

APPENDIX 2

Logs and photographs

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Claremorris Unregulated Landfill Site Investigation



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JS DRILLING LTD
 20 THE BELFRY
 CHAPEL LANE
 THOMASTOWN
 CO. KILKENNY

Soft Ground Boring: Daily Record

Location: Claremorris	Site: Claremorris Landfill
Client: Mayo Co Co	Borehole No: TP 01
Date: 25-11-10	Sheet: 1 of 1
Ground Level: 72 m (Ordnance datum)	Engineer: AMR
GPS: 35131 74668	
Rig Type: Tracked excavator	

Depth to base of strata	DESCRIPTION OF STRATA						
	soft firm stiff	loose med.d. dense	colour	clayey silty sandy	fine med. coarse	soil name	with gravel, cobbles, sand bands, etc
0.0	Start of days boring						
0.4	Soft black – brown peat with some plastic and waste content						
6.4	Waste- moderately well rotted, appears to be mainly domestic some construction demolition (concrete insulation) strong pungent odour						
End of Hole @ 6.4m limit of excavator reach							
End of days boring							

No	Type	Depth (m)		U100 Blows	S.P.T / C.P.T (mm)					Remarks	
		From	To		0 to 75	75 to 150	150 to 225	225 to 300	300 to 375		375 to 450
		TP01	D		4	4.5					

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Water Strike (m)					24hr after pulling casing
Duration	mins	mins	mins	mins	
Depth to water					
Depth cased					
Depth of hole					
Comments					
Leachate in Trial pit standing at approx 6m below ground level, ingress at multiple depths in the waste.					

CASING			
Size (mm)	From (m)	To (m)	
GAS MONITORING			
CH4(%)	CO2(%)	O2 (%)	Atm pressure (MB)
0.1	0.2	21.0	0956

Client.....

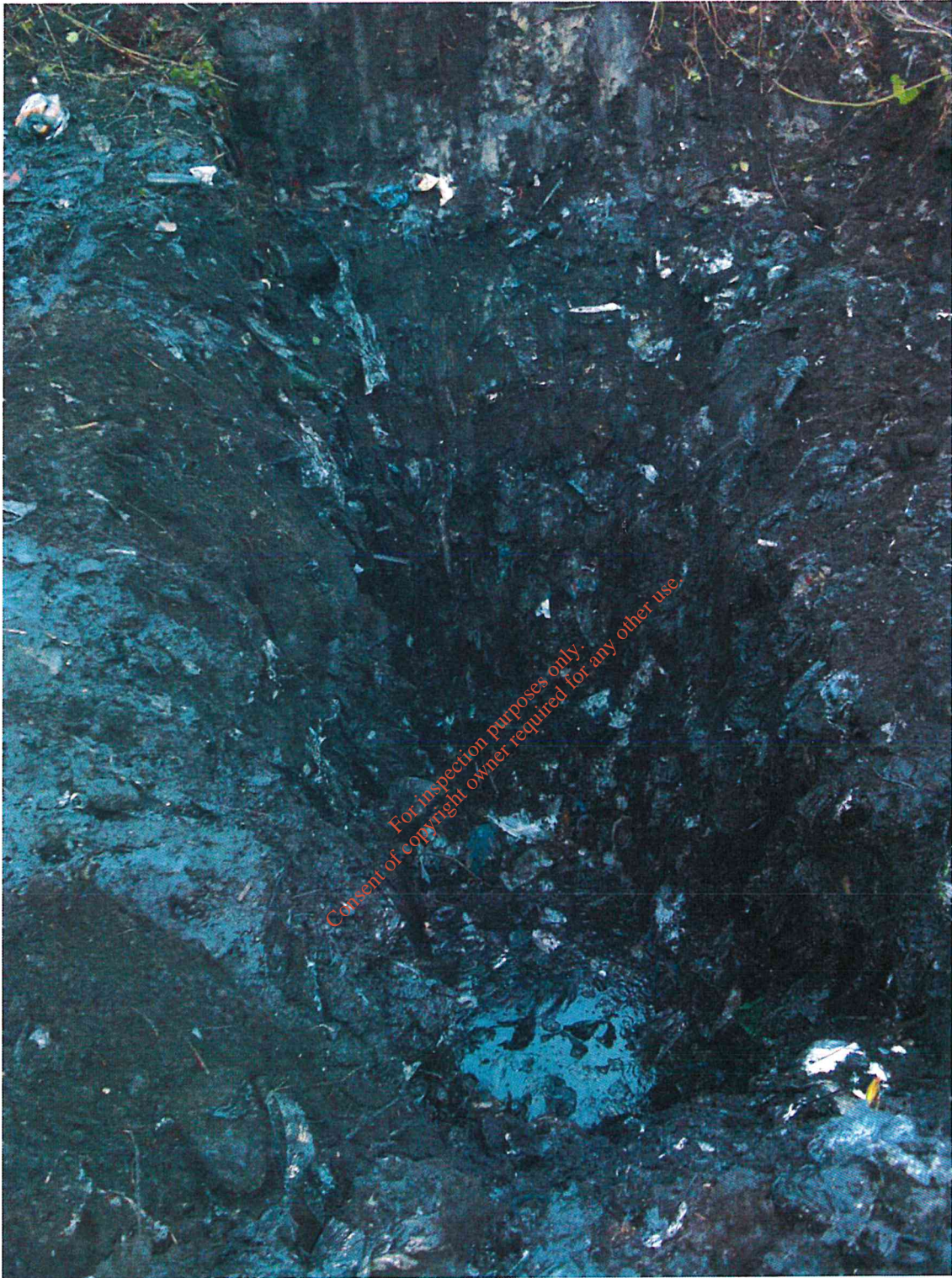
Driller.....

Claremorris Unregulated Landfill Site Investigation



TP01





TP02



TP03

Claremorris Unregulated Landfill Site Investigation



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Soft Ground Boring: Daily Record

Location: Claremorris	Site: Claremorris Landfill
Client: Mayo Co Co	Borehole No: TP 04
Date: 25-11-10	Sheet: 1 of 1
Ground Level: 66 m (Ordnance datum)	Engineer: AMR
GPS: 135212 274575	
Rig Type: Tracked excavator	

Depth to base of strata	DESCRIPTION OF STRATA						
	soft firm	loose med.d. dense	colour	clayey silty sandy	fine med. coarse	soil name	with gravel, cobbles, sand bands, etc
0.0	Start of days boring						
0.5	Soft black – brown peat FILL with some roots and vegetation in top 0.2m						
5.5	Waste- very wet, poorly- moderately well rotted, appears to be mainly domestic plastic bags of waste, strong pungent odour						
	End of Hole @ 5.5m still in waste body unable to excavate deeper due to ground conditions.						
	End of days boring						

No	Ty Pe	Depth (m)		U100 Blows	S.P.T / C.P.T (mm)					Remarks	
		From	To		0 to 75	75 to 150	150 to 225	225 to 300	300 to 375		375 to 450
		TP04	D		4	4.5					

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Water Strike (m)								
Duration	mins	mins	mins	mins	24hr after pulling casing			
Depth to water								
Depth cased								
Depth of hole								
Comments								
Leachate in Trial pit standing at approx 5.0m below ground level, ingress at multiple depths in the waste.								

CASING			
Size (mm)	From (m)	To (m)	
GAS MONITORING			
CH4(%)	CO2(%)	O2 (%)	Atm pressure (MB)
0.1	0.2	20.9	0954

Client.....

Driller.....

Claremorris Unregulated Landfill Site Investigation

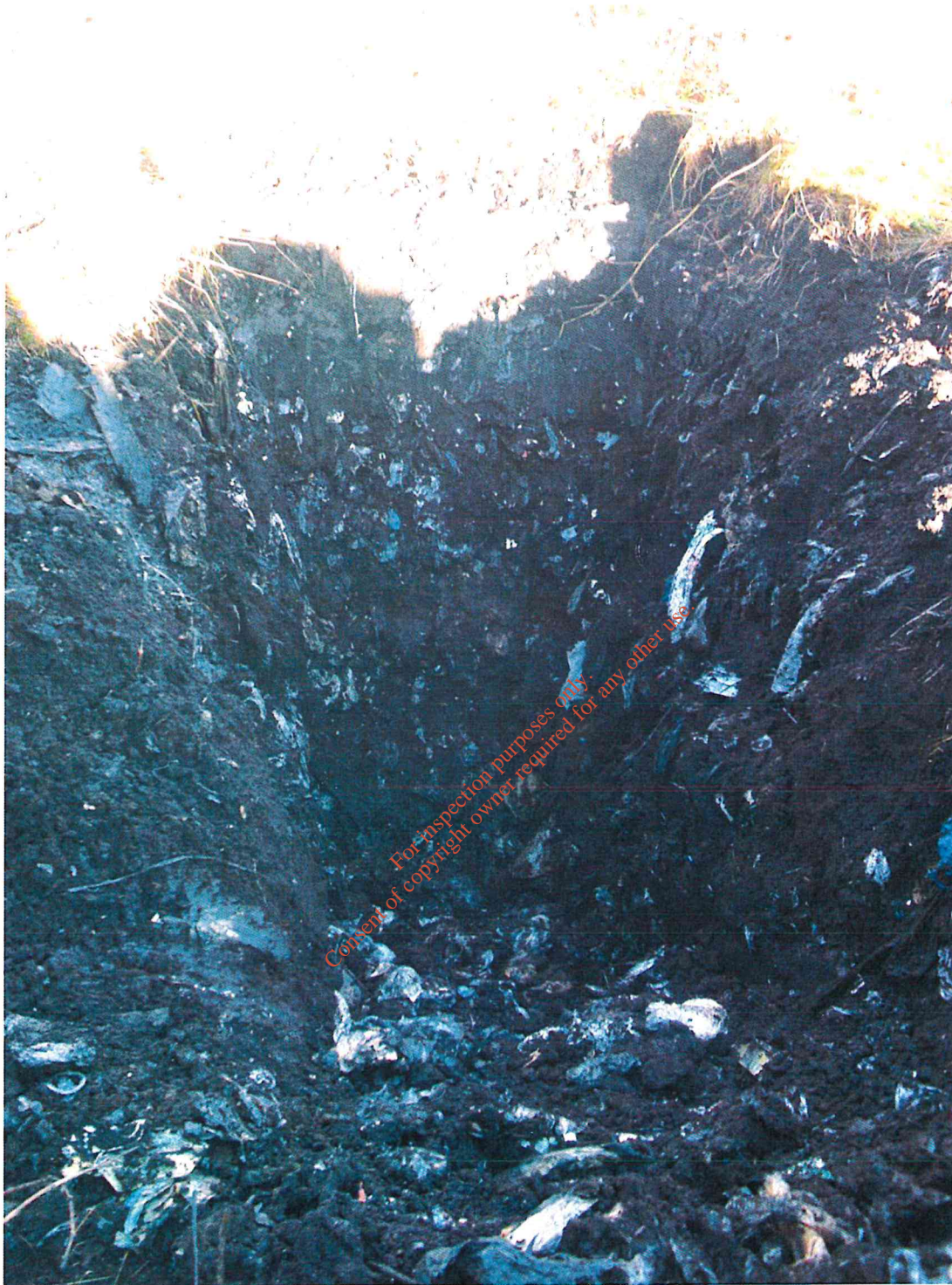


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TP04



TP05



TP06



TP07

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Soft Ground Boring: Daily Record

Location: Claremorris	Site: Claremorris Landfill
Client: Mayo Co Co	Slit trench No: ST 01
Date: 26-11-10	Sheet: 1 of 1
Ground Level: 64 m (Ordnance datum)	Engineer: AMR
GPS: 135057 274582	
Rig Type: Tracked excavator	

Comments
4m slit trench, edge of waste running into natural peat ground

GAS MONITORING			
CH4(%)	CO2(%)	O2 (%)	Atm pressure (MB)
0.1	0.1	21.0	0954



Client.....

Driller.....

Claremorris Unregulated Landfill Site Investigation



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Geological & Environmental Drilling Contractors

J/S DRILLING LTD
 20 THE BELFRY
 CHAPEL LANE
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 CO. KILKENNY

Soft Ground Boring: Daily Record

Location: Claremorris	Site: Claremorris Landfill
Client: Mayo Co Co	Slit trench No: ST 02
Date: 26-11-10	Sheet: 1 of 1
Ground Level: 64 m (Ordnance datum)	Engineer: AMR
GPS: 135080 274545	
Rig Type: Tracked excavator	

Comments
6m slit trench, edge of waste running into natural peat ground

GAS MONITORING			
CH4(%)	CO2(%)	O2 (%)	Atm pressure (MB)
0.1	0.2	21.0	0954



Client.....

Driller.....

