# WESTERN PORT RIVERS MANAGEMENT STUDY

## LAND CAPABILITY STUDY OF THE WESTERNPORT CATCHMENT

By

H. M. Goss
T. Reimers
R. H. M. van de Graaff

April 1988

Land Protection Division
Department of Conservation Forests and Lands

Report prepared for the Dandenong Valley Authority

## ACKNOWLEDGEMENTS

There are many people who deserved to be acknowledged for their contributions to this report; David Howe, Brian White, Frank Gigliotti, Mal Lorimer, Phil Cook, Ian Sargeant, Evan Nichols, Mark Kurzeme, Lisa Shoebridge, Brian Hodgson.

## CONTENTS



## List of Tables



## List of Figures

westport.tab

30 November, 1987

## INTRODUCTION

This report provides a general description of land units within the Westernport Bay Catchment Area and an accompanying assessment of the capability of the land to sustain a range of land uses.

The Westernport Bay Catchment Area occupies some 2600 km2 of land east of Melbourne, as shown in figure 1. The survey was undertaken at a scale of 1:25000 between the months of January 1986 and October 1986. Its principal objective was to identify major soil types and landform elements, thus providing physical data on which predictions can be made regarding the degree of erosion hazard of the land units under a variety of land uses.

The study was initiated under the Westernport Rivers Management Study and was funded by the Dandenong Valley Authority.

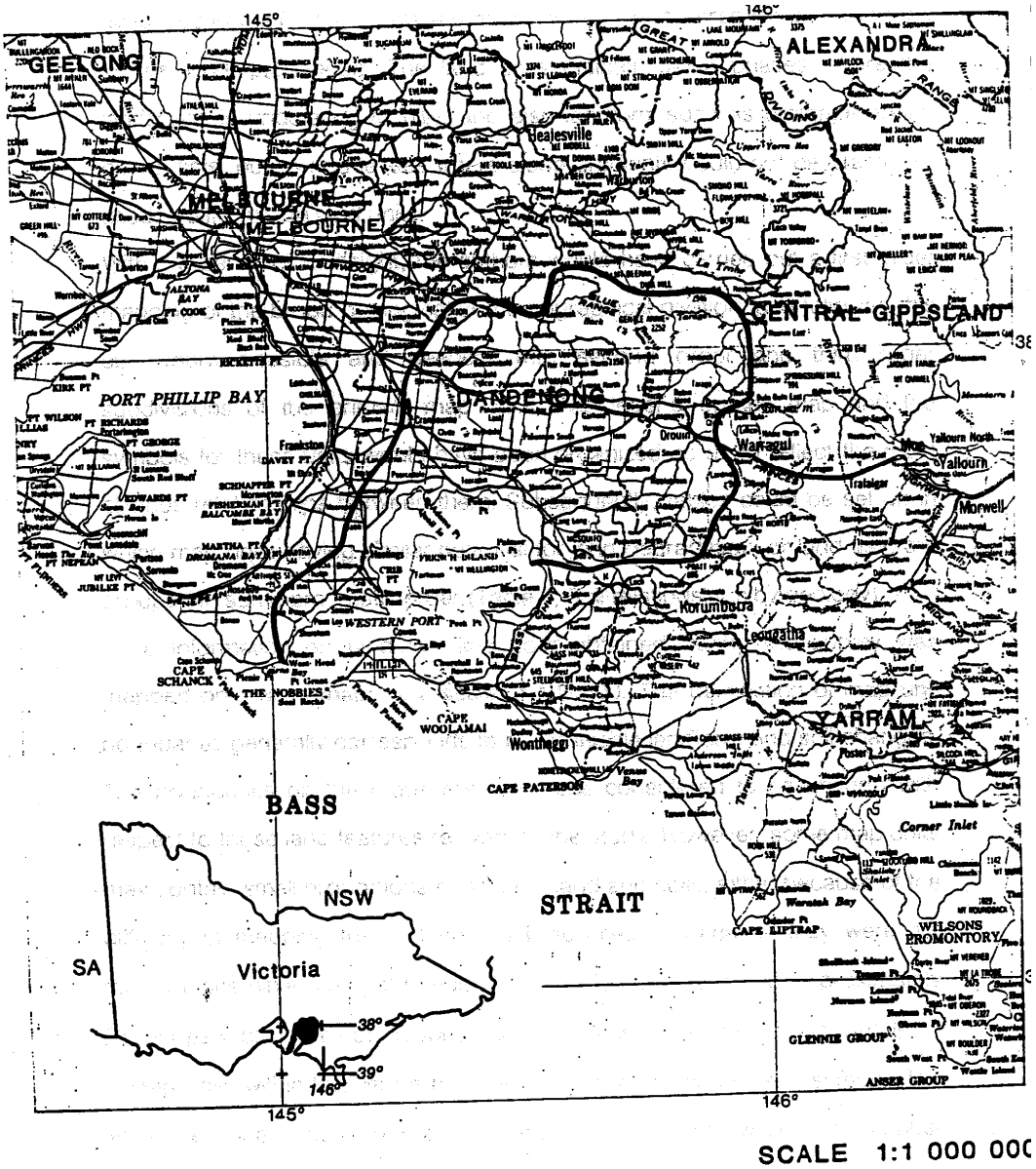
## PROCEDURE

Different types of landforms were recognized from stereo-interpretation of 1:25000 scale aerial photographs. Geological Survey Maps and other published soil surveys (see appendix A) were used as base data in defining the major soil types within the Westernport Bay Catchment Area Landform and soil descriptions are based on varying levels of sampling, field inspections and interpretation of data from previous studies.

The soil association survey of the Westernport Bay Catchment at a scale of 1:123 000 by Sargeant (1975) needs special recognition because of its comprehensiveness and accuracy. This map was especially useful in the low lying flat land around Koo-Wee-Rup where a high level of detail is shown which is of particular relevance to agricultural land use.

**Figure 1**

**LOCATION MAP OF WESTERNPORT BAY CATCHMENT AREA**



Mapping units were numbered and coded in the order that they were described in the field and letter-number codes were entered on the draft map as the work proceeded. The land units indicate slope phases where the landscape is undulating to hilly, and also landform, such as drainage areas, plains, fiats, dunes and levees where slope gradients could not be practically used to differentiate land units.

With the benefit of hindsight, the authors would have carried out a first order mapping of the broad geological and topographical division, and followed this up, where possible and needed, with second order and third order subdivisions of the primary map Units.. The legend on the map and the symbols for these units would have been organized so as to reflect the most obvious relationships between them. Subsequently, tables could be set up in which map units having similar potential for land degradation, or land use, are grouped in some pragmatic order (Table 3, Soil relationships by geology).

The information on landform and soils obtained during the survey was mapped onto base maps at a scale of 1:25000. The delineation of map unit boundaries generally corresponds to recognisable landform and soil changes. The boundaries on the maps enclose areas considered to be uniform with respect to those land features relevant to the study. However, some map units may contain small proportions of different land and soils, either because of the difficulty of mapping them at the scale adopted or because they were not readily discernible during the mapping. Land features less than approximately 75 metres width were not mapped due to the limitation of the mapping scale.

Map units within this report have been given an alpha-numeric symbol. The letter describes the topographic (landform) element, while the number describes the soil type. The relevant keys for map unit symbols and land form definitions are shown tables 1 and 2.

Seven potential land degradation tables are proposed based on previous land studies by Rowe et al, (1981). Each table lists the main land factors affecting the potential for soil land degradation from a particular land use. Each limiting land feature is represented by a dual letter symbol (see table 4).The map units within the study area are rated against these tables. When a land feature of the map unit becomes limiting (there is a likelihood of soil land degradation resulting from the proposed land use), the corresponding symbol is placed beside the map unit under the particular land use.

The information on the map units is presented on two facing pages, with the first page containing observed and measured data. The second page contains the inferences made from that data.

**Table 1**

**MAP UNIT SYMBOL LEGEND**

| LANDFORM COMPONENT | | SOIL TYPE COMPONENT |
|---|---|---|
| **Landform Element** | **Symbol** | **Soil Number** |
| Tidal flats | T | |
| Beach | B | |
| Dunes | N | |
| Levees | L | |
| Drainage areas: | | |
| depression | D | |
| deeply incised | Dv | Numbers 1 to 40 refer to the soil type variations which were identified in the Western Port Catchment Area. Refer to text for soil type definitions. |
| Flats | F | |
| Plains | P | |
| Undulating terrain | U | |
| Sloping terrain: | | |
| 2%-5% gradient | Sa | |
| 5%-10% gradient | Sb | |
| 10%-15% gradient | Sc | |
| 15%-30% gradient | Sd | |
| >30% gradient | Se | |

**Table 3**

**GEOLOGY AND SOIL GROUP RELATIONSHIPS**

| Geology | Soil Group Numbers |
|---|---|
| Quaternary alluvium | 9A,B 10 1 18 19 27* 28 29 |
| Tertiary & Quaternary gravel, sand, ferruginous sand & clay | 31 32 39 |
| Tertiary sands over Jurassic-Cretaceous sediments | 33 34 35 36 38 |
| Tertiary sandstone overlain by Quaternary sand sheet | 5 6 7* |
| Tertiary sandstone | 3 8* |
| Older Tertiary Basalt | 2 4 15 16 20 24 25 |
| Devonian granite and granodiorite | 11 22 23 13 |
| Silurian and Devonian mudstone, siltstones and sandstones | 1A,B 12 14 1A, B6*30 40 37 |

**FOOTNOTES***

| Soil Group Numbers | |
|---|---|
| 7 | -Quaternary sands |
| 8 | -Tertiary sandstone and alluvium derived from it |
| 26 | -influenced by windblown Quaternary sand overlay |
| 27 | -Quaternary alluvium overlain by windblown sheets |

**Table 2**

**DEFINITION OF LANDFORM ELEMENT**

| Landform element | Symbol | Definition |
|---|---|---|
| Tidal flats | T | Saline mudflats under tidal influence. |
| Beach | B | Sandy coastline, tidally influenced on the lower slopes and merging gradually into foredunes or ending abruptly at cliffs. |
| Dunes | N | Moderately inclined to steep ridge or hillock built up wind. |
| Levees | L | Long and nearly level sinuous ridge adjacent to the stream. |
| Drainage areas: | | |
| depression | D | Open depression where water run-off concentrates. |
| deeply incised | Dv | Deeply incised drainage lines. |
| Flats | F | Flatlands with maximum slope gradient of 2% and is subject to flooding. |
| Plains | P | Any flat area, large or small; having few if any prominent surface irregularities. Maximum slope gradient of 2%. |
| Undulating terrain | U | Hummocky uneven ground containing rises and depressions larger unconfined areas and lower slopes, with a 2%-5% dominant gradient. |
| Sloping terrain | Sa | Very gentle slopes. Dominant gradient of 2%-5%. |
| | Sb | Gentle slopes. Dominant gradient of 5%-10% |
| | Sc | Moderate slopes. Dominant gradient of 10°/0-15%. |
| | Sd | Steep slopes. Dominant gradient of 15%-30%. |
| | Se | Very steep slopes. Dominant gradient of greater than 30%. |

**Table 4**

**LIMITING LAND FACTOR SYMBOLS**

| Main land factor affecting use | Symbol |
|---|---|
| Unified Soil Group | USG |
| Slope Gradient | Sg |
| Soil drainage | Sd |
| Measured Soil Permeability (hydraulic conductivity) | Sp |
| Depth to hard rock | R |
| Linear Shrinkage (shrink-swell) | L |
| Emerson Soil dispersion (Aggregate Stability) | E |
| Texture | T |
| Topsoil Texture | Tt |
| Depth of Topsoil | Td |

## ASSESSING THE RISKS OF SOIL EROSION

One of the purposes of the land resources survey of the Westernport Bay catchment is to provide soil and terrain information for predicting soil erosion hazards resulting from current or proposed land uses. Such information would be even more useful if it could indicate on what kinds of land the risks are greater or smaller and specifically, what forms of erosion - including sheet, rill, gully, tunnel, landslip, soil creep, are likely to occur.

To make these predictions realistic it is necessary to have a good understanding of the processes involved, a knowledge of the soils, hydrology and climatology of these various types of land and last but not least, a knowledge of the kinds of disturbances typically associated with the various land uses. Such understanding and knowledge must be employed systematically and with a scientific method to yield useful results.

Because of the complexity of erosion\ processes, predictions of erosion risks are frequently made off the cuff based on subjective experience. Whilst these may have resulted from a systematic approach, extensive validation is needed before they can be regarded as reliable. For lack of truly sound models in Australia, the risk of sheet and rill erosion is often assessed using the Universal Soil Loss Equation or USLE (Wischmeier and Smith, 1972). The USLE is an empirical model based on the statistical analysis of more than 10,000 plot-years of runoff and soil loss data in the United States. It is, as Rose (1987) has pointed out, a captive of its own data set, which relates to soils common in the eastern United States and an efficient, totally mechanised farming system based on cereals, as well as experimental plots with straight slopes (Hudson, 1980).

As there is a total lack of similar data for Victoria the USLE cannot be used to quantify soil losses in an absolute sense here. The extrapolation of the USLE to whole mapping units is also fraught with unknowns. However it can be used to identify the important factors contributing to soil loss.

There are no similar models for gully and tunnel erosion. Slope stability or lack of it at specific sites can be assessed by geotechnical investigation. For tunnel and gully erosion the only predictive tools are listings of the factors and conditions which are known to initiate and worsen these forms of degradation.
The survey of the land resources of the Westernport catchment has resulted in reasonably homogeneous mapping units with respect to geology, landform, slope gradients, and broad soil classification (at the level of Northcote's Principal Profile Form). These features are easily identified on air photos and in the field.

Specific soil properties such as infiltration rate and hydraulic conductivity (permeability), are important determinants of runoff and soil loss. As these can vary considerably within a map unit, and were not measured, predictions become more uncertain. These properties, moreover, are highly dependent on soil structure and hence on past and present land management and land use. Therefore, if different parcels of the same kind of land are used in different ways, they can have very different hydrological

responses. **Hence a single generalized assessment of erosion risk and land capability should not be applied to a mapping unit which is heterogeneous with respect to hydrological properties.** The USLE is reproduced below to assist the users of this. report and land resource map in making relative assessments of erosion risk for an area of sloping land which is being investigated. Terms used in this report such as soil erodibility, rainfall erosivity (rainfall and runoff factor), etc, are identical to these terms as defined in the USLE.

The soil loss equation is:

A =RKLSCP 1)

Where

A is the computed soil loss per unit area, expressed in the units selected for K and for the period selected for R. In practice, these are usually so selected that they compute A in tons per acre per year, but other units can be selected.

**R,** the rainfall and runoff factor, is the number of rainfall erosion index units, plus a factor for runoff from snowmelt or applied water where such runoff is significant.

**K,** the soil erodibility factor, is soil loss rate per erosion index unit for a specific soil as measured on a unit plot, which is defined as 72.6 ft. length of uniform 9 percent and is kept continuously in clean tilled fallow.

**L,** the slope length factor, is the ratio of soil loss from the field slope length to that from a 72.6 ft. length under identical conditions.

**S,** the slope steepness factor, is the ratio of soil loss from field slope gradient to a 9 percent slope under otherwise identical conditions.

**C,** the cover management factor, is the ratio of soil loss from an area with specific cover and management to that from an identical area in tilled continuous fallow.

