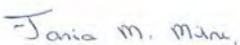


Dalgety Bay

Appropriate Person Report

Appendix 3

Author	Miss Nina Patton		26 June 2013
Reviewed	Dr James Gemmill		27 June 2013
Approved for Release	Ms Janice Milne		27 June 2013

From: Michael McArdle
Sent: 25 March 2013 16:43
To: Patton, Nina
Subject: Dalgety Bay Information
Attachments: Hillend_1964.pdf

Nina,
our technicians did a bit of wizardry and produced the attached. Quite different now and few reliable reference points.

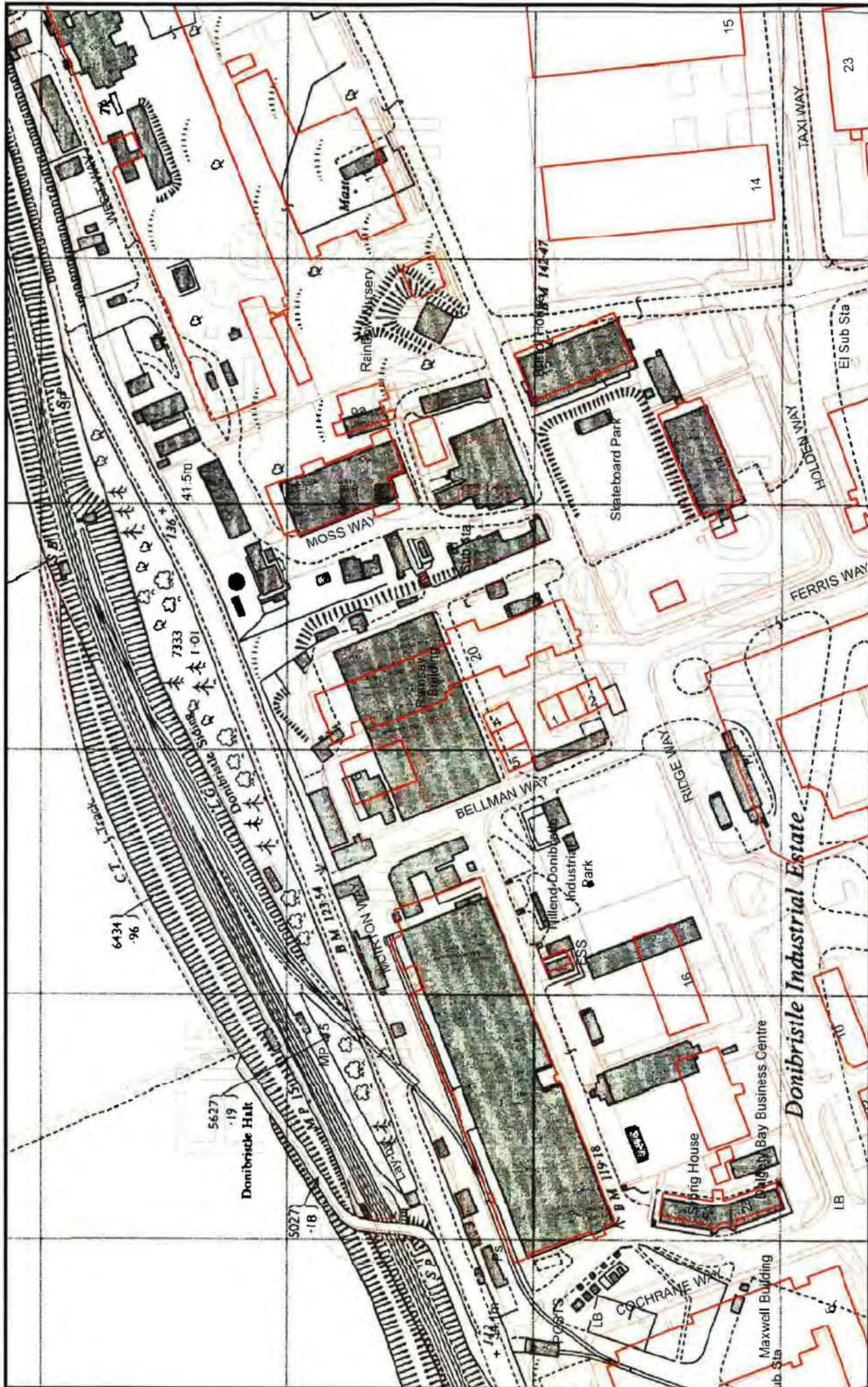
The dark is from an old OS plan and the red is the current OS.

