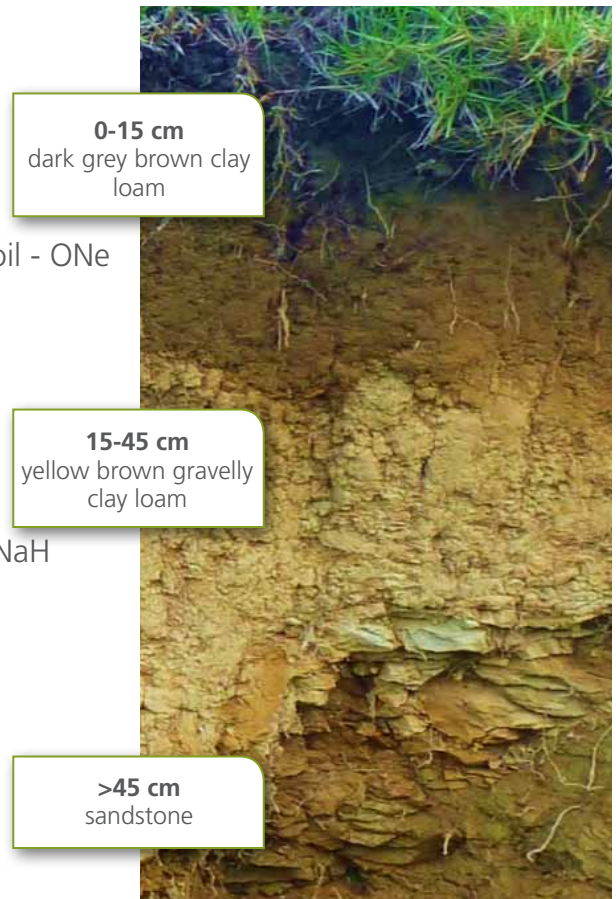


Young sandstone soils

Soil types in this group

- Atuanui clay steepland soil - ANS
- Autea clay - AEe, AEeH
- Autea clay loam/silty clay loam - AE, AEH
- Omanaia clay loam - ON, ONH
- Omanaia clay loam with coarse-structured subsoil - ONe
- Omahuta clay - OF, OFH
- Puhoi clay loam - PB, PBH
- Puhoi light brown clay loam - PBu, PBuH
- Purua clay loam - PUeH
- Purua silt loam - PU
- Tanoa sandy clay loam - TN, TNH
- Tanoa sandy loam and sandy clay loam - TNa, RNaH
- Taumata clay loam - TM, TMH
- Tautoro clay loam steepland soil - TLS
- Waitotira brown clay loam - YCr, YCrH
- Waitotira clay - YCe, YCeH
- Waitotira clay loam - YC, YCH
- Waitotira gravelly sandy loam - YCgH
- Whangaripo clay - WRe, WReH
- Whangaripo clay loam - WR, WRH
- Whirinaki clay loam - WN, WNH
- White Cone sandy clay loam steepland soil - WCS



Waitotira clay loam (YC, YCH) soil profile

*The H denotes the hill variant of this soil type, which occurs on slopes over 20° and has a shallower profile.

This fact sheet uses NZ Soil Bureau map series soil type names and abbreviations.

Features of young sandstone soils

- These soils formed from banded, massive and shattered sandstone, and sandstone–mudstone basement rocks
- They are part of the Puhoi, Purua, Omanaia and Waitotira suites
- Sandstone is a harder basement rock and supports steep slopes where slip erosion is common
- These soils are prone to tunnel gullying, which in turn can trigger extensive slumping and earthflow erosion
- Because basement rocks differ, these soils vary widely in their natural fertility

Structure and drainage management

Issues	Management tips
Soils are all winter wet and prone to pugging	Maintaining good pasture covers helps build soil organic matter and improve soil structure Consider draining wet pasture, creating or protecting wetlands
Young sandstone soils are difficult to cultivate because of high clay content in topsoils	Oversow or direct drill for pasture renewal where clay prohibits a fine tilth
Soil structures vary due to different parent material and hill gradients, so management needs to be specific to different soil properties	Consider retiring very steep or marginal pastoral land from grazing if pastoral returns are poor and/or weed invasion is a problem