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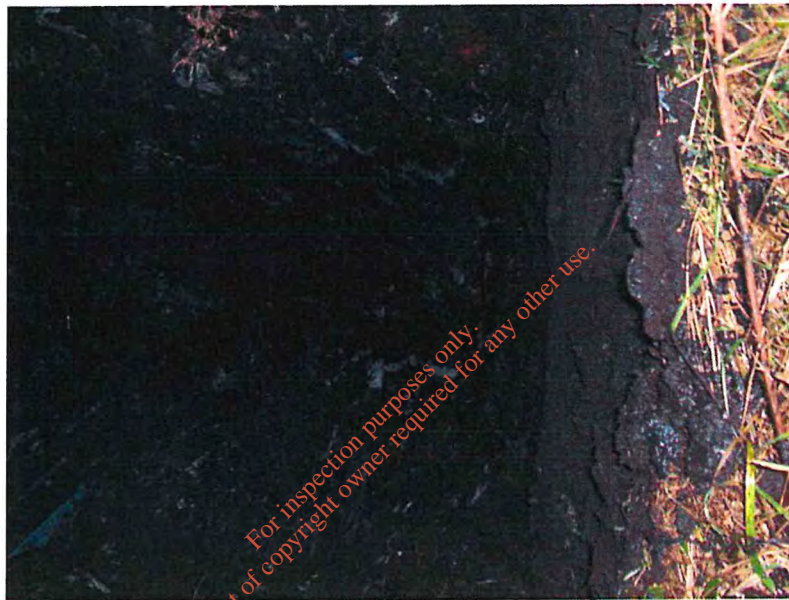
JS DRILLING LTD
 20 THE BELFRY
 CHAPEL LANE
 THOMASTOWN
 CO. KILKENNY

Soft Ground Boring: Daily Record

Location: Claremorris	Site: Claremorris Landfill
Client: Mayo Co Co	Slit trench No: ST 03
Date: 26-11-10	Sheet: 1 of 1
Ground Level: 65 m (Ordnance datum)	Engineer: AMR
GPS: 135115 274533	
Rig Type: Tracked excavator	

Comments
5m slit trench, waste 3m deep no edge found

GAS MONITORING			
CH4(%)	CO2(%)	O2 (%)	Atm pressure (MB)
0.1	0.1	21.0	0956



Client.....

Driller.....

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JS DRILLING
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Soft Ground Boring: Daily Record			
Location: Claremorris		Site: Claremorris Landfill	
Client: Mayo Co Co		Slit trench No: ST 05	
Date: 26-11-10		Sheet: 1 of 1	
Ground Level: 64 m (Ordnance datum)		Engineer: AMR	
GPS: 135237 274538			
Rig Type: Tracked excavator			

Comments
6m slit trench, edge of waste into natural peat very soft saturated ground

GAS MONITORING			
CH4(%)	CO2(%)	O2 (%)	Atm pressure (MB)
0.1	0.1	21.0	0956



Client.....

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Soft Ground Boring: Daily Record

Location: Claremorris	Site: Claremorris Landfill
Client: Mayo Co Co	Slit trench No: ST 06
Date: 26-11-10	Sheet: 1 of 1
Ground Level: 66 m (Ordnance datum)	Engineer: AMR
GPS: 135257 274573	
Rig Type: Tracked excavator	

Comments
5m slit trench, edge of waste into natural peat

GAS MONITORING			
CH4(%)	CO2(%)	O2 (%)	Atm pressure (MB)
0.1	0.2	21.0	0958



Client.....

Driller.....

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 20 THE BELFRY
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 THOMASTOWN
 CO. KILKENNY

Soft Ground Boring: Daily Record

Location: Claremorris	Site: Claremorris Landfill
Client: Mayo Co Co	Slit trenchNo: ST 07
Date: 26-11-10	Sheet: 1 of 1
Ground Level 65 m (Ordnance datum)	Engineer: AMR
GPS: 135031 274643	
Rig Type: Tracked excavator	

Comments
5m slit trench, no lateral edge of waste but vertical depth shallow 0.3-0.4m suggesting close to edge

GAS MONITORING			
CH4(%)	CO2(%)	O2 (%)	Atm pressure (MB)
0.1	0.1	21.0	0958



Client.....

Driller.....



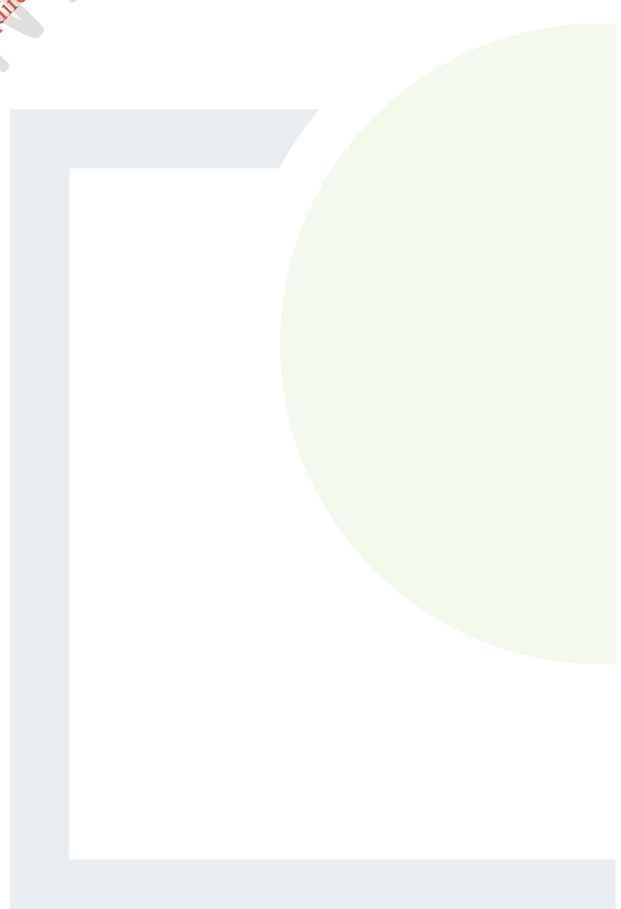
CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 3

Site Walkover Photos

ISSUE FOR CLIENT COMMENT

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PHOTOGRAPHIC LOG



Client Name: Mayo County Council

Site Location: Claremorris

Project Number: P2348

Photo No.
1

Date:
16/01/20

Description:
View of Site



Photo No.
2

Date:
16/01/20

Description:
Railway located running along the northern boundary of the site



PHOTOGRAPHIC LOG



Client Name: Mayo County Council

Site Location: Claremorris

Project Number: P2348

Photo No.
3

Date:
16/01/20

Description:
Wetland



Photo No.
4

Date:
16/01/20

Description:
Surface waste



PHOTOGRAPHIC LOG



Client Name: Mayo County Council

Site Location: Claremorris

Project Number: P2348

Photo No.
5

Date:
16/01/20

Description:
Overview of site



Photo No.
6

Date:
16/01/20

Description:
Kilbeg-Malone stream which crosses the site on the North-East corner.



PHOTOGRAPHIC LOG



Client Name: Mayo County Council

Site Location: Claremorris

Project Number: P2348

Photo No.

Date:

7

16/01/20

Description:

Leachate seepage



Photo No.

Date:

8

16/01/20

Description:

Surface waste



PHOTOGRAPHIC LOG



Client Name: Mayo County Council

Site Location: Claremorris

Project Number: P2348

Photo No.

Date:

9

16/01/20

Description:

BHOX located xxxxx.



Photo No.

Date:

10

16/01/20

Description:

Surface waste





CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 4

Report on Site Investigation
for Proposed
Knock/Claremorris By-pass

ISSUE FOR CLIENT COMMENT

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**KNOCK -
CLAREMORRIS**

MAYO COUNTY COUNCIL

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- II. Fieldwork**
- III. Testing**
- IV. Discussion**

APPENDICES

- I(a). Boring Records**
- I(b). Core Logs**
- II. Test Data**
- III. Site Plan**

REPORT ON A SITE INVESTIGATION
FOR PROPOSED KNOCK\CLAREMORRIS BY-PASS
FOR MAYO COUNTY COUNCIL

Report No.2402

January 1994

I.INTRODUCTION

A new by-pass road is to be constructed by Mayo County Council from Claremorris to Knock .

An investigation of sub-soil conditions has been carried out by IGSL on the instructions of Mayo County Council .

The investigation consisted of conventional cable-tool borehole drilling with in-situ testing and sampling at specified chainages along the route . Where rock was encountered (relevant to the development) it was diamond drilled and core was recovered to establish rock type , RQD etc.

The field operations were followed by a programme of laboratory tests to establish soil classification , grading characteristics , CBR and strength where relevant .

This report details the findings of the investigation and discusses the findings for each section of the route examined .

page 2.

II. FIELDWORK

(a) Boreholes : Conventional cable-tool boreholes (200mm) were sunk using a Pilcon Wayfarer Rig in locations set out on site by Mayo County Council and shown on the drawing enclosed with this report .

A total of 22 locations were examined involving 25 boreholes .

Descriptions and depths of the strata encountered are given in the detailed boring records enclosed in Appendix I to this report . These records also give details of samples taken and in-situ tests carried out as well as comment on ground water conditions pertaining at the time of the investigation .

(b) Cored Holes : An Edeco Strata drilling rig , equipped with NQ wireline equipment , permitting recovery of 50mm rock core , was used to recover core at a total of 6 locations .

Core was returned to the IGSL laboratory and was accurately logged by our geotechnical engineer . Full details of rock type , weathering , discontinuities , RQD etc . are noted on the detailed core records enclosed in Appendix II .

III . TESTING

(a) In-Situ Penetration Tests : During the course of the investigation , standard in-situ penetration tests were carried out at intervals in each borehole to establish relative soil strength . The N values recorded are noted in the right hand column of the boring records and will be discussed in the following paragraphs .

(b) Laboratory : All soil samples have been returned to the laboratory for careful examination and testing has been carried out in accordance with the requirements of Mayo County Council .

Strength tests (Triaxial Compression Tests) have been performed on cohesive soils at structural locations while grading analyses have been carried out to assess particle size distribution . CBR tests have been carried out on selected samples to provide data for road pavement design .

Chemical analyses have also been carried out at structural locations to determine sulphate content and acidity relative to below ground concrete.

All laboratory data is enclosed in Appendix II to this report .

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IV. DISCUSSION ON GROUND CONDITIONS RELATIVE TO FOUNDATION DESIGN

(a) Chainage 800 : Road Construction : At this location 1.70 metres of gravelly clay fill overlies soft peat to a depth of 3.60 metres . Gravelly clays and silts extend from 3.60 to 4.20 metres and overlie compact silty sandy gravel . The borehole was terminated at 6.00 metres , probably on boulders .

A vane test in the peat gave a cohesion of 27KN\sq.m , the remoulded value of 20.7 KN\sq.m would suggest that the stratum is quite silty . The moisture content for the sample of peat at 2.50 metres was 193 percent .

For optimum road construction we would suggest the removal of the peat stratum and construction of the new road on the underlying sandy gravelly clays . An N value of 18 at 4.00 metres indicates an allowable bearing capacity of 150 KN\sq.m.

A grading analyses of the gravel base stratum shows well graded material in the sand gravel range . A CBR value of 11.3 percent has been obtained from a sample of gravel at 4.50 metres .

(b) Chainage 1250 - Bridge over Railway : Two holes were bored at this location . In borehole 1250R , 1.00 metres of filling overlies a 2.00 metres peat stratum . Coarse compact gravel was noted from 3.00 to 3.80 metres with Limestone rock found at 3.80 metres.

In Borehole 1250L , fill and peat again occurred to a depth of 1.40 metre, overlying a firm stiff gravelly clay . Gravel was noted from 2.70 to 3.70 metres with refusal (probably rock) at 3.70 metres .

Diamond drilling methods were used to recover NQ (50mm) core at both locations .

At 1250R good quality core was recovered from 3.70 metres below ground level to 7.00 metres , while at Borehole 1250L , solid rock core

was recovered from 4.90 to 6.70 metres . Some weathered rock was noted in Borehole 1250L above the solid horizon .

Laboratory testing at this location includes grading analyses of the gravel stratum and a remoulded triaxial test on the clay stratum . A chemical test on a water samples indicate low sulphate concentrations .

Foundations for the proposed structure should be taken below the upper fill and peat strata . At Borehole 1250R , the gravel stratum below the peat is very thin , with Limestone rock at 3.70 metres and the foundations at this location will obviously be taken to the rock .

To ensure uniformity of founding medium it will therefore be necessary to carry all structural loadings to the Limestone , where the allowable bearing capacity will easily exceed design requirements . (A safe bearing pressure in the strong Limestone of 1000KN/sq.m can be taken) .

Some groundwater ingress can be expected from th gravel stratum in deep excavation and this should be borne in mind by the contractor .

Approach embankments , if placed at existing ground level , will obviously cause settlements in the peat stratum . To avoid differential settlements between the bridge structures and approach embankments we would advise the removal of the peat stratum . The gravels or gravelly clays below the peat will adequately support new embankment loading .

Chemical tests indicate that no special precautions need be taken to protect buried foundation concrete .

(c) Chainage 1875 - Bridge Structure :

The investigation has shown 0.80 metres of clayey fill overlying a stratum of grey-brown silty sandy gravelly clay (boulder clay). The clay is initially firm, but increases in strength to stiff, below a depth of 2.00 metres. The cable-tool borehole was terminated at 5.00 metres in the boulder clays.

Rotary core diamond drilling techniques were used to extend this borehole to a depth of 30 metres. Rock was not encountered within this range.

Some cutting is anticipated at this location. Tests in the gravelly clay below about 2.00 metres, indicate an allowable bearing pressure of

250 kN/m² for pad foundations. Because of the highly granular nature of the sub-soils and the preconsolidation of the glacial tills, settlements should be negligible under this load. As no groundwater was encountered to a depth of 5.00 metres, problems in this regard are not anticipated.