**P,** the support practice factor, is the ratio of soil loss with a support practice like contouring, strip-cropping, or terracing to that of straight-row farming up and down the slope.

The soil erodibility factor, K, is determined by inherent properties of the soil, including texture, organic matter content and structure. Therefore different soils have different susceptibilities to erosion. The erosion risk or hazard, however depends on all the factors listed in the USLE. Some important properties which increase the erodibility of a soil are:

- high percent of silt plus very fine sand - high percent of sand

- low percent of organic matter

- dispersive tendencies

- coarse soil structure and lack of structure - slow profile permeability.

1) Agriculture Handbook 537, USDA, 1978.

The first four of these tend to produce soils with low cohesiveness, causing soil aggregates to be easily broken down and soil material to be entrained by raindrop impact and runoff. Coarse structure or lack of structure and low profile permeability tend to produce lower infiltration rates, and hence higher runoff.

As slope length increases, the soil loss by sheet erosion increases also, but not to the same degree. The proportionality factor is approximately a square root function, i.e. for a doubling of the length the average soil loss increases by a factor of the square root of 2 or 1.4. On very long slopes, e.g. 400m or longer, this proportionality underestimates the soil loss because of rilling. On near level slopes runoff water cannot develop high velocities, thus forming a thicker layer and protecting the soil from raindrop impact. Therefore actual soil losses are less than predicted by the proportionality factor of 2.

The equation which evaluates the slope-steepness factor (Agric. Handbook 537, USDA, p.15) predicts a much more rapid increase of soil loss with an increase of slope gradient. Doubling the slope angle from 2.5° to 5° (4.3% to 8.7% gradient) increases soil loss by a factor of about 2.5. Doubling the angle again to 10° (17.6% gradient) increases soil loss by a factor of 2.9 and so on. According to the Handbook this predictive relationship is believed to be affected by various interactions with soil properties and surface conditions. These effects were not quantified at the time of publication in 1978.

The concepts of the USLE: A = RKLSCP can be helpful in assessing relative erosion risks associated with:

- a current or proposed land use in a specific parcel of land, e.g. a paddock, under different management methods;

- in comparing relative erosion risks between different possible land uses on the one parcel; or

- comparing the same land use on parcels of different land.

Within the survey area the rainfall and runoff factor, R, may probably be considered a constant for all map units. It may then be ignored in relative ratings.

There are no quantitative data on soil erodibility, K, but the main factors which increase or decrease soil erodibility are known. To obtain an appreciation of the variability of K, one has to depend largely on US data. For the majority of these soils the high K values are no more than 2.5 times the low K values (see list p.9 in Handbook 537).

Possibly, the soils in the Westernport Bay catchment follow a similar pattern.

The slope length factor, L; has to be assessed on the spot, making sure that it incorporates the full length of travel of the runoff. This extends from the point where runoff begins to where it joins a drainage line and becomes channelized. As the length increases, so does average soil loss, but at a lesser rate (square root). The slope steepness factor, S; is quite significant, as between a very gentle slope, say 2.50(4.3%), and a steep slope, say 20° (36.3%), a twenty-fold increase in soil loss appears possible (equation 5, p.15, Handbook 537). Such an increase would tend to overshadow any likely differences in K values.

The cover and management factor, C, and the support practice factor, P, are also quite significant, as bare cultivated surfaces will lose soil much faster, say 3 times as fast as surfaces protected by litter or plant canopies (table 5, p 22, 23 Handbook 537). In assessing soil erosion risks one should take, therefore, the disturbed, bare surface condition as a starting point if the proposed land use creates such conditions.

In the control of soil erosion the USLE can assist in developing correct land management practices. the factor R cannot be changed, while factors L and S cannot be easily modified to decrease the risk of soil loss. Terracing, construction of contour banks, changing the direction and length of cultivation furrows or beds are ways in which L and S can be modified.

Factors C and P, and to some extent K, can be maximised by agronomic techniques and soil conservation measures. Therefore, in deriving recommendations for soil erosion control C and P should be emphasised.

## ASSESSING POTENTIAL LAND DEGRADATION

The ,land resources survey of the Westernport Bay catchment was carried out to provide physical data on which predictions can be made regarding the potential for land degradation from a variety of specified land uses. In this report the term potential land degradation, rather than land capability, is used. Judgement of the degree of land degradation from the specified land uses can only be accurate and useful if they are soundly based on:

(1) a knowledge of the land factors or properties which have an impact on the land Use in question;

(2) an adequate knowledge of the variability of land factors within each kind of land (map unit) distinguished and mapped; and

(3) a knowledge of the kind, severity and duration of the land or soil disturbances inherent in the land use being considered.

Clearly, a survey of 2600 $km^2$ taking place in 10 months, which relied heavily on interpretation of aerial photographs at a scale of 1:25000, and using existing soils data with field checking has meant that knowledge of detail on the variability of land attributes in the mapping units is limited.

The primary source of soils data has been the "Soil Survey of Westernport Bay Catchment" (Sargeant 1974) which defined, in general terms, the dominant soil related to geology and topographic patterns.

Knowledge of certain land factors pertaining to the map units, such as lithology and slope gradients, tends to be accurate than knowledge of soil type and soil properties. In the case of the former, the data are derived from good geological and topographic maps, and are stated in general terms. Also, they are based on features which can be assessed with reasonable accuracy from aerial photos. With soil types and soil conditions the picture is much more complex. Geomorphological and hydrological processes can result in significant soil variation over short distances. Whilst some of this variability may be reflected in features observable on aerial photos, a considerable amount needs to be determined by detailed field work. During this survey, however, there was severely limited time for such detailed field work and its correlation with airphoto patterns.

Sampling of soils for laboratory analysis was limited to soil types that were visually distinct and appeared to be common or dominant in the map units. The dominant soils are represented by one sampled profile, and therefore no data on chemical or physical variability within such visually recognised kinds of soil are available.

From the foregoing it will be clear that to consider proposals for land use changes pertaining to specific areas of land more site -specific investigations will generally be required after consideration of the data in this report.

Furthermore, one must know if and how the disturbances of the land or soil inherent in the land use can be minimised by improved site management. And finally, as acknowledged in the Guidelines for Land Capability Assessment (Rowe et al. 1981), the understanding of the relationships between land and its use is increasing which will require the updating of the assessment systems from time to time. The rating systems published by Rowe et al. (1981) have been modified in this report to accommodate some of these new insights.

In the rating systems the land factors which are known to affect the land's potential for degradation for a given kind of land use are tabulated in the order of perceived importance. Each land factor in the Tables is accompanied by a statement on the manner in which the factor affects the performance of the land under that use, or construction activities related to it. Where possible; known critical values or classes are given for the attribute.

Other land factors which are thought to have an effect on the land use, but which remains undocumented, are discussed in a note added to the Tables.

The assumption implicit in the rating systems proposed by Rowe *et. al*. (1981), that any single land factor has a proportional effect on land degradation as its magnitude or intensity changes, has been abandoned. This has been done because for certain land factors the subdivision of their values or levels into five classes has been found to be arbitrary and unrealistic.

Instead of five-class breakdown, the new explanatory notes may be more informative and so lead to increased acceptance and better land management methods. Thus, this report can only broadly indicate the potential land degradation in a mapping unit for a specified land use.

In summary, much of the data consists of more or less subjective interpretations and that inter-map unit variability at a higher level of resolution is not clearly understood and the physical parameters observed or measured often may be favourable or unfavourable to the land use depending on circumstances. (see tables 5-11 for the impact of land factors on potential land degradation for specific land uses).

The description of each mapping unit is presented on two facing pages, such that all data based on observation in the field, on airphotos, topographic maps, extrapolations from published soils data and all field or laboratory measurements are combined as factual information on the first page. All inferred data are combined on the second and facing page. This should assist the readers to make their own interpretations from factual survey information if they wish to do so. It will also enable others to distinguish between an objective physical data base and subjective interpretations.

**Table 5**

**IMPACT OF LAND FACTORS ON POTENTIAL LAND DEGRADATION FOR: SECONDARY ROADS**

Land factors significant for the construction of roads with sealed surfaces for light vehicles and with drainage and kerbing.

| MAIN LAND FACTORS AFFECTING USE | UNIT | EFFECTS |
|---|---|---|
| Unified Soil Group | Class | The Unified Soil Group provides an indication of the particle size, cohesiveness and plasticity of a soil. The classification will therefore reflect the percentage linear shrinkage, sometimes called 'shrink-swell capacity', ease of compaction and workability of the soil to which it refers. |
| Slope Gradient | % | Slope gradients have a significant effect on road location and design when they exceed 20%-25%. On steeper grades roads have to zig-zag and turning points have to be carefully selected on gentler slopes. Surface relief is often more important because of its effect on cut and fill required. |

Most Melbourne roads are constructed on a subgrade of low to high plasticity clays (CL-CH). Silty soils (MH, ML, some SM) may be difficult to compact and may have low cohesive strength, particularly when wet. Organic or peaty soils (OH, Pt) are generally not suitable for use as a road subgrade.
.

**Table 6**
**IMPACT OF LAND FACTORS ON POTENTIAL LAND DEGRADATIONFOR: ON BUILDING FOOTINGS FOR DWELLINGS**

Land factors significant for the construction of building footings for dwellings with one or two storeys.

| MAIN LAND FACTORS AFFECTING USE | UNIT | EFFECTS |
|---|---|---|
| Slope Gradient | % | Steep slopes can limit the choice of type of footing and the ease of installation. In practice gradients steeper than 20-25% are considered to be limiting for these types of structures. |
| Unified Soil | class | Peaty and organic soils (PT, OH, OL) are to be avoided for footings because of their low strength and high compressibility, while silty soils may be difficult to work with when wet because of their low cohesive strength. |

The height of rock outcrop is more significant than its percentage cover*. Filled sites generally require careful investigations to determine whether the fill is suitable as a founding material.

The severity of the limitation posed by the depth of soil to hard rock depends almost wholly on what structures are being proposed. It also depends on the slope of the ground surface, (the slope of the bed rock surface being considered as generally parallel to the former), the nature of the soil, the depth of seasonal wetting and drying, and the hardness and degree of fracturing of the rock itself. Where closely jointed sedimentary rock occurs at shallow depth, for example in hilly country or Silurian sediments, many house sites require cuts into the rock. Such cuts provide a very stable surface for any footings. If the soils were deep and consisted of reactive clays, the footings would have to penetrate to a depth beyond seasonal moisture changes. On shallow reactive clays the footings could be made to rest on rock.

Apart from these aspects, SEC trenches for underground services must be a minimum of 0.6m deep, and domestic gas pipes a minimum of 0.45 m deep. No simple statement can be made regarding the impact of depth of soil to bedrock on building footings.

*

* Building codes in general require that where rock is encountered during tending, then excaration must be extended to ensure that hard rock is exposed in the base of all trenches.

**Table 7**
**IMPACT.OF LAND FACTORS ON POTENTIAL LAND DEGRADATION FOR: SEPTIC TANK EFFLUENT ABSORPTION.**

Land factors significant to the installation and functioning of on-site effluent disposal fields.

| MAIN LAND FACTORS AFFECTING USE | UNIT | EFFECTS |
|---|---|---|
| Soil Drainage | class | When soils are saturated septic tank effluent cannot be absorbed, and when oxygen is lacking from the soil purification of effluent is poor. Soil drainage is often difficult to improve through artificial drainage. Septic absorption fields are likely to fail if the ground is continuously waterlogged for more than two to three weeks. |
| Measured Soil Permeability (hydraulic conductivity) | m/d | Soil permeability at the usual depth of septic tank trenches should fall in the range (0.05- 0.6m/d). Below 0.05m/d to about 0.005m/d designs have to be based on a combination of absorption and transpiration processes. |
| Slope Gradient | % | Affects installation of trenches with backhoe; gradient of approximately 25% is critical for operation of backhoe on the -contour. Slope by itself does not affect absorption of effluent or its seepage path in the ground. |
| Depth To Hard Rock | m | An adequate thickness of soil is needed to result in acceptable purification of effluent. When the underlying rock or layer is not densely fractured, a thicker i layer of soil is needed to transmit the extra water in a lateral direction. A critical soil depth over fractured rock is about 0.75m. |

Other factors having an impact on this land use include frequency and duration of flooding. However, Victorian Building Regulations prohibit houses on flood-prone land.

**Table 8**
**IMPACT OF LAND FACTORS ON POTENTIAL LAND DEGRADATION FOR: SMALL EARTHEN DAMS**

Aspects considered are; the suitability of earth materials for homogeneous embankments, water retention, foundation conditions for embankments, and construction conditions. Small earthen dams for private use. are considered

| MAIN LAND FACTORS AFFECTING USE | UNIT | EFFECTS |
|---|---|---|
| Unified Soil Group | class | SM, ML and MH materials are difficult to work and do not perform well in homogeneous embankments. Peaty and organic materials (PT, OH) are not suitable for use in construction of dams. Coarse textured soils such as GP, GW, SP and SW are too pervious. Clayey soils or clay/sand or clay/gravel mixtures are the best materials for homogeneous embankments. |
| Slope Gradient | % | The washing out of spillways can lead to large quantities of sediment moving into streams and reservoirs and to the pollution of water resources. Spillways grassed with kikuyu or other running grass species, rather than clumped grasses provide a suitable structure for discharging excess water without soil erosion of the spillway. The alternative is a concrete structure and channel at a much greater cost. If gully slopes are steeper than 15%,the corresponding width of the required spillway to maintain a control of excess water discharge becomes impractical. The gully axis slope controls generally the water storage-soil excavation volume ratio (S/E) for a dam on a plane of slope >10%, the S/E ratio falls dramatically and more importantly storage lies over disturbed land leading to erosion control problems. |
| Linear shrinkage (shrink- swell) | % | Up to 12% of linear shrinkage few problems are experienced. Some shrinkage implies the presence of swelling clays which can help seal the dam. At high values of more than 20% or so, embankments that become dry can develop large cracks which not only allow leakage but in doing so can threaten the stability of the structure by changing the internal pore pressures within the dam. The embankment material and how well it is compacted (constructed) will the difficult. When the type of failure that may occur. |
| Emersion Soil Dispersion | class | High dispersibility leads to turbidity and a potential for internal erosion resulting in leakage from macrochannels. Class 1, 4, 5, and 6, are undesirable soils, and 3 is the best. |

Because the soils of the dam bottom, side walls and embankment are remoulded during construction, natural soil permeability is not relevant. But the Unified Soil Group gives a good characterisation of the suitability of the soil for retaining water in the dam.

Rock is almost always seen as a negative feature when constructing small dams. There is the problem of obtaining sufficient embankment material with rock in the borrow pit area. Small rocks in the embankment material make placement and compaction difficult. When an embankment is resting on a rock surface, the interface could become a plane of weakness and seepage path for water. Thus, when bedrock occurs at shallow depths a problem of keying in embankment material may occur. Limestone or other water soluble rock within the storage area leads to seepage losses which can become disastrous. A small amount of seepage from the embankment is not considered a problem unless the stability of the embankment is endangered. The key to small dam siting and design is to try and balance catchment size and thus potential annual runoff to the storage capacity. Thus the dam will fill regularly and th1, 4, 5, andy6, are not being subjected to excessive stress.

