Desk Study Report

6 Shore Path
Gurnard
Isle of Wight

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Job No. 24061

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1. Introduction

The proposed scheme consists of the construction of two dwellings, one single storey one double storey to replace an existing single storey dwelling. The single storey dwelling will be in the footprint of the existing dwelling and he two storey dwelling will be partially in the footprint of the original dwelling.

The new dwellings will be of lightweight, timber frame construction.

2. Site Location

The site is located on Shore Path, Gurnard, refer to Image 1.

The site is accessed from the north along the communal concrete promenade/sea wall which serves all the properties along Shore Path.

The present structure is set back from the front boundary of the site and back from the adjacent properties on both sides of the site.

3. Planning Guidance

With Reference to the Cowes to Gurnard Coastal Slope Stability Study and the Planning Guidance map, refer to Map Extract 03, the site is within the 'Area unsuitable for built development' and suggests that 'A full Stability Report would normally be required, prepared by a competent person'.

This report details the Ground conditions and makes assessment of them in relation to the proposed scheme.

4. Site Walkover

We inspected the site on 12th February 2024 and the 15th February 2024, undertaking a visual walkover.

The existing property consists of a detached single storey chalet, of timber frame construction. It has a large raised timber deck, with storage under, to the front. See image below.

It is evident that there is a retaining structure under the footprint of the existing property.

The proposed dwellings are to have a similar FFL.

If possible the existing foundations could be re-used for the new front dwelling as the weight of the structures will be similar, the condition will be inspected once the existing building is demolished. If not suitable a reinforced concrete raft will be constructed.

The dwelling to the rear will be founded on the upper level of the site and will be constructed on a reinforced concrete raft.

Access to the front of the site is from the path which forms the sea wall.

The site slopes gently up to the centre of the existing dwelling to a retaining wall, beyond this the site is relatively level.

On the upper part of the site is the rear of the existing dwelling and a single storey chalet to the rear left hand corner, refer to Photographs below, with Chalet to the left and shed to the right.

The ground beyond the rear of the plot slopes gently up and is a heavily wooded area.

With Reference to the Cowes to Gurnard Coastal Slope Stability Study and the Ground Behaviour map, refer to Map Extract 02, the site is within the ‘Area fronting the deep-seated landslide blocks prone to differential shear, tension, opening of fissures, settlement and heave. Open Tension cracks indicate Ground Movement is ongoing’

There is no evidence of significant ground movement or debris run out to indicate the presence of recent ground movement or debris slide activity.

No structural movement was noted to either the existing dwelling or the chalet to the rear.

It should also be noted that the neighbouring plots have been developed and there is no evidence of movement associated with this fairly recent construction.

5. Slope Stability Assessment

The site falls within the Cowes to Gurnard coastal frontage which is an area of land instability.

The over-steepened coastal slopes to the Solent have evidence of ancient and more recent ground movements.

The ground movements tend to follow the Bembridge Marl or Osborne Bed clays.

Deep movements occur on the near-horizontal slow-moving slip plane. Generally this movement does not cause a risk to structures. Shallow movements can have the potential to disturb structures during their lifetime.

The following slope analysis used is that of “bishops” method of slices to achieve an overall factor of safety based upon the combination of known Geotechnical parameters and the general slope profile of the site and adjacent land.

The Isle of Wight Council requires a factor or safety of no less than 1.3 for this geological area.

Data from adjacent sites and from the walk over survey have been used for the analysis.

The following ground profile has been assumed for the model.

Stratum	**Material**	**Shear Strength Parameters**
Firm Clay	Firm Clay	c’ = 1 kN/m^2 Φ’ = 16 degrees
Stiff & Very Stiff Clay (Bembridge Marls)	Stiff or Very Stiff Clay Φ’ = 19 degrees	c’ = 0.5 kN/m^2
Hard (Fissured) Clay	Very Stiff and Hard Fissured Clays. Strength controlled by near horizontal pre-existing discontinuities at near residual sheer strength.	c’ = 0.0 kN/m^2 Φ’ = 16 degrees

The Slope Analysis gives a factor of safety of 1.43, which is above the required figure.

