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The role of building surveyors in rural land use planning

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Preface

The booklet has been prepared by the Land Evaluation Group of the Department of Agriculture to further its aim of promoting the use of Land Capability Assessment to achieve better rural land use planning in Western Australia.

The aims of this booklet are:

(1) To inform Building Surveyors of the proposed Rural Land Use Planning Policy and its benefits, and implications, for Local Authorities.

(2) To highlight the role of Building Surveyors in achieving better rural land use planning within their Shire.

and

(3) This booklet should be read in association with the Department's document "Land Capability Assessment".

1. INTRODUCTION

The State Planning Commission has prepared a draft "Rural Land Use Planning Policy" which aims to provide an effective framework for planning in rural areas. The Policy proposes that Local Authorities currently experiencing land use conflicts or pressure for development and subdivision, prepare a Local Rural Strategy prior to the Commission considering any major development proposals. These Local Authorities are listed in Appendix I.

1.1 Local Rural Strategies

A Local Rural Strategy is a policy document which will address the needs of the local rural economy, community and environment and provide the framework within which Local Authorities can:

(1) plan for desirable change in rural land use (e.g. more rural-residential development, industry?);

(2) promote desirable activities;

(3) consider servicing and resource needs of different land uses (e.g. the need for deep sewerage in a residential area);

(4) manage conflicting and competing land uses (e.g. residential encroachment into farming areas);

(5) assist in co-ordinating the activities of all management agencies in the local authority area.

1.2 Guidelines for Local Rural Strategies

The State Planning Commission has produced the document "Guidelines for the Preparation of a Local Rural Strategy" which details the sequential steps to prepare a Local Rural Strategy, including the need to undertake land resource and land capability surveys for various land uses. The Land Evaluation Group of the Department of Agriculture has produced the document "Land Capability Assessment" which details (for those who are not familiar with this work) how to undertake these surveys.

Many local authorities expect to engage planning consultants to undertake Local Rural Strategies because they do not have the staff or the staff-time to undertake the work in-house.

The two guideline documents have therefore been written primarily for planning consultants, and for others involved in producing Local Rural Strategies. The documents emphasise the need to use the best available information, and to liaise with, and seek information from, the local authority (including Health and Building Surveyors), State Government agencies and local community and interest groups.

Planning consultants may have difficulties obtaining and understanding land resource information; undertaking land resource surveys; and undertaking land capability assessment. **It is in these three areas that Building Surveyors can have a vital role in the formulation of a Local Rural Strategy.**

2. LAND RESOURCE SURVEY AND LAND CAPABILITY ASSESSMENT

This section is a summary from the document "Land Capability Assessment", and has been included as background information for the sections which follow.

Land Capability is defined as "the ability of land to sustain a specified land use without resulting in significant onsite or offsite degradation of damage to the land resources".

The land use must be carefully described so that its **land use requirements** are appreciated. For example, for urban development important land use requirements are that the land can be readily trenched (or excavated) and is free from flooding; whereas for annual horticulture, a ready supply of irrigation water and a minimal potential for water pollution to occur, are important requirements.

Land can be described in terms of its **land qualities**, which are attributes which help to describe its capability for a specified use. Examples of land qualities are susceptibility to waterlogging, wind erosion hazard, ease of excavation and foundation stability. In turn, each land quality is generally determined by several distinct factors. For example, ease of excavation is determined by a combination of factors including soil depth, type of material below the soil, depth to the water table, amount of stones and boulders in the soil and land slope. These individual factors are termed **land characteristics.**

In order to undertake Land Capability Assessment, planning consultants will need to firstly produce a Land resources map showing the area broken up into **mapping units.** These are areas within which its land characteristics are similar, but which are distinctly different from adjacent areas. The boundaries between mapping units can be determined from existing maps and reports, by **personal knowledge of the area,** or by undertaking a field survey.

Once the land resource map is prepared and the land characteristics of each mapping unit are known, the Land Capability Assessment can be undertaken. Land Capability Assessment is simply a process where the land (described in terms of its land qualities) is matched or compared with the physical requirements of the land use.

Figure 1 indicates the sequential steps which must be followed to produce a land resource map (termed the land resource survey) and the land capability assessment for specific uses. These steps are described in detail in the document "Land Capability Assessment".