Based on this I don't think Building 26 exists. It was adjacent to what is now Rainbow Nursery.

Hope this assists.

Michael

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Fife Council



Hillend Industrial Estate

Prepared By: Jhannay
 Service: Property Services - Estates
 Printing Date: 25/03/2013

N

Scale: 1:2,000

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From: Patton, Nina
Sent: 21 December 2012 13:16
To:
Subject: Dalgety Bay Information

SEPA are currently undertaking an Appropriate Persons investigation as part of their duties under Part IIA for the Dalgety Bay site. As part of this we are currently looking at the land history and also the activities that were carried out at the site.

Following email dated 21/12/12 giving your contact details would you be able to provide any information regarding the following:

- Correspondence with Dalgety Bay Sailing Club (re: Slipways, Rock Armour, when and where these were emplaced and maintained);
- Information regarding responsibilities for coastal defence in the Dalgety Bay vicinity and any works carried out.

Your help would be much appreciated. If you have any queries about the above please do not hesitate to contact me.

Regards
Nina

Nina Patton

Contaminated Land Specialist (East Region)
Scottish Environment Protection Agency,
Clearwater House, Heriot Watt Research Park,
Avenue North, Riccarton, Edinburgh, EH14 4AP

m: t: 0131 449 8578
e: nina.patton@sepa.org.uk web: www.sepa.org.uk

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Your help would be much appreciated. If you have any queries about the above please do not hesitate to contact me.

Regards
Nina

Nina Patton

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Scottish Environment Protection Agency,
Clearwater House, Heriot Watt Research Park,
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From: Patton, Nina
Sent: 21 December 2012 13:16
To: 'Michael.McArdle'
Subject: Dalgety Bay Information
Attachments: Building 26 Location.doc

Michael

SEPA are currently undertaking an Appropriate Persons investigation as part of their duties under Part IIA for the Dalgety Bay site. As part of this we are currently looking at the land history and also the activities that were carried out at the site.

Following email dated 21/12/12 giving your contact details would you be able to provide any information regarding the following:

- Information regarding former operational Building 26: according to MoD, Fife Council (or predecessor) took a responsibility for Building 26 (Please see attached location plan - located between the area currently known as Taxi Way and Merlin Way (NGR NT 16100 84107)) and other areas. In addition, they took responsibilities for coastal defence.

Your help would be much appreciated. If you have any queries about the above please do not hesitate to contact me.

Regards
Nina

Nina Patton

Contaminated Land Specialist (East Region)
Scottish Environment Protection Agency,
Clearwater House, Heriot Watt Research Park,
Avenue North, Riccarton, Edinburgh, EH14 4AP