6. Geology

British Geological Maps indicate that the bedrock is of Headon Hill formation, interbedded mudstone and limestone.

Adjacent bore holes indicate Clay to depth.

With reference to the Cowes to Gurnard Coastal Slope Stability Study the Geomorphology Map indicates the site to be located in an area of ‘Deep seated Coastal Landslides formed in Bembridge Marls, Bembridge Limestone and Osborne Maris’. Refer to Map Extract 01.

This is in agreement with the data from adjacent sites.

7. Conclusions

Our walk over survey noted no ground movement and the structures on site, and adjacent sites appeared sound.

The Slope Analysis indicates a factor of safety of 1.43, which exceeds the Isle of Wight Council requirement of 1.3. The site is therefore considered suitable for re-development.

In line with recommendations, the new structure must be lightweight with all services connected to the new structure with fully-flexible connections.

The proposed concrete raft and lightweight timber frame construction are considered suitable for this plot and will not lead to instability of any other structures, the sea wall or the site itself.

The Cowes to Gurnard Coastal Slope Stability Study and the Planning Guidance, August 200, notes the site to be in an area unsuitable for development, this report indicates that following the correct construction procedure and attention to building material used the proposed development will not cause instability to this or surrounding sites.

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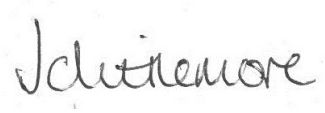
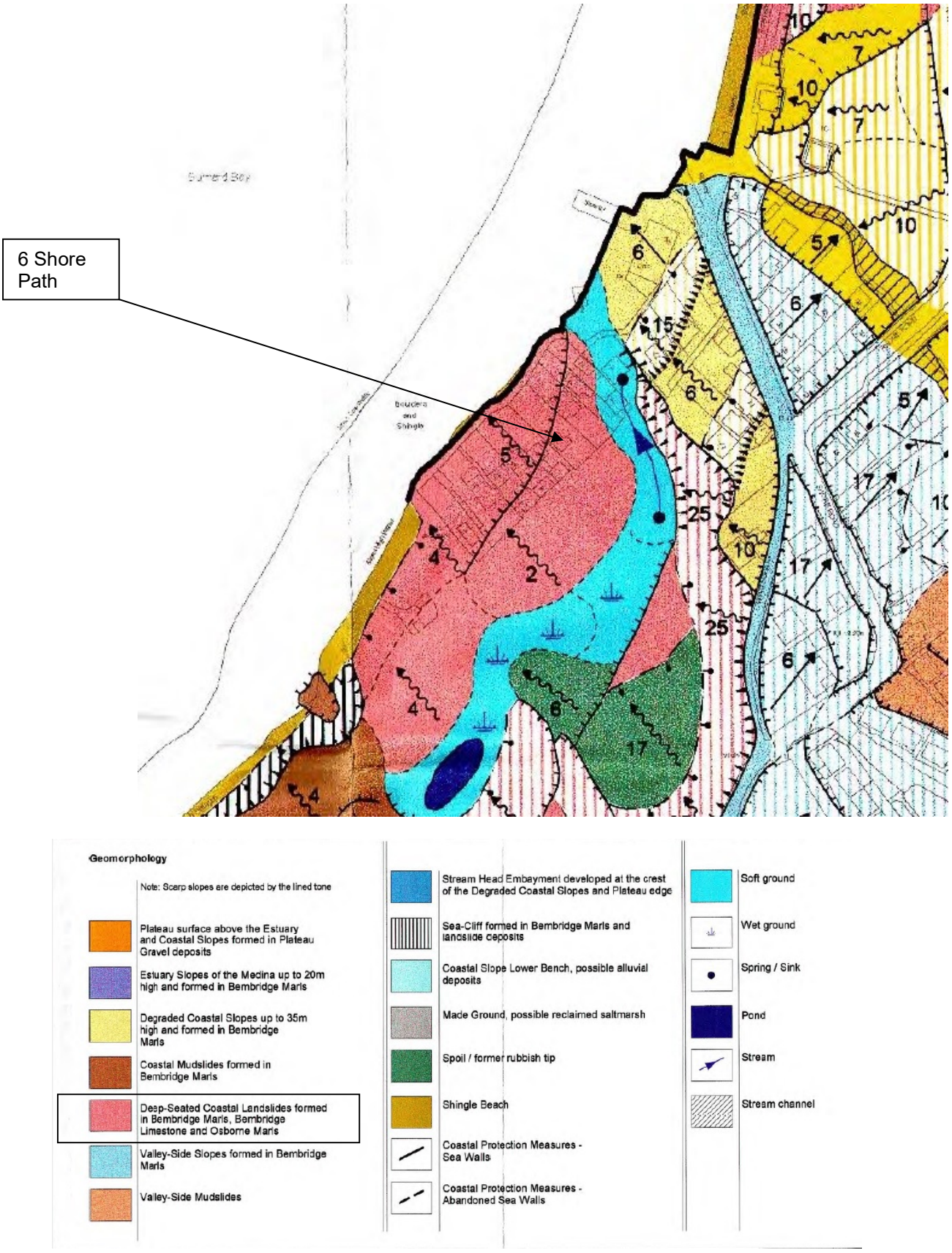