3. THE ROLE OF BUILDING SURVEYORS IN LAND RESOURCE SURVEY AND LAND CAPABILITY ASSESSMENT

Building Surveyors are probably unaware that, while undertaking on-site inspections of construction sites, they are obtaining land resource information and undertaking land capability assessment. **This information is invaluable input to a Local Rural Strategy.** The aspects of building construction that Building Surveyors assess on-site are:

(a) the adequacy of the soils and land surface to accept applied loads,
(b) the management of stormwater disposal,
and (c) the management of surface drainage.

The land qualities which Building Surveyors are currently (informally) assessing as part of their duties are:

(a) waterlogging hazard,
(b) ease of excavation, i.e. the ability to trench land for footings, septic tanks, etc.,
(c) water erosion hazard, i.e loss of surface soils by the action of water,
(d) soil absorption ability, i.e. the ability of soils to absorb water applied to the land,
(e) foundation stability, i.e. the potential for differential movement or mass movement to occur,
(f) soil salinity, as it relates to the potential to corrode steel reinforcement in footings,
(g) wind erosion hazard, i.e. the potential for wind to erode soils around structures, or to inundate them,
(h) flood hazard,
and (i) wave erosion hazard, i.e. the potential for shoreline erosion to occur.

The land characteristics that Building Surveyors are therefore currently (but probably informally) assessing include:

- soil texture*, depth to rock or clay, colour, cobble/stone content, subsoil dispersibility*, nature of underlying rock;

- depth to seasonal watertable, soil mottles, soil drainage*, surface seeps*;

- geological factors such as location of faults, dolerite dykes*, karst topography;

- land slope, vegetation type and cover;

- site disturbance*, previous use of the site*;

- location of 1:100 year floodplain, surface topography;

- visual evidence of wind, wave and water erosion; salinity, waterlogging, flooding; and evidence of stabilized or active landslips*, etc.

- wind speed and direction.

4. THE ROLE OF BUILDING SURVEYORS IN THE PREPARATION OF A LOCAL RURAL STRATEGY

The role of Building Surveyors in the preparation of a Local Rural Strategy should include all of the following:

(a) provide information, to the best of your knowledge, on the land resources of the Shire. This will help to ensure that the mapping units are more accurately and more fully described, and perhaps also reduce the time taken up for the Land Resource Survey.

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* Appendix II comprises information, and various tests for soils; and a checklist indicating possible unstable site conditions, which may be useful.

(b) Provide information on problem areas for construction purposes within the Shire, which will help planners (working with the Building Surveyor) to prevent or place controls on construction activities in these areas. This will prevent Council being embroiled in arguments over liability for building failures.

(c) Check that the methodology for Land Capability Assessment, as described in the guidelines document, has been followed, and that all relevant information (including from (a) and (b) above) has been incorporated in the land resource map and the Land Capability Assessment.

(d) Check that the chosen land uses and their policy areas are compatible with maintenance of the land resources. This will minimize the potential for land degradation to occur and may also reduce maintenance costs to Council for road drainage, etc.

(e) Check that land management policies address and resolve land use issues arising from (d) above.

Figures (2) and (3) indicate the type of imput which Building Surveyors can provide at each step in the preparation of a Local Rural Strategy and the Land Capability Assessment respectively.

5. CONCLUSIONS AND RECOMMENDATIONS

Building Surveyors have an important role to play in the preparation of their Shire's Local Rural Strategy. They are often only one of the few Shire officers with a knowledge of the land resources, and an understanding of the impacts of buildings on the environment (and vice versa).

Their role includes providing information for the preparation of the Local Rural Strategy and checking or vetting the strategy and associated maps and policy documents.

It is suggested that Building Surveyors develop a system of recording site-specific land resource information during on-site inspections. Information recorded in this manner would be readily accessible and therefore particularly useful for land resource mapping and Land Capability Assessment. In addition Building Surveyors would benefit by gaining a more thorough appreciation of land in their Shire; by extrapolating information to adjacent areas and reducing the time taken for building surveyors new to the Shire to work effectively.

A possible data recording card is included as Appendix III.

It is also suggested that Building Surveyors undertake preliminary surveys (i.e. preferably prior to rezoning) for waterlogged and other areas of suspected unstable soil and surface condition. The severity of seasonal waterlogging may be assessed by installing a series of slotted PVC pipes into the soil and regularly measuring the depth to water over several seasons. Areas suspected of having unstable soil or surface conditions may be highlighted on a map or aerial photograph by outlining all areas containing one or more of the features listed in Appendix II.