Should depth of cutting exceed the 5.0 metres achieved with the cable-tool boring equipment, we would suggest that a boring be carried out to determine soil type and strength to the appropriate depth.

A chemical analysis of the subsoil shows negligible sulphate concentrations and no problems are envisaged with deterioration of foundation concrete.

(d) Chainage 2400 - Road Construction :

Peat extends to 3.70 at this location overlying a soft white marl.

Compact fine to coarse sandy gravel lies below the soft upper soils from 4.90 to 5.70m. Groundwater was noted in association with the gravel stratum.

Vane tests carried out in the peat and marl indicate strengths of 22 and 13 kN/m² in the respective strata.

The moisture content of the peat determined in the laboratory was 236 per cent, while an index property test in the marl established high plasticity characteristics.

To avoid difficulties associated with settlements of new road construction on the peat, we would advise total removal of the very soft organic material and replacement by selected fill material. Coarse granular material should be placed at the base of the excavated area and graded towards 804 or similar closer to formation level.

(e) Chainage 3200 - Road Construction :

The records show gravelly clays from G.L. to 1.60m overlying a medium dense to dense gravel (1.60 - 3.70). Further deposits of stony clay (Boulder Clay) extended from 3.70 - 6.00m. Groundwater was noted at 1.60 in the gravel stratum.

A C.B.R. was carried out on the gravelly clay at 1.30 and a value of 3.7 per cent obtained.

No problems are anticipated with road construction in this vicinity. Embankments supported on the gravelly clay or gravel stratum should be stable.

(f) 3675 - Road : Construction :

Peat extends to a depth of 1.60m and overlies a medium dense to dense gravel. To avoid problems with settlement of road construction, removal of the peat stratum is recommended.

A grading analysis of the gravel confirms that it is clean and well-graded in the fine sand to coarse gravel range. A C.B.R. test on the gravel gave a value of 14.3 per cent.

(g) 4325 : Road Construction :

Topsoil and loose organic soil extends to 1.30, overlying a firm sandy or silty clay, extending to 4.10 metres where compact coarse gravels occur. The borehole was terminated at 6.50m in gravel, water was noted at 3.60 below ground level.

In-situ penetration tests in the silty clay stratum gave N-values of 8 and 14, indicating an allowable bearing pressure of 100 kN/m² which should be adequate for embankment support.

A CBR test carried out on the silty clay sample from 1.00m below ground gave a low result of 1.1 per cent. An index property test shows the clay to be of low plasticity. Groundwater should not present a problem at this location.

(h) Chainage 6200 - Road Construction :

Some topsoil with loose sandy clay was noted overlying a thin gravelly clay layer, with gravels noted from 1.60 to 3.50m. No free groundwater was encountered.

Assuming removal of the upper organic soils, construction of embankments on the underlying gravelly clay or gravel stratum should present no difficulties.

A high CBR value was obtained from the gravel stratum at 2.50m.

(i) Ch. 6950 - Road Construction :

An 0.90 stratum of silty clay overlies a stiff grey sandy gravelly clay. Boring was terminated at 3.60m in this stratum. No groundwater was observed.

A grading analysis was carried out on the gravelly clay, using wet sieve and hydrometer methods. The graph shows typical strength line grading for glacial tills.

No difficulties are envisaged, with road or embankment construction at this chainage, assuming that the upper organic material is removed.

(j) Ch. 7625 : Road Construction :

A surface 1.50 metres of soft mottled slightly organic grey-brown silt clay overlies grey sandy gravelly clay, in turn overlying a gravel stratum, proved from 2.20 to 3.70m. Groundwater was noted at 1.90m. Road construction should be kept above the water table, if possible. A CBR of 3.55 was obtained from the gravelly clay stratum.

(k) Chainage 8525 : Road Construction :

A brown silty clay extends to 1.70 and overlies a grey silty sandy gravelly clay. Boring was completed at 3.70m. No free water was encountered.

A CBR on the upper stratum of 2.6% was obtained while an improved CBR value of 4.45 was obtained from the more granular underlying material.

A grading analysis of the lower soil was also carried out and confirms the typical glacial till grading. No difficulties are envisaged with construction in the vicinity of this chainage. The upper silty clay can support loadings of 150 kN/m^2 (N value = 18) and this should safely support any proposed embankment loading.

(l) Chainage 9275 - Road Construction :

Topsoil (0 to 0.20) overlies a yellow-grey mottled silty sandy gravelly clay. A stiff grey silty sandy gravelly clay (glacial till) extends from 1.70 to the final depth of 3.80m.

The N-value of 17 at 1.50m indicates an allowable bearing pressure in the soil of 150 kN/m² which will be satisfactory for embankment support.

A CBR test has been carried out on the upper yellow grey silty sandy gravelly clay and a result of 2.85m obtained.

No water was found at this location and no difficulties are envisaged in road construction.

(m) Ch. 9600 : Bridge over Existing Road :

Two boreholes were constructed to examine overburden soils at the vicinity of the above bridge. Rotary diamond core methods were utilised to determine depth of overburden and proof-drill bedrock at one location.

At Borehole 9000 (L), fill and organic clay with a thin silt layer extends to 2.00m where a medium dense clayey silty sandy gravel was found. This gravel stratum was penetrated to a depth of 5.00 metres.

In Borehole 9000 (R), clayey soils extend to 2.40m where the gravels again occurred. This hole was extended to 4.90 metres.

Water was noted in the gravel stratum in both boreholes - details are given on the record sheets.

The rock coring rig continued penetration of gravels at one location to a depth of 9.20m. Limestone rock was recovered as core from 9.20 to 12.30m.

A vane test in the upper soils at 9600 (L) gave a shear value of 14.6 kN/m² confirming the unsuitability of this material as a founding medium.

The gravel stratum found at 2.00 and 2.40m in the respective boreholes is reasonably uniformly graded (see graphs) and the N-values of 10 and 13

would suggest an allowable bearing capacity of about 75 kN/m² for bridge foundations placed on the gravel.

This intensity of allowable bearing pressure is unlikely to be sufficient and foundations will have to be transferred to more competent material.

While the gravels improve rapidly in strength, and an allowable bearing pressure of 300 kN/m² can be taken at about 4.00 metres, the depth of required excavation and associated dewatering difficulties may preclude the economic construction of excavated footings. The use of piling is, therefore, suggested. Piles should be driven or bored to the limestone bedrock at about 9.50 metres below ground level.

Chemical analyses indicate that no special precautions are necessary to protect below ground concrete.

(n) Chainage 10500 : Road Construction :

A fine to stiff grey silty sandy gravelly clay (glacial till) was noted from ground level to 1.80m, where refusal of boring apparatus occurred.

An index property (liquid and plastic limit) test and a CBR test was performed on a sample of soil from 1.00. The material is of low plasticity, with a CBR of 3.2 per cent.

No problems are envisaged in this vicinity.

(o) Chainage 11150 : (Proposed New Bridge) :

At this location, two holes were initially bored using 200mm cable-tool techniques. The records show a little made ground (approximately 0.50 metres) overlying firm to stiff grey silty sandy gravelly clay. Medium dense gravels were noted at about 2.70m, increasing in density to compact below 4.00 metres. Holes were terminated at 7.80 (left) and 6.80 (right) on large boulders.

Rotary diamond coring was utilised to proof-drill and establish bedrock level. Continuing strata of compact gravels, gravelly clays and boulders were cored from surface to 23.30 metres. Limestone bedrock was cored and recovered from 23.30 to 25.00 metres in BH 11150(R). A cored hole at 11150(L) achieved a depth of 20.00 metres without encountering bedrock. Coring was terminated at this point.

Groundwater was struck in association with the gravel stratum at about 2.70m, final standing level was recorded at an average depth of 1.30 metres.

Standard penetration tests have been carried out to establish soil strength and N-values of 20 and 24 have been recorded in the upper granular clay stratum.

Grading analyses have been carried out on the lower gravel deposits. Graphs indicate a uniform well-graded, slightly silty in places, sand and gravel.

Chemical analysis of two samples has indicated very low sulphate concentrations and no special precautions need be taken to protect foundation concrete.

Foundations for the proposed structure can be supported on the granular clay stratum. Footings placed at 2.00 metres can be designed using an allowable bearing pressure of 200 kN/m². Settlements at this intensity of load in preconsolidated glacial till will be low, differential settlement should be negligible.

Should an increase in allowable bearing pressure be required, foundation loads could be carried on piles, founded in the compact gravel stratum. A precast concrete pile, driven to, say 10.00 metres should support a minimum of 80 tonnes (assuming a 300mm x 300mm pile section).

(p) Ch. 11950 : Road Construction

At this location an upper 1.0m of peaty clay was encountered, overlying a firm to stiff grey silty sandy gravelly clay. The borehole extended to 5.00 metres with slight water seepage at 4.10m.

A CBR test at 1.00m gave a result of 3.6 per cent.

The N-value of 18 at 1.50m suggests an allowable bearing capacity of 150 kN/m² which should be sufficient for embankment support. No problems are anticipated with road/embankment construction in this vicinity.

(q) Ch. 13050 : Road Construction :

Soft silty fibrous peat extends to 2.60 metres overlying medium dense to dense gravels which extended to the final depth bored of 4.50 metres. An SPT in the peat gave an N-value of 1 while in-situ vanes indicate a shear strength of 12.8 kN/m².

We would suggest the removal of the very soft organic material and construction of the roadway on the gravel stratum, which is in a compact condition and is well-graded. Coarse rock fill should be utilised at the base of the road construction grading to fine selected material (804 or similar) closer to final grade.

(r) Chainage 13775 : Road Construction :

At this location, a claybound gravel was found from GL to 0.90m with compact sandy gravels from 0.90 to 2.70m. Water level was noted at 2.30 in the gravels.

A grading analysis and a CBR test has been carried out on a gravel sample from 0.90m below ground level.

The material is well-graded with a CBR greater than 10 and no problems are envisaged with road construction in this area, providing construction is maintained above the water table.

(s) Chainage 14025 : Road Construction :

A thin (0.30) stratum of peat overlies a very soft silty clay to a depth of 2.10 metres. Sandy gravel extends from 2.10 to 4.40m, the material is quite compact. Boring was terminated at 4.40 and groundwater was encountered at 2.90m, with a final water level of 1.50m.

A CBR test carried out at 1.00m gave a value of 0.7 per cent which is very low. Should the upper clay stratum be utilised as a base material, we would recommend the use of a geotechnical membrane (terram) and a suitable thickness of selected fill material.

(t) Chainage 14675 : Road Construction :

The borehole at this position shows a firm sandy gravelly clay from GL to 1.20m overlying medium dense to dense gravels, terminating at 4.00m. Water was noted at 1.90m.

No problems are anticipated with road construction at this chainage. A CBR test at 1.00m on the upper gravelly clay gave a value of 1.85 per cent.

(u) Chainage 15250 : Road Construction :

A grey gravelly clay extends from GL to 1.50 at this location overlying a thin gravel stratum, in turn overlying a stiff glacial till. Water was noted in the gravels. In-situ tests indicate that all soils are competent and no problems are expected at this chainage.

(v) Chainage 15625 : Road Construction :

Sandy gravels were noted extending from ground level to the final depth of 3.60m. Water was noted at 3.00. A grading analysis of the gravel has been carried out and a CBR of 15.4 established. No problems are anticipated at this location.

GENERAL :

Structures :

Where piling techniques are recommended, guideline proposals have been given on the basis of precast concrete driven piles. Various other techniques are obviously available and specialist contractors should be consulted to prepare competitive quotations. Where structural bearing pressures are in the medium range, the use of reinforced earth construction could also be considered.

Soft Soils :

Where very soft soils, peats, peaty clays or silt/marls have been encountered, the depth of such deposits generally does not exceed 3.00 metres and the recommendation to remove such material has been given.

Any such excavation should obviously include for minimum 1 : 1 side slopes.

Some excavation of soft soils may be below water table, however, the use of coarse fill (rock fill) at the base of the construction will ensure that any soft soils remaining following excavation will be displaced into the voids in the rock fill.

Other techniques of dealing with peaty deposits could be considered, including installation of vertical drains and surcharge loading of soft areas.

Any such procedures would require some further soil investigation and the installation of equipment to monitor settlement behaviour of embankments.