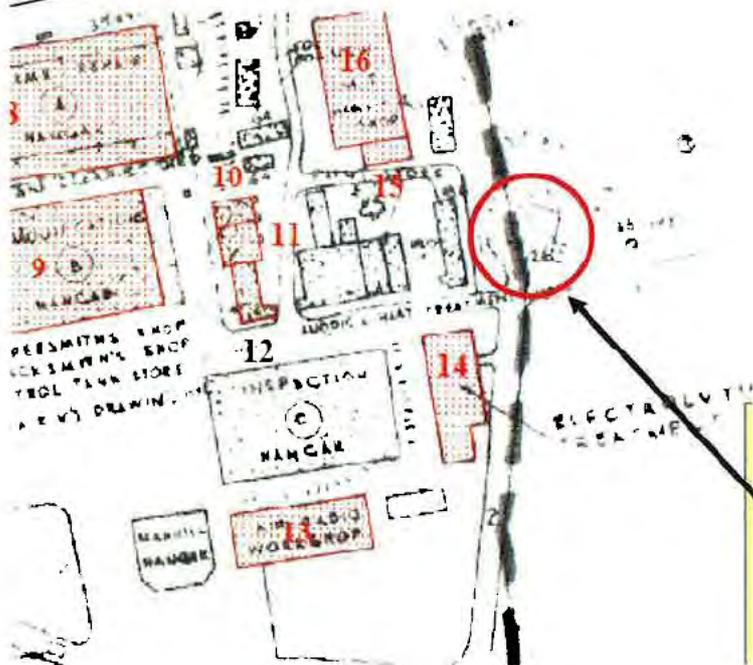
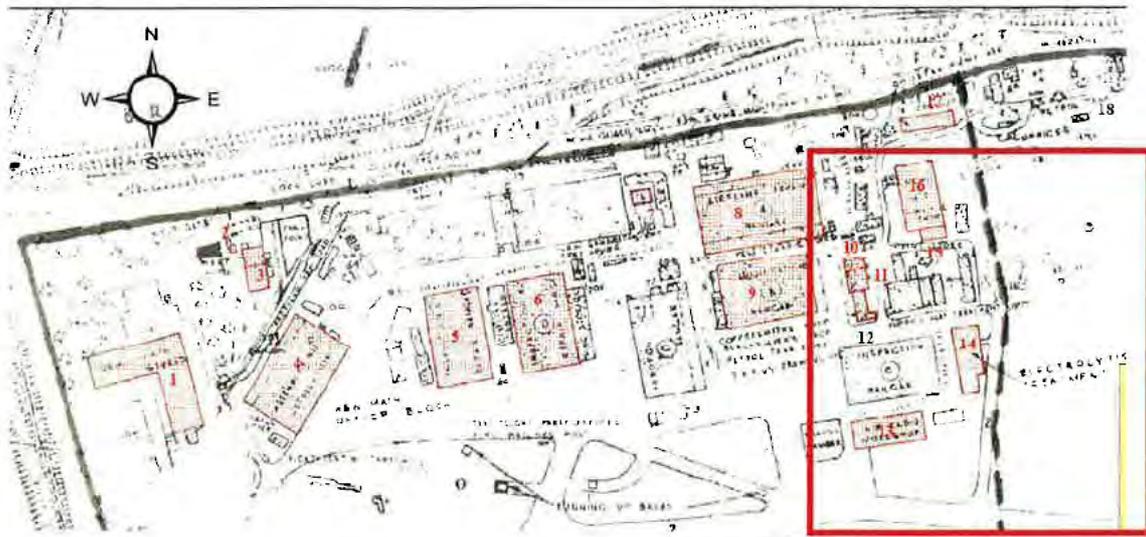
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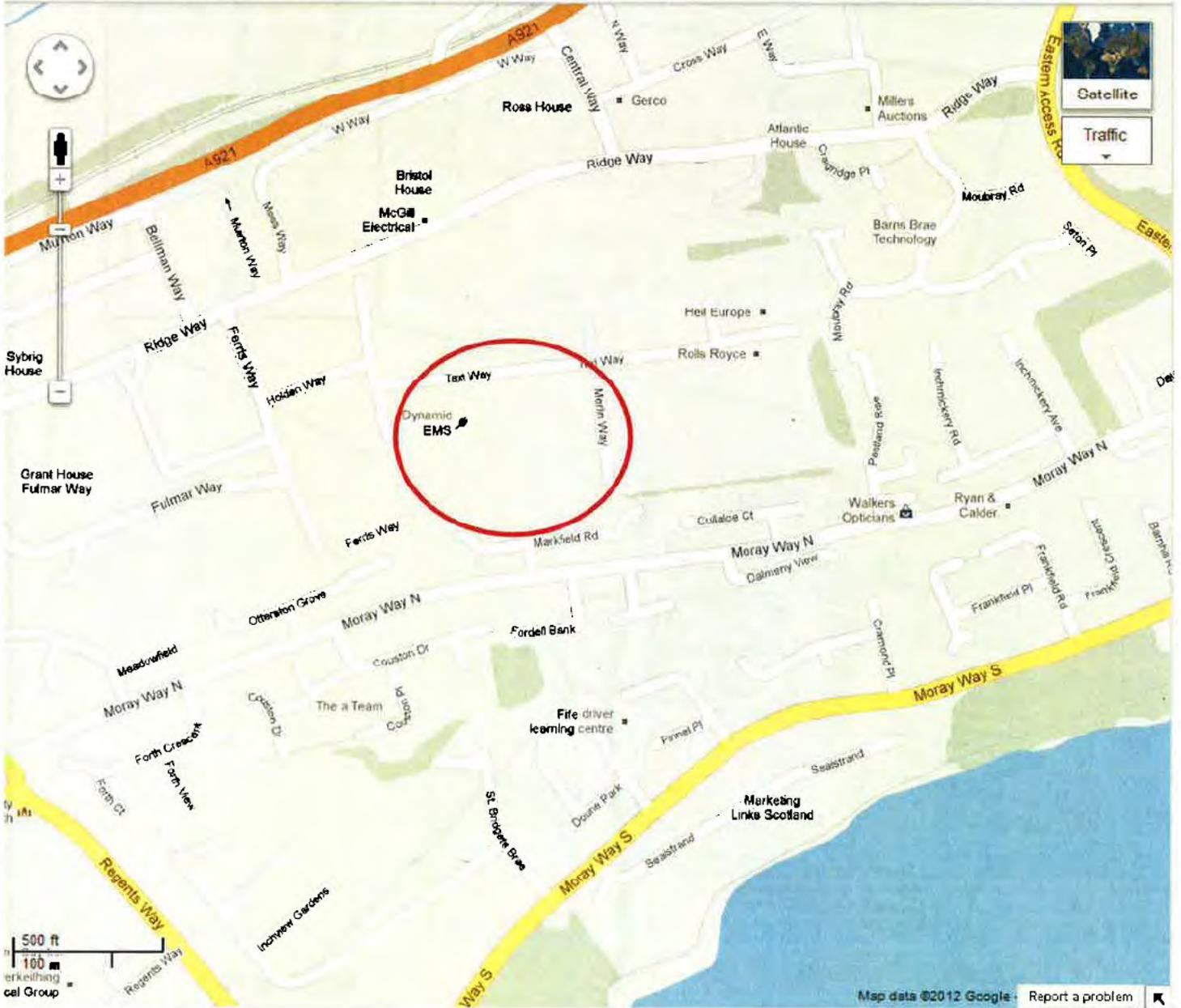
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Operational Layout