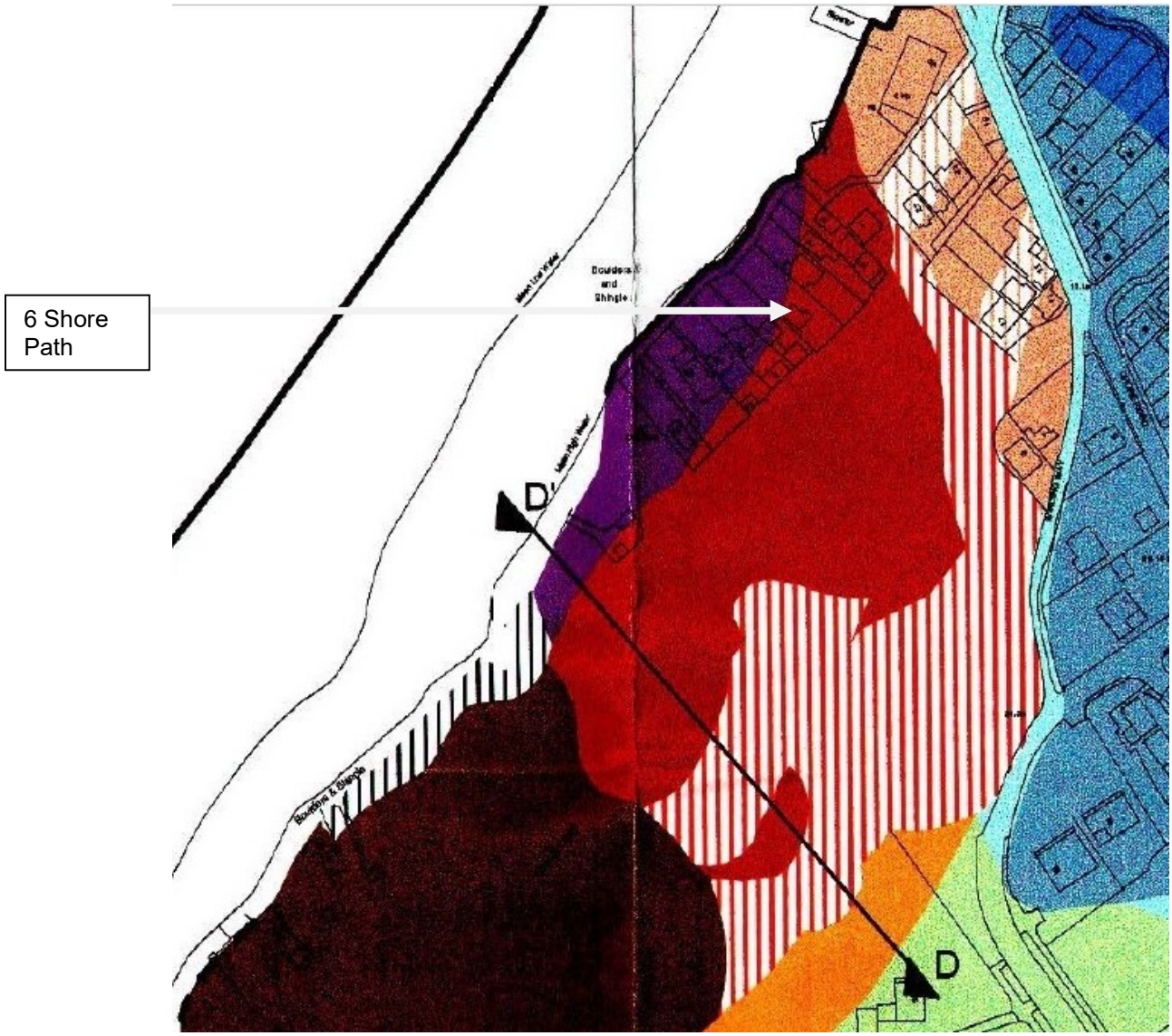
Julie Littlemore
MEng (Hons) BA (Hons) CEng MIStructE

