

COASTAL SLOPES – PLANNING POLICY

APPROVED BY EXECUTIVE COUNCIL SEPTEMBER 2nd, 2004

1.0 Introduction.

This leaflet is for developers, landowners, businesses and the public. All coastal areas are of value to Anguilla. They have a remarkable marine natural heritage and provide rich resources for both work and play. These areas are also particularly sensitive to development.

2.0 Developer and Landowner's responsibility:

The responsibility for determining whether land is suitable for a particular purpose rests primarily with the developer. The responsibility and subsequent liability for safe development and secure occupancy of the site rests with the developer / land owner.

3.0 Planning Authority Does not provide Warranty of support or stability of Land

It is not the Planning Authority's responsibility to investigate the ground conditions and it does not 'owe a duty of care' to individual landowners when granting permission. It is also not liable for loss caused to an adjoining landowner. The granting of planning permission does not mean that the land is free from instability and it is not a warranty of support or stability.

This document does not cover remedial measures which may be required for existing land / property affected by or on unstable land.

4.0 Background.

In November 1999 Anguilla suffered from two Hurricanes (Jose and Lenny) which caused damage estimated to be US\$ 62 Million. Whilst no lives were lost many were endangered. The Hurricanes resulted in 6 ½ miles of the northern coastline experiencing widespread slope instability. Failure to provide adequately for these events can result in damage to:

- buildings and property
- surrounding infrastructure including access roads and
- our natural environment.

Landslides and similar events on coastal slopes can also result in loss of income and, loss of life.

It must also be recognised that Anguilla is also within a seismically active area and that historically earthquakes affecting the island have had intensities within the range of 4 to 5 on the Richter Scale.

5.0 Government of Anguilla's response:

It commissioned a report into the slopes and cliffs of Anguilla which was undertaken by Halcrow Transportation Infrastructure. The guidelines contained in this leaflet are a further Government response to this important issue.

6.0 Key Policy.

There is a clear presumption against built development on all coastal slopes where landslides have been identified.

Other slopes which are unstable or have the potential to become unstable fall into two other categories :

- i) Sea Cliff where active wave attack occurs and
- ii) Coastal slopes steeper than 26°.

These also present a potential hazard to safe future development.

7.0 Current Position

Listed Below are details about specific sites where coastal land movement has been recorded.

Roaches Hill

- Cliffs at Southern end (adjacent to the Seawater facility) :

Wave attack to the base of the cliffs with cliff recession taking place. Process is slow no immediate risk

- Bisky Cove to Little Bay –

Set back requirements will be enforced as remedial measures at this location are inappropriate.

Crocus Hill

- The cliffs along True Love Bay is subject to extensive recent and ongoing rock falls, debris slides and debris flows

Katouche

- No new development adjacent to the sea cliffs will be permitted as this 300m length of cliff suffers from debris falls in the 45° vegetated slopes and rock falls and undercutting from wave attack at the lower sections.
- Access constraints limit the options for remedial measures.

North Hill

- Cliffs between Lower Katouche Bay and Benzines Bay are undergoing active erosion from wave attack
- Buckstone (Yellow Cliff) is an area of active cliff recession.

North Hill Village

- Subject to individual site assessments, some of the less steep slopes below North Hill Village may be suitable for development

South Hill / Sandy Ground -South Shannon Hill Slopes

- No development to the West (to Lower South Hill) is appropriate due to their instability
- Some of the less steep slopes to the East (to the roundabout near Dolly Hill) may be suitable for development

Lower South Hill

- Virtually the entire length of cliff exhibits signs of active instability.
- In some areas significant landward recession is taking place.
- All proposed developments require an individual site assessment to determine the specific site setbacks and lands potential for safe development.

Isaac's Cliffs

- Remedial measures (extensive riprap stone protection) by developers is the only solution to mitigate the cliff erosion caused by wave attack. This is unlikely to be deemed economically feasible except for large-scale development.