Building 26
Approximate Grid
Ref: NGR NT 16100
84107

Current Location



From: Patton, Nina
Sent: 18 December 2012 09:30
To:
Cc: Toner, Mark; Dale, Paul; Hamilton, James
Subject: Dalgety Bay Information
Attachments: Building 26 Location.doc

I'm not sure if you're the correct person to contact or not within the council but you may be able to indicate who is.

SEPA are currently undertaking an Appropriate Persons investigation as part of their duties under Part IIA for the Dalgety Bay site. As part of this we are currently looking at the land history and also the activities that were carried out at the site.

We are looking for information about the following:

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Your help would be much appreciated. If you have any queries about the above please do not hesitate to contact me.

Regards
Nina

Nina Patton
Contaminated Land Specialist (East Region)
Scottish Environment Protection Agency,
Clearwater House, Heriot Watt Research Park,
Avenue North, Riccarton, Edinburgh, EH14 4AP

m: 0131 440 8578
e: nina.patton@sepa.org.uk web: www.sepa.org.uk

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19/06/2013

From:
Sent: 02 April 2013 13:56
To: Patton, Nina
Subject: FW: Dalgety Bay Information

Hi Nina

I have picked up your email below

Could you clarify what you are hoping to locate through our planning history search so that we could search our records more efficiently.