6 Shore Path

Site Location



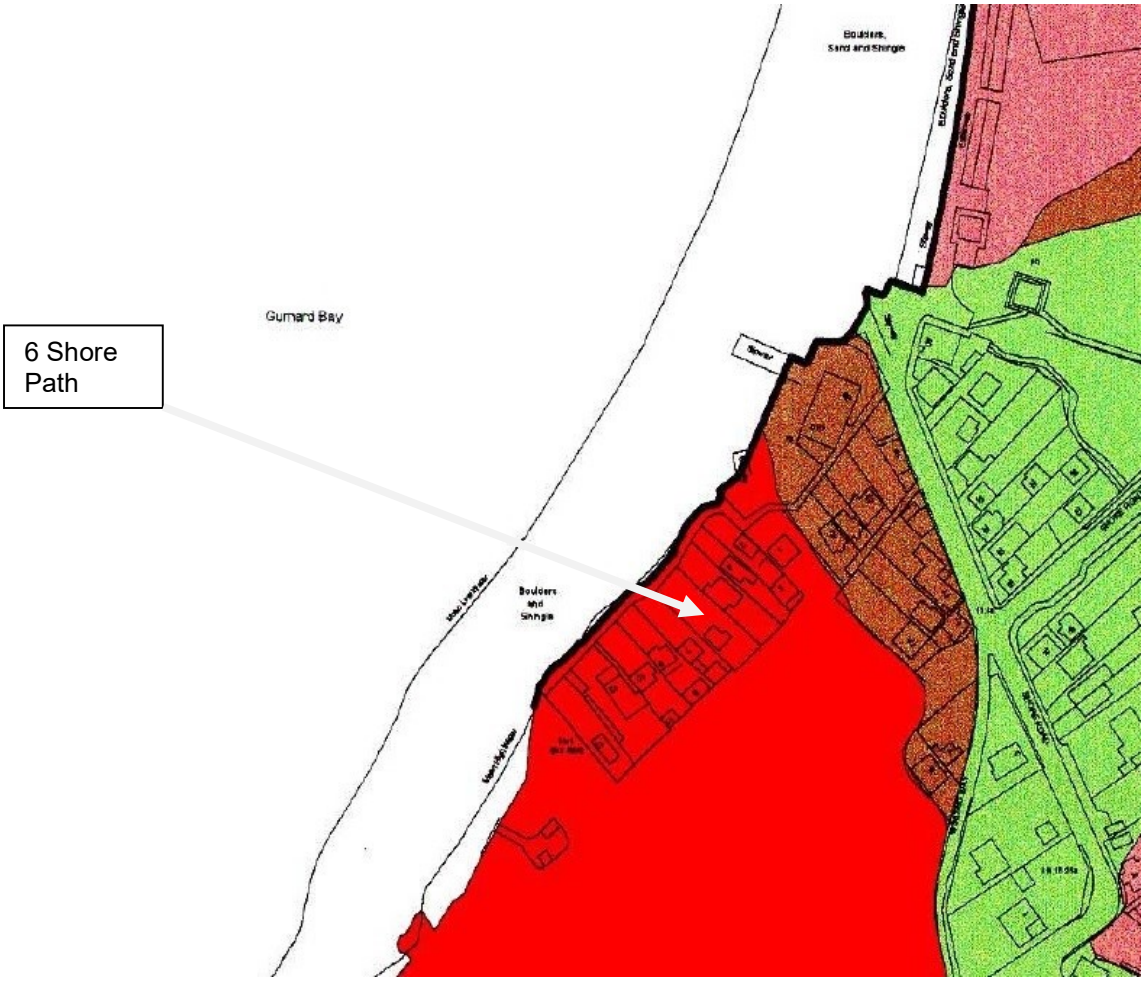
MAP EXTRACT 1 Cowes to Gurnard Coastal slope Stability Study, August 2000 - GEOMOPRPHOLOGY