**Table 9**
**IMPACT OF LAND FACTORS ON POTENTIAL LAND DEGRADATION FOR: SHALLOW EXCAVATIONS FOR LEVEL CONSTRUCTION SITES AND TRENCHES.**

Trenches excavated to a depth of less than 1.5 metres do not require mechanical support, while for trenches deeper than 1.5 metres permits are required from the Department of Industry, Technology and Resources. The degree of waterlogging is of practical significance to excavation but it is not possible to assess the magnitude of problems or costs associated with a particular soil drainage condition.

**Table 10**
**IMPACT OF LAND FEATURES ON POTENTIAL LAND DEGRADATION FOR: LOGGING AND CROPPING.**

Land factors significant to the erosion hazard associated with intensive logging and cropping. Intensive logging is considered to result in intensive disturbance of the topsoil. Land degradation from unsealed forest tracks is not part of this table.

| MAIN LAND FACTORS AFFECTING USE | UNIT | EFFECTS |
|---|---|---|
| Aggregate Stability (Emerson) | Class | Stable aggregates are more likely to retain their original size when the soil is disturbed and hence less likely to be entrained in surface run off. Even when remoulded by mechanical disturbances, such soil material is likely to be more stable and non-dispersive than unstable or moderately stable aggregates. Class 1 and 2 are most stable. The settling velocity characteristic of the soil particles would be the most direct measure of entrainment potential. |
| Texture | Class | The coarsest mineral particles are the least likely to be picked up by overland flow. However, the degree of cohesion between soil particles due to organic matter, clay sesquioxides, etc, can override the effect of primary particle size. Many heavy clay soils, whilst being composed of extremely small particles, have strong cohesion. Grey or bleached fine sands tend to have little cohesion and are readily transported by water. |
| Slope Gradient | % | Steep slopes result in more rapid overland flow. The critical slope value on apedal soils is probably about 20%, while it may increase to 40% on strongly structured soils. Limiting slope gradients for operation of agricultural machinery are considerably lower (3% potato growing) than logging equipment. |

As run off is the agent causing erosion, the infiltration rates of the soil after disturbance, are important. In general, soils with high inherent fertility tend to have more organic matter and biological activity, and hence have more cohesion and higher permeability.

**Table 11**
**IMPACT OF LAND FACTORS ON POTENTIAL LAND DEGRADATION FOR: GRAZING.**

Land factors significant to the erosion hazard associated with livestock grazing. This table assumes that even under overgrazing the soil at the surface remains largely cohesive.

| MAIN LAND FACTORS AFFECTING USE | UNIT | EFFECTS |
|---|---|---|
| Topsoil Texture | class | Sandy soils have lower waterholding capacities than loamy and clayey soils, so that pastures dry out in summer and cover is lost sooner. The highest waterholding capacities often occur in L, SL, SIL, FSL and organic L, the lowest in coarse S. Waterholding capacity depends on soil structure also. Erosion risk depends on shear strength in cohesion soils. Sands are less cohesive than medium and fine textured soils. Organic matter levels are important also. |
| Depth of Topsoil | cm | Deeper topsoils can store more water and hence dry out later, all other factors being the same. Deeper topsoils also take longer to become fully saturated than shallow soil |
| Slope Gradient | % | Steeper slopes are more prone to suffer from erosion, all • factors being the same critical value 35%. |

Erosion hazards associated with grazing are largely related to an interaction between management and inherent-factors of the land. Productivity depends on inherent factors such as soil fertility, waterholding capacity, natural drainage conditions, and the presence of physical obstacles on the land surface which limit the movement of farm vehicles, and may restrict management practices.

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 01A

**LANDFORM**: Sloping terrain with gradients up to 20%.

**GEOLOGY**: Silurian and Devonian mudstones, siltstones and some sandstones.

**SOIL DESCRIPTION**: Hard setting loamy soils with mottled yellow clayey subsoils. Moderately well to imperfectly drained.

**NORTHCOTE FACTUAL KEY**: Dy3.21, .31, .41, .42. **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**: Associated with soil group 21.

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1 0-15cm | Loam, silty loam and clay loam | - | Weak to massive | Greyish brown to dark brown | 5.3-6.0 | Mod. strong | Mod. firm | ML | Low | Low-mod. 3(1)-5 |
| A2. 15-50cm | Loam to silty clay loam | Rock fragments common | Weak to massive | Pale brown | 5.5-6.0 | Mod. strong | Very weak | ML | Low | Mod. 2-3 |
| B 50-120cm | Silty clay to heavy clay | Rock fragments common | Moderate to strong | Mottled yellow grey, brown red | 5.3-7.0 | Mod. strong | Mod. firm | CL-CH | Mod. | Mod. 2.3 |
| C >120cm | Siltstone, mudstone, | - | - | - | - | - | - | - | - | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sa 1A | Imperfectly drained | Slow |
| Sb 1A | Moderately well drained to well drained | Moderately rapid |
| Sc 1A | Moderately well drained to well drained | Moderately rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sa 1A | USG | USG | Sd, Sp | USG | - | - |
| Sb 1A | USG | USG | - | USG | - | - |
| Sc 1A | USG | USG | - | USG | - | - |

* Class definitions to be found in tabular form In Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 01B

**LANDFORM**: Sloping terrain with 20% to 45% gradient.

**GEOLOGY**: Silurian and Devonian mudstones, siltstones and some sandstones.

**SOIL DESCRIPTION**: Shallow stony gradational soil. Moderately well drained.

**NORTHCOTE FACTUAL KEY**: Gn3.82 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**: Associated with soil group 1A when soil group 21 does not occur.

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-10cm | Very fine sandy clay loam to silty clay loam | Rock fragments common | Weak | Dark greyish brown | 5.5 | Very firm | Mod. firm | ML | Low | Low-mod. 3-5 |
| A2<br>10-20cm | Silty clay loam | Rock fragments common | weak | Pale brown | 5.5 | Very firm | Mod. weak | MC | Low | High-mod. 2-3 |
| B<br>20-50cm | Medium silty clay | Rock fragments and ironstone concretions common | Moderate to strong | Yellowish brown with yellow mottles | 6.0 | Mod. strong | Very firm | CL/CH | Mod. | Mod.3 |
| C<br>50+cm | Medium clay to heavy clay | Rock fragments abundant | Moderate to strong | Yellowish brown with yellow, grey and red mottles | 6.0 | Mod. strong | Very firm | CL/CH | Mod. | Mod. 3 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sc 1B | Moderately well drained | Moderately rapid |
| Sd 1B | Moderately well drained to well drained | Moderately rapid |
| Se 1B | Well drained | Rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sc 1B | USG | USG | Sd, Sp | USG | - | Td |
| Sd 1B | USG, Sg | USG, Sg | Sg, R | USG, Sg | - | Td |
| Se 1B | USG, Sg | USG, Sg | Sg, R | USG, Sg | Sg | Td |

* Class definitions to be found in tabular form In Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 02

**LANDFORM**: Sloping terrain up to 15 to 30X.

**GEOLOGY**: Older Tertiary Volcanics (Basalt).

**SOIL DESCRIPTION**: Red brown friable earths. Well drained.

**NORTHCOTE FACTUAL KEY**: Gn3.11 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A 15-150cm | Clay loam to light clay (sub plastic) | Few buckshot gravels | Strong | Red to reddish brown | 6.5-7.0 | Mod. firm | Very weak | CL-MH | Mod. | Low 6 |
| A1 0-15cm | Clay loam (sub plastic) | Few buckshot gravels | Moderate to strong | Reddish to greyish brown | 6.5-7.0 | Mod. firm | Very weak | CL-MH | Low | Low 6 |
| B >150cm | Light cloy to heavy clay | Few buckshot gravels | Strong | Red brown often mottled with brown and grey | 6.5-7.0 | Very firm | Mod. firm | CL-CH | Mod.-high | Low 5-6 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sd 2 | Well drained | Rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sd 2 | - | Sg | Sg | Sg | - | - |

* Class definitions to be found in tabular form In Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 03

**LANDFORM**: Sloping terrain with gradients up to 20%

**GEOLOGY**: Tertiary gravels, sands and clays, without covering layers of wind- blown sand.

**SOIL DESCRIPTION**: Sandy loams with mottled yellow clayey subsoils. Imperfectly to well drained.

**NORTHCOTE FACTUAL KEY**: Dy3.21, .31, .41 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1 0-25cm | Fine sandy clay loam | - | Weak | Grey to dark greyish brown | 5.3-6.0 | Mod. - very firm | Mod. weak - mod. firm | SH-ML | Low | Low-mod. 3(1)-5 |
| A2 25-50cm | Fine sandy clay loam | Few ironstone concretions | Massive | Pale brown | 5.6-6.5 | Mod. strong | Very weak | SH-ML | Low | Mod.-high 2.3(3) |
| B1 50-75cm | Sandy clay and light to heavy clay | - | Strong | Mottled yellowish, greyish brown and reddish brown | 5.7-6.5 | Very strong | Mod. - very firm | CH-CL | Mod. | Mod.-low (3-5) |
| B2 82 75+cm | Sandy clay and light to heavy clay | - | Strong | Mottled yellowish, greyish brown and reddish brown | 5.7-6.5 | Very strong | Mod. - very firm | CH-CL | Mod. | Mod.-low (3-5) |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sa 3 | Imperfectly drained | Slow |
| Sb 3 | Moderately well drained to well drained | Slow |
| Sc 3 | Moderately well drained to well drained | Moderately rapid |
| Sd 3 | Moderately well drained to well drained | Moderately rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sa 3 | - | - | Sd, Sp | - | - | - |
| Sb 3 | - | - | | - | - | |
| Sc 3 | - | - | | - | - | |
| Sd 3 | Sg | Sg | Sg | Sg | Sg | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 04

**LANDFORM**: Sloping terrain with gradients up to 10%

**GEOLOGY**: Tertiary Basalt.

**SOIL DESCRIPTION**: Undulating to rolling hills on basalt with yellow mottled duplex soils imperfectly to moderately well drained.

**NORTHCOTE FACTUAL KEY**: Dy3.41, .31. **SOIL REACTION TREND**: Acid-neutral trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-20cm | Clay loam to medium clay, sometimes sandy | - | Weak | Dark brown to dark brownish grey | 5.5-6.0 | Mod. firm | Very weak | ML-CL | Low-mod. | Low 5 |
| A2<br>20-40cm | Clay loam to heavy clay, sometimes sandy | - | Weak | Brown, sometimes light greyish brown | 5.5-6.5 | Mod. - very firm | Very weak | ML-CL | Low-mod. | Low 5-6 |
| B1<br>40-180cm | Medium clay to heavy clay | Few Ironstone concretions | Moderate | Yellow brown with light brown or grey mottles | 5.5-7.5 | Mod. - very firm | Very weak | CL-CH | Mod.-high | Low 5-6 |
| 82<br>>180cm | Medium clay to heavy cloy, bedrock can occur | - | Strong | Yellow brown with red and pale brown mottles | 5.4-7.5 | Mod. - very firm | Very weak | - | Mod.-high | Low 5-6 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sa 4 | Imperfectly drained | Slow |
| Sb 4 | Imperfectly drained | Moderately rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sa 4 | - | | Sd, Sp | USG, L, E | E | - |
| Sb 4 | - | - | - | USG, L, E | E | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 05

**LANDFORM**: Undulating rises with gradients up to 10%

**GEOLOGY**: Thin Quaternary wind blown sand sheets over Tertiary sandstone.

**SOIL DESCRIPTION**: Grey loamy sand to sandy loam over yellow-brown medium clay, imperfectly to moderately well drained

**NORTHCOTE FACTUAL KEY**: Dy5.41 **SOIL REACTION TREND**: Strongly acid -acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-25cm | Loamy sand to sandy loam | - | Single grained to weak | Dark grey to dark greyish brown | 4.4-6.5 | - | - | - | Low | Low |
| A2<br>25-75cm | Loamy sand to sandy loam | Few ironstone concretions above clays in lowlands | Single grained | Pale grey | 5.0-6.0 | - | - | - | - | Low |
| B<br>75-90cm | Iron impregnated sandy looms | Few ironstone concretions above clays in lowlands | Massive | Dark brown and yellow brown | - | - | - | - | - | Low |
| C<br>>90cm | Medium clay | - | Strong | Mottled yellow brown and light grey | 5.9-6.0 | - | - | CL-CH | Mod. | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sa 5 | Imperfectly drained | Slow |
| Sb 5 | Moderately well drained | Slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sa 5 | - | - | Sd, Sp | E | E | Tt |
| Sb 5 | - | - | - | E | E | Tt |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 06

**LANDFORM**: Gently undulating to undulating plains up to 5% gradient.

**GEOLOGY**: Quaternary sands overlying Tertiary gravel, sand, iron rich sands and clay.

**SOIL DESCRIPTION**: Sandy loam soils with clayey subsoils. Very poorly to moderately well drained

**NORTHCOTE FACTUAL KEY**: Dy5.41, Uc2. **SOIL REACTION TREND**: Strongly acid-acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-15cm | Sandy loam to loamy sand | - | Single grained | Greyish brown | 4.4-6.5 | Loose - mod. firm | Loose - mod. weak | SM-ML | Low | Mod (3/3) |
| A2<br>15-45cm | Sandy loam to loamy sand | Few iron oxide concretions at A/B interface | Single grained | Light grey | 5.0-6.0 | Loose | Loose - mod. weak | GM-SM -ML | Low | Mod (3/3) |
| B1<br>45-60cm | Gravelly or sandy clay to heavy clay | - | Moderate | Yellowish brown | 5.0-6.0 | Very firm | Mod. weak | CL-CH | Mod.-high | Low 5 |
| B2<br>60-150cm | Gravelly or sandy clay to heavy clay | - | Strong | Yellowish brown | - | Very firm | Mod. weak | CL-CH | Mod – High | Low 5 |
| C<br>>150cm | Decomposed rock | - | - | - | - | - | - | - | - | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| P6 | Moderately well drained | Slow |
| U6 | Poorly drained to moderately drained | Very slow to slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| P6 | USG | - | Sd | USG | T | . |
| US | USG | - | Sd | USG | T | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 07

**LANDFORM**: Sloping terrain up to 15% gradient.

**GEOLOGY**: Quaternary sandsheets.

**SOIL DESCRIPTION**: Leached sandy soil with cemented hardpan at about 1 metre depth. Rapidly drained.

**NORTHCOTE FACTUAL KEY**: Uc2.32, .33. **SOIL REACTION TREND**: Strongly acid-acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1 0-30cm | Loamy sand | - | Single grained | Grey to dark greyish brown | 4.4-6.8 | Loose | Very weak | SP-SM | - | Low |
| A2 30-110cm | Sand | - | Single grained | Pale grayish brown | 4.3-5.5 | Loose | Loose | SP-SM | - | Low |
| B 110-130cm | Cemented sand hardpan-iron/humus | - | - | Yellowish red with dark brown mottles | - | - | - | - | - | Low |
| C >130cm | Sand (sandy, gritty clays and clays in lowlands) | - | Massive | Mottled yellow brown | - | - | - | - | - | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sb 7 | Rapidly drained | Very slow |
| Sc 7 | Rapidly drained | Slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sb 7 | USG | - | - | USG, E | E, T | Tt |
| Sc 7 | USG | - | - | USG, E | E, T | Tt |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 08

