

HAP Haines Plateau Land System

Plateau surfaces, slopes, and a few drainage depressions, often with gilgai microrelief (flats, mounds, and crabholes). To the north of this system are gullied slopes running down to low-lying plains; and to the east, south and west are rises and plateau areas often with saline drainage depressions. The system is named after the Hundred of Haines.

Area: 52 km²

Annual rainfall: 510 – 565 mm average

Geology: The majority of the system is underlain by early Cambrian age (Kanmantoo Group) Tapanappa Formation meta-sandstone: of which there are minor areas of near surface expression. This rock is mostly overlain by Pliocene age regolith or Pliocene-Quaternary age colluvium, both of which consist of clayey sediments often with a capping of ironstone gravel: these sediments are derived from the underlying weathered Cambrian rock. Cracking clay soils are common; and most other soils have cracking clayey subsoils. The regolith areas (remnant plateau surfaces) in particular have many areas where cracking clay soils occur. On such areas it seems that lighter textured topsoil and ironstone gravel has been 'stripped off', leaving behind clayey subsoil material to form topsoil. Some areas of Permo-Carboniferous age clayey glacial deposits occur, especially in the central and western sections of the system: these deposits give rise to cracking clay soils. Some minor areas of recent alluvium occur: these often consist of clayey deposits which also give rise to cracking clay soils.

Some soils at the northern edge of the system are underlain by middle Cambrian age (Kanmantoo Group) meta-sediments of grey fine to medium grained phyllite.

Topography: Mostly plateau surfaces with some slopes and some depressions. The plateau surfaces form gently undulating plains; while the slopes down from these areas rarely exceed 5% and form gently undulating to undulating rises. Areas with cracking clay soils and gilgai microrelief (flats, mounds, and depressions) occur widely, with gilgai microrelief expressed most strongly on plateau surfaces and in depositional depressions. These areas usually consist of approximately 20% crabholes (small circular depressions), which are about 1m below surrounding flats, and are often water filled; while the remaining 80% of the land consists of flats and low mounds.

Elevation: The eastern section of this system has a plateau surface which varies from about 55m to 80m in elevation; while the main central section varies from 30m on some of the lower slopes to 95m on the main plateau surface; and the small western section varies from just less than 40m on the lower slopes to 50m on the plateau surface.

Relief: Typically less than 10 m; often up to 20 m

Main Soils:

- F2-J1c** Cracking and sodic texture contrast soil
- E3** Cracking clay soil
- J2-J1** Ironstone soil

Main Features: Mostly arable. Topsoils are mainly loamy, with many clayey and some sandy. The most common soils have loamy topsoils with ironstone gravel over cracking and sodic clayey subsoils; there are also many cracking clay soils. The most obvious feature of the land surface is the areas gilgai microrelief (flats, mounds, and crabholes) which are widespread throughout this system. These areas pose management problems



due to the frequent sharp changes in soil and drainage conditions across a paddock. Crabholes are poorly drained and are usually seasonally water-filled: they can also have raised salinity levels especially when they occur in the larger drainage depression areas. The flats and low mounds have 'sticky' and poorly drained cracking clay soils which are very fertile but pose many practical surface management problems. Poor drainage due to low permeability clayey subsoil which is often sodic occurs across this system, resulting in increased runoff and lowering plant available water. Ironstone gravel, which occurs in many soils, reduces fertility due to the 'fixation' of phosphorus. Some saline seepage occurs. Soils often have fine carbonate in their lower subsoils, or sometimes their subsoil.

Soil Landscape Unit summary: Haines Plateau Land System (HAP)