Cliff Behaviour Model D: Coastal Landslide Complex (no toe protection)

Contemporary Processes	Impact
Sea Cliffs: Low sea cliffs formed of weak rocks subject to falls, slides and erosion due to undercutting by waves and weathering processes.	Undeveloped slopes. Falls and slides present a threat to public safety. Recession of the sea cliffs may undermine the coastal slopes/landslide units above, promoting reactivation of pre-existing instability inland.
Coastal Mudslides: Area affected by seasonal mudslide movement. Occasional rapid movements (i.e. >5m per year) and large-scale events may occur. Degradation of coastal slopes through mudslide processes may lead to a range of ground movement problems including differential shear, tension, opening of cracks, settlement and heave.	Largely undeveloped slopes. Structures located in these areas have been subject to severe damage due to ground movement. Earth pressures behind structures and overtopping of sea walls has led to severe damage and destruction of former coast protection measures. Mudslides present a threat to public safety due to the very soft ground conditions.
Deep-seated (rotational) Landslide Beach: Area affected by recent and on-going settlement of deep-seated landslide blocks upon pre-existing shear surfaces. The benches are poorly drained and show signs of active landslide processes, with differential shear, tension, opening of fissures, settlement, heave, development of mudslides and small rotational slides. Subsidence ponding and infilling of soft ground deposits is apparent at the rear of landslide blocks.	Undeveloped area affected by differential settlement, rotation, tension, forward tilt and heave. Soft ground and ponded areas present a threat to public safety.
Area fronting the deep-seated landslide blocks prone to differential shear, tension, opening of fissures, settlement and heave. Open tension cracks indicate ground movement is ongoing.	Property situated in these areas has been affected by serious and localised cases of severe damage. Differential shear, settlement and crack damage to sea walls has been recorded.
Scarp slopes subject to recent and on-going superficial ground movements. In places, the slopes may be susceptible to mudslides and small rotational slides.	The scarp slopes are affected by recent ground movement. Property and structures located near to the scarp slopes have been subject to high rates of differential settlement and shear, and are at risk in the medium to long term. The scarp slopes present a threat to public safety due to the steep unstable terrain.

MAP EXTRACT 2 Cowes to Gurnard Coastal slope Stability Study, August 2000 – GROUND BEHAVIOUR



	Development Plan Policy	Development Plan Proposals	Development Control
	Area suitable for development in accordance with the development plan.	Ground movement does not impose any constraints on site development.	No stability report required.
	Area likely to be suitable for development in accordance with the development plan.	Ground movement does not impose significant constraints, although some mitigation/stabilisation measures may be required to ensure the stability of the site and surrounding land.	An Outline Stability Report would normally be required, prepared by a competent person.
	Area likely to be suitable for development in accordance with the development plan provided the developer undertakes appropriate mitigation and stabilisation measures.	Ground movement imposes significant constraints that would generally require large-scale mitigation/stabilisation measures to ensure the stability of the site and surrounding land.	A Full Stability Report would normally be required, prepared by a competent person.
	Area unlikely to be suitable for development in accordance with the development plan unless the developer undertakes appropriate mitigation and stabilisation measures.	Ground movement imposes major constraints that would generally require large-scale mitigation/stabilisation measures to ensure the stability of the site and surrounding land.	A Full Stability Report would normally be required, prepared by a competent person.
	Area unsuitable for built development.	Ground movement imposes severe constraints that probably could not be overcome by cost-effective and environmentally acceptable mitigation/stabilisation measures to ensure the stability of the site and surrounding land.	A Full Stability Report would normally be required, prepared by a competent person.