**LANDFORM**: Flats and Plains up to 2% gradients.

**GEOLOGY**: Tertiary sandstone and derived alluvium.

**SOIL DESCRIPTION**: Hardsetting sandy loam soils with mottled yellow clayey subsoils. Poorly to very poorly drained.

**NORTHCOTE FACTUAL KEY**: Dy3.41 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-15cm | Sandy clay loam | - | Weak | Very dark greyish brown | 6.5 | Mod. strong | Mod. weak | L-CL | Low-mod | Low-,pd 3(1)-5 |
| A2<br>15-35cm | Sandy clay loam | Gravel and ironstone concretions common | Weak | Pale brown | 6.0 | Mod. strong | Mod. firm | ML-CL | Low-mod | Lo-mod 3(1)-5 |
| B1<br>35-45cm | Medium clay | - | Moderate | Brown | 6.0 | Mod. strong | Mod. firm | CL-CH | Mod-high | - |
| B2<br>45-85cm | Medium clay | - | Moderate | Brownish yellow | 6.5 | Mod. strong | Mod. firm | CL-CH | Mod – High | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| F8 | Very poorly drained | Very stow |
| P8 | Poorly drained | Stow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| F8 | - | - | Sd, Sp | L, Sd, Sp | Sd, Sp | - |
| P8 | - | - | Sd, Sp | L | - | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 09A

**LANDFORM**: Drainage areas, usually broad.

**GEOLOGY**: Quaternary alluvium.

**SOIL DESCRIPTION**: Greyish clays. Very poorly drained.

**NORTHCOTE FACTUAL KEY**: Gn3.04, Dy3.41 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**: Associated with soil group 9B

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1 0-10cm | Very fine silty clay loam | - | Weak | Dark brown to dark grey | 5.7 | Mod. firm | Mod. weak | CL | Mod. | Low-mod 3(1)-5 |
| A2 10-25cm | Very fine silty clay loam | - | Weak | Pale brown | 5.6-6.0 | Mod. firm | Mod. weak | CL | Mod. | Low-mod 3(1)-5 |
| B1 25-50cm | Light cloy to medium clay | - | Moderate | Greyish brown with faint yellow mottles | 5.6-6.0 | Mod. strong | Mod. firm | LC | High | Low-mod 3(1)-5 |
| B2 50-100cm | Heavy clay | - | Moderate | Grey brown strongly mottled with yellow brown | 6.0 | Mod. strong | Mod. firm | CH | High | Low-mod 3(1)-5 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| D9A | Very poorly drained | Very slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| D9A | USG | Sd, Sp | Sd, Sp | L, Sd, Sp | Sd, Sp | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 09B

**LANDFORM**: Drainage areas, usually broad.

**GEOLOGY**: Quaternary alluvium.

**SOIL DESCRIPTION**: Grey cracking soils very poorly drained.

**NORTHCOTE FACTUAL KEY**: Ug5.28 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**: Associated with soil group 9A.

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A<br>0-20cm | Silty clay | - | Weak | Dark grey | 5.6-6.0 | Mod. firm | Mod. weak | CL | Mod. | Low-mod 3(1)-5 |
| B1<br>20-50cm | Medium clay to heavy clay | - | Moderate | Greyish brown with faint yellow mottles | 6.0 | Mod. strong | Mod. firm | CL-CH | High | Low-mod 3(1)-5 |
| 02<br>>50cm | Heavy clay | - | Strong | Brownish yellow with grey and yellow mottles | 6.1-6.9 | Mod. strong | Mod. firm | CH | High | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| D9B | Very poorly drained | Very slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| D9B | USG | Sd, Sp | Sd, Sp | L, Sd, Sp | Sd, Sp | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 10

**LANDFORM**: Drainage areas, usually broad.

**GEOLOGY**: Quaternary alluvium usually with a thin cover of wind blown sand.

**SOIL DESCRIPTION**: Grey loamy send over deep mottled clay subsoils. Very poorly drained.

**NORTHCOTE FACTUAL KEY**: Dy5 **SOIL REACTION TREND**: Strongly acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-25cm | Sand | - | Single grained | Dark grey | 4.4-6.5 | - | - | SM/SP | - | Low-mod 3(1)-5 |
| A2<br>25-60cm | Sand | Variable amount of ironstone concretions | Single grained | Light grey | 5.0-6.0 | - | - | SM/SP | - | Mod 3(1)-5 |
| B<br>60+cm | Clay | - | Moderate to strong | Mottled yellow, variations of brown and grey | - | - | - | Cl-CH | Variable | Mod 3(1)-5 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| D10 | Very poorly drained | Very slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| D10 | USG | Sd, Sp | Sd, Sp, | L, Sd, Sp | Sd, Sp | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 11

**LANDFORM**: Sloping terrain up to 25% gradient.

**GEOLOGY**: Devonian granite and granodiorite.

**SOIL DESCRIPTION**: Sandy loam soil over mottled yellow-brown sandy clay subsoil. Imperfectly to well drained.

**NORTHCOTE FACTUAL KEY**: Dy3.41, Gn3.84. **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**: Associated with soil group 13 and soil group 23.

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-20cm | Sandy loam to sandy clay loam | - | Weak | Grey brown | 5-0-6-0 | Mod-strong | Mod. firm | SM-SL | Low | Mod 3(1)-5 |
| A2<br>20-45cm | Clayey sand | Few ironstone concretions | Weak | Light grey brown | 5.3-6-0 | Mod. strong | Mod. weak | SM-ML | Low | High 2 |
| B1<br>45-70cm | Sandy clay to medium clay | - | Strong | Mottled yellow brown | 5.7-6-0 | Very strong | Very firm | CL-CH | Mod.-high | Mod 3(1)-5 |
| B2<br>70-180+cm | Medium clay to heavy clay | - | Strong | Mottled yellow brown | | Very strong | Very firm | CL-CH | Mod.-high | Mod 3(1)-5 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sa 11 | Imperfectly drained | Moderately rapid |
| Sb 11 | Imperfectly drained | Moderately rapid |
| Sc 11 | Moderately well drained | Rapid |
| Sd 11 | Well drained | Rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Se 11 | USG | USG | Sd | USG | T | - |
| Sb 11 | USG | USG | Sd | USG | T | - |
| Sc 11 | USG | USG | - | USG | T | - |
| Sd 11 | USG, Sg | USG, Sg | Sg | USG, Sg | T | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 12

**LANDFORM**: Gently sloping lower slopes of 2% to 5% gradient.

**GEOLOGY**: Deeply weathered Silurian and lower Devonian siltstones, sandstones, mudstones, claystones

**SOIL DESCRIPTION**: Loamy soils with mottled yellow clayey subsoils. Imperfectly drained.

**NORTHCOTE FACTUAL KEY**: Dy3.41, Dy3.42 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**: Associated with soil group 21.

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-20cm | Sandy clay loam to silty cloy loam | - | Moderate | Dark grey brown | 5.0-6.5 | Mod. firm - very strong | Mod. firm | ML-CL | Low-mod. | Mod.-high-2(1)-3 |
| A2<br>20-50cm | Sandy clay | Ironstone concretions common | Moderate | Light grey brown - | 5.1-6.0 | Mod. firm - very strong | Very weak - very strong | ML-CL | Low-mod. | Mod–high 2(1)-3 |
| B<br>50-150+cm | Silty clay to heavy clay | Variable | Moderate to strong | Mottled yellow, grey, brown, red | 5.3-7.0 | Very firm - strong | Mod. firm | CL - ML/CH | Mod. | Mod-high 2(1)-3 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sa 12 | Imperfectly drained | Slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sa 12 | USG | USG | Sd, Sp. | USG | - | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 13

**LANDFORM**: Drainage basin, plains and lower drainage slopes up to 8%.

**GEOLOGY**: Quaternary Alluvium derived from Devonian granite and granodiorite.

**SOIL DESCRIPTION**: Hard setting sandy loam soils with mottled yellow clayey subsoils. Very poorly to imperfectly drained.

**NORTHCOTE FACTUAL KEY**: Uc2.33, Dy3.11, .21 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1 0-30cm | Sandy loam to sandy clay loam | - | Weak to moderate | Dark grey brown | 5.6-6.0 | Mod. strong | Mod. firm | SM . | Low | Low-mod 3(1)-5 |
| A2 30-60cm | Clayey sand to sandy clay loam, gritty | - | Apedal | Grey brown | 5.2-5.8 | Very strong | Mod. weak | SM | Low | Low-mod 3(1)-5 |
| B 60-180cm | Sandy clay loam, gritty | - | - | Yellow brown with grey mottles | 5.1-6.0 | Very strong | Mod. strong | CH | Mod. | Low-mod 3(1)-5 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| D13 | Very poorly drained | Very stow |
| L13 | Very poorly drained to poorly MAP UNIT | Slow to very slow |
| P13 | Poorly drained | Slow to very slow |
| Sa 13 | Poorly drained | Stow |
| Sb 13 | Imperfectly drained | Moderately rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| D13 | USG | Sd, Sp | Sd, Sp | USG | E, T | Tt |
| L13 | USG | Sd, Sp | Sd, Sp | USG | E, T | Tt |
| P13 | USG | Sd, Sp | Sd, Sp | USG | E, T | Tt |
| Sa 13 | USG | S, Sp | Sd, Sp | USG | E | T |
| Sb 13 | USG | Sd, Sp. | Sd, Sp | USG | E, T | Tt |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 14

**LANDFORM**: Plains with gradients up to 2%.

**GEOLOGY**: Quaternary alluvium derived from Silurian sediments.

**SOIL DESCRIPTION**: Black cracking clays. Very poorly drained.

**NORTHCOTE FACTUAL KEY**: Ug5.16, .24

**SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A 0-15cm | Medium clay | - | Moderate | Very dark grey | 5.3-6.0 | Very firm | Very firm - mod. firm | OH | High | Mod-high 2(1)-3 |
| B1 15-40cm | Heavy clay | - | Moderate to strong | Grey | 5.9-6.0 | Very strong | Very firm | CH | Very high | Mod-high 2(1)-3 |
| B2 40-90cm | Heavy clay | - | Moderate to strong | Grey becoming mottled | 5.9-6.0 | Very strong | Very firm | CH | Very high | Mod-high 2(1)-3 |
| B3 90+cm | Heavy clay | - | Moderate to strong | Grey with fine light grey and yellow mottles | 5.8-6.0 | Very strong | Very firm | CH | Very high | Mod-high 2(1)-3 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| P14 | Very poorly drained | Slow to moderately rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| P14 | USG | USG | Sp | SG, L | - | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 15

**LANDFORM**: Hill crests and sloping terrain up to 30X gradient.

**GEOLOGY**: Older Tertiary Basalt.

**SOIL DESCRIPTION**: Reddish brown friable earths. Well drained.

**NORTHCOTE FACTUAL KEY**: Gn3.11 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A 15-60cm | Silty clay to clay loam (subplastic) | - | Strong | Red to reddish brown | 5.5 | Mod. firm | Mod. weak | NH-CL | Low-mod. | Low (6) |
| A1 0-15cm | Silty clay loam to clay loam (subplastic) | - | Strong | Greyish brown | 5.7 | Mod. weak | Mod. weak | MH-CL | Low | Low (6) |
| B 60-100cm | Clay loam to medium clay | - | Strong | Red to reddish brown | 5.5 | Mod. - very firm | Mod. firm | CL-CH | Low-mod. | |
| C 100+cm | Decomposing rock | - | - | - | - | - | - | - | - | |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sb 15 | Well drained | Moderately rapid |
| Sc 15 | Well drained | Moderately rapid |
| Sd 15 | Well drained | Rapid |
| Se 15 | Well drained | Rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sb 15 | - | - | - | USG,E | E | - |
| Sc 15 | - | - | - | USG,E | E | - |
| Sd 15 | Sg | Sg | Sg | USG, Sg, E | E | - |
| Se 15 | Sg | Sg | Sg | USUSG, E | E | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 16

**LANDFORM**: Long straight and gently convex slopes up to 5% gradients.

**GEOLOGY**: Older Tertiary Basalt.

**SOIL DESCRIPTION**: Brown and grey uniform clay soils. Poor to imperfectly drained.

**NORTHCOTE FACTUAL KEY**: Ug5.22 **SOIL REACTION TREND**: Neutral trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A 0-20cm | Clay loam to loamy clay | - | Strong | Very dark greyish brown | 6.8 | Mod. strong | Mod. firm | CL | Low-mod. | Low 3(1)-5 |
| B1 20-60cm | Medium clay to heavy clay | - | Moderate | Dark greyish brown | 7.0 | Very strong | Mod. firm | CL | Mod.-high | Low 3(1)-5 |
| B2 60-120+ cm | Heavy clay | - | Moderate to strong | Dark greyish brown | 7.2 | Very strong | Mod. firm | HL | High | Low 3(1)-5 |
| C 1204cm | Decomposing rock | - | - | . | - | - | - | - | - | Low 3(1)-5 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| P16 | Poorly drained | Slow |
| Sa 16 | Imperfectly drained | Moderately rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| P16 | - | - | Sd, Sp | L | - | - |
| Sa 16 | - | - | Sd, Sp | L | | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 17

**LANDFORM**: Plains and drainage areas up to 2% gradients.

**GEOLOGY**: Quaternary alluvium.

**SOIL DESCRIPTION**: Alluvial loamy soils, often silty, over mottled grey yellow and brown subsoils. Poorly to very poorly drained.