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APPENDIX I (2) ... BORING RECORDS

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APPENDIX I(b) CORE LOGS

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REPORT NO		GEOTECHNICAL CORE LOG RECORD					I.G.S.L.		
CONTRACT WESTPORT AND SRAHLEA					BOREHOLE NO 1250R		SHEET		
CLIENT MAYO COUNTY COUNCIL			CORE DIAMETER (mm)		DATE STARTED 21.9.93				
			GROUND LEVEL (mOD)		DATE COMPLETED 22.9.93				
LOCATION KNOCK CLAREMORRIS BY-PASS			INCLINATION Vertical		DRILLED BY IGSL				
			FLUSH Water		LOGGED BY IGSL				
DOWNHOLE DEPTH (m)	CORE RUN LENGTH (m)	TCR %	SCR %	RQD %	DISCONTINUITIES	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	GEOTECHNICAL DESCRIPTION
1									Stiff dark brown peaty CLAY/clayey peat
2	3.7	17	0	0					Predominantly fine to medium-grained gravel size fragments of limestone
3									
4	2.0	91	48	33	From 3.70 to 3.85m, highly fractured and non-intact with fine to medium-grained size fragments			3.7	Dark grey/grey black fine grained, moderately and slightly weathered LIMESTONE, moderately strong to strong
5					From 3.85 to 4.05m, black shaley limestone with very closely spaced sub-horizontal discontinuities				From 4.60 to 4.85m, prominent highly weathered shaley LIMESTONE, weak to mid-weak
6					subplanar to irregular with slight calcareous clay smearing			5.7	
7	1.3	86	73	36				7.0	
8									END OF DRILLHOLE
9									
REMARKS:									

REPORT NO		GEOTECHNICAL CORE LOG RECORD					I.G.S.L.		
CONTRACT WESTPORT AND SRAHLEA					BOREHOLE NO 1250L				
CLIENT MAYO COUNTY COUNCIL					CORE DIAMETER (mm) 47NQ		DATE STARTED 22.9.93		
					GROUND LEVEL (MOD)		DATE COMPLETED 22.9.93		
LOCATION KNOCK CLAREMORRIS BY-PASS			INCLINATION Vertical		Water		DRILLED BY IGSL		
			FLUSH				LOGGED BY IGSL		
DOWNHOLE DEPTH (m)	CORE RUN LENGTH (m)	TCR %	SCR %	RQD %	DISCONTINUITIES	SYMBOLIC LOG	ELEVATION (MOD)	DEPTH (m)	GEOTECHNICAL DESCRIPTION
1	2.50	26	11	0		///			Overburden (fragments of limestone with slight clay smearing present)
2					From 2.0m, generally highly fractured and non-intact with widely spaced sub-vertical discontinuities, subplanar, smooth and slightly rough, clean			2.0	
3								2.5	Dark grey fine-grained slightly weathered siliceous LIMESTONE, moderately strong or strong
4	1.4	60	0	0				3.9	From approx. 3.50m locally moderately weathered and becoming increasingly carbonaceous/shaley from 4.10 to 4.40m
5									
6	1.8	85	63	48	From 5.25m, widely spaced sub-horizontal discontinuities, subplanar, slightly rough with some calcareous shale smearing			5.7	From circa 5.05 to 5.25m highly fractured/non-intact with much of core represented as fine-grained size angular fragments
7	1.0	83	76	52					From 5.70m, becoming generally slightly weathered, strong to very strong.
8								6.7	
9									END OF DRILLHOLE
REMARKS:									

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REPORT NO		GEOTECHNICAL CORE LOG RECORD					I.G.S.L.		
CONTRACT						BOREHOLE NO SHEET			
CLIENT				CORE DIAMETER (mm)		DATE STARTED			
MAYO COUNTY COUNCIL				GROUND LEVEL (mOD)		23.4.93			
LOCATION				INCLINATION		DRILLED BY			
KNOCK CLAREMORRIS BY-PASS				Vertical		IGSL			
				FLUSH		LOGGED BY			
				Water		IGSL			
DOWNHOLE DEPTH (m)	CORE RUN LENGTH (m)	TCR %	SCR %	RQD %	DISCONTINUITIES	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	GEOTECHNICAL DESCRIPTION
2	5.5	3	1	0					Overburden (coarse gravel-size fragments of LIMESTONE)
4									
6	1.9	24	0	0			5.50		
8	1.1	38	13	0			7.40		
10	3.0	3	0	0			8.50		
12	3.5	9	6	6			11.5		From 11.50 to 15.0m, very stiff brown silty CLAY with some fine gravel
14									
16							15.0		From 15.0m, becoming hard silty CLAY, highly weathered MUDSTONE
18	2.5	54	29	6			17.5		
REMARKS:									

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REPORT NO		GEOTECHNICAL CORE LOG RECORD					I.G.S.L.		
CONTRACT						BOREHOLE NO SHEET			
CLIENT				CORE DIAMETER (mm)		DATE STARTED			
MAYO COUNTY COUNCIL				GROUND LEVEL (mOD)		23.4.93			
LOCATION				INCLINATION		DRILLED BY			
KNOCK CLAREMORRIS BY-PASS				FLUSH		IGSL			
				Vertical		LOGGED BY			
				Water		IGSL			
DOWNHOLE DEPTH (m)	CORE RUN LENGTH (m)	TCR %	SCR %	RQD %	DISCONTINUITIES	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	GEOTECHNICAL DESCRIPTION
	1.5	58	51	24					(As previous sheet)
20	1.5	55	37	6			19.0		
							20.50		
22	3.0	32	12	0					
							23.50		From approx. 22.50m, generally greyish white fragments of LIMESTONE with much clay infill, medium-gravel size, angular to sub-angular
24									
26	6.5	4	0	0					
28									
30								30.0	
32									END OF DRILLHOLE
34									
36									
REMARKS:									

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REPORT NO		GEOTECHNICAL CORE LOG RECORD				I.G.S.L.			
CONTRACT					BOREHOLE NO 9600 SHEET				
CLIENT MAYO COUNTY COUNCIL			CORE DIAMETER (mm)		DATE STARTED 4.10.93				
LOCATION KNOCK CLAREMORRIS BY-PASS			GROUND LEVEL (mOD)		DATE COMPLETED 5.10.93				
			INCLINATION Vertical		DRILLED BY IGSL				
			FLUSH Water		LOGGED BY IGSL				
DOWNHOLE DEPTH (m)	CORE RUN LENGTH (m)	TCR %	SCR %	RQD %	DISCONTINUITIES	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	GEOTECHNICAL DESCRIPTION
1	2.5	14	4	0					Overburden (Predominantly medium to coarse gravel and cobble size fragments of LIMESTONE)
2								2.50	
3	1.8	9	0	0					
4								4.30	
5	1.4	64	46	38				5.70	From 4.30 to 5.25m, highly fragmented and non-intact medium to coarse gravel size LIMESTONE, intact stick (representing boulder horizon from 5.25 to 5.60m)
6									
7	3.5	7	0	0					
8									
9								9.2	
REMARKS:									

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REPORT NO.		GEOTECHNICAL CORE LOG RECORD				I.G.S.L.			
CONTRACT					BOREHOLE NO. 9600 SHEET				
CLIENT MAYO COUNTY COUNCIL			CORE DIAMETER (mm)		DATE STARTED				
LOCATION KNOCK CLAREMORRIS BY-PASS			GROUND LEVEL (MOD)		DATE COMPLETED				
			INCLINATION Vertical		DRILLED BY IGSL				
			FLUSH Water		LOGGED BY IGSL				
DOWNHOLE DEPTH (m)	CORE RUN LENGTH (m)	TCR %	SCR %	RQD %	DISCONTINUITIES	SYMBOLIC LOG	ELEVATION (MOD)	DEPTH (m)	GEOTECHNICAL DESCRIPTION
10	1.5	97	97	91	From 9.20m, very widely spaced subhorizontal discontinuities, subplanar, aperture <1mm, clean to 10.45 and 10.50m, sub-horizontal discontinuation, subplanar to planar with slight smearing, predominantly carbonaceous smearing.	[Symbolic Log]	10.70		Dark grey black fine-grained slightly weathered siliceous LIMESTONE, strong to very strong.
11	1.6	100	100	81			12.30		
12									END OF DRILLHOLE

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REMARKS:

REPORT NO 2263VA		GEOTECHNICAL CORE LOG RECORD					I.G.S.L.		
CONTRACT						BOREHOLE NO 11150R SHEET			
CLIENT MAYO COUNTY COUNCIL			CORE DIAMETER (mm) 47 (NQ)			DATE STARTED 28 9 93			
LOCATION KNOCKICLA E MORRIS BY-PASS			GROUND LEVEL (mOD)		DATE COMPLET 30 9 93				
			INCLINATION FLUSH		Vertical Water		DRILLED BY I G S L LOGGED BY I G S L		
DOWNHOLE DEPTH (m)	CORE RUN LENGTH (m)	TCR %	SCR %	RQD %	DISCONTINUITIES	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	GEOTECHNICAL DESCRIPTION
0	2.50	3	0	0				2.50	Overburden (Predominantly medium to coarse gravel-size fragments of limestone)
2									
4	3.00	13	6	0				5.50	
6									
8	3.00	32	13	0				8.50	From approx 8.50m occasional clay present
10									
12	3.00	16	16	0				11.50	
14									
16	3.00	7	0	0				14.50	From 14.50 to 17.50m very stiff to hard brown slightly sandy gravelly CLAY
18									
	0.50	96	96	96				17.50 18.00	

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REPORT NO		GEOTECHNICAL CORE LOG RECORD					I.G.S.L.		
CONTRACT					BOREHOLE NO 11150R		SHEET 2		
CLIENT MAYO COUNTY COUNCIL			CORE DIAMETER (mm 47 (NQ))		DATE STARTED 28 9 93		DATE COMPLETED 30 9 93		
LOCATION KNOCK CLAREMORRIS BY-PASS			INCLINATION Vertical		DRILLED BY I G S L		LOGGED BY I G S L		
			FLUSH Water						
DOWNHOLE DEPTH (m)	CORE RUN LENGTH (m)	T C R %	S C R %	R Q D %	DISCONTINUITIES	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	GEOTECHNICAL DESCRIPTION
18	2.50	48	38	29	From 19.0m very widely spaced subhorizontal discontinuities with prominent clay infill (10-20mm)				Dark grey black fine-grained siliceous LIMESTONE strong and very strong with slight clay infill
20	0.80	70	30	19				20.50	From 20.50m much stiff to very stiff clay infill with gravel size fragments in limestone
22	1.00	61	28	11				21.30	
24	1.00	91	49	32	From 23.30m becoming fresh to slightly weathered, very strong good quality massive and intact with widely-spaced subhorizontal discontinuities aperture <1mm			22.30	From 22.30m slightly weathered with much highly fragmented and non-intact bands, clay infill from 23.10 to 23.30m Moderately strong to strong
26	1.70	89	71	63				23.30	
28								25.00	
30									End of drillhole
32									
34									
36									
38									
REMARKS.									

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REPORT NO		GEOTECHNICAL CORE LOG RECORD					I.G.S.L.		
CONTRACT						BOREHOLE NO SHEET 11150L			
CLIENT MAYO COUNTY COUNCIL			CORE DIAMETER (mm)		DATE STARTED 27.9.93				
LOCATION KNOCK CLAREMORRIS BY-PASS			GROUND LEVEL (mOD)		DATE COMPLETED 28.9.93				
			INCLINATION Vertical		DRILLED BY IGSL				
			FLUSH Water		LOGGED BY IGSL				
DOWNHOLE DEPTH (m)	CORE RUN LENGTH (m)	TCR %	SCR %	RQD %	DISCONTINUITIES	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	GEOTECHNICAL DESCRIPTION
2	3.3	9	7	5					Overburden (dark grey black fine-grained fragments of siliceous LIMESTONE)
4	2.2	12	5	5			3.30		From approx. 3.30m, medium to coarse gravel and cobble size fragments, angular to subangular
6	1.5	26	26	21			5.50		
8	1.5	18	18	18			7.00		
10	1.5	14	11	7			8.50		
12	4.0	4	0	0			11.00		
14							15.00		
16	3.0	3	0	0					
18								18.0	
REMARKS: Drillhole terminated at 20.0 b.g.l. in overburden									

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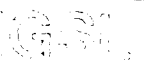
REPORT NO		GEOTECHNICAL CORE LOG RECORD				I.G.S.L.			
CONTRACT					BOREHOLE NO SHEET				
CLIENT		MAYO COUNTY COUNCIL		CORE DIAMETER (mm)		DATE STARTED			
LOCATION		KNOCK CLAREMORRIS BY-PASS		GROUND LEVEL (mOD)		DATE COMPLETED			
		INCLINATION		Vertical		DRILLED BY			
		FLUSH		Water		IGSL			
LOGGED BY		IGSL							
DOWNHOLE DEPTH (m)	CORE RUN LENGTH (m)	T.C.R. %	S.C.R. %	R.O.D. %	DISCONTINUITIES	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	GEOTECHNICAL DESCRIPTION
18	2.0	7	0	0					
20								20.0	END OF DRILLHOLE
<p style="color: red; transform: rotate(-45deg); font-weight: bold;">For inspection purposes only. Consent of copyright owner required for any other use.</p>									
REMARKS:									

APPENDIX II TEST DATA

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Report No.

PARTICLE SIZE ANALYSIS



Contract

KNOCK - CLAREMORRIS

Borehole No.