Figure 2: The role of Building Surveyors in the preparation of a Local Rural Strategy.

LOCAL RURAL STRATEGY (Section and sub-section headings as found in the document "Guidelines for the Preparation of a Local Rural Strategy".)	Input from Building Surveyors
SECTION 1 : SOCIO-ECONOMIC SURVEY AND DEMAND ANALYSIS	
1.1 BACKGROUND SURVEYS	Provide information on problems of existing buildings and how these problems are being overcome (e.g. stabilizing cut and fill, surface and subsurface drainage, etc.). Indicate important natural resources, such as water resources.
1.2 LAND USE ASSESSMENT	Assess likely management requirements (e.g. cut and fill, stabilizing slopes, surface and subsurface drainage, etc.) of buildings associated with new land uses and likely onsite and offsite impacts. Assess likely management (e.g. drainage schemes) and cost implications to Council.
1.3 DEMAND ASSESSMENT	
SECTION 2 : PRELIMINARY PHYSICAL ASSESSMENT	
2.1 BACKGROUND SURVEYS	Provide broadscale information on the land resources of the Local Authority such as soils, geology, vegetation, hydrology; areas of significant erosion hazards and land instability; and existing management and environmental problems (e.g. localized flooding, sand inundating roads and drains, etc.) of particular areas such as coastal areas, steep hilly areas etc. Provide information on servicing requirements.
2.2 PRELIMINARY ASSESSMENT REPORT	Check to ensure that the report is factually correct and includes information provided.

Figure 2. (Continued)

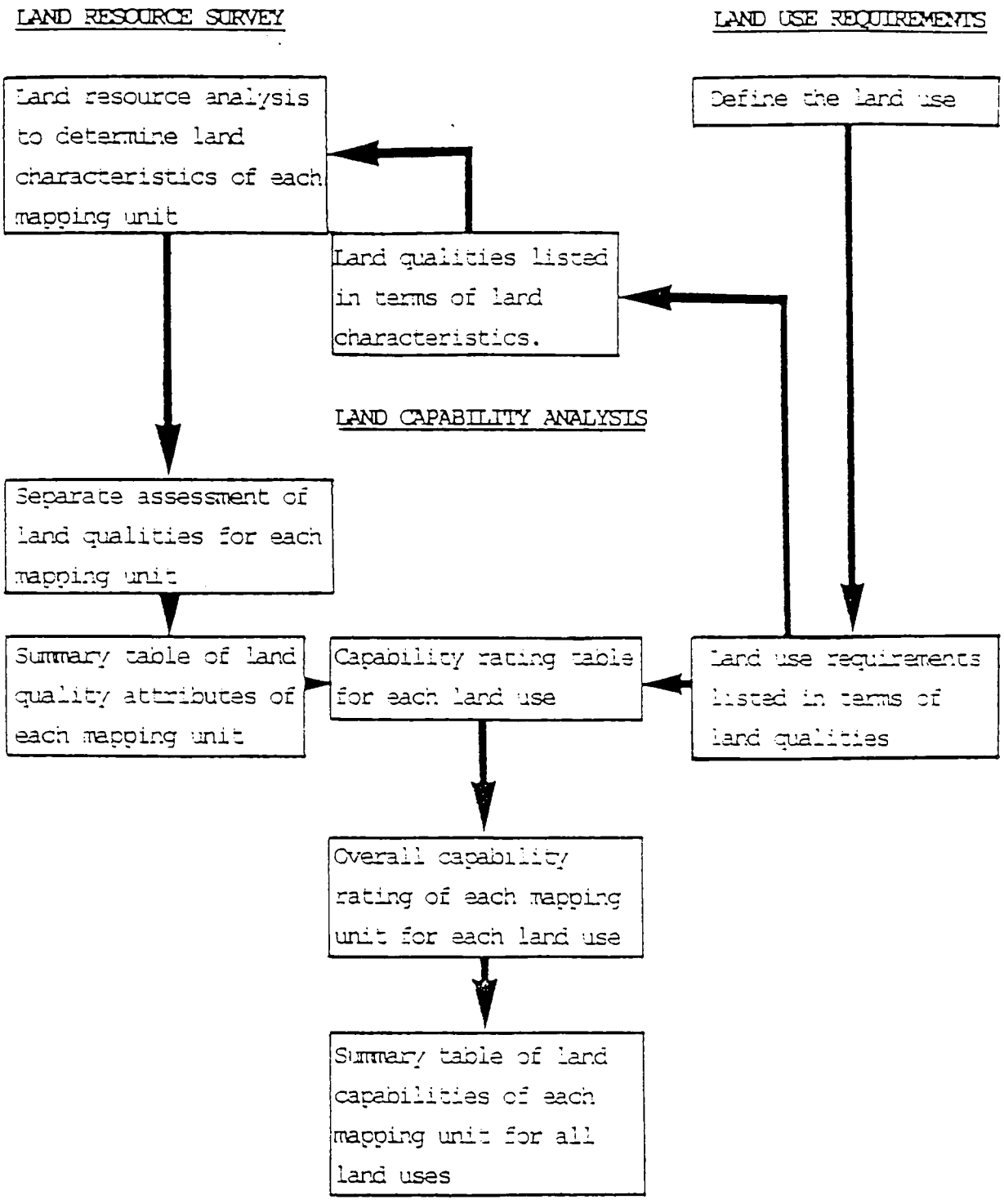
		Input from Building Surveyors
SECTION 3 : FURTHER ASSESSMENT FOR SELECTION OF LAND TO MEET DEMAND CRITERIA		
3.1	SELECTION OF AREAS FOR ASSESSMENT	Ensure areas selected for assessment for more intensive uses do not have overiding constraints which would prohibit the use.
3.2	LAND CAPABILITY ASSESSMENT	See Figure 3.
3.3	LAND SUITABILITY ASSESSMENT	Determine whether proposed use may have adverse impacts on the land and to adjacent areas, e.g. potential for exacerbated erosion. Determine the likely magnitude of the impacts and how these problems can be overcome.
3.4	SELECTION OF LAND	Check that land is both capable of sustaining the land uses and is suitable for the uses and that the above concerns have been adequately addressed.
SECTION 4 : SYNTHESIS TO DETERMINE LOCAL RURAL STRATEGY		
7.1	BASE MAPS	
7.2	POLICY PRECINCTS	Check that policy precincts for specified land uses and environmentally sensitive areas (such as floodplains) are accurately located and that the policy statements address the relevant issues and provide the required management strategies.
7.3	GENERAL MANAGEMENT	Check that general policies regarding management or protection of land with special needs are included, if necessary, and that any policy areas are accurately located and the policy statements address the relevant issues and provide the required management strategies, e.g. coastal areas, areas subject to flooding, steep hilly land subject to mass movement, etc.