**NORTHCOTE FACTUAL KEY**: Dy3.11, .21, .31. **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-20cm | Clay loam | | Moderate | Dark brownish grey | 5.0-6.5 | Very strong | Mod. weak | ML-CL | Low-mod. | Low-mod 3(1)-5 |
| A2<br>20-40cm | Clay loam | | Weak to moderate | Light brownish grey with faint yellow or brown mottles | 5.1-6.0 | Very strong | Mod. weak - firm | ML-CL | Low-mod. | Low-mod 3(1)-5 |
| B1<br>40-70cm | Medium clay to heavy clay | | Moderate to strong | Light to dark greyish brown with yellow and brown mottles | 5.3-6.0 | Very firm - strong | Mod. firm | CL-CH | High | Low-mod 3(1)-5 |
| B2<br>70-140cm | Medium clay to heavy clay | | Moderate to strong | Yellowish brown with pale grey brown mottles | 4.5-6.5 | Very firm - strong | Mod. firm | CL-CH | High | Low-mod 3(1)-5 |
| C<br>I140+cm | Decomposed rock | | | | | | - | - | | Low-mod 3(1)-5 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| D17 | Very poorly drained | Very slow |
| P17 | Poorly drained | Slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| D17 | USG | USG | Sd, Sp | USG | E | - |
| P17 | USG | USG | Sd, Sp | USG | E | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 18

**LANDFORM**: Complex of flats, plains, drainage areas and lower slopes up to 5% gradient

**GEOLOGY**: Quaternary alluvium.

**SOIL DESCRIPTION**: A complex of both soils groups 17 and 19. Poorly to very poorly drained

**NORTHCOTE FACTUAL KEY**: Dy3.31, .41 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**: A complex of soil group 17 and 19

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL * | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-20cm | Sandy loam to sandy clay loam | - | Moderate | Dark greyish brown | 5.0-6-5 | Very strong | Mod. weak - mod-firm | ML-CL | Low-mod. | Low-mod 3(1)-5 |
| A2<br>20-30cm | Sandy loam to sandy clay loam | - | Weak to moderate | Light brown grey with faint yellow or brown mottles | 5.1-6.0 | Very strong | Very weak - mod. firm | ML-CL | Low-mod. | Low-mod 3(1)-5 |
| B1<br>30-70cm | Medium clay to heavy clay | - | Moderate to strong | Light to dark greyish brown with yellow and brown mottles | 5-3-6.0 | - | | CL-CH | High | Low-mod 3(1)-5 |
| B2<br>70+cm | Medium clay to heavy clay. | | Moderate to strong | Yellowish brown with pale grey brown mottles | 4-5-6.5 | - | - | - | - | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| D18 | Very poorly drained | Very slow |
| F18 | Very poorly drained | Slow to very slow |
| P18 | Poorly drained | Slow |
| Sa 18 | Poorly drained | Slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| D18 | USG | USG | Sd, Sp | Usg | E | - |
| F18 | USG | USG | Sd, Sp | USG | E | - |
| P18 | USG | SG | Sd, Sp | Usg | E | - |
| Sa 18 | USG | USG | Sd, Sp | USG | E | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 19

**LANDFORM**: Plains and lower slopes up to 8% gradient

**GEOLOGY**: Quaternary alluvium.

**SOIL DESCRIPTION**: Hard setting sandy soils with yellow clayey subsoils. Very poorly to imperfectly drained

**NORTHCOTE FACTUAL KEY**: Dy5.41 **SOIL REACTION TREND**: Acid trend

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1 0-25cm | Loamy sand | - | Weak | Grey to very dark brownish grey | 5-0-6.0 | Loose | Mod. weak - mod. firm | ML | Low | Mod 3(1)-5 |
| A2 25-50cm | Loamy sand | - | Weak to moderate | Light grey to grey brown | 5.1-5-5 | Loose | Very weak - mod. firm | ML | Low | High 2 |
| B1 50-75cm | Sandy clay to medium clay | - | Strong | Grey with mottled brown, yellow and red | 5-3-5.5 | - | - | CL-CH | Mod.-high | Mod 3(1)-5 |
| B2 75-150+cm | Sandy medium clay to heavy clay | - | Strong | Mottled grey, brown, yellow | 5-3-5.5 | - | - | CH | Low | Mod 3(1)-5 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| P19 | Poorly drained to very poorly drained | Slow |
| Sa 19 | Poorly drained | Slow |
| Sb 19 | Imperfectly drained to moderately well drained | Moderately rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| P19 | USG | - | Sd, Sp | USG | E | - |
| Se 19 | USG | - | Sd, Sp | USG | E | - |
| Sb 19 | USG | - | | USG | E | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 20

**LANDFORM**: Sloping terrain up to 30% gradient.

**GEOLOGY**: Older Tertiary Basalt.

**SOIL DESCRIPTION**: Red and brown friable earths moderately well to well drained.

**NORTHCOTE FACTUAL KEY**: Gn3.11, .31, .51, Gn4.14 **SOIL REACTION TREND**: Neutral-acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A<br>30-100cm | Clay loam to medium clay (subplastic) | Very few | Strong | Red brown to yellow brown | 5.0-6.5 | Weak - mod. firm | Weak - mod. firm | MH-ML -CL | Mod. | Low-mod 3(1), 3(2), 5, 6 |
| A1<br>0-30cm | Clay loam (subplastic) | - | Strong | Dark brown | 5.0-6.5 | Mod. weak | Weak | MH-ML -CL | Low-mod. | Low-mod 3(1), 5, 6 |
| B1<br>100-150cm | Light clay to medium clay | - | Strong | Mottled red or yellow brown (Gn3) | 5.2-7.0 | Mod. firm - very strong | Weak - very firm | CH | Mod. | Low (5-6) |
| 82<br>150+cm | Light clay to heavy clay | - | Strong | Mottled yellow, red, brown, grey (Gn3) | 5.2-7.0 | Mod. firm - very strong | Weak - very firm | CII | Mod.-high | Low (5-6) |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sa 20 | Moderately well drained | Slow |
| Sb 20 | Moderately well drained | Moderately rapid |
| Sc 20 | Moderately well drained | Rapid |
| Sd 20 | Well drained | Rapid |
| Se 20 | Well drained | Very rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sa 20 | - | - | - | USG, E | E | - |
| Sb 20 | - | - | - | USG, E | E | - |
| Sc 20 | - | - | - | USG, E | E | - |
| Sd 20 | Sg | Sg | Sg | USG, Sg, E | E | - |
| Se 20 | Sg | Sg | Sg | USG, Sg, E | E | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 21

**LANDFORM**: Sloping terrain steeper than 20%, up to 45% gradient.

**GEOLOGY**: Silurian and Devonian mudstones, siltstones, claystones, and some sandstones.

**SOIL DESCRIPTION**: Hard setting loamy soils with mottled clayey subsoils, often shallow and stony. Well drained.

**NORTHCOTE FACTUAL KEY**: Gn3.71, 3.81 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**: Associated with soil group 1B.

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-20cm | Fine sandy loam, silt loam | - | Weak | Dark grey brown | 5.5 | Very firm | Mod. firm | ML | Low | Low-mod 3-5 |
| A2<br>20-50cm | Fine sandy loam, silty loam | Common | Weak | Pale grey brown | 5.5 | Very firm | Mod. firm | ML | Low | High–mod 2-3 |
| B1<br>50-70cm | Silty clay to light clay | Few | Moderate | Yellowish brown with dark brown and grey brown mottles | 6.0 | Mod. strong | Very firm | CL- ML/CH | Mod. | Mod 3 |
| B2<br>70-120cm | Medium clay | Increasing to bottom of B2 horizon | Moderate to strong | Yellowish brown with reddish brown mottles | 6.0 | Mod. strong | Very firm | CL-CH | Mod. | Mod 3 |
| C<br>120+ cm | Weathering siltstone, mudstone, claystone | - | - | - | - | - | - | - | - | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sd 21 | Well drained | Rapid |
| Se 21 | Well drained | Rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sd 21 | USG, Sg | USG, Sg | R | USG, Sg | USG, T | Tt |
| Se 21 | USG, Sg | USG, Sg | R | USG, Sg | USG, Sg, T | Tt, Sg |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 22

**LANDFORM**: Sloping terrain, predominant south or east aspects up to 40% gradients.

**GEOLOGY**: Devonian granite and granodiorite.

**SOIL DESCRIPTION**: Brown friable earths. Plus minor red earths. Moderately well to well drained.

**NORTHCOTE FACTUAL KEY**: Gn3.54, Gn4.51 **SOIL REACTION TREND**: Acid trend

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-25cm | Sandy loam to sandy clay loam | - | Weak to moderate | Dark grey brown | 5.0-6.0 | Mod. firm | Mod. weak | SP-SC | Low | Low-mod 3(1)-5 |
| A2<br>25-40cm | Sandy loam to sandy clay loam | - | Weak to moderate | Grey brown or light grey brown | 5.0-6.0 | Very firm | Mod. firm | SP-SC | Low | Low-mod 3(1)-5 |
| B1<br>40-60cm | Sandy clay loam to sandy clay | - | Moderate to strong | Mottled yellow brown | 5.0-6.3 | Very firm | Mod. firm | SC | Mod. | Low-mod 3(1)-5 |
| B2<br>60+ cm | Sandy clay to medium clay | - | Moderate to strong | Mottled yellow brown | 5.2-6.2 | Very firm | Mod. firm | SC | Mod. | Low-mod 3(1)-5 |
| C<br>120+ cm | Decomposing rock | - | - | - | - | - | - | - | - | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sb 22 | Moderately well drained | Moderately rapid |
| Sc 22 | Moderately well drained | Moderately rapid |
| Sd 22 | Well drained | Moderately rapid |
| Se 22 | Well drained | Moderately rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sb 22 | - | - | - | - | E, T | - |
| Sc 22 | - | - | - | - | E, T | - |
| Sd 22 | .Sg | Sg | Sg | Sg | E, T | - |
| Se 22 | Sg | Sg | Sg | Sg | Sg, E, T | Sg |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 23

**LANDFORM**: Sloping terrain, predominant north or west aspects with 10% to 40% gradient.

**GEOLOGY**: Devonian granite and granodiorite.

**SOIL DESCRIPTION**: Yellow brown gradational soils and some sandy soils usually associated with rock outcrops. Rapidly drained.

**NORTHCOTE FACTUAL KEY**: Uc5.2, Gn4.31 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A<br>0-15cm | Loamy sand to sandy loom | - | Weak | Yellow brown to grey brown | 5.5-6.0 | Loose | Very weak | SC-SP | Low | Low-mod 3(1)-5 |
| B<br>15-100cm | Sandy clay loam to sandy clay | - | Weak | Yellowish brown to grey brown | 6.0 | Mod. weak | Mod. weak | SC-SP | Low | Low-mod 3(1)-5 |
| C<br>1004+ cm | Decomposing rock | - | - | - | - | - | - | - | - | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sc 23 | Rapidly drained | Moderately rapid |
| Sd 23 | Rapidly drained | Rapid |
| Se 23 | Rapidly drained | Rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sc 23 | - | | - | - | E, T | - |
| Sd 23 | Sg • | Sg | Sg | Sg | E, T | - |
| Se 23 | Sg | Sg | Sg | Sg | Sg, E, T | Sg |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 24

**LANDFORM**: Sloping terrain with 10 to 15% gradient.

**GEOLOGY**: Tertiary Basalt.

**SOIL DESCRIPTION**: Dark grey cracking clays, imperfectly to moderately well drained.

**NORTHCOTE FACTUAL KEY**: Ug5.14 **SOIL REACTION TREND**: Neutral-alkaline trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**: Associated with soil group 25.

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A<br>0-20cm | Light clay | - | Strong | Very dark brownish grey | 6.8 | Very firm - mod. strong | Mod. firm | CH | Low | Low |
| B1<br>20-55cm | Medium clay | - | Strong | Very dark grey brown | 7.0 | Very strong | Mod. - very firm | CL-CH | Mod.-high | Low 3(1), 5 |
| B2<br>55-100cm | Medium clay to heavy clay | Very few buckshot | Strong | Dark grey mottled | 8.0 | Very strong | Mod. - very firm | CL-CH | High | Low 3(1), 5 |
| C<br>100+cm | Decomposing basalt | - | - | - | - | - | - | - | - | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sc 24 | Imperfectly drained to moderately well drained | Rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHERN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sc 24 | - | - | - | L | - | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 25

**LANDFORM**: Sloping terrain with 5% up to 10% gradient.

**GEOLOGY**: Tertiary Basalt.

**SOIL DESCRIPTION**: Dark reddish brown friable clay looms. Moderately well drained.

**NORTHCOTE FACTUAL KEY**: Gn3.11, 3.52 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**: Associate with soil group 24.

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-30cm | Clay loam or light clay | - | Strong | Dark reddish brown | 6.0 | Mod. firm | Mod. weak | CL | Low-mod. | Low 3(1).5 |
| B1<br>30-60cm | Light clay | - | Strong | Dark reddish brown | 6.0 | Mod. firm | Mod. weak | CL-CH | Low-mod. | Low 3(1).5 |
| B2<br>60-140cm | Medium clay | - | Strong | Red brown with faint grey mottles | 6.5 | Mod. firm | Mod. weak | CH | Mod. | Low 3(1).5 |
| C<br>140+ cm | Decomposing basalt | - | - | - | - | - | - | - | - | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sb 25 | Moderately well drained | Moderately rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sb 25 | - | - | - | - | - | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 26

**LANDFORM**: Undulating and sloping terrain up to 10% gradient.

**GEOLOGY**: Silurian sediments, influenced by windblown Quaternary sand overlay

**SOIL DESCRIPTION**: Grey loamy sand to sandy loam over mottled yellow brown medium to heavy clay. Moderately well drained

**NORTHCOTE FACTUAL KEY**: Dy5.41 **SOIL REACTION TREND**: Strongly acid-acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**: This soil group is similar to soil group 6, but has formed from Silurian rock sediments rather from Tertiary sandstones.

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-15cm | Loamy sand to sandy loam | - | Single grained to weak | Grey to greyish brown | 4.4-6.5 | Loose - mod. firm | Loose - mod. firm | SP | - | Low 3(1)-5 |
| A2<br>15-45cm | Loamy sand to sandy loam | Few ironstone concretions and buckshot | Single grained to weak | Light grey | 5.0-6.0 | Loose | Loose | SP | - | Low 3(1)-5 |
| B<br>45+cm | Medium clay to heavy clay | - | Moderate to strong | Mottled yellow, brown, with light grey brown | - | Loose - very strong | Loose - very strong. | CL-CH | Mod.-high | Low 3(1)-5 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sa 26 | Moderately well drained | Slow |
| Sb 26 | Moderately well drained | Slow |
| U26 | Moderately well drained | Slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sa 26 | - | - | - | - | E | Tt |
| Sb.26 | - | - | - | - | E | Tt |
| U26 | - | - | - | - | E | Tt |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 27

**LANDFORM**: Plains, undulating sloping terrain up to 5% gradient.

**GEOLOGY**: Quaternary alluvium. Overlain by more recent thin wind blown sand sheets

**SOIL DESCRIPTION**: Sandy soils with clay subsoils. Imperfectly to moderately well drained

**NORTHCOTE FACTUAL KEY**: Dy5.41 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**: This soil group is similar to soil groups 6 and 26, but is derived from unconsolidated parent materials rather than rocks.

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-15cm | Loamy sand | - | Single grained | Dark grey brown | 4.4-6.5 | Mod. firm | Mod. weak | SM-ML | Low | Low-mod 3(1)-5 |
| A2<br>15-45cm | Loamy sand | Few to common ironstone concretions | Single grained | Light brownish grey | 5-0-6-0 | Loose | Loose | SM-ML | Low | Low-mod 3(1)-5 |
| B<br>45+cm | Heavy clay with sand | | Moderate to strong | Mottled grey with yellow, brown | | | | CL-CH | Mod.-high | Low-mod 3(1)-5 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| N27 | Well drained | Very slow |
| P27- | Imperfectly drained | Slow |
| Sa 27 | Moderately well drained | Slow |
| U27 | Imperfectly drained | Slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| N27 | USG | - | - | USG | - | E |
| P27 | USG | | Sd, Sp | USG | - | E |
| Sa 27 | USG | - | | USG | - | E |
| U27 | USG | - | Sd, Sp | USG | - | E |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 28

**LANDFORM**: Plains, flats and drainage areas up to 2% gradient.

**GEOLOGY**: Quaternary alluvium.

**SOIL DESCRIPTION**: Grey and black cracking clays. Very poorly to imperfectly drained.

**NORTHCOTE FACTUAL KEY**: Ug6.32 **SOIL REACTION TREND**: Strongly acid-acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A<br>0-23cm | Medium clay | - | Strong | Dark grey to black | 4.8-6.5 | Mod. weak | Mod. weak | CL-CH | High | Low 3(1)-5 |
| B1<br>23-80cm | Medium clay to heavy clay | - | Moderate to strong | Dark grey to black | 5.1-6.0 | Mod. firm | Mod. firm | CH | High | Low 3(1)-5 |
| B2<br>80-180cm | Medium clay to heavy clay | - | Moderate to strong | Mottled grey with yellow brown | 5.6-6.5 | Mod. firm | Mod. firm | CH | High | Low 3(1)-5 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| D28 | Very poorly drained | Very slow |
| F28 | Poorly drained | Slow |
| P28 | Imperfectly drained | Slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| D28 | - | - | Sd, Sp | L | - | - |
| F28 | - | - | Sd, Sp | L | - | - |
| P20 | - | - | Sd, Sp | L | - | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 29

**LANDFORM**: Plains, flats, undulating terrain and drainage areas up to 2% gradient.

**GEOLOGY**: Quaternary alluvium, derived predominantly from Devonian granite.

**SOIL DESCRIPTION**: Black self mulching organic clays very poorly to imperfectly drained. Moderately well where artificially drained.