SLU	% of area	Main features #
FBA FBB FBC FBK FBL FBM FBO FBZ	6.0 6.1 1.6 2.6 3.6 0.4 4.7 7.5	<p>Arable slopes, plains, depressions and plateau surfaces. Such areas have patches with 'slight' gilgai microrelief.</p> <p>Main soils: <u>ironstone soil</u> – loamy topsoil with ironstone gravel over sodic clay J2-J1 (<i>Ferric Brown Sodosol</i>). With 10-40% <u>cracking and sodic texture contrast soil</u> – loamy topsoil often including ironstone gravel over cracking and sodic clay in areas with 'slight' gilgai microrelief F2-J1c (<i>Vertic Brown Sodosol</i> and <i>Vertic Brown Ferric Sodosol</i>).</p> <p>FBA – mid-level gently undulating to level plains. FBB – slopes (1.5-3.5%, 2-1e) FBC – slopes (4-5%, 3-2e) FBK – mid-level gently undulating to level plains with <10% saline seepage (2s) FBL – slopes with <10% saline seepage (slopes 1.5-3.5%, 2-1e, 2-1s) FBM – slopes with <10% saline seepage (slopes 4-5%, 3-2e, 2s) FBO – depressions with <10% saline seepage (1-2e, 2-3s) FBZ – level to gently undulating plateau surface.</p> <p>Summary: the main issues are subsoil physical condition, reduced fertility where ironstone gravel occurs due to phosphorous fixation, some water erosion risk on sloping land, some waterlogging, and some raised subsoil salinity levels.</p>
FCA FCB FCK FCL FCO FCZ	3.1 2.4 1.6 0.4 1.4 9.1	<p>Arable slopes, plains, depressions and plateau areas. Such areas mostly have 'slight' gilgai microrelief or actual gilgai microrelief.</p> <p>Main soils: <u>cracking and sodic texture contrast soil</u> – loamy topsoil often with ironstone gravel over cracking and sodic clay F2-J1c (<i>Vertic Brown Sodosol</i> and <i>Vertic Ferric Brown Sodosol</i>). With 10-40% loamy <u>ironstone soil</u> J2-J1 (<i>Ferric Brown Sodosol</i>) and <u>cracking clay soil</u> E3 (<i>Vertisol</i>).</p> <p>FCA – mid-level gently undulating to level plains FCB – slopes (1.5-3.5%, 2-1e) FCK – slight depression in plateau surface or mid-level plains with <10% saline seepage (2s) FCL – slopes with <10% saline seepage (slopes 1.5-3.5%, 2-1e, 2-3s) FCO – depression with <10% saline seepage (3-2s) FCZ – level to gently undulating plateau surface.</p> <p>Summary: the main issues are subsoil physical condition, reduced fertility where ironstone gravel occurs due to phosphorous fixation, some raised subsoil salinity levels, some water erosion risk on sloping land, and some waterlogging; and difficult surface management conditions occur where cracking clay soils occur. Also, structures built in areas where clayey subsoils expand and contract need foundations which are designed to cope with such conditions or else structural damage can result.</p>
FDB FDC FDK FDL FDZ	4.6 2.0 0.6 2.5 1.6	<p>Mostly arable slopes and plateau surfaces. Such areas have patches of 'slight' gilgai microrelief and some soils formed on weathered rock.</p> <p>Main soils: loamy <u>ironstone soil</u> J2-J1 (<i>Ferric Brown Sodosol</i>). With 10-40% <u>cracking and sodic texture contrast soil</u> – loamy topsoil often with ironstone gravel over cracking and sodic clay in areas of 'slight' gilgai microrelief F2-J1c (<i>Vertic Brown Sodosol</i> and <i>Vertic Ferric Brown Sodosol</i>); and loamy topsoil often including ironstone gravel and some rock</p>



		<p>fragments over usually sodic clay overlying weathered rock, usually phyllite or sometimes meta-sandstone K2-K4-D7 (stony Brown Sodosol-Chromosol).</p> <p>FDB – slopes (1.5-3.5%, 2-1e) FDC – slopes (4-5%, 3-2e) FDK – plains with <10% saline seepage (1-2e, 2-1s) FDL – slopes with 10% saline seepage (slopes 1.5-3.5%, 2-1e, 2s) FDZ – level to gently undulating plateau surface.</p> <p>Summary: the main issues are reduced fertility where ironstone gravel occurs due to phosphorous fixation, sodic subsoils, some raised subsoil salinity, some water erosion risk on sloping land, and some stony patches.</p>
FFA FFB FFK	0.1 1.8 0.2	<p>Arable plains and slopes. Mostly medium thickness loamy to sandy soil with ironstone gravel over sodic clay.</p> <p>Main soils: <u>ironstone soil</u> – sandy loam to light sandy loam with a bleached sub-surface layer of loamy sand which includes ironstone gravel, over sodic clay J2-J1 (<i>Ferric Brown Sodosol</i>).</p> <p>FFA – level to gently undulating plain. FFB – slopes (1.5-3.5%, 2-1e) FFK – level to gently undulating land with <10% saline seepage (2s).</p> <p>Summary: the main issues are reduced fertility with ironstone gravel due to phosphorous fixation, and sodic subsoils.</p>
TGA TGB TGL TGO TGP TGZ	4.6 1.4 6.4 1.7 3.6 0.1 14.0	<p>Arable to semi-arable plains, slopes, depressions and plateau surfaces. Such areas mostly have gilgai or strong gilgai microrelief.</p> <p>Main soils: <u>cracking clay soil</u> E3 (<i>Vertosol</i>). With 10-50% <u>cracking and sodic texture contrast soil</u> – loamy soil often with ironstone gravel over cracking and sodic clay F2-J1c (<i>Vertic Brown Sodosol</i> and <i>Ferric Vertic Brown Sodosol</i>).</p> <p>TGA – mid-level gently undulating to level plain. TGB – slopes (1.5-3.5%, 2-1e) TGK – slight depressions on plateau surface or mid-level plains with <10% saline seepage (2-1s) TGL – slopes with <10% saline seepage (1.5-3.5%, 2-1e, 2s) TGO – depression with <10% saline seepage (2-3s) TGP – plateau surface with marginal salinity (4-3s) TGZ – level to gently undulating plateau surface.</p> <p>Summary: the main issues are surface soil management, subsoil physical condition, waterlogging and inundation of crabhole depressions, and some saline seepage. Also, structures built in such areas need foundations which are designed to cope with the expansion and contraction of the clayey subsoils or else structural damage will result.</p>
PpO PpU	3.6 0.9	<p>Semi-arable drainage depressions. These areas have patches of 'slight' gilgai microrelief and some soils formed over weathered rock.</p> <p>Main soils: loamy to sandy soil with a bleached sub-surface layer over sodic clay usually with fine carbonate in lower subsoil F2a-G4 (<i>Brown Sodosol</i>). With 10-50% loamy to sandy soil with a bleached sub-surface layer which often includes some rock fragments over sodic clay overlying weathered rock K4-D7 (<i>stony Brown Sodosol</i>) and <u>cracking and sodic texture contrast soil</u> – loamy soil over cracking and sodic clay in areas of 'slight' gilgai microrelief F2 (<i>Vertic Brown Sodosol</i>).</p> <p>PpO – drainage depression with <10% saline seepage. PpU – drainage depression with 10-50% saline seepage (4-3*s).</p> <p>Summary: the main issues are waterlogging, saline seepage, and the risk of inundation.</p>