Figure 3. The role of Building Surveyors in Land Capability assessment.

LAND CAPABILITY ASSESSMENT

(Section and sub-section headings as found in the document "Land Capability Assessment".)	Input from Building Surveyors
SECTION 1 : LAND USE DEFINITIONS AND REQUIREMENTS	
1.1 LAND USE REQUIREMENTS	Provide information to carefully define the proposed land uses and the land use requirements. Check that the uses are defined accurately to ensure that the Land Capability Assessment is relevant.
1.2 IDENTIFICATION OF REQUIRED LAND QUALITIES AND CHARACTERISTICS	Check that all relevant land qualities are being considered, and that all the relevant land characteristics have been included for assessment.
SECTION 2 : LAND RESOURCE SURVEY	
2.1 LAND RESOURCES MAP	Provide information on the land characteristics. Check that boundaries between mapping units are accurately located (to the best of your knowledge).
SECTION 3 : LAND CAPABILITY ANALYSIS	
3.1 BACKGROUND	
3.2 LAND QUALITY ANALYSIS	Provide information on the land qualities. Check that, to the best of your knowledge, the land qualities have been assessed accurately, incorporating all the relevant land characteristics.
3.3 LAND CAPABILITY RATING	Check that (from your knowledge of existing buildings and any associated management and environmental problems) the final capability ratings from the proposed uses of the mapping units are accurate.