3675

Method of Test

Wet Sieve

Sample No

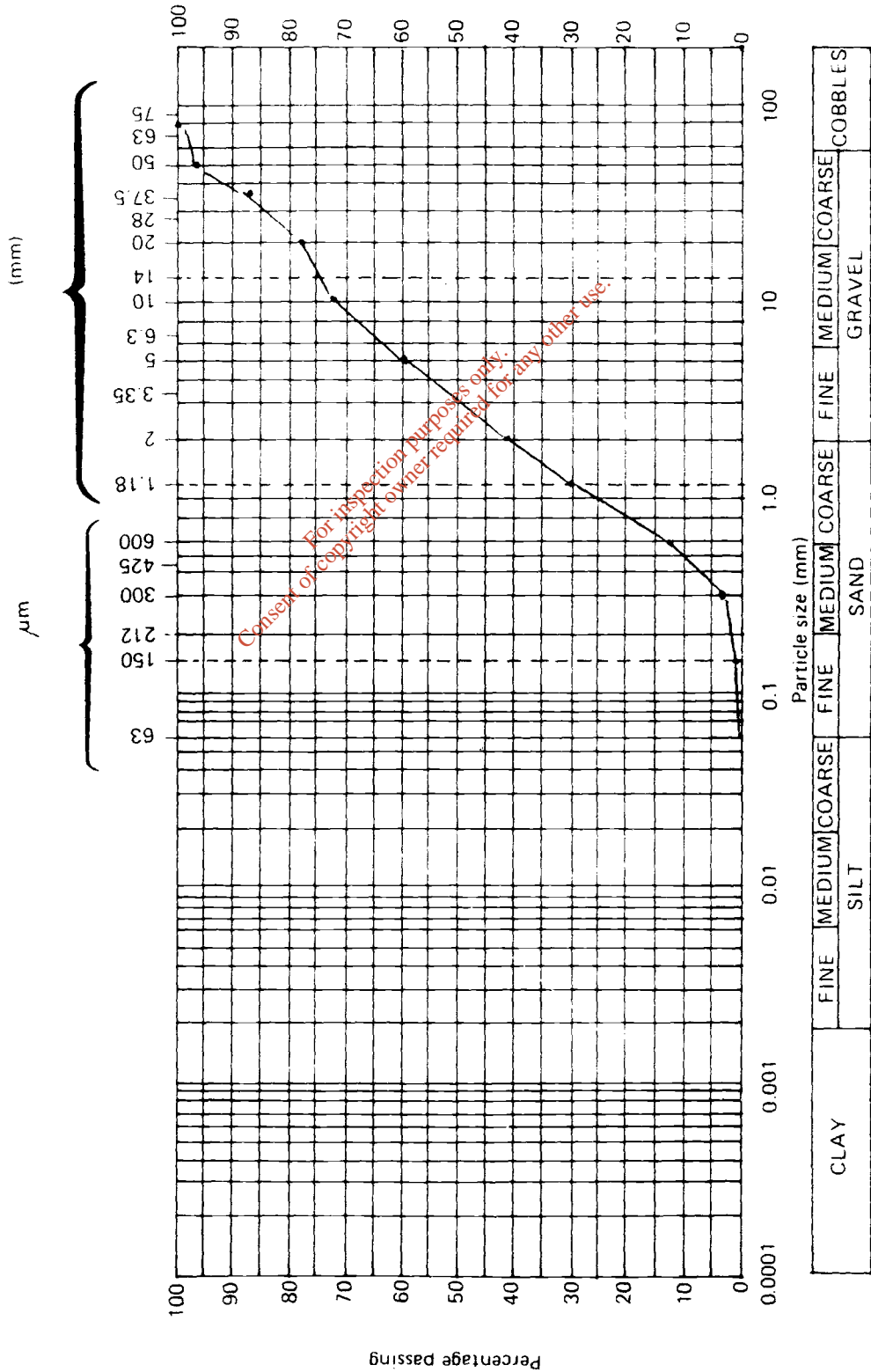
2292

Depth

2.50

Sample Description

Grey-brown fine to coarse sandy GRAVEL



Report No

PARTICLE SIZE ANALYSIS

Contract

KNOCK - CLAREMORRIS

Borehole No.

6950

Method of Test

Wet Sieve & Hydrometer

Sample No.

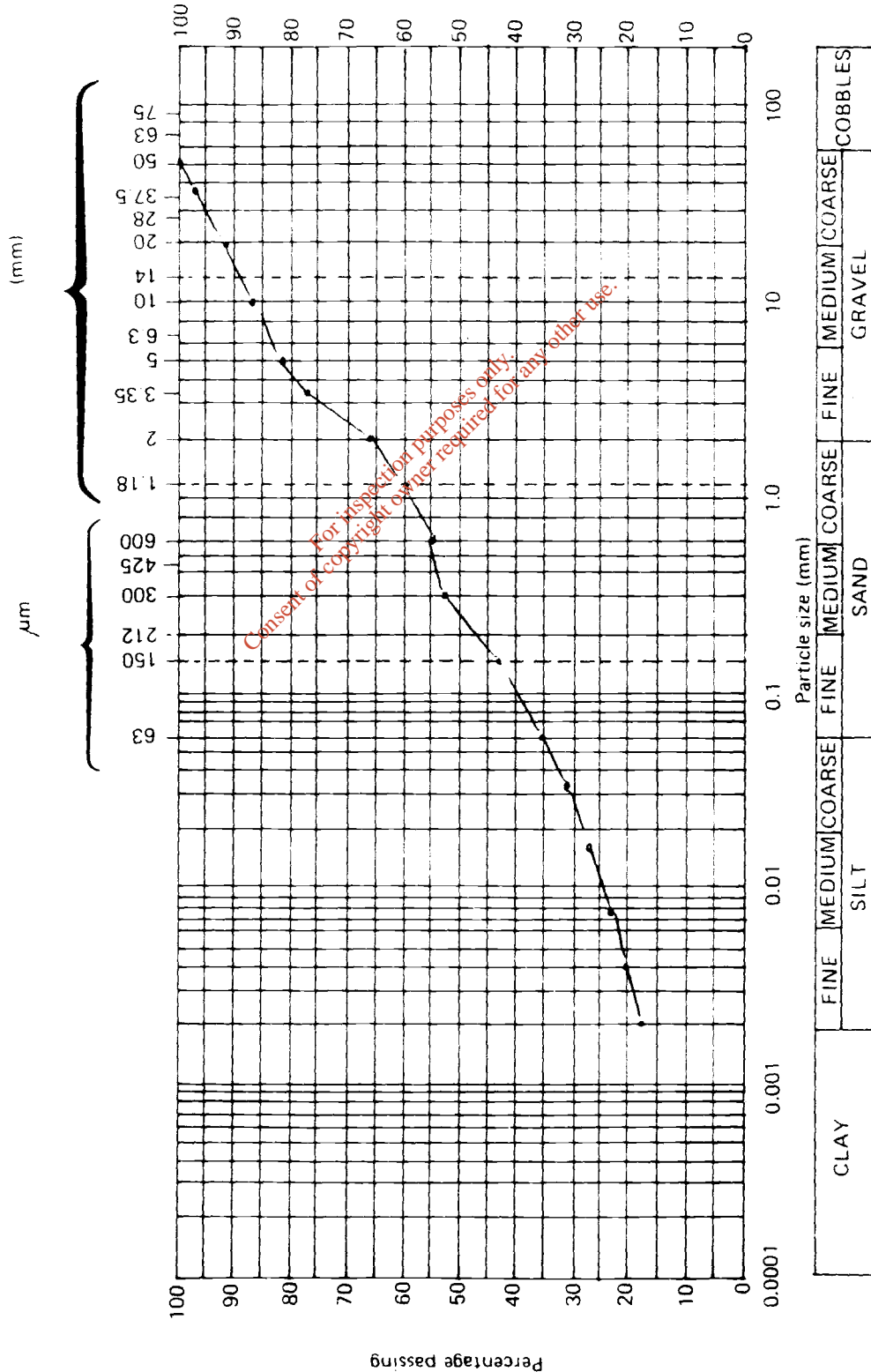
7206

Depth

2.00

Sample Description

Grey silty sandy gravelly CLAY



Report No.

PARTICLE SIZE ANALYSIS

Contract

KNOCK - CLAREMORRIS

Borehole No. **8525**

Method of Test

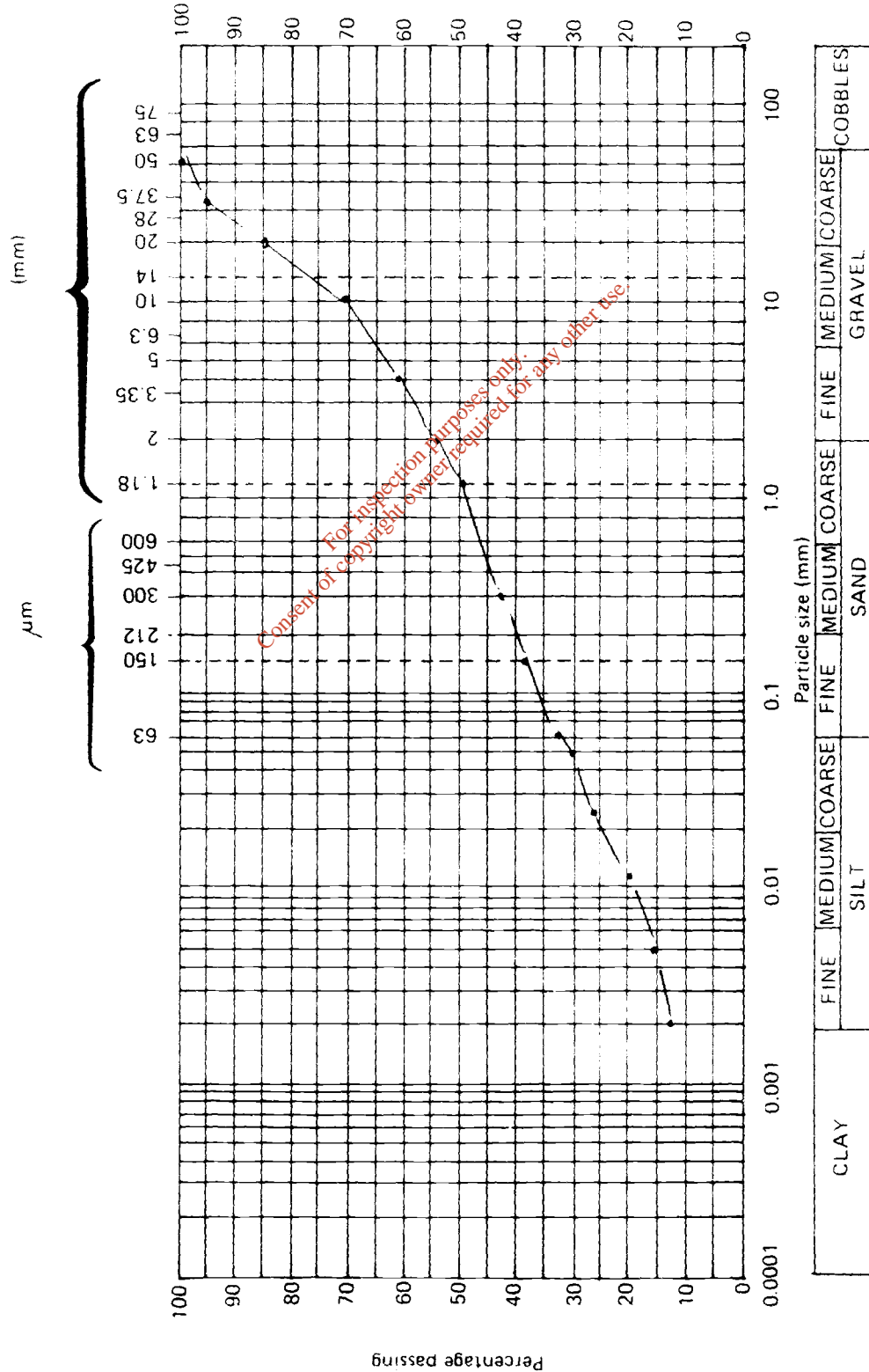
Wet Sieve & Hydrometer

Sample No. **7218**

Depth **2.00**

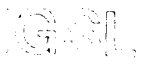
Sample Description

Grey silty sandy gravelly CLAY



Report No.

PARTICLE SIZE ANALYSIS



Contract

KNOCK - CLAREMORRIS

Borehole No.

9600R

Method of Test

Wet Sieve

Sample No.