Erosion control

Erosion risks	Soil type	Specific problems	Possible solutions
Landslide erosion (slips and slumps)	All young sandstone soils on steeper slopes, especially Puhoi suite and Omanaia suite soil types	Clay washed downwards by rain creates a slip plane known as a 'greasy back' During high intensity rain storms following dry weather, water penetrates cracks in soils and lubricates the slip plane, triggering slips Deep slips >1 m can occur on Whangaripo clay and clay loam (WRe, WReH, WR, WRH) Whirinaki clay loam (WN, WNH) is prone to slip erosion and deep seated mass movement on steeper slopes	On actively eroding areas, densely plant at 5m spacings at the foot of slips, expanding to 8-10m spacings upslope Open plant poplars across hillsides at 15m spacing as a preventative measure Consider retiring very steep or marginal pastoral land from grazing if pastoral returns are poor and/or weed invasion is a problem Oversow and fertilise slip scars for faster revegetation Use contour cultivation for cropping on slopes under 15°
Gully erosion	Omanaia suite especially	More mature soils are prone to gully erosion	Plant poplar or willow poles in a zig-zag pattern along the gully
Tunnel gully erosion (severe)	Waiotira suite, especially Waiotira clay loam (YC, YCH) and Waiotira gravelly sandy loam (YCg)	Tunnels 2–3 m underground cut their way downslope, unnoticed until the surface collapses Holes (tomos) then open As well as creating a stock and vehicle hazard, these holes generate sediment and destabilise hillsides	Plant poplar or tree willow poles adjacent to, or directly into, the holes (if able) and along the tunnel path



Typical young sandstone Waiotira hill country

Nutrient management

Soil type	Nutrient status	Management strategies
All young sandstone soils	Nutrient status varies considerably in this group	Differences in basement rock make detailed knowledge of soil types and nutrient status essential for good management. Test your soils regularly
Younger soils, e.g. Waiotira clay loam	Naturally more acidic than older soils	More lime is required to achieve optimal pH which unlocks nutrients bound to clay and makes them available to plants
Waiotira suite	Low in sulphur because of massive sandstone basement rock	Little and often sulphur inputs are recommended

Drainage classes

Soil symbol	Full name	Drainage class
PUHOI SUITE Basement rock: banded sandstone		
ANS	Atuanui clay steepland soil	4 - Well drained
TM, TMH	Taumata clay loam	4 \Rightarrow 3 - Moderately well drained
WR, WRH	Whangaripo clay loam	3 - Moderately drained
PBU, PBUH	Puhoi light brown clay loam	3 \Rightarrow 2 - Moderately to imperfectly drained
OF, OFH	Omahuta clay	3 \Rightarrow 2 - Moderately to imperfectly drained
WRe, WReH	Whangaripo clay	2 \Rightarrow 1 - Imperfectly to poorly drained
PB, PBH	Puhoi clay loam	1 - Poorly drained
OMANAIA SUITE Basement rock: sandstone–mudstone complex		
AE, AEH	Autea clay loam/silty clay loam	3 - Moderately drained
WN, WNH	Whirinaki clay loam	3 \Rightarrow 2 - Moderately to imperfectly drained
ON, ONH	Omanaia clay loam	3 \Rightarrow 2 - Moderately to imperfectly drained
AEE, AEEH	Autea clay	2 \Rightarrow 1 - Imperfectly to poorly drained
ONE	Omanaia clay loam with coarse-structured subsoil	1 - Poorly drained
WAIOTIRA SUITE Basement rock: massive sandstone		
WCS	White Cone sandy clay loam steepland soil	4 - Well drained
YCGH	Waiotira gravelly sandy loam	3 - Moderately drained
YC, YCH	Waiotira clay loam	3 - Moderately drained
YCr, YCrH	Waiotira brown clay loam	3 \Rightarrow 2 - Moderately to imperfectly drained
YCe, YCeH	Waiotira clay	2 - Imperfectly drained
PURUA SUITE Basement rock: shattered sandstone		
TLS	Tautoro clay loam steepland soil	4 - Well drained
PU	Purua silt loam	3 - Moderately drained
TN, TNH	Tanoa sandy clay loam	3 - Moderately drained
TNa, TNaH	Tanoa sandy clay loam	3 - Moderately drained
PUeH	Purua clay loam	3 \Rightarrow 2 - Moderately to imperfectly drained



Waiotira hillside showing the later stages of the tunnel gully process

Northland soil factsheet series

- Northland's climate, topography, historic vegetation and mixed geology have combined to form a complex pattern of soils across the region. There are over 320 soil types in Northland. Other regions in New Zealand average only 20 soil types per region.
- The information in this fact sheet is based on a 1:50,000 mapping scale. Therefore, it is not specific to individual farms or properties. However, it may help you to understand general features and management options for recent alluvial soils.
- Knowing your soils' capabilities and limitations is the key to sustainable production in Northland. Northland Regional Council (NRC) land management advisors are available to work with landowners to provide free soil conservation advice, plans and maps specific to your property.
- Regular soil tests are recommended. If you are concerned about your soil structure or health, the Visual Soil Assessment test could be useful. Contact the land management advisors at Northland Regional Council for more information.
- Further background information about the processes that have formed these soils can be found here:
www.nrc.govt.nz/soilfactsheets

Contact a land management advisor on
0800 002 004 or visit www.nrc.govt.nz/land