FIGURE 1: LAND CAPABILITY ASSESSMENT



APPENDIX I: List of Local Authorities which will be required to produce a Local Rural Strategy (as proposed in the Draft Rural Land Use Planning Policy)

METROPOLITIAN:	Wanneroo, Swan, Mundaring, Kalamunda, Gosnells, Canning, Armadale, Serpentine-Jarrahdale, Rockingham, Kwinana, Cockburn.
COUNTRY SOUTH:	Esperance, Boddington, York, Northam, Toodyay, Chittering, Gingin, Dangaragan, Mandurah, Murray.
COUNTRY GREAT SOUTHERN:	Ravensthorpe, Jerramungup, Albany, Denmark, Plantagenet.
COUNTRY MIDWEST:	Coorow, Carnamah, Irwin, Greenough, Chapman Valley, Northampton.
COUNTRY NORTH:	Exmouth, West Pilbara, Roebourne, Port Hedland, Broome, Derby/West Kimberley, Wyndham/East Kimberley, Shark Bay, Carnarvon.
COUNTRY SOUTHWEST:	Busselton, Capel, Collie, Dardanup, Waroona, Harvey, Donnybrook/Balingup, Nannup, Bridgetown/Greenbushes, Boyup Brook, Augusta/Margaret River, Manjimup.

APPENDIX II: Soils and landform information for Building Surveyors

A SOIL TEXTURE TEST

Texture refers to the feel of the soil. It is based on the varying amounts of sand, silt and clay found in the soil. To work out the texture of a soil first take a handful of soil. Gradually moisten it with water. Roll the soil in your hand whilst doing this. You will soon have a ball of soil which is moist all the way through and just sticks to your fingers. Now use the following key:

1.	The soil will not roll out into a rod	- go to 2
	The soil will roll out inot a rod about 8 cm long and ½ cm thick but it cannot be turned into a ring without cracking	- go to 4
	The soil rolls easily into a rod and can be turned into a ring. No sand can be felt	- go to 7
2.	The soil feels gritty	- go to 3
	The soil feels silky	- it is silty loam*
	The soil feels neither gritty nor silky	- it is loam*
3.	The soil will make a firm ball	- it is sandy loam*
	The soil does not make a firm ball but colours your fingers	- it is loamy sand
	The soil neither makes a firm ball nor colours your fingers	- it is sand
4.	The soil feels gritty	- go to 5
	The soil feels silky	- go to 6
	The soil feels neither gritty nor silky	- it is clay loam
5.	The soil feels like gritty plasticine to mould	- it is sandy clay
	The soil feels earthy	- it is sandy clay loam*
6.	The soil feels like plasticine to mould	- it is silty clay
	The soil feels silky but more earthy	-it is silty clay loam*
7.	The soil is easy to mould	- it is light clay
	The soil is fairly stiff to mould	- it is medium clay
	The soil is very stiff to mould	- it is heavy clay

* A loam is a soil made up of roughly equal amounts of sand, silt and clay.

A SOIL DISPERSIBILITY TEST

A soil is dispersible when a lump of soil makes water cloudy or milky within three minutes. A lump of soil may slake (i.e. the lump disintegrates) whether it is dispersible or not. These properties indicate how easily the soil will erode. If a soil disperses or slakes quickly then it can be easily eroded by water. A soil that does not disperse or slake quickly is probably more resistant to erosion.

METHOD

1. Fill a jar about two-thirds full of water.

2. Break the soil into a lump about 2 cm across.

3. Gently lower the lump of soil into the water.

4. For the next three minutes observe any changes.

5. Record your observations.

   Note if the soil is highly moderately or only slightly dispersible or not dispersible (i.e. no cloudiness develops in the water).

   Note if the soil slakes completely (100%), significantly (50%), slightly (10%) or not at all.

CHECKLIST OF WARNING SIGNS OF POTENTIAL PROBLEM SITES
(Based on information supplied by F.R. Gordon of Gordon Geological Consultants)

The checklist below indicates areas where site instability may be a problem. If one or more of these conditions occur, all forms of construction, excavation and land drainage should be avoided, unless proposals are accompanied by a report from a competent geotechnical engineer.

1. Where the site is subject to any easements and there has been or will be excavation for the provision of services or utilities such as sewers, pipelines, gas mains, etc. The presence of marker posts or inspection covers on, or adjacent to, the site.

2. The presence of fill of unknown quality or suspect construction at the proposed building site.

3. Evidence of soft compressible material such as peat, diatomaceous earth or organic soil occurring on the site.

4. Signs of distress or cracking in any structures on the site or on adjacent sites.

5. A site known to be permanently damp or that has visible springs. Water on the site that has a strong yellow-brown to red-brown colour or is turbid.