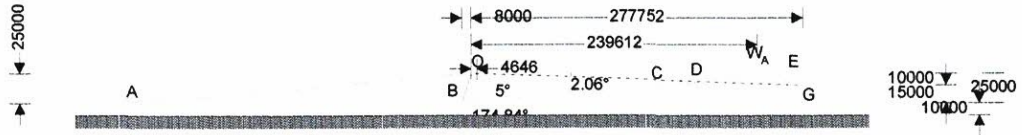
MAP EXTRACT 3 Cowes to Gurnard Coastal slope Stability Study, August 2000 –PLANNING GUIDANCE

SLOPE STABILITY

Tedds calculation version 1.0.02

Slope geometry

Angle of slope	β = **5** deg
Height of slope	H = **25000** mm
Horizontal length of slope	L = H / Tan(β) = **285751** mm
Depth of upper soil layer	H_A = **10000** mm
Depth of lower soil layer	H_B = **15000** mm
Depth of hard layer	H_L = **10000** mm



Soil properties

Bulk unit weight of upper soil	γ_A = **19** kN/m^3
Bulk unit weight of lower soil	γ_B = **19** kN/m^3
Undrained shear strength of upper soil	c_{uA} = **50** kN/m^2
Undrained shear strength of lower soil	c_{uB} = **75** kN/m^2

Automated analysis test results

No.	x co-ordinate (m)	y co-ordinate (m)	Radius (m)	Factor of safety
1	13000	23000	272759	1.418
2	13000	23000	272759	1.418
3	13000	23000	272759	1.418
4	13000	25000	272752	1.413
5	13000	25000	272752	1.413
6	13000	25000	272752	1.413
7	13000	27000	272759	1.407
8	13000	27000	272759	1.407
9	13000	27000	272759	1.407
10	15000	23000	270759	1.413
11	15000	23000	270759	1.413
12	15000	23000	270759	1.413

No.	x co-ordinate (m)	y co-ordinate (m)	Radius (m)	Factor of safety
13	15000	25000	270752	1.408
14	15000	25000	270752	1.408
15	15000	25000	270752	1.408
16	15000	27000	270759	1.402
17	15000	27000	270759	1.402
18	15000	27000	270759	1.402
19	17000	23000	268759	1.408
20	17000	23000	268759	1.408
21	17000	23000	268759	1.408
22	17000	25000	268752	1.403
23	17000	25000	268752	1.403
24	17000	25000	268752	1.403
25	17000	27000	268759	1.397
26	17000	27000	268759	1.397
27	17000	27000	268759	1.397

Undrained stability - total stress analysis

Origin co-ordinates	x = **8000** mm
	y = **25000** mm
Radius of circle	R = **277752** mm
Sector angle	θ = **174.836** deg
Area of upper slip mass	A_{sA} = **570.909** m^2
Centroid distance from origin	d_A = **239612** mm
Upper soil sector angle	θ_A = **2.063** deg
Area of lower slip mass	A_{sB} = **110303.713** m^2
Centroid distance from origin	d_B = **4646** mm
Lower soil sector angle	θ_B = **172.773** deg
Factor of safety	$F = R^2 \times (c_{uA} \times \theta_A + c_{uB} \times \theta_B) \times \pi / [(A_{sA} \times \gamma_A \times d_A + A_{sB} \times \gamma_B \times d_B) \times 180 \text{ deg}]$ = **1.426**
Required factor of safety	F_{req} = **1.3**

PASS - Actual factor of safety exceeds required factor of safety