Classes in the 'Soil Landscape Unit summary' table (eg. 2-1e, 3w, 2y, etc) describe the predominant soil and land conditions, and their range, found in Soil Landscape Units. The number '1' reflects minimal limitation, while increasing numbers reflect increasing limitation. Letters correspond to the type of attribute:

a - wind erosion e - water erosion f - flooding g - gullyng
r - surface rockiness s - salinity w - waterlogging y - exposure



Detailed soil profile descriptions:**Main Soils:**

F2-J1c Cracking and sodic texture contrast soil - often with ironstone gravel (*Vertic Brown-Grey Ferric Sodosol* and *Vertic Brown-Grey Sodosol*). Thin, medium thickness or thick sandy loam to loam (occasionally sandy clay loam), often with a bleached sub-surface layer of loamy sand to sandy loam to loam which often includes ironstone gravel; over olive, olive-brown or yellow-brown cracking and sodic clay usually with fine carbonate in the lower subsoil. Found on slopes, flats on plateau surfaces, in drainage depressions, and the flats and crabholes of gilgai microrelief areas: soils with grey subsoils occur in crabholes. Land with no obvious gilgai microrelief can often have a 'slight' gilgai microrelief of very slight mounds and depressions.

There is a variant of this soil found in drainage depressions which does not have cracking clay subsoil, and has loamy to sandy topsoil over sodic clay, usually with fine carbonate in the lower subsoil: **F2a-G4**.

Some texture contrast soils with alkaline subsoils, and often fine carbonate in the lower subsoil, overlie weathered rock at moderate depth: **D7**.

E3 Cracking clay soil (*Epipedal Brown-Grey Vertosol*). Usually thin light to medium cracking clayey topsoil with strong sub-angular blocky to polyhedral pedality and sometimes with prismatic primary structure; over strongly structured olive to olive-brown sodic and cracking clayey subsoil, which is often prismatic and often has fine carbonate in the subsoil or lower subsoil. Soils on the mounds of areas with gilgai microrelief have fine carbonate closest to the soil surface: sometimes these soils are calcareous throughout. Occasionally stones are seen on the soil surface of cracking clays in drainage depression areas. These soils are particularly found on mounds of areas with gilgai microrelief, and to a lesser extent on flats and crabholes of areas with gilgai microrelief: grey subsoils typically occur in crabholes.

J2-J1 Ironstone soil (*Ferric Brown Sodosol*). Medium to thick sandy loam to light sandy loam (with some light loam and minor loamy sand), with a sub-surface layer of light sandy loam to loamy sand which is usually bleached and usually includes ironstone gravel; over olive-brown, yellow-brown, red-brown or olive sodic clay which often has fine carbonate in the lower subsoil. Found on slopes and flats.

Further information: [DEWNR Soil and Land Program](#)