West End

- Cliff recession is estimated to be at a rate of 13-26 inches a year and consequently to provide a 50 year design life a minimum distance of 108 feet is required as a setback.

8.0 Development of coastal slopes.

Where the ground is unstable or has the potential to be unstable the following design principles **must** be followed by the applicant:

8.1 *Specialist Technical Advice:*

The applicant must commission Geotechnical investigations, assessments and reports as specified below (this service will not be provided by the Government of Anguilla):

A) Statement on Terms of Reference for the Commission

- B) Background** to include Desk studies undertaken and review of any discussions held with the Department of Physical Planning.

C) Site Description to include:

- A contoured site plan at 1:2500 or larger scale showing the development site in relation to adjacent parcels of land.
- Site reconnaissance
- An annotated site plan showing the following:
 - Topographic features
 - Vegetation cover
 - Ground slopes and gradients
 - Drainage paths / evidence of surface flow.

D) Ground Investigation to include as a minimum:

- Plan at 1:500 or larger scale showing location of exploratory holes
- Description of exploratory holes to determine sub-surface conditions and methods used (e.g. machine / hand dug trial pits etc)
- Exploratory hole records (e.g. pit logs) and ground elevations.
- In situ site tests (e.g. soakaway tests) and standards applicable (ASTM, etc)
- Laboratory tests and standards applicable.

E) Geological / Geomorphological Assessment

This information should all relate back to a clear site plan:

- Soil cover, including description and depth
- Weathered rock cover description and depth
- Unweathered rock description and structure (bedding joints / faults – directions / openness) and evidence of karstic features (cavities)
- Evidence of ground instability within and adjacent to the development site boundary (type, rate of development)

F) Conclusions

- Summary of ground conditions with detail to demonstrate a full appreciation and understanding of the issues relevant to ground instability
- Assessment of current and future stability of the ground in the context of the design life of the proposed development
- Assessment of the impact of unavoidable clearing of vegetation and excavation works on the site and surrounding environment
- Statement of whether the site can be safely developed for the intended purpose.

G) Recommendations

Assuming that the development is considered feasible:

- Constraints / factors relevant to the detailed design must be clearly stated. In particular a written statement and plans showing constraint on the building footprint.
- Specific remedial measures required to deal with existing or predicted future instability

- *Cut slopes.* Angles of all cut slopes (in soil, weathered and unweathered rock) and the appropriate support measures. Maximum slope heights.
- *Fill slopes.* Maximum ground slope angle on which fill can be placed. Ground preparation works (e.g. benching) prior to fill placement. Compaction standards.
- *Foundations.* Type, excavation depth, maximum allowable bearing pressures.
- *Run-off.* Measures to mitigate the effects of surface water run-off from the site on the surrounding environment.
- *Soakaways.* Identification of suitable locations and specifications.

8.2 *Building Footprint*

Location at the top of a cliff.

- Avoid (or at least minimise) surcharge loading at the head of the slope by maximising the inland set back of the footprint.
- Take account of current and expected rates of cliff recession / erosion within the design life of the building.

Location at / near the top of a vegetated slope

- To minimise surcharge loading only residential properties with a footprint size not exceeding 1500sq. feet will be considered. High and low rise apartment blocks and other commercial developments will be precluded.
- The footprint size and shape must be compatible with the sites physical constraints. The formation of unsupported cut and fill slopes must be minimised.

Location at / near the toe of a vegetated slope

- A minimum buffer zone of 15 feet between the slope and the back wall of a building must be maintained.
- No excavation into the toe of the slope.

8.3 *Freshwater cisterns*

- Any Freshwater collection systems must be located on the upslope side of the property
- System overflow discharge must be planned in a controlled and safe manner

8.4 *Spoil / excavated material*

- All excavation arising from the site must be disposed offsite.
- Down-slope tipping of surplus material will be prohibited.

8.5 *Mitigating the effects of surface water run-off / site drainage*

- Multiple soakaway systems will be preferred
- Soakaways to be located on relatively flat areas away from the footprint of buildings.
- All run-off to be directed via well constructed and appropriate drainage paths to soakaways where it can be demonstrated that there will be no adverse effects on neighbouring land and will not accelerate offsite erosion or instability.