**NORTHCOTE FACTUAL KEY**: Uf6.22, 6.32 **SOIL REACTION TREND**: Strongly acid-acid trend

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A<br>0-30cm | Peaty or organic clay loam | - | Strong | Dark grey brown | 5.2 | Mod. weak | Very weak | OL-CL | High | Low 3(1), 5 |
| B1<br>30-50 cm | Medium clay to heavy clay | Very slightly fine gravelly | Moderate | Dark grey brown | 5-3 | Mod. firm | Mod. firm | SC-CH | High | Low 3(1), 5 |
| B2<br>50-180cm | Heavy clay | Very slightly fine gravelly | Strong | Grey with yellow brown mottles | 4.7 | - | - | CH | High | Low 3(1), 5 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| D29 | Very poorly drained | Very slow |
| F29 | Poorly drained | Very slow |
| P29 | Imperfectly drained | Slow |
| U29 | Imperfectly drained | Slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| D29 | USG | USG | Sd, Sp | USG,L | - | - |
| F29 | USG | USG | Sd, Sp | USG,L | - | - |
| P29 | USG | USG | Sd, Sp | USG,L | - | - |
| U29 | USG | USG | Sd, Sp | USG,L | - | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 30

**LANDFORM**: Sloping terrain up to 25% gradient.

**GEOLOGY**: Tertiary terrain overlain by Silurian.

**SOIL DESCRIPTION**: Grey very fine sandy clay looms over light to medium clays. Moderately well to well drained.

**NORTHCOTE FACTUAL KEY**: Dy3.21, 3.41 **SOIL REACTION TREND**: Neutral trend

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A 0-15cm | Very fine sandy clay loam | - | Moderate | Dark grey | 5-5 | Mod-strong | Mod. firm | ML | Low | Low-mod.3(1)-5 |
| B 15-40cm | Very fine sandy clay loam | - | Moderate | Light brownish grey | 6 | Mod. strong | Mod. firm | ML | Low | - |
| B2 40-50cm | Light clay to medium clay | - | Moderate | Light grey brown with yellow brown mottles | 6 | Mod. strong | Mod. firm | CL- ML/CH | Mod | Mod 3 |
| B3 50-130cm | Medium clay | - | Moderate to strong | Light grey brown with yellow brown mottles | 5.5-6 | Mod. strong | Mod. firm | CL-CH | Mod.-high | Mod 3 |
| C 130+ cm | Decomposing rock | - | - | - | - | - | - | - | - | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sa 30 | Moderately well drained | Slow |
| Sb 30 | Moderately well drained | Slow |
| Sc 30 | Well drained | Moderately rapid |
| Sd 30 | Well drained | Moderately rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sa 30 | USG | USG | - | USG | T | Tt |
| Sb 30 | USG | USG | - | USG | T | Tt |
| Sc 30 | USG | USG | - | USG | T | Tt |
| Sd 30 | USG, Sg | USG, Sg | Sg | USG,S9 | T | Tt |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 31

**LANDFORM**: Sloping terrain up to 30% gradient.

**GEOLOGY**: Tertiary and Quaternary gravel, sand, ferruginous sand and clay.

**SOIL DESCRIPTION**: Leached acid sands over cemented coffee rock. Moderately well to well drained.

**NORTHCOTE FACTUAL KEY**: Uc2.32, Dy5.41 **SOIL REACTION TREND**: Strongly acid-acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-25cm | Loamy sand to sandy loam | - | Single grain | Grey to dark grey | 4.0-4.7 | Loose | Loose | SP | - | - |
| A2<br>25-55cm | Loamy sand | - | Single grain | Pale grey | 4.5 | Loose | 'Loose | SP | - | - |
| B<br>55-90cm | Cemented sand | - | Single grain | Dark brown and yellow brown | 4.5-4.9 | Loose | Loose | SP | - | - |
| C<br>90+ cm | Clayey sand to gravelly sand | - | Single grain | Grey with yellow brown mottles | 4.9 | Mod. weak | Very weak | SP | - | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sa 31 | Moderately well drained | Moderately rapid |
| Sb 31 | Moderately well drained | Moderately rapid |
| Sc 31 | Moderately well drained | Moderately rapid |
| Sd 31 | Well drained | Rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sa 31 | - | - | - | E | E, T | Tt |
| Sb 31 | - | - | - | E | E, T | Tt |
| Sc 31 | - | - | - | E | E, T | Tt |
| Sd 31 | Sg | Sg | Sg | Sg, E | E, T | Tt |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 32

**LANDFORM**: Sloping terrain up to 15% gradient.

**GEOLOGY**: Tertiary gravel, sand, ferruginous sand and clay

**SOIL DESCRIPTION**: Sandy clay looms over medium to heavy clay. Imperfectly to moderately well drained.

**NORTHCOTE FACTUAL KEY**: Dy5 **SOIL REACTION TREND**: Acid trend

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-15cm | Sandy clay loam to sandy loam | - | Weak | Yellowish grey brown or grey brown | 6.0 | Mod. weak | Mod. weak | ML | Low | Mod 3(2) |
| A2<br>15-50cm | Sandy clay loam to sandy loam | - | Weak | Pale yellowish brown | 6.0 | Very weak | Mod. weak | ML | Low | Low 5 |
| B1<br>50-80cm | Medium clay | - | Weak to moderate | Yellow brown | 5.5 | Mod. firm | Mod. firm | CL-CH | Mod. | Low 5 |
| B2<br>80-130cm | Medium clay to heavy clay | - | Moderate | Yellow brown with red grey mottles | 6.0 | Mod. firm | Mod. firm | CH | Mod.-high | Low 5 |
| C<br>130+ cm | Medium clay to heavy clay | - | Moderate | Light grey with red grey mottles | 5.5 | Very firm | Mod. weak | CH | - | Low 5 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sa 32 | Imperfectly drained | Slow |
| Sb 32 | Imperfectly drained to moderately well drained | Slow |
| Sc 32 | Moderately well drained | Slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sa 32 | - | | Sd, Sp | E | E | - |
| Sb32 | - | - | Sp | E | E | - |
| Sc 32 | - | - | - | E | E | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 33

**LANDFORM**: Drainage areas and sloping terrain up to 35% gradient

**GEOLOGY**: Jurassic-Cretaceous sediments

**SOIL DESCRIPTION**: Sandy acid soils over sandy to medium clays- Imperfectly to well drained

**NORTHCOTE FACTUAL KEY**: Dy3.21, 3.41 **SOIL REACTION TREND**: Acid trend

**RELATIONSHIPS WITH OTHER SOIL GROUPS**: Associated with soil groups 34 and 35

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-20cm. | Silty loam, fine sandy loam to very fine sandy clay loam | | Weak, massive or S/grain ' | Grey brown to dark grey | 4-0-5-5 | Very weak - mod-firm | Loose - mod. weak | ML | Low | - |
| A2<br>20-50cm | Silty loam, fine sandy loam to very fine sandy clay loam. | | Weak, massive or S/grain | Light brownish grey | 4-5-5-5 | Mod-weak - mod-firm | Loose - mod-weak | MI. | Low | - |
| B1<br>50-80cm | Fine sandy loom to fine sandy clay, weakly cemented hard pan | | Weak massive or S/grained | Mottled grey, yellow brown | 4-5-5-5 | Mod-firm - mod-strong | Mod-weak - mod-firm | CL | Low | Mod 3(1)-3(3) |
| B2<br>80-100cm | Fine sandy clay, light cloy to medium clay | | Moderate | Mottled yellow brown and • light grey | 4-5-5-5 | Mod-firm - rigid | Mod-weak - mod-firm | CL-CH | Low-mod. | Mod 3(1)-3(4) |
| C<br>100+ cm | Clay with fine sand or sandstone lenses | - | Moderate | Mottled yellow brown and light grey | 4-5-5-5 | - | - | CH | - | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| D33 | Imperfectly drained | Slow |
| Sa 33 | Moderately well drained to well drained | Slow |
| Sb 33 | Moderately well drained to well drained | Slow |
| Sc 33 | Well drained | Slew |
| Sd 33 | Well drained | Slow |
| Se 33 | Well drained | Slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| D33 | USG | USG, Sp, Sd | Sd, Sp | USG, Sd, Sp | E | - |
| Sa 33 | USG | USG | Sd | USG | E | - |
| Sb 33 | USG | USG | Sd | USG | E | - |
| Sc 33 | USG | USG | Sd | USG | E | - |
| Sd 33 | USG, Sg | USG, Sg | Sg, R | USG, Sg | E, Sg | - |
| Se 33 | USG, Sg | USG, Sg | Sg, R | USG, Sg | E, Sg | Sg |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 34

**LANDFORM**: Drainage areas and sloping terrain up to 35% gradient

**GEOLOGY**: Jurassic-Cretaceous sediments

**SOIL DESCRIPTION**: Hard setting loamy soils over yellow-brown mottled subsoils- Poorly to moderately well drained

**NORTHCOTE FACTUAL KEY**: Dy3.31, 3.91, 3.94, 5.33 **SOIL REACTION TREND**: Acid trend

**RELATIONSHIPS WITH OTHER SOIL GROUPS**: Associated with soil groups 33 and 35

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1 0-15cm | Loam, fine sandy clay loam, fine sandy clay, clay loam | - | Weak to moderate | Grey brown to dark grey brown | 5-6-7-0 | Mod-firm -mod-strong | Mod-weak | ML-CL | Low | Low-mod 3(1),5 |
| A2 15-50cm | Loam, fine sandy clay loam, fine sandy clay, clay loam | - | Moderate | Yellowish grey-brown | 5-5-7-0 | Mod-firm - very strong | Mod-firm | ML-CL | Low | Low-mod 3(2),5 |
| B1 50-65cm | Light clay to medium clay | - | Moderate to strong | Mottled brownish grey and yellow brown | 5-6-6-5 | Very firm -very strong | Mod-firm - very firm | CL | Mod- | Low-mod 3(2),5 |
| B2 65-120cm | Light clay to medium clay | Slightly gravelly | Moderate to strong | Mottled grey, brown and yellow brown | 5-5-6-5 | Very firm - very strong | Mod-firm - very firm | CL-CH | Mod. | Mod 3(1), 3(4) |
| C 120+ cm • | Light clay to medium clay with rock fragments | Very abundant, hard rock with depth | - | - | - | - | - | - | - | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| D34 | Poorly drained | Slow |
| Sa 34 | Imperfectly drained | Moderately rapid |
| Sb 34 | Imperfectly drained | Moderately rapid |
| Sc 34 | Moderately well drained | Moderately rapid |
| Sd 34 | Moderately well drained | Rapid |
| Se 34 | Moderately well drained | Rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| D34 | USG | USG, Sd, Sp | Sd, Sp | USG, Sd, Sp | E | - |
| Sa 34 | USG | USG | Sp | USG | E | - |
| Sb 34 | USG | USG | Sp | USG | E | - |
| Sc 34 | USG | USG | - | USG | E | - |
| Sd 34 | USG, Sg | USG, Sg | Sg | USG, Sg | E, Sg | - |
| Se 34 | USG, Sg | USG,S g | Sg, R | USG, Sg | E, Sg | Sg |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 35

**LANDFORM**: Sloping terrain with 5% to 25% gradient

**GEOLOGY**: Jurassic-Cretaceous sediments

**SOIL DESCRIPTION**: Uniform silty clay looms- Moderately well drained

**NORTHCOTE FACTUAL KEY**: Uf6.12 **SOIL REACTION TREND**: Acid trend

**RELATIONSHIPS WITH OTHER SOIL GROUPS**: Associated with soil groups 33 and 35

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1 0-15cm | Silty clay loam | - | Moderate | Dark grey brown | 6-0 | Mod-weak | Mod-weak | CL | Mod- | Mod 3(3) |
| A2 15-60cm | Silty clay loam | - | Moderate | Grey brown | 6-5 | Mod-weak | Mod-weak | CL-CH | Mod.-high | Mod 3(3) |
| B1 60-120cm | Silty clay | - | Moderate | Grey brown with yellow brown mottles | 6-0 | Mod-weak | Mod-firm | CL-CH | Mod.-high | Mod 3(4) |
| C 120+cm | Decomposing rock | - | - | - | - | - | - | - | - | - |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sb 35 | Moderately well drained | Moderately rapid |
| Sc 35 | Moderately well drained | Moderately rapid |
| Sd 35 | Moderately well drained | Rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sb 35 | - | - | - | L | E | - |
| Sc 35 | - | - | - | L | E | - |
| Sd 35 | Sg | Sg | Sg | Sg, L | E, Sg | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 36

**LANDFORM**: Lower slopes, flats and drainage areas up to 5% gradient.

**GEOLOGY**: Quaternary alluvium from Jurassic-Cretaceous sediments.

**SOIL DESCRIPTION**: Dark brownish grey silty to sandy clay loams over mottled light brownish grey silty medium clays. Poorly to very poorly drained.