6. Distinct changes in vegetation occurring in a regular or linear pattern (e.g. on ridges). Lush vegetation existing next to stunted growth. The presence of reeds or rushes. The presence of trees leaning at an angle to the vertical when growing on steep slopes.

7. An average slope of the ground steeper than 1 (vertical) to 2½ (horizontal) (i.e. steeper than 40%).

8. A building plan that shows the site topography will need to be modified in order to accommodate the building such that:

   (a) Fill is to be placed to a maximum depth greater than 1.5 metres.
   (b) The site will be cut to a depth exceeding 1.5 metres at the deepest portion.

9. Erosion gullies or field tunnels on the site. The presence of land slide scars or other signs of recent ground movement. A site that is hummocky or with signs of clay mixed with the rocks.

10. A building location over or adjacent to non-cohesive granular soil (clean sand) that records a blow count less than four per 300 mm using a Standard Perth Penetrometer.

11. A building location over or adjacent to cohesive soil (clay) which may be moulded by strong finger pressure, or less.

    Note: Most cohesive soils when dry (i.e. exposed or near to the atmosphere during dry or hot weather) will pass this test. Accordingly, this test may be valid only to soil immediately after excavation from a depth greater than 1 metre. If there is any doubt, experienced professional advice should be obtained.

12. A top soil dark red in colour, or black topsoil over red subsoil.

13. Clay from the site that has a smooth greasy feel when wetted and cracks on drying. A pattern of cracking in the ground. A poorly drained surface.

14. If in any pits or cuttings, clays are visible with:

(a) a yellow, orange and grey mottle;
(b) a medium to dark grey and black clay;
(c) a grey-green clay under red soil;
(d) brown and red-brown clays.

15. The presence of dark coloured rock (as seen on a freshly broken surface):

(a) scattered on the ground;
(b) present at the base of larger trees.

16. The presence of outcrops of dark coloured rock.

Typical names	Suitability for Road Construction: Value as subgrade	Value as subbase	Value as base directly under seal	Shrinkage or swelling properties	Drainage properties	Workability as construction material
Well graded gravels or gravel sand mixtures, little or no fines.	Excellent	Excellent	Good	Almost none	Excellent	Excellent
Poorly graded gravels or gravel-sand mixtures, little or no fines.	Good to excellent	Good	Fair to good	Almost none	Excellent	Good
Silty gravels, gravel-sand-silt mixtures.	Good to excellent Good	Good Fair	Fair to good Poor to not suitable	Very slight Slight	Fair to poor Poor to practically impervious	Good Good
Clayey gravels, gravel-sand-clay mixtures.	Good	Fair	Poor to not suitable	Slight	Poor to practically impervious	Good
Well graded sands or gravelly sands, little or no fines.	Good	Fair to good	Poor	Almost none	Excellent	Excellent
Poorly-graded sands or gravelly sands, little or no fines.	Fair to good	Fair	Poor to not suitable	Almost none	Excellent	Fair
Silty sands, sand-silt mixtures	Fair to good	Fair to good	Poor	Very slight	Fair to poor	Fair
	Fair	Poor to fair	Not suitable	Slight to medium	Poor to practically impervious	Good
Clayey sands, sand-clay mixtures	Poor to fair	Poor	Not suitable	Slight to medium	Poor to practically impervious	Good
Inorganic silts, and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.	Poor to fair	Not suitable	Not suitable	Slight to medium	Fair to poor	Fair

Typical names	Suitability for Road Construction: Value as subgrade	Value as subbase	Value as base directly under seal	Shrinkage or swelling properties	Drainage properties	Workability as construction material
Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.	Poor to fair	Not suitable	Not suitable	Medium	Practically impervious	Good to fair
Organic silts and organic silt-clays of low plasticity.	Poor	Not suitable	Not suitable	Medium to high	Poor	Fair
Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic soils.	Poor	Not suitable	Not suitable	High	Fair to poor	Poor
Inorganic clays of high plasticity, greasy clays.	Poor to fair	Not suitable	Not suitable	High	Practically impervious	Poor
Organic clays of medium to high plasticity, organic silts.	Poor to very poor	Not suitable	Not suitable	High	Practically impervious	Poor
Peat and other highly organic soils.	Not suitable	Not suitable	Not suitable	Very high	Fair to poor	