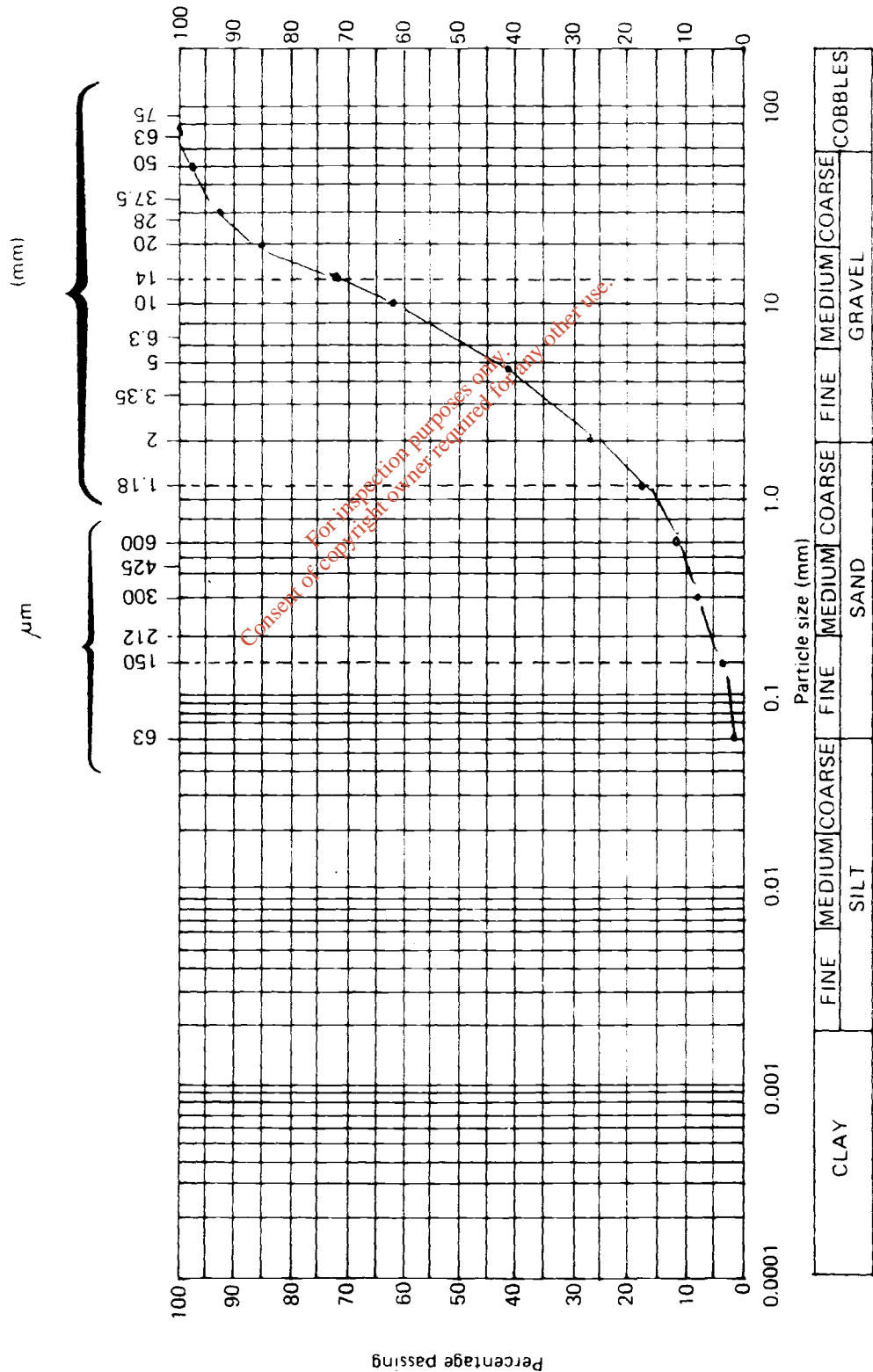
7223

Depth

2.50

Sample Description

Grey brown sandy GRAVEL



Report No.

PARTICLE SIZE ANALYSIS

Contract

KNOCK - CLAREMORRIS

Borehole No

11150

Method of Test

Wet Sieve

Sample No

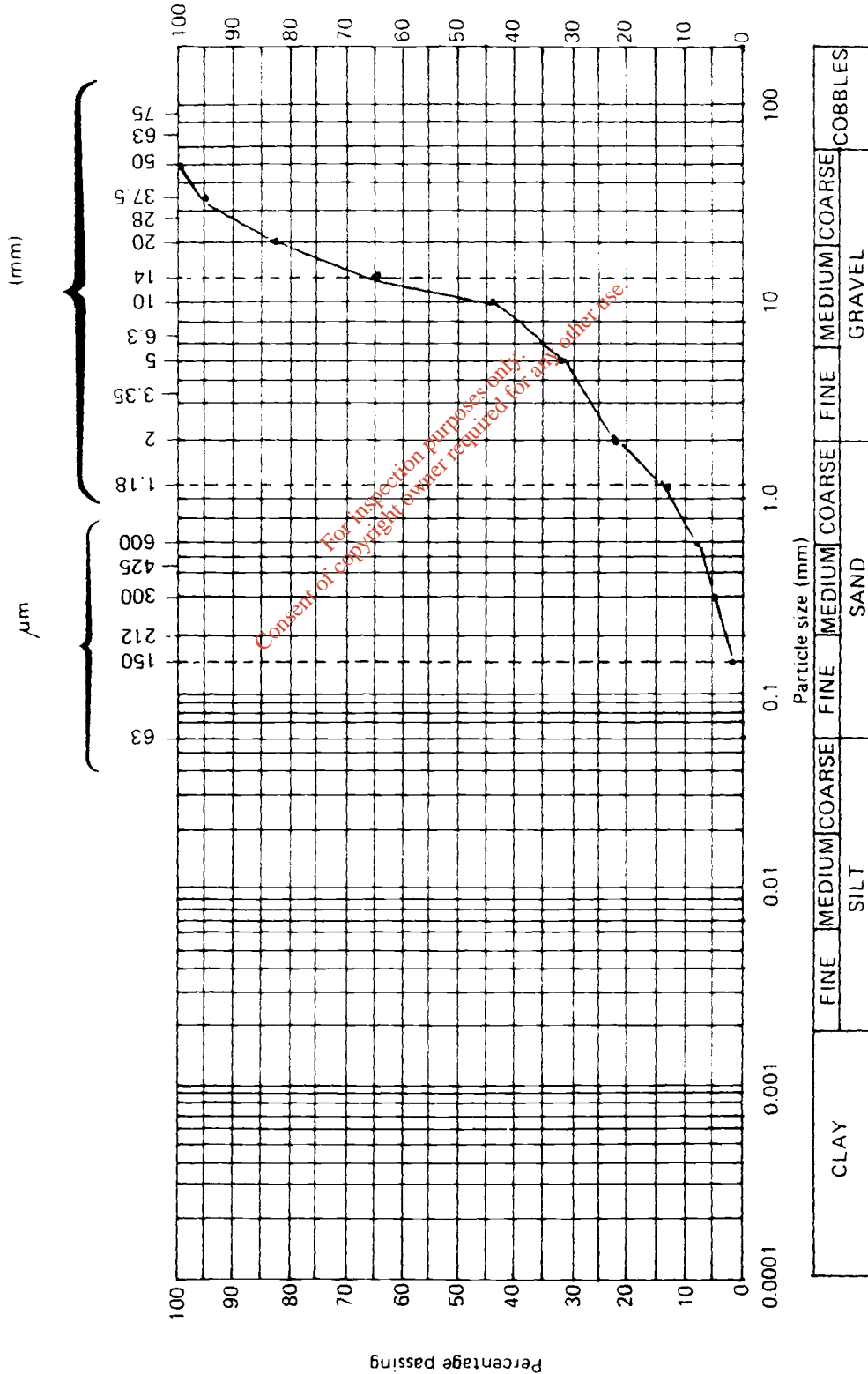
7225

Depth

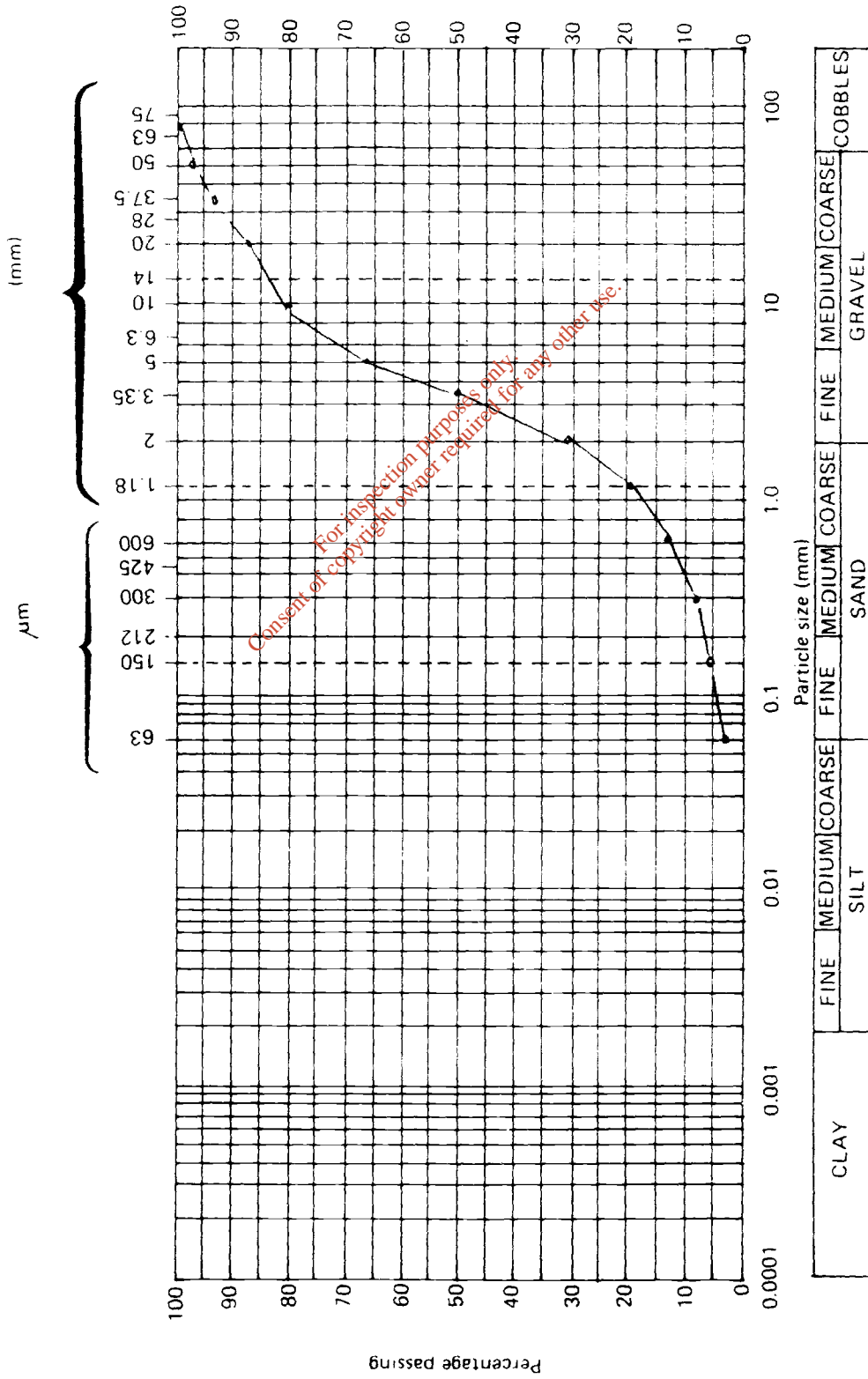
3.00

Sample Description

Fine to coarse sandy GRAVEL



Report No.	PARTICLE SIZE ANALYSIS		
Contract	KNOCK - CLAREMORRIS	Borehole No.	1150R
Method of Test	Wet Sieve	Sample No	7230
Sample Description	Grey fine to coarse slightly silty sandy GRAVEL		
		Depth	5.50



Report No.

PARTICLE SIZE ANALYSIS

Contract

KNOCK - CLAREMORRIS

Borehole No.

13050

Method of Test

Wet Sieve

Sample No.