**NORTHCOTE FACTUAL KEY**: Gn3.91, 4.54 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A<br>0-60cm | Cloy loam, sandy clay loam to silty clay loam | - | Moderate to strong | Brownish dark grey | 5.1-5.7 | Mod. weak - mod. firm | Very weak - mod. firm | ML-CL | Low | Low-mod. 3(1),5 |
| B<br>60-180cm | Silty clay to medium clay | | Moderate to strong | Mottled light brownish gray and yellowish brown | 4.7-5.7 | Mod. firm - mod-strong | Mod. weak - mod. firm | CL-CH | Low-mod. | Low-mod. 3(1),5 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| D36 | Very poorly drained | Very slow |
| F36 | Poorly drained | Slow |
| Sa 36 | Poorly drained | Slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| D36 | | Sd, Sp | Sd, Sp | E | E | - |
| F36 | - | Sd, Sp | Sd, Sp | E | E | - |
| Sa 36 | | - | Sd, Sp | E | E | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 37

**LANDFORM**: Flats and sloping terrain up to 15% gradient.

**GEOLOGY**: Devonian sandstone, mudstone, shale and slate.

**SOIL DESCRIPTION**: Clay looms over light to medium clays. Very poorly to imperfectly well drained.

**NORTHCOTE FACTUAL KEY**: Gn4.31 **SOIL REACTION TREND**: Acid trend

**RELATIONSHIPS WITH OTHER SOIL GROUPS**: Associated with soil groups 33 and 34.

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A<br>0-30cm | Cloy loam | - | Weak | Greyish brown | 6.0 | Mod. firm | Very weak | ML | Low | Low 5 |
| B1<br>30-60cm | Light clay | - | Weak | Greyish brown | 6.0 | Mod-strong | Mod. weak | CL | Low-mod. | Low 5 |
| B2<br>60-100cm | Light medium clay | | Strong | Light greyish brown, red and grey mottled | 6.0 | Very strong | Mod. firm | CL | Mod. | Low 5 |
| C<br>100+ cm | Light medium clay | - | Strong | Yellowish brown, grey red mottles | 5.5 | Mod. firm | Mod. firm | CL-CH | Mod.-high | Low 5 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| F37 | Very poorly drained | Very slow |
| Sa 37 | Imperfectly drained | Slow |
| Sb 37 | Imperfectly drained | Moderately rapid |
| Sc 37 | Imperfectly drained | Moderately rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| F37 | - | Sd, Sp | Sd, Sp | E | E | - |
| Sa 37 | - | Sd, Sp | Sd, Sp | E | E | - |
| Sb 37 | - | Sp | Sp | E | E | - |
| Sc 37 | - | Sp | Sp | E | E | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 38

**LANDFORM**: Plains, flats, undulating terrain and drainages areas up to 5% gradient.

**GEOLOGY**: Quaternary alluvium.

**SOIL DESCRIPTION**: Sandy clay or clay looms over medium to heavy mottled clays- Poorly to imperfectly drained.

**NORTHCOTE FACTUAL KEY**: Dy3.11, 3.21 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1<br>0-20cm | Clay loam to fine sandy clay | - | Moderate | Dark grey brown | 4.7 | Mod. firm | Mod. firm - mod. weak | CL | Low | Mod 3(2) |
| A2<br>20-45cm | Clay loam to fine sandy clay loam | - | Moderate | Grey to brownish grey | 4.7 | Mod. firm | Mod. firm - mod. weak | CL | Low | Mod 3(2) |
| B1<br>45-80cm | Medium clay to heavy clay | - | Moderate to strong | Grey, slightly mottled yellow brown | 5.0 | Mod. firm | Mod. firm | 'CH | High-mod. | Mod.3(1) |
| B2<br>80+ cm | Medium clay to heavy clay | - | Moderate to strong | Brownish grey to yellow brown mottled | 5.5 | Mod. firm | Mod. firm | .CH | Mod.-high | Mod.3(3) |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| D38 | Poorly drained | Very stow |
| F38 | Poorly drained | Slow |
| P38 | Imperfectly drained | Slow |
| U38 | Imperfectly drained | Rapid to slow |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| D38 | - | Sd, Sp | Sd, Sp | - | T, Sd, Sp | Tt |
| F38 | - | Sd, Sp | Sd, Sp | - | T, Sd, Sp | Tt |
| P38 | - | | Sd, Sp | - | T | Tt |
| U38 | - | - | - | - | T | Tt |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 39

**LANDFORM**: Sloping terrain up to 15% gradient.

**GEOLOGY**: Tertiary gravel, sand, ferruginous sand and clay.

**SOIL DESCRIPTION**: Sandy clay loams over medium to heavy clay. Imperfectly to moderately well drained

**NORTHCOTE FACTUAL KEY**: Dy4.22 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1 0-30cm | Sandy clay loam | - | Massive | Brown to yellow brown | 6.0 | Mod. weak | Mod. weak | CL | Low-mod. | Mod 3(2) |
| A2 30-50cm | Sandy clay loam | - | Massive | Yellow brown | 6.0 | Very weak | Mod. weak | CL | Low-mod. | Low 5 |
| B1 50-90cm | Medium clay | - | Weak | Yellow brown | 5.5 | Mod. firm | Mod. firm | CL-CH | Mod. | Low 5 |
| B2 90-150cm | Medium clay to heavy clay | - | Moderate | Yellow brown, red grey mottles | 6.0 | Mod. firm | Mod. firm | CH | Mod.-high | Low 5 |
| C 150+cm• | Medium clay to heavy clay | - | Strong | Light grey, red grey mottle' | 5.5 | Very firm | Mod. weak | CH | - | Low 5 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sa 39 | Imperfectly drained | Slow |
| Sb 39 | Imperfectly drained | Moderately rapid |
| Sc 39 | Moderately well drained | Moderately rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Sa 39 | - | - | Sd, Sp | E | E | - |
| Sb 39 | - | - | - | E | E | - |
| Sc 39 | - | - | - | E | E | - |

* Class definitions to be found in tabular form in Appendix

## FIELD OBSERVATIONS AND LABORATORY MEASUREMENTS

**SOIL GROUP NUMBER:** 40

**LANDFORM**: Sloping terrain up to 10% gradient.

**GEOLOGY**: Tertiary terrain overlain by Silurian.

**SOIL DESCRIPTION**: Silty clay loom over medium clays- Moderately well drained

**NORTHCOTE FACTUAL KEY**: Gn3.91, 3.71 **SOIL REACTION TREND**: Acid trend.

**RELATIONSHIPS WITH OTHER SOIL GROUPS**:

**SOIL PROFILE DESCRIPTION –**

| HORIZON SOIL DEPTH | TEXTURE | STONE / GRAVEL* | SOIL STRUCTURE | SOIL COLOUR | SOIL pH | UNWORKED - DRY | CONSISTENCY - MOIST | UNIFIED SOIL GROUP* | LINEAR SHRINKAGE | EMERSON. DISPER. IN WATER |
|---|---|---|---|---|---|---|---|---|---|---|
| A1 0-10cm | Silty loam | - | Weak | Very dark greyish brown | 6.0 | - | Mod. weak | ML | | Low-mod 3(1)-5 |
| B1 10-40cm | Silty clay | - | Moderate | Dark greyish brown with yellow mottles | 5.5 | - | Mod. firm | CL | Low-mod. | Mod 3 |
| B2 40-95cm | Medium clay• | - | Strong | Light olive brown with yellow, red and grey mottles | 5.0 | - | Mod. firm | CH | Mod.-high | Mod 3 |
| C 95+cm | Light clay | Rock fragments | Strong | common - | 5.0 | - | Mod, strong | CL/CH | Mod. | Mod 3 |

**INTERPRETATIONS: INTERNAL AND EXTERNAL DRAINAGE FOR CLEARED LAND, DOMINANT CONDITION**

| MAP UNIT | INTERNAL DRAINAGE* | EXTERNAL DRAINAGE* |
|---|---|---|
| Sa 40 | Moderately well drained | Moderately rapid |
| Sb 40 | Moderately well drained | Moderately rapid |

**INTERPRETATIONS: POTENTIAL LAND DEGRADATION ASSESSMENT**

| MAPUNIT | SECONDARY ROADS | BUILDING FOOTINGS | SEPTIC TANKS | EARTHEN DAMS | LOGGING/CROPPING | GRAZING |
|---|---|---|---|---|---|---|
| Se 40 | - | - | - | - | E | - |
| Sb 40 | - | - | - | - | E | - |

* Class definitions to be found in tabular form in Appendix

**Table 12**

**ABUNDANCE OF COARSE FRAGMENTS***

| CLASS | DEFINITION (Percentage) |
|---|---|
| No surface coarse fragments | 0 |
| Very slightly; or Very few<br>For example, very slightly fine gravelly; very few small pebbles | <2% |
| Slightly; or Few<br>For example, slightly stony; few stones | 2%-10% |
| No qualifier; or Common<br>For example, medium gravelly; stony; common medium pebbles; common stones. | 10%-20% |
| Moderately; or Many | 20%-50% |
| Very; or Abundant | 50%-90% |
| Extremely; or Very abundant | 90% |

*FIELD HANDBOOK, R. D. McDonald et.al., pg.78.

**Table 13**
**SOIL REACTION TRENDS***

| CLASS | DEFINITION |
|---|---|
| Strongly acid trend | The surface soil has a pH value higher than pH 7.0 and the deep subsoil** has a pH value less than pH 6.5. |
| Acid trend | Surface soil has a pH value lower than pH 7.0 and the deep subsoil** has a pH value less than pH 6.5. |
| Neutral trend | The surface soil has a pH value between pH5.0 and pH 8.0 and the deep subsoil** has a pH value between pH 6.5 and pH 8.0. |
| Alkaline trend | The surface soil has a pH value higher than pH 5.0 and the deep sub-soil** has a pH value higher than. pH 8.0. |

*A FACTUAL KEY FOR THE RECOGNITION OF AUSTRALIAN SOILS, K.H.Northcote, pg.25.
** It has been found that the diagnostic pH figure for many soils is that of the deep subsoil.

**Published Surveys**

Geological Survey: Cranbourne Mapsheet., Geological Survey of VIC., 1967. Map scale, 1:63 360. Map No. 859 Zone 7. Government Printer. Melbourne.

Geological Survey: Ringwood Mapsheet., Geological Survey of Vic., 1970. Map Scale, 1:63 360. Map No. 849. Zone 7. Government Printer. Melbourne

Geological Survey: Westernport Mapsheet., Geological Survey of Vic., 1963. Map scale, 1:63 360. Map No. 868. Zone 7. Government Printer. Melbourne

Soil Survey Westernport Bay Catchment., Soil Survey Report No. 52, I. J. Sargeant, Department of Agriculture, Vic., 1975.

Terrain Classification of Engineering Purposes of the Melbourne Area. Victoria., C.S.I.R.O. Australia, Division of Applied Geomechanics Technical Paper No.11., 1972.

Soil and Land Utilization Survey of the Country around Berwick., LC. Holmes, G.W. Leeper, K.D. Nicholls, Proc. Roy. Soc. Vic. 52, pg.177 - 245, 1940.

Land System Map. County of Mornington., Soil Conservation Authority, 1975. Map Scale 1:126 000.

Land capability for urban and related uses in Berwick-Pakenham area and the Shire of Hastings., Soil Conservation Authority, 1979. Map Scale, 1:50 000

**Technical References**

Australian Soil and Land Survey. Field Handbook., R.C. McDonald, R.F. Isbell, J.G. Speight, J. Walker, and M.S. Hopkins, Inkata press, Melbourne, 1984.

A Factual Key for the Recognition of Australian Soils., K. H. Northcote, 4th ed-, Rellim Technical Publications, S.A., 1979.

Victorian Building Regulations., Victorian Government printing office, 1983- S.A.A. Site investigation Code., Australian Standard, 1726 - 1981.

The design of flexible pavements., Technical bulletin 31, September, 1980. The design of flexible pavements., Technical bulletin 26, September, 1980. Residential slabs and footings., Australian standard, 2870 - 1986. Agricultural Handbook 537., United States Department of Agriculture, 1978.

Earth Manual - A water resources technical publication. U.S. Department of the Interior. Water and power Resources Service 2nd edition. 1974 U.S. printing office.

**Table 15**

**INTERNAL SOIL DRAINAGE***

| CLASS | DEFINITION |
|---|---|
| Very poorly drained | The water table remains at or near the surface for most of the year. |
| Poorly drained | All horizons remain wet for periods of several months |
| Imperfectly drained | Some horizons are wet for periods of several weeks. |
| Moderately well drained | Some horizons may remain wet for as long as one week after water addition. |
| Well drained | Some horizons may remain wet for several das after water addition. |
| Rapidly well drained | No horizon is normally wet for more several hours after water addition. |

*FIELD HANDBOOK, R. D. McDonald et.al., pg. 125.

**Table 16**

**EXTRNAL SOIL DRAINAGE***

| CLASS | DEFINITION |
|---|---|
| No run-off Very slow | Free water on surface for long periods, or water enters soil immediately. Soils usually either level to nearly level or loose and porous |
| Slow | Free water on surface for significant periods or water enters soil relatively rapidly. Soils usually either nearly level to gently sloping of relatively porous. |
| Moderately rapid | Free water on surface for short periods only; moderate proportion enters soil. |
| Rapid | Large proportion; moderate runs off, small, propron enters soil. Water runs off nearly as fast as it is added. Soils usually have moderate to steep slopes and low infiltration rates. |
| Very rapid | Very large proportion of water runs off; very small proportion enters soil. Water runs off as fast as it is added. Soils usually have steep slopes and low infiltration rates. |

*FIELD HANDBOOK, R. D. Mc Donald et.al., pg. 82.(modified)

| MAP UNIT | SOIL EROSION RISKS | | | LAND CAPABILITY ASSESSMENT | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Urban Development | Rural Subdivision | Shallow Excavation | Intensive Rowcrops | Intensive Cultivation For Pasture Renovation & Fodder Crops | Grazing Conservation Tillage | Intensive Cropping | Grazing | Secondary Roads | Septic Tanks | Building Foundations | Earthen Dams | Shallow Excavations | Intensive Logging | Rural Subdivision | Urban Development |
| Sa4 | VS | VS | VS | VS | VS | VS | 2 | 2 | 3 | 5 | 3 | 4 | 5 | 3 | 3 | 2 |
| Sb4 | L | VS | L | L | VS | VS | 2 | 2 | 3 | 5 | 3 | 4 | 5 | 2 | 2 | 2 |
| Sa5 | VS | VS | VS | VS | VS | VS | 2 | 2 | 3 | 3 | 3 | 5 | 3 | 3 | 1 | 1 |
| Sb5 | VS | VS | VS | VS | VS | VS | 2 | 2 | 3 | 2 | 3 | 5 | 3 | 3 | 2 | 2 |
| 06 | VS | VS | VS | VS | VS | VS | 3 | 2 | 3 | 4/5 | 4 | 3 | 5 | 2 | 3/4 | 2/3 |
| Sb7 | L | L | M | M | L | VS | 3 | 3 | 2 | 2 | 3 | 5 | 3 | 3 | 2 | 2 |
| Sc7 | L | L | M | M | L | VS | 4 | 3 | 3 | 3 | 3 | 5 | 4 | 3 | 3 | 3 |
| Sd7 | M | M | M | M | M | L | 4 | 3 | 4 | 4 | 4 | 5 | 4 | 3 | 4 | 4 |
| Se7 | H | M | H | H | H | M | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 4 | 5 | 5 |
| N(7) | S | S | S | S | S | S | 5 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 5 | 5 |
| P8 | VS | VS | VS | VS | VS | VS | 3 | 3 | 4 | 5 | 4 | 3 | 5 | 4 | 4 | 4 |
| P8 | VS | VS | VS | VS | VS | VS | 4 | 4 | 5 | 5 | 5 | 3 | 5 | 5 | 5 | 4 |

| MAP UNIT | SOIL EROSION RISKS | | | LAND CAPABILITY ASSESSMENT | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Urban Development | Rural Subdivision | Shallow Excavation | Intensive Rowcrops | Intensive Cultivation For Pasture Renovation & Fodder Crops | Grazing Conservation Tillage | Intensive Cropping | Grazing | Secondary Roads | Septic Tanks | Building Foundations | Earthen Dams | Shallow Excavations | Intensive Logging | Rural Subdivision | Urban Development |
| D9 | H | H | H | H | H | H | 4 | 4 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 |
| DV9 | S | H | S | S | S | S | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| P11 | VS | VS | VS | VS | VS | VS | 2 | 2 | 3 | 4 | 4 | 3 | 3 | 3 | 3 | 3 |
| Sa11 | VS | VS | VS | VS | VS | VS | 2 | 2 | 3 | 4 | 3 | 3 | 3 | 2 | 3 | 3 |
| Sb11 | L | L | L | L | VS | VS | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 |
| Sc11 | M | M | M | M | L | VS | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 |
| Sa12 | L | VS | L | L | VS | VS | 2 | 2 | 3 | 5 | 3 | 3 | 5 | 3 | 3 | 3 |
| F13 | VS | L | L | L | VS | VS | 4 | 4 | 5 | 5 | 5 | 3 | 5 | 5 | 5 | 5 |
| P13 | VS | L | L | L | VS | VS | 3 | 3 | 5 | 5 | 4 | 3 | 5 | 5 | 5 | 5 |
| D13 | S | S | S | S | S | S | 5 | 5 | 5 | 5 | 5 | 4/5 | 5 | 5 | 5 | 5 |
| DV13 | S | S | S | S | S | S | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

