gradational brown loam

*Soils formed on Tertiary sediments*

**D3** Hard sandy loam over dispersive red clay
**D2a** Loam over well structured red clay
**A4** Calcareous sandy loam
**A4/C1** Gradational loamy sand

**Main features**: The Pisant Land System is mainly undulating and arable. Most soils are formed on fine grained basement rocks or sediments derived from them, and consequently have loamy surfaces. However, isolated Tertiary remnants give rise to sandier soils which are generally less fertile and more erodible. The loamy soils are mixed calcareous and non calcareous. The calcareous types tend to be better structured, although often shallow. The non-calcareous types are often hard setting, but usually moderately deep and inherently fertile. Most of the land is prone to erosion.

**Soil Landscape Unit summary:** 16 Soil Landscape Units (SLUs) mapped in the Pisant Land System:

| SLU | % of area | Main features # |
|---|---|---|
| AAB<br>AAC | 0.7<br>3.1 | Rocky low hills and hills formed on mainly fine grained rocks. There is up to 10% rock outcrop and 10-20% surface quartzite and siltstone.<br>**AAB** Low hills with slopes of 10-30% and relief to 40 m.<br>**AAC** Yangya Hill with slopes of 10-30% and relief of up to 100 m.<br>Main soils: shallow calcareous loam - **A2** (E), with shallow stony loam - **L1a** (C), shallow loam over friable red clay on rock - **D1** (C) and gradational loam over rubble - **C2** (L) on lower slopes. The hills are non arable due to the roughness of the terrain, moderate slopes and shallow stony soils. Rocky outcrops limit accessibility in places. Runoff is rapid and exposure is high, so a significant proportion of rainfall does not infiltrate the soil. However, areas of deeper soils are potentially productive for grazing. |
| EGB<br>EGC | 2.8<br>44.7 | Rises formed on fine grained rock.<br>**EGB** Rises with slopes of 1-4% and relief to 20 m. There is up to 2% rock outcrop in linear reefs, and up to 10% surface siltstone, calcrete and quartzite fragments.<br>**EGC** Rises and low hills with slopes of 4-12% and relief to 50 m. There is up to 5% rock outcrop in linear reefs and 2-20% surface siltstone, calcrete and quartzite fragments.<br>Main soils: shallow calcareous loam - **A2** (V), with loam over friable red clay on rock - **D1** (C) on lower slopes, gradational loam over rubble - **C2** (L) and shallow stony loam with carbonate - **L1b** (M). Hard sandy loam over dispersive red clay - **D3** (L) occurs on remnant Tertiary sediments on some upper slopes. The rises are fully arable, although moisture shortages limit crops in dry finishes. Improvement of hard setting surface soils to reduce water loss and erosion through runoff is the main management issue. |
| EQD | 1.2 | Prominent rises up to 50 m high with slopes of 10-20% formed on silcreted Tertiary sediments. There is 20% or more silcrete outcrop and surface stone.<br>Main soils: loam over well structured red clay - **D2a** (E) and shallow calcareous loam - **A2** (E), with shallow stony loam - **L1a** (L) over silcrete. Use of these isolated rises is primarily limited by the extensive outcrops of silcrete and associated shallow stony soils. The remainder of the land is arable but with limitations due to erosion potential, shallow soils, fertility and highly abrasive surface stones. |

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|---|---|---|
| ESD | 1.7 | Slopes of 8-20% and relief to 40 m formed on basement rock. There is 10-20% rocky outcrop, and 10-20% surface quartzite and siltstone.<br>Main soils: gradational loam over rubble - **C2** (E) and shallow calcareous loam - **A2** (E), with loam over friable red clay on rock - **D1** (L) and shallow stony loam - **L1a/L1b** (L). Rocky reefs, shallow stony soils and sometimes moderate slopes limit cropping of these areas. The arable land is generally confined to strips between the reefs of rock. Water erosion is a potential problem because of the high runoff from the shallow soils and rocky areas. |
| HJB<br>HJC | 0.5<br>4.1 | Rises formed on Tertiary sandstones and related unconsolidated sediments.<br>**HJB** Rises with slopes of 2-4% and relief to 20 m.<br>**HJC** Rises with slopes of 3-10%, relief to 40 m and up to 10% surface sandstone and ironstone.<br>Main soils: hard sandy loam over dispersive red clay - **D3** (E) and loam over well structured red clay - **D2a** (E), with calcareous sandy loam - **A4** (C) and gradational loamy sand - **A4/C1** (M). These slopes are highly erodible due to their predominantly sodic soils and sandy textured surfaces. Eroded watercourses indicate substantial historic erosion. The hard setting surfaces shed water, reducing profile storage, are difficult to work and may cause patchy emergence. |
| JDB<br>JDC<br>JDE<br>JDH<br>JDI<br>JDJ | 14.8<br>11.5<br>3.2<br>0.5<br>0.6<br>5.9 | Outwash fans and drainage depressions with well defined watercourses and up to 10% surface quartzite stones, formed on fine grained alluvium:<br>**JDB** Fans with slopes of 2-4%.<br>**JDC** Fans with slopes of 3-7%.<br>**JDE** Drainage depressions with slopes of 2-4% and usually stable watercourses.<br>**JDH** Fans with slopes of 3-5% and eroded watercourses.<br>**JDI** Fans with slopes of 6-12% and eroded watercourses.<br>**JDJ** Drainage depressions and flats with slopes of 1-4% and eroded watercourses.<br>Main soils: loam over well structured red clay - **D2b** (E), with calcareous loam - **A6** (C) and gradational red loam - **C3a** (C). Except for the areas immediately adjacent to watercourses, the whole unit is arable. Hard setting surface soils are the main management problem, because of their adverse effects on runoff / erosion, workability, seedling emergence, and moisture retention. Most soils are reasonably fertile, deep and well drained. |
| KJA | 2.1 | Alluvial plains with slopes of less than 1% formed on fine to medium grained alluvium.<br>Main soils: gradational red loam - **C3a** (V) with calcareous loam - **A6** (L), loam over well structured red clay - **D2b** (L) and gradational red loam over rubble - **C3b** (L). These flats have deep well drained fertile soils with no significant limitations. |
| XJJ | 2.6 | Flood plains of lower Pisant Creek, including the stream channel, the banks of which are sporadically eroded.<br>Main soils: gradational red loam - **C3a** (E), with calcareous loam - **A6** (C) and gradational brown loam - **M4** (L). These flats are at the bottom of the catchment and are therefore prone to a number of problems such as flooding, salinity, waterlogging and stream bank erosion. The soils themselves are deep, fertile and moderately well drained and potentially productive. |