8.6 *Mitigating the volume of surface water run-off / site drainage*

- Minimise impermeable areas that generate run-off
- Swimming pools at the head of cliffs and vegetated slopes will be prohibited.

8.7 *Clearance of site vegetation*

- This will be regulated
- There will be a presumption against clearance as this has been a contributing factor in Anguilla's landslides.

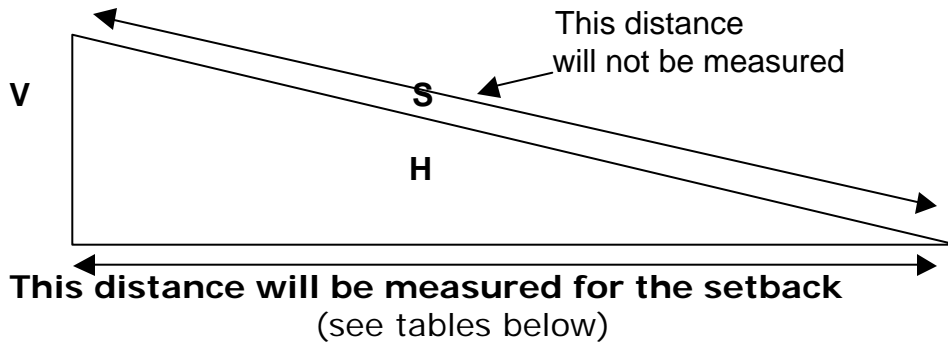
8.8 *Planting*

A detailed planting scheme will be required which must be undertaken within a prescribed timetable.

9.0 Glossary of Terms – Simple explanations.

Coastal Setbacks

These will be measured horizontally (and not measured along the slope)



Examples of setback slopes for distance of 80 feet, 100 feet and 110 feet.

Horizontal Distance	Slope Distance	Vertical Height	Horizontal Distance	Slope Distance	Vertical Height	Horizontal Distance	Slope Distance	Vertical Height
H	S	V	H	S	V	H	S	V
80	80	0-5 feet	100	100	0-5 feet	110	110	0-5 feet
80	81	5-10 feet	100	101	5-10 feet	110	111	5-10 feet
80	83	15-20 feet	100	102	15-20 feet	110	112	15-20 feet
80	84	20-25 feet	100	103	20-25 feet	110	113	20-25 feet
80	85	25-30 feet	100	104	25-30 feet	110	114	25-30 feet
80	87	30-35 feet	100	106	30-35 feet	110	115	30-35 feet
80	89	35-40 feet	100	108	35-40 feet	110	117	35-40 feet
80	92	40-45 feet	100	110	40-45 feet	110	119	40-45 feet
80	97	50-55 feet	100	114	50-55 feet	110	123	50-55 feet

Riprap

This form of protection at the toe of coastal slopes can combat undercutting of cliffs. Sources of rock for ripraps are limited on Anguilla to limestone. The principal quarry being Lake's at Brimegin. Whilst the durability as armour stone in ripraps is not as strong as that which can be imported from St Martin it is considered adequate and is more environmentally acceptable due to its appearance. Placement by crane is the preferred option.

Landslide Classification

The System used in this report is that of type of movement (i.e. the type of failure). The major forms of failure are:

- Falls
- Slides and
- Flows.

In reality landslides often contain combinations of these movements. The type of

ground material is also used for classification i.e.:

- Rock –i.e. Bedrock
- Debris – coarse engineering soils (sand size or larger) and / or a mixture of gravel, cobbles and boulders
- Soil – fine engineering soils (silt, clay, organic material)

10.0 Acknowledgements:

Thanks go to the support of Halcrow Water, part of the Halcrow Group Limited who produced Anguilla Coastal Slopes Study February 2000 on behalf of the Government of Anguilla

11.0 Contact Details

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