| MAP UNIT | SOIL EROSION RISKS | | | | | | LAND CAPABILITY ASSESSMENT | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Urban Development | Rural Subdivision | Shallow Excavation | Intensive Rowcrops | Intensive Cultivation For Pasture Renovation & Fodder Crops | Grazing Conservation Tillage | Intensive Cropping | Grazing | Secondary Roads | Septic Tanks | Building Foundations | Earthen Dams | Shallow Excavations | Intensive Logging | Rural Subdivision | Urban Development |
| P14 | VS | VS | VS | VS | VS | VS | 4 | 4 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 |
| F14 | VS | VS | VS | VS | VS | VS | 4 | 4 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 |
| D14 | H | M | H | M/H | H | H | 5 | 5 | 5 | 5 | 5 | 4/5 | 5 | 5 | 5 | 5 |
| Sb15 | L | VS | L | L | VS | VS | 2 | 1 | 3 | 2 | 3 | 4 | 3 | 2 | 2 | 2 |
| Sc15 | M | M | H | H | M | L | 4 | 2 | 4 | 4 | 4 | 5 | 5 | 3 | 4 | 4 |
| Sd15 | M | M | H | H | M | L | 4 | 2 | 4 | 4 | 4 | 5 | 5 | 3 | 4 | 4 |
| Se15 | H | M | S | S | H | M | 5 | 3/4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 |
| P16 | VS | VS | VS | VS | VS | VS | 5 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 3 |
| P17 | VS | VS | VS | VS | VS | VS | 4/5 | 3/4 | 4/5 | 5 | 4/5 | 3 | 5 | 4/5 | 4/5 | 4 |
| F17 | VS | VS | VS | VS | VS | VS | 4 | 4 | 5 | 5 | 5 | 3 | 5 | 5 | 5 | 5 |
| D17 | S | S | S | S | S | S | 5 | 4/5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 |
| DV17 | S | S | S | S | S | S | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

| MAP UNIT | SOIL EROSION RISKS | | | | | | LAND CAPABILITY ASSESSMENT | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Urban Development | Rural Subdivision | Shallow Excavation | Intensive Rowcrops | Intensive Cultivation For Pasture Renovation & Fodder Crops | Grazing Conservation Tillage | Intensive Cropping | Grazing | Secondary Roads | Septic Tanks | Building Foundations | Earthen Dams | Shallow Excavations | Intensive Logging | Rural Subdivision | Urban Development |
| P18 | VS | VS | VS | VS | VS | VS | 4/5 | 3/4 | 4/5 | 5 | 4/5 | 3 | 5 | 4/5 | 4/5 | 4 |
| F18 | VS | VS | VS | VS | VS | VS | 4 | 4 | 5 | 5 | 5 | 3 | 5 | 5 | 5 | 5 |
| D18 | S | S | S | S | S | S | 5 | 4/5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 |
| DV18 | S | S | S | S | S | S | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| P19 | VS | VS | VS | VS | VS | VS | 3 | 3 | 4 | 4 | 4 | 3 | 5 | 4 | 4 | 3 |
| F19 | VS | VS | VS | VS | VS | VS | 4 | 4 | 5 | 5 | 5 | 3 | 5 | 5 | 5 | 4 |
| D19 | S | S | S | S | S | S | 5 | 5 | 5 | 5 | 4/5 | 5 | 5 | 5 | 5 | 5 |
| DV19 | S | S | S | S | S | S | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Sa20 | VS | VS | VS | VS | VS | VS | 2 | 1 | 3 | 2 | 2 | 4 | 3 | 2 | 2 | 2 |
| Sb20 | L | VS | L | L | VS | VS | 2 | 1 | 3 | 2 | 2 | 4 | 3 | 2 | 2 | 2 |
| Sc20 | M | L | M | M | L | VS | 3 | 2 | 3 | 3 | 3 | 4 | 3 | 2 | 3 | 3 |
| Sd20 | M/S | M/H | H | M/H | L/M | L | 4 | 3 | 4 | 4 | 4 | 5 | 4 | 3 | 4 | 4 |
| Se20 | H/S | H/S | S | H/S | M/H | M | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 |

| MAP UNIT | SOIL EROSION RISKS | | | LAND CAPABILITY ASSESSMENT | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Urban Development | Rural Subdivision | Shallow Excavation | Intensive Rowcrops | Intensive Cultivation For Pasture Renovation & Fodder Crops | Grazing Conservation Tillage | Intensive Cropping | Grazing | Secondary Roads | Septic Tanks | Building Foundations | Earthen Dams | Shallow Excavations | Intensive Logging | Rural Subdivision | Urban Development |
| Sd21 | H | M | H/S | H/S | M | L | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 |
| Se21 | H | H | S | S | H | M | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 |
| Sb22 | L | VS | L | L | VS | VS | 2 | 1 | 3 | 2 | 3 | 4 | 3 | 2 | 2 | 2 |
| Sc22 | L | L | M | M | L | VS | 3 | 2 | 3 | 3 | 3 | 4 | 4 | 3 | 3 | 3 |
| Sd22 | M | M | H | H | M | L | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Se22 | S | H/S | S | S | H | M | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Sd23 | H | H | H | H | M | L | 4 | 4 | 4 | 4/5 | 4 | 5 | 4 | 4 | 4/5 | 4 |
| Se23 | S | S | S | S | H | M | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

| UNIT | SOIL EROSION RISKS | | | | | | LAND CAPABILITY ASSESSMENT | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Urban Development | Rural Subdivision | Shallow Excavation | Intensive Rowcrops | Intensive Cultivation For Pasture Renovation & Fodder Crops | Grazing Conservation Tillage | Intensive Cropping | Secondary Grazing | Roads | Septic Tanks | Building Foundations | Earthen Dams | Shallow Excavations | Intensive Logging | Rural Subdivision | Urban Development |
| Sc24 | M | L | M | M | L | L | 3 | 3 | 4 | 5 | 3 | 4 | 4 | 4 | 3 | 4 |
| Sb25 | VS | VS | VS | VS | VS | VS | 2 | 1 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 2 |
| U26 | VS | VS | VS | VS | VS | VS | 4 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 2 |
| Sa26 | VS | VS | VS | VS | VS | VS | 4 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 2 |
| Sb26 | L | L | L | L | VS | VS | 4 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 |
| U27 | VS | VS | VS | VS | VS | VS | 2 | 2 | 3 | 4 | 3 | 3 | 3 | 2 | 2 | 2 |
| Sa27 | VS | VS | VS | VS | VS | VS | 2 | 1 | 3 | 4 | 2 | 3 | 2 | 2 | 2 | 2 |
| Sb27 | VS | VS | VS | VS | VS | VS | 2 | 1 | 3 | 3 | 2 | 4 | 2 | 2 | 2 | 2 |
| D27 | H/S | S/H | H/S | S/H | H | H | 4 | 4 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 |
| DV27 | S | S | S | S | S | S | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

| MAP UNIT | SOIL EROSION RISKS | | | | | | LAND CAPABILITY ASSESSMENT | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Urban Development | Rural Subdivision | Shallow Excavation | Intensive Rowcrops | Intensive Cultivation For Pasture Renovation & Fodder Crops | Grazing Conservation Tillage | Intensive Cropping | Secondary Grazing | Roads | Septic Tanks | Building Foundations | Earthen Dams | Shallow Excavations | Intensive Logging | Rural Subdivision | Urban Development |
| P28 | VS | VS | VS | VS | VS | VS | 3 | 2 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 |
| F28 | VS | VS | VS | VS | VS | VS | 4 | 3 | 5 | 5 | 5 | 3 | 5 | 5 | 5 | 4 |
| D28 | M | M | H | H | H | M | 4 | 4 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 4 |
| DV28 | H | H | S | S | H | H | 4/5 | 4 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 4 |
| P29 | VS | VS | VS | VS | VS | VS | 2 | 2 | 4 | 4 | 4 | 4 | 5 | 3 | 3 | 5 |
| F29 | VS | VS | VS | VS | VS | VS | 3 | 3 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 5 |
| D29 | S | S | S | S | S | S | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| DV29 | S | S | S | S | S | S | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Sb31 | VS | VS | L | L | L | VS | 3 | 2 | 3 | 2 | 3 | 5 | 4 | 2 | 2 | 2 |
| Sc31 | L | L | M | M | L | VS | 3 | 2 | 3 | 3 | 3 | 5 | 4 | 3 | 3 | 3 |
| U31 | VS | VS | VS | VS | VS | VS | 3 | 2 | 3 | 2 | 3 | 5 | 4 | 2 | 2 | 2 |

| MAP UNIT | SOIL EROSION RISKS | | | | | | LAND CAPABILITY ASSESSMENT | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Urban Development | Rural Subdivision | Shallow Excavation | Intensive Rowcrops | Intensive Cultivation For Pasture Renovation & Fodder Crops | Grazing Conservation Tillage | Intensive Cropping | Secondary Grazing | Roads | Septic Tanks | Building Foundations | Earthen Dams | Shallow Excavations | Intensive Logging | Rural Subdivision | Urban Development |
| Sa33 | VS | VS | VS | VS | VS | VS | 3 | 2 | 2 | 1 | 2 | 4 | 3 | 3 | 1 | 1 |
| Sb33 | VS | VS | L | L | L | VS | 3 | 2 | 2 | 2 | 2 | 4 | 3 | 3 | 2 | 2 |
| Sc33 | L | L | M | M | L | VS | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 3 | 3 | 3 |
| Sd33 | M | M | H | H | M | L | 4 | 3 | 4 | 4 | 4 | 5 | 4 | 3 | 4 | 4 |
| Sa34 | VS | VS | VS | VS | VS | VS | 3 | 3 | 4 | 4 | 4 | 3/4 | 5 | 4 | 4 | 3 |
| Sb34 | L | VS | L | L | L | VS | 2 | 2 | 3 | 4 | 3 | 3/4 | 5 | 2 | 3 | 4 |
| Sc34 | M | L | M | M | L | VS | 3 | 2 | 3 | 4 | 3 | 3/4 | 5 | 2 | 4 | 4 |
| Sd34 | H | M | H | H | M | L | 4 | 3 | 4 | 4 | 4 | 4 | 5 | 3 | 4 | 4 |
| Se34 | S | H | S | S | H | M | 5 | 3/4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 |
| Sa35 | VS | VS | VS | VS | VS | VS | 3 | 3 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 3 |
| Sb35 | L | VS | L | L | L | VS | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 |
| Sc35 | M | L | M | M | L | VS | 2 | 2 | 4 | 3 | 3 | 3 | 4 | 3 | 3 | 3 |
| Sd35 | M | M | H/S | H/S | M | L | 2 | 3 | 4/5 | 4 | 4 | 4 | 4/5 | 3 | 3 | 4 |

| MAP UNIT | SOIL EROSION RISKS | | | LAND CAPABILITY ASSESSMENT | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Urban Development | Rural Subdivision | Shallow Excavation | Intensive Rowcrops | Intensive Cultivation For Pasture Renovation & Fodder Crops | Grazing Conservation Tillage | Intensive Cropping | Secondary Grazing Roads | Septic Tanks | Building Foundations | Earthen Dams | Shallow Excavations | Intensive Logging | Rural Subdivision | Urban Development |
| P36 | VS | VS | VS | VS | VS | VS | 4 | 3/4 | 5 | 5 | 5 | 4/5 | 5 | 5 | 5 | 5 |
| F36 | VS | VS | VS | VS | VS | VS | 4 | 4 | 5 | 5 | 5 | 4/5 | 5 | 5 | 5 | 5 |
| D36 | S | S | S | S | S | S | 5 | 5 | 5 | 5 | 5 | 4/5 | 5 | 5 | 5 | 5 |
| DV36 | S | S | S | S | S | S | 5 | 5 | 5 | 5 | 5 | 4/5 | 5 | 5 | 5 | 5 |
| Sa37 | L | VS | L | L | L | L | 3 | 1 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 |
| Sb37 | L | VS | L | L | L | L | 3 | 1 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 |
| Sc37 | M | L | M | M | L | L | 3 | 1 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 |
| D38 | S | S | S | S | S | S | 4 | 4 | 5 | 5 | 5 | 3 | 5 | 5 | 5 | 5 |
| F38 | VS | VS | VS | VS | VS | VS | 4 | 4 | 5 | 5 | 5 | 3 | 5 | 5 | 5 | 5 |
| U38 | VS | VS | VS | VS | VS | VS | 3 | 3 | 4 | 5 | 5 | 3 | 4 | 4 | 4 | 3 |

| MAP UNIT | SOIL EROSION RISKS | | | LAND CAPABILITY ASSESSMENT | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Urban Development | Rural Subdivision | Shallow Excavation | Intensive Rowcrops | Intensive Cultivation For Pasture Renovation & Fodder Crops | Grazing Conservation Tillage | Intensive Cropping | Secondary Grazing | Roads | Septic Tanks | Building Foundations | Earthen Dams | Shallow Excavations | Intensive Logging | Rural Subdivision | Urban Development |
| Sa39 | VS | VS | VS | VS | VS | VS | 2 | 1 | 3 | 4 | 3 | 4 | 3 | 3 | 3 | 2 |
| Sb39 | L | VS | L | L | L | VS | 2 | 1 | 3 | 4 | 3 | 4 | 3 | 3 | 3 | 2 |
| Sc39 | M | L | M | M | L | VS | 2 | 1 | 3 | 4 | 3 | 4 | 4 | 3 | 3 | 3 |

| MAP UNIT | SOIL EROSION RISKS | | | LAND CAPABILITY ASSESSMENT | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Urban Development | Rural Subdivision | Shallow Excavation | Intensive Rowcrops | Intensive Cultivation For Pasture Renovation & Fodder Crops | Grazing Conservation Tillage | Intensive Cropping | Grazing | Secondary Roads | Septic Tanks | Building Foundations | Earthen Dams | Shallow Excavations | Intensive Logging | Rural Subdivision | Urban Development |
| Sa1 | VS | VS | L | VS | VS | VS | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Sb1 | L | L | M | L | VS | VS | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 |
| Sc1 | M | M | H | M | L | L | 4 | 2 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 |
| Sd1 | H | H | S | S | M | L | 5 | 3 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 4 |
| Sc2 | L | L | L | M | L | L | 3 | 2 | 3 | 3 | 3 | 4 | 4 | 2 | 3 | 3 |
| Sd2 | M | M | M | H | M | L | 4 | 3 | 4 | 4 | 4 | 5 | 5 | 3 | 4 | 5 |
| Se2 | H | H | H | S | H | M | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 |
| Sa3 | VS | VS | VS | VS | VS | VS | 2 | 1 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 |
| Sb3 | L | L | L | L | VS | VS | 2 | 1 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 |
| Sc3 | M | M | M | M | L | VS | 3 | 2 | 3 | 3 | 3 | 3 | 4 | 2 | 3 | 3 |
| Sd3 | H | M | H | H | M | L | 4 | 3 | 4 | 4 | 4 | 4 | 4 | 3 | 4 | 4 |
| Se3 | S | H | S | S | H | M | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 5 |