# PROPORTION codes assigned to soils within Soil Landscape Units (SLU):

(D) Dominant in extent (>90% of SLU)
(V) Very extensive in extent (60–90% of SLU)
(E) Extensive in extent (30–60% of SLU)
(C) Common in extent (20–30% of SLU)
(L) Limited in extent (10–20% of SLU)
(M) Minor in extent (<10% of SLU)

**Detailed soil profile descriptions:**

**A2** Shallow calcareous loam (Paralithic, Hypercalcic / Supracalcic Calcarosol)
Calcareous sandy loam to loam grading to a highly calcareous sandy clay loam with abundant soft to rubbly carbonate segregations from about 30 cm, grading to siltstone or sandstone at depths ranging from 25 to 80 cm. Sheet calcrete overlies the rock in 10% of profiles.

**A4** Calcareous sandy loam (Regolithic, Hypercalcic / Lithocalcic Calcarosol)
Calcareous loamy sand to sandy clay loam grading to a highly calcareous sandy clay loam to sandy clay with abundant soft to rubbly carbonate from about 40 cm.

**A4/C1** Gradational loamy sand (Hypercalcic, Epibasic Calcarosol OR Calcareous, Regolithic, Red-Orthic Tenosol OR Hypercalcic, Red Kandosol)
Medium to thick soft loamy sand over a massive red clayey sand to sandy clay loam with soft carbonate segregations, forming in sandstone at about 60 cm.

**A6** Calcareous loam (Regolithic / Pedal, Hypercalcic Calcarosol)
Calcareous loam to clay loam, becoming more calcareous and clayey with depth with abundant soft carbonate at depths ranging from 35 to 90 cm.

**C2** Gradational loam over rubble (Supracalcic / Petrocalcic, Red Dermosol)
Medium thickness loam to clay loam grading to a well structured red clay, shallow on rubbly or sheet carbonate overlying weathering siltstone at 50 to 100 cm.

**C3a** Gradational red loam (Hypercalcic / Calcic, Red Dermosol)
Medium thickness loam to clay loam grading to a well structured red clay, calcareous at depths varying from 40 to 80 cm over alluvium.

**C3b** Gradational red loam over rubble (Supracalcic / Lithocalcic, Red Dermosol)
Medium thickness clay loam grading to a well structured red clay over rubbly carbonate within 50 cm over alluvium.

**D1** Loam over friable red clay on rock (Hypercalcic / Lithocalcic, Red Chromosol)
Medium thickness hard setting sandy loam to clay loam overlying a red well structured clay with soft to rubbly carbonate from about 55 cm grading to soft siltstone or sandstone within a metre.

**D2a** Loam over well structured red clay (Hypercalcic / Lithocalcic, Red Chromosol)
Medium thickness hard setting sandy loam to loam overlying a red well structured clay with soft carbonate from about 50 cm grading to ferruginized sandstone by 100 cm.

**D2b** Loam over well structured red clay (Calcic / Hypercalcic, Red Chromosol)
Medium to thick hard setting sandy loam to clay loam overlying a well structured red clay, calcareous from depths ranging from 40 to 80 cm over alluvium.

**D3** Hard sandy loam over dispersive red clay (Hypercalcic / Supracalcic, Red Sodosol)
Medium to thick hard setting loamy sand to sandy clay loam, commonly with a pronounced A2 horizon, overlying a red coarsely structured and dispersive clay grading to soft (80%) or rubbly (20%) carbonate at about 60 cm.

**L1a/B3** Shallow stony loam to sandy loam (Lithic / Petrocalcic / Silpanic, Leptic Rudosol)
Shallow stony loam or sandy loam over hard rock, sheet calcrete or silcrete.

**L1b** Shallow stony loam with carbonate (Calcareous, Paralithic, Leptic Tenosol)
Stony loam grading to weathering siltstone with soft carbonate, shallower than 50 cm.

**M4** Gradational brown loam (Eutrophic, Brown Kandosol)
Thick massive loam grading to a brown fine sandy clay loam extending below 100 cm.

**Further information:** DEWNR Soil and Land Program