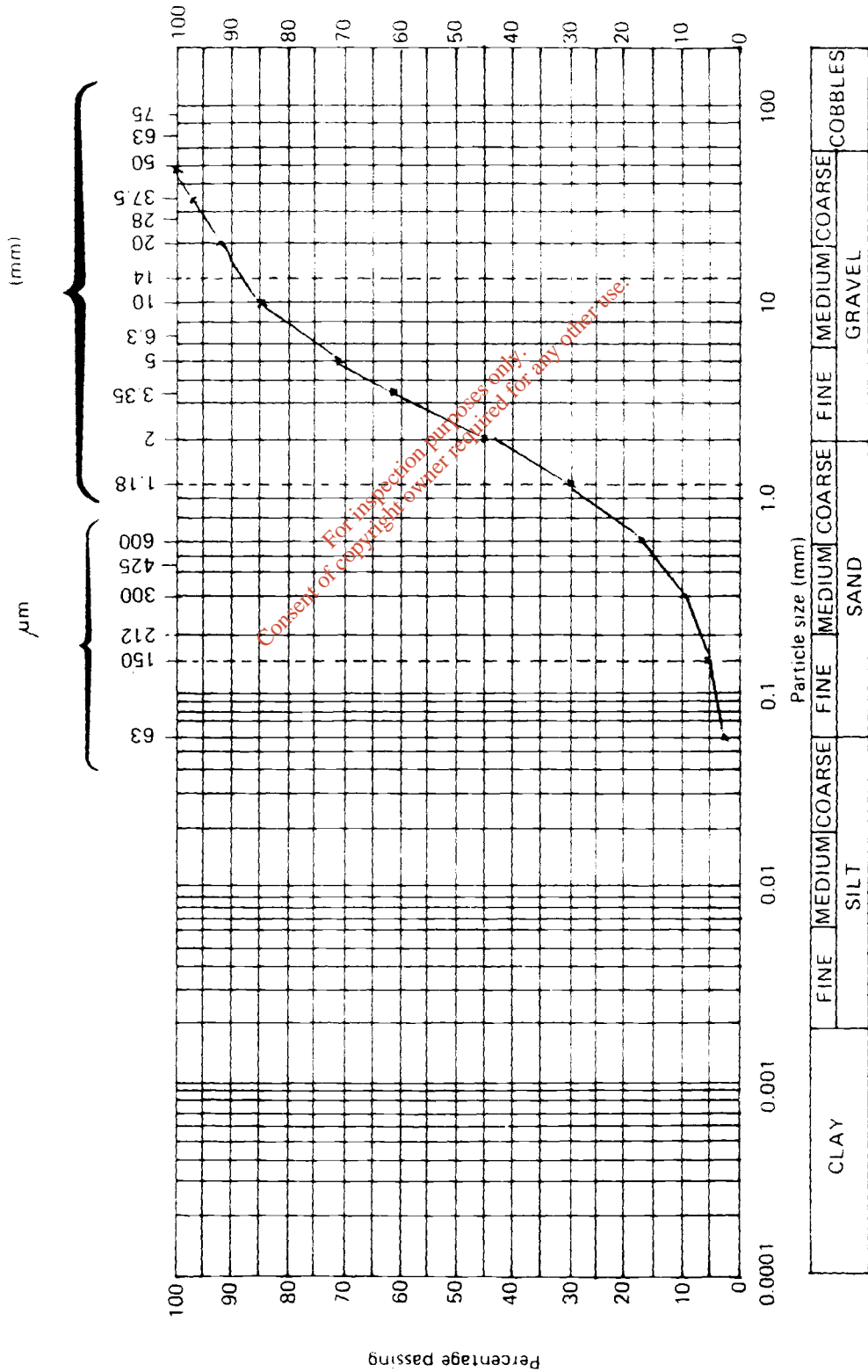
7234

Depth

3.00

Sample Description

Slightly silty sandy GRAVEL



Report No

PARTICLE SIZE ANALYSIS

Contract

KNOCK - CLAREMORRIS

Borehole No. **13775**

Method of Test

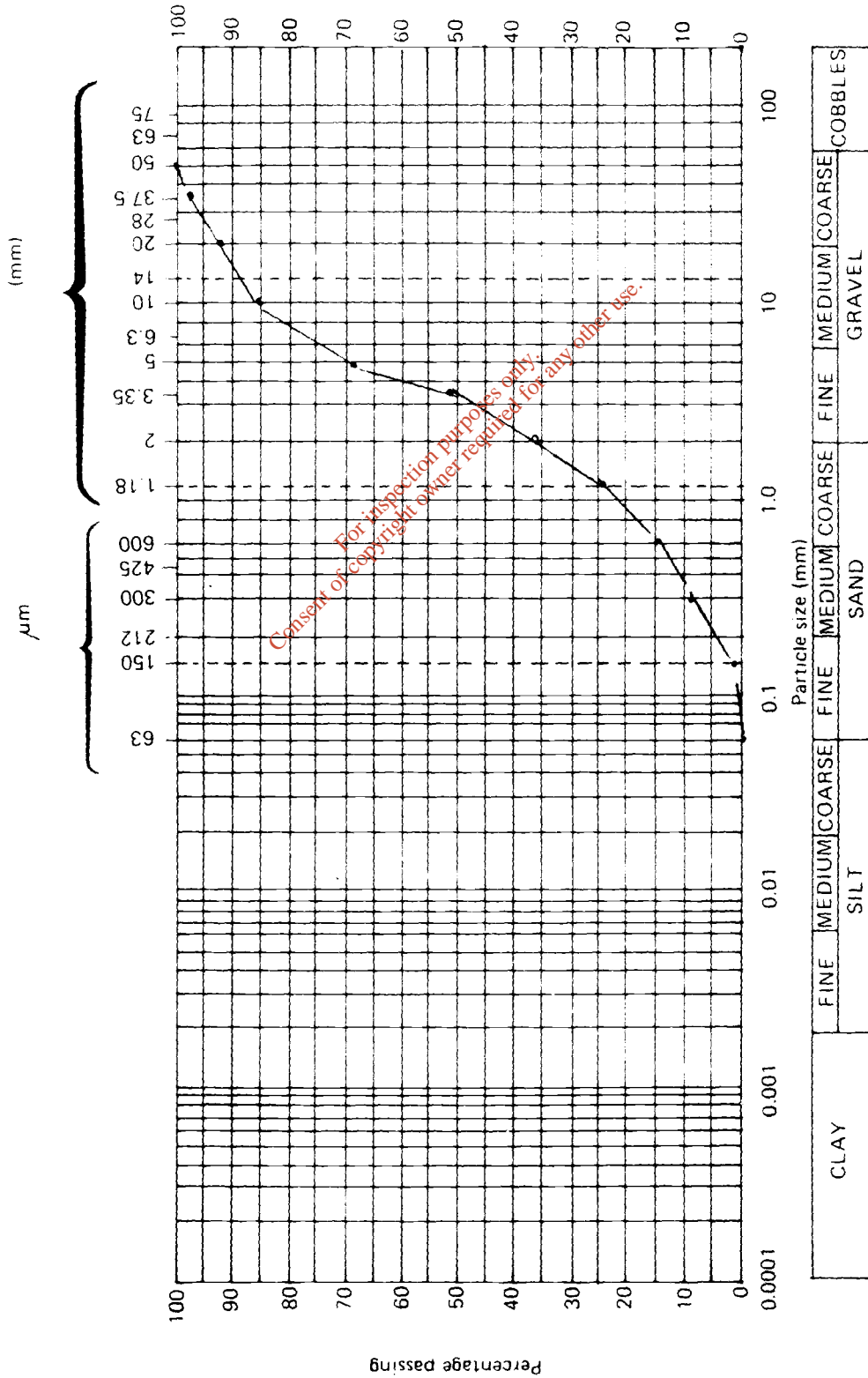
Wet Sieve

Sample No. **7248**

Depth **0.90**

Sample Description

Grey brown sandy GRAVEL



Report No

PARTICLE SIZE ANALYSIS

Contract

KNOCK - CLAREMORRIS

Borehole No.

15625

Method of Test

Wet Sieve

Sample No.

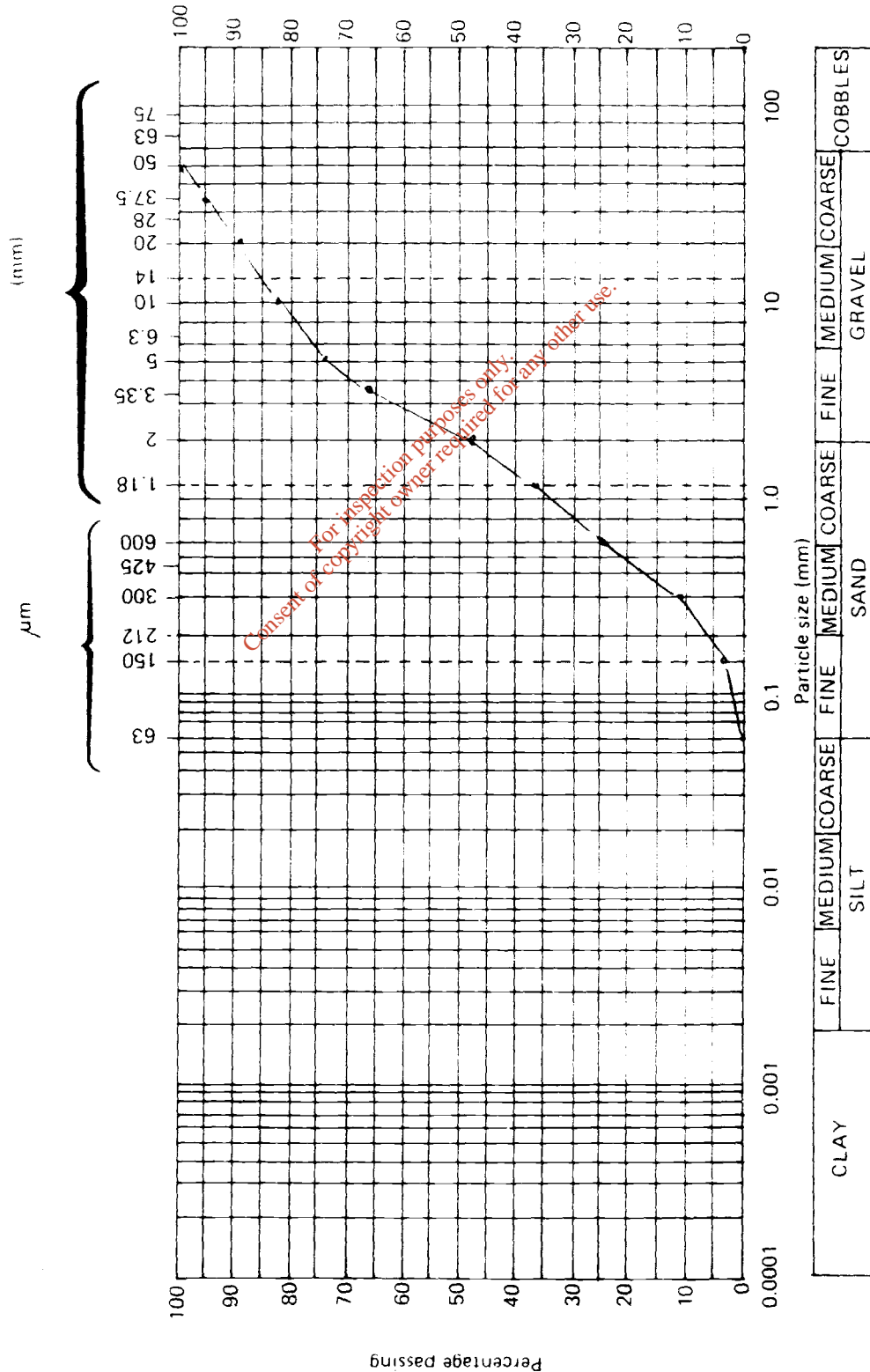
7259

Depth

1.00

Sample Description

Brown sandy GRAVEL



Report No.		CALIFORNIA BEARING RATIO					IGSL				
Contract								KNOCK - CLAREMORRIS			
Location	Sample No	Depth of Sample	Description of Sample	Water Content (% dry Weight)	Dry Density Mg/m ³	Test Code	Top Water Content %	Base Water Content %	C.B.R.		
									Top %	Base %	Average %
Ch. 800	2278	4.50	Grey silty sandy GRAVEL			95% St. H			11.0	11.6	11.3
3200	2286	1.30	Grey silty sandy gravelly CLAY	15.2		95% St. H			3.8	3.7	3.75
4325	2299	1.50	Brown silty sandy CLAY	17.3		do			0.9	1.2	1.15
6200	2298	2.50	Grey brown silty sandy GRAVEL			95% St. H			16.3	16.5	16.4
7025	7208	2.00	Grey silty sandy gravelly CLAY	13.7		95% St. H			3.6	3.5	3.55
8525	7217	1.00	Brown silty CLAY	16.5		do			2.5	2.7	2.6
8525	7218	2.00	Grey sandy gravelly CLAY	12.9		do			4.5	4.4	4.45
9275	7215	1.00	Yellow-brown silty sandy CLAY	13.10		95% St. H			3.0	2.7	2.85
10500	7220	1.00	Grey sandy gravelly CLAY	12.9		do			3.2	3.2	3.2
11950	7231	1.00	Grey silty sandy gravelly CLAY	14.21		95% H			3.7	3.6	3.65
13775	7248	0.90	Fine to coarse very sandy GRAVEL						11.8	12.2	12.0
14025	7250	1.00	Grey silty CLAY, some organic fibres and small gravel-sized stone	21.37					0.7	0.7	0.7
Test Code			St. - Static Compaction D - Dynamic Compaction U - Undisturbed Sample				A/5 - 5% Air Voids Ratio A/10 - 10% Air Voids Ratio				V - Vibrating Hammer M - BSI377 Method number (ex. D.L.M.I.)

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Report No.		CALIFORNIA BEARING RATIO				IGSL					
Contract											
KNOCK - CLAREMORRIS											
Location	Sample No	Depth of Sample	Description of Sample	Water Content (% dry Weight)	Dry Density Mg/m ³	Test Code	Top Water Content %	Base Water Content %	C.B.R.		
									Top %	Base %	Average %
14675	7253	1.00	Brown sandy gravelly CLAY	16.52					1.90	1.80	1.85
15625	7259	1.00	Grey-brown sandy GRAVEL			95% St. H			13.6	13.2	13.4
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Test Code		St. - Static Compaction D - Dynamic Compaction U - Undisturbed Sample		L - 2.5 kg Rammer H - 4.5 kg Rammer		A/5 - 5% Air Voids Ratio A/10 - 10% Air Voids Ratio		V - Vibrating Hammer M - BS1377 Method number (ex. D.L.M.I.)			

Report No.		TRIAXIAL COMPRESSION TEST										
Contract												
KNOCK - CLAREMORRIS												
Borehole No.	Sample No.	Depth (Metres)	Description of Sample	Triaxial Compression						Remarks		
				Test Code	Lateral Pressure kN/m ²	Compression Strength kN/m ²	Cohesion kN/m ²	Angle of Friction (degrees)	Bulk Density Mg/m ³		Water Content % dry Weight	
1250L	2271	1.50	Grey silty sandy gravelly CLAY	38U R	100 200 300	170 190 200	93	0	1.97 1.99 1.98	13.41 13.63 13.77		
Triaxial Compression Code:				38 · 38mm dia specimen	U · Undrained	M · Multi-stage						
				102 · 102mm dia specimen	CD · Consolidated Drainer	R · Remoulded						
					CU · Consolidated Undrained							

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Report No		CLASSIFICATION TEST RESULTS						
Contract		KNOCK - CLAREMORRIS						
Borehole No	Sample No	Depth (Metres)	Sample Description	Percentage Passing 425 µm Sieve	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)	Water Content
800	2276	2.50	Brown silty PEAT					193.0
2400	2280	2.00	Brown silty fibrous PEAT					236.0
	2282	4.20	Grey white very silty MARL		56	35	21	57.7
4325	7202	2.00	Grey brown silty CLAY		29	17	12	13.4
10500	7220	1.00	Grey sandy gravelly CLAY		28	18	10	12.9

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REPORT NO.

CHEMICAL ANALYSIS

IGSL

CONTRACT

KNOCK - CLAREMORRIS

BOREHOLE NO	SAMPLE NO	DEPTH (METRES)	SAMPLE TYPE	TEST CODE	SULPHUR TRIOXIDE		pH VALUE
					PARTS SO ₃ PER 100,000 WATER	PER CENT SO ₃ SOIL	
12502	2269		Water	-	17.2		7.6
18756	2295	2.20	Clay	S		0.04	7.5
9600 (L)	7210	1.00	Peaty clay	S		0.11	7.6
9600	7222	1.50	Gravelly Clay	S		Negligible	7.5
11150L	7224	1.00	Clay	S		0.07	7.6
1150R	7228	1.00	Clay	S		0.05	7.6

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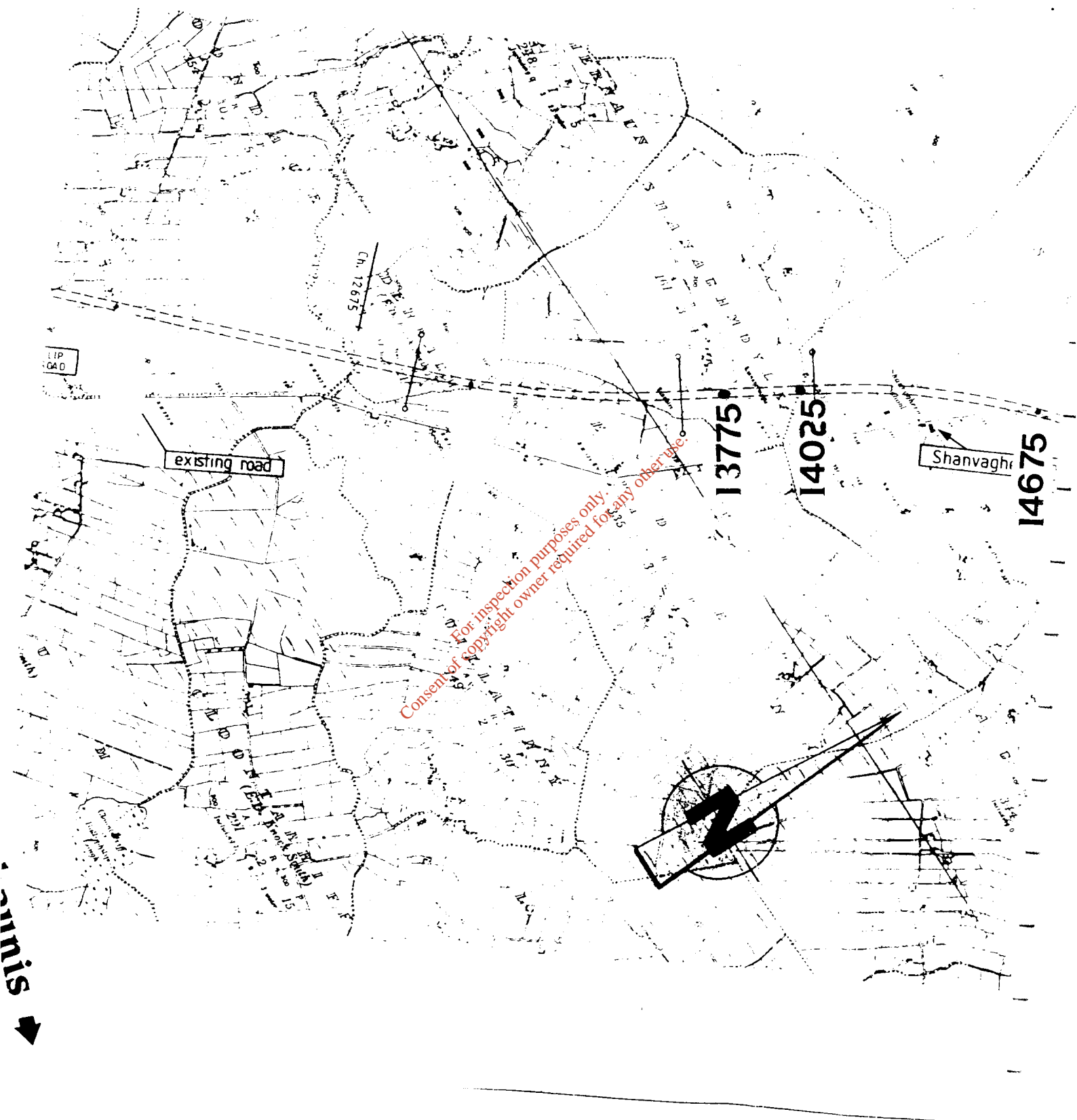
TEST CODE W - WATER

S - SOIL

A - AQUEOUS SOIL EXTRACT.

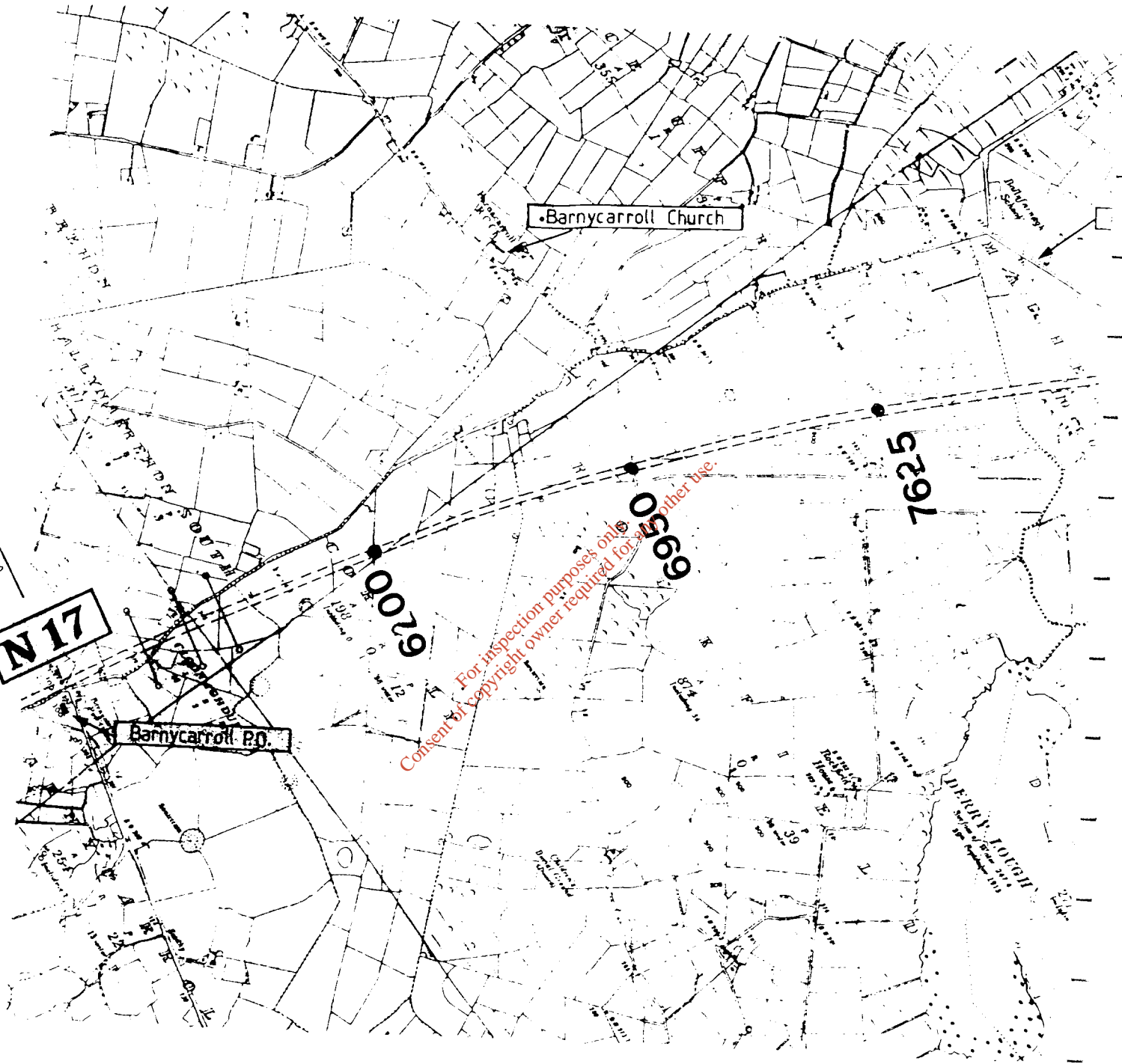
APPENDIX III SITE PLAN

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N17

Barnycarroll R.O.

Barnycarroll Church

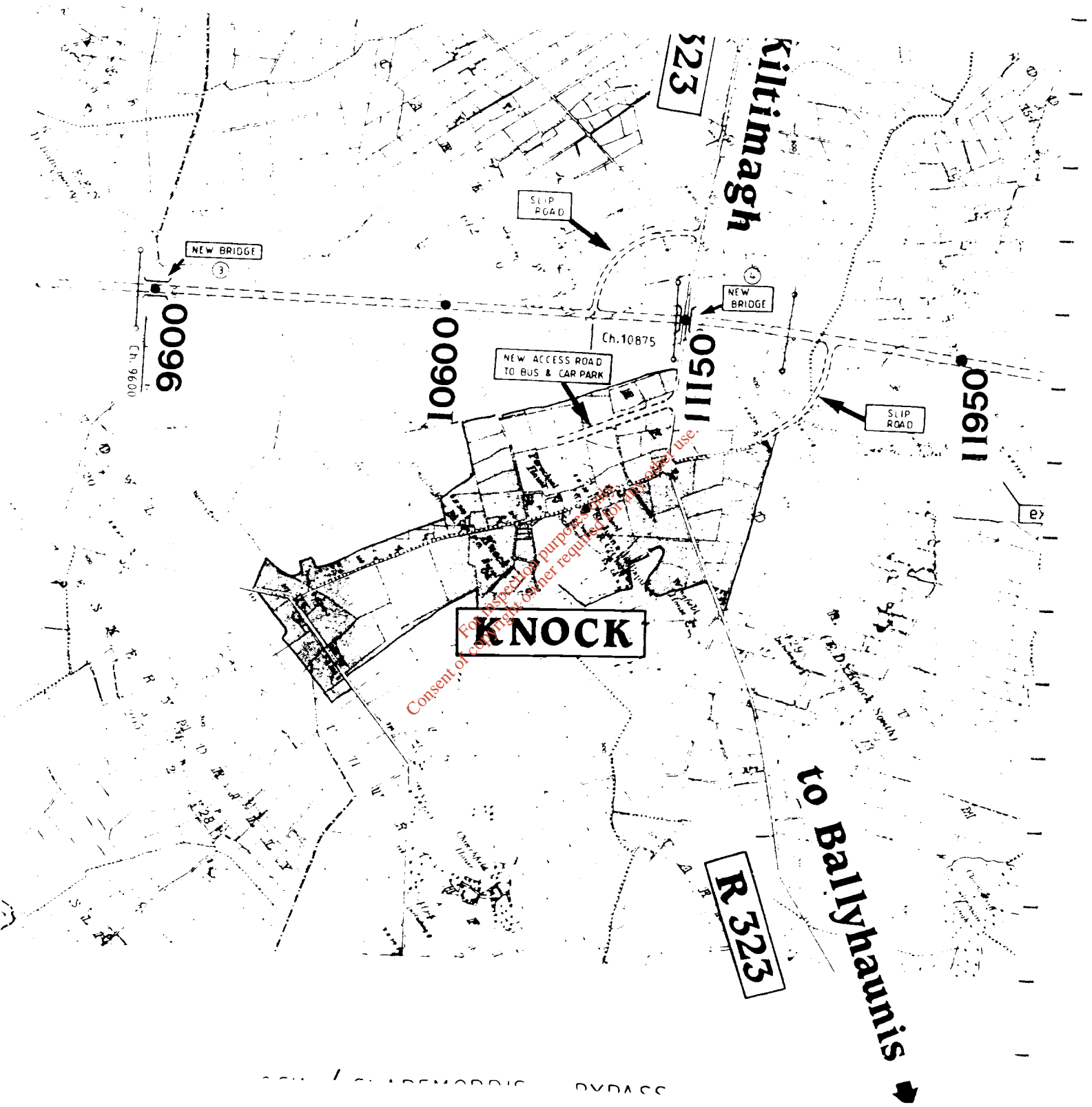
6200

6960

7625

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MAP 2



CLAREMORRIS

800

1250

NEW BRIDGE OVER RAILWAY

SLIP ROAD

existing road

NEW BRIDGE

St Colmans Co

HEME

1875

2400

3200

09 N

to Ballyhannis

5193

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