Also, a timeframe and radius would also assist.

Regards

From: Patton, Nina [Nina.Patton@sepa.org.uk]
Sent: 25 March 2013 13:46
To:
Subject: RE: Dalgety Bay Information

Hi Mags

I wonder if you could let me know if you have any information pertaining to the email I sent on 21/12/12 regarding planning permissions for Dalgety Bay?

Just to re-cap:

SEPA are currently undertaking an Appropriate Persons investigation as part of their duties under Part IIA for the Dalgety Bay site. As part of this we are currently looking at the land history and also the activities that were carried out at the site.

Following email dated 21/12/12 giving your contact details would you be able to provide any information regarding the following:

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Your help would be much appreciated. If you have any queries about the above please do not hesitate to contact me.

Regards
Nina

Nina Patton
Senior Policy Officer - Radioactive Substances Unit
Scottish Environment Protection Agency,
Clearwater House, Heriot Watt Research Park,

19/06/2013

Avenue North, Riccarton, Edinburgh, EH14 4AP
t: 0131 449 8578
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From:
Sent: 14 February 2013 09:09
To: Patton, Nina
Subject: RE: Dalgety Bay Information

Hi Nina

This was passed on to our Technicians to deal with. I will chase up.

Regards

From: Patton, Nina [Nina.Patton@sepa.org.uk]
Sent: 13 February 2013 13:27
To:
Subject: RE: Dalgety Bay Information

Hi

I wonder if you could let me know if you have any information pertaining to the email I sent on 21/12/12 regarding planning permissions for Dalgety Bay?

Just to re-cap:

SEPA are currently undertaking an Appropriate Persons investigation as part of their duties under Part IIA for the Dalgety Bay site. As part of this we are currently looking at the land history and also the activities that were carried out at the site.

Following email dated 21/12/12 giving your contact details would you be able to provide any information regarding the following:

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Your help would be much appreciated. If you have any queries about the above please do not hesitate to contact me.

Regards
Nina

Nina Patton
Contaminated Land Specialist (East Region)

19/06/2013

Scottish Environment Protection Agency,
Clearwater House, Heriot Watt Research Park,
Avenue North, Riccarton, Edinburgh, EH14 4AP

t: 0131 449 8578

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From: Patton, Nina
Sent: 21 December 2012 13:16
To:
Subject: Dalgety Bay Information

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From:
Sent: 21 December 2012 10:14
To: Patton, Nina
Cc: Hamilton, James; Toner, Mark; Dale, Paul
Subject: Re: Dalgety Bay Information

Nina
In response to your enquiries

- Planning Applications - Information may be available from [redacted] or [redacted] Development Management
- This service holds no correspondence with the Sailing Club regarding slipways, rock armour etc. This may have been the subject of correspondence with the former Leisure and Recreation Dept Dunfermline District Council [redacted] or Fife Regional Council Engineering Services. The current coastal defence responsibility rests with Transportation & Environmental Services
- Regarding Building 26 contact should be made with [redacted] Estates and/or [redacted] Legal Services
- Anecdotal information suggests that material from the aircraft repair yard was disposed of at Ballast Bank Inverkeithing. Fife Council has not undertaken any prioritisation or investigation on scrapyards in Inverkeithing

Regards

"Think Green" and only print this email if absolutely necessary

>>> "Patton, Nina" <Nina.Patton@sepa.org.uk> 18/12/2012 09:29 >>>

I'm not sure if you're the correct person to contact or not within the council but you may be able to indicate who is.

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We are looking for information about the following:

- Planning Applications. Developments (house extensions) in the vicinity of the site. Particularly [redacted] the owner of this house told us that [redacted] was told to install a surface water drain as part of [redacted] planning consent. During the construction of the drain, [redacted] advised that the workmen removed all sorts of instrument panels/dials and rock. This drains directly onto the beach through a flange. The coordinates of this point are [redacted]
- Correspondence with Dalgety Bay Sailing Club (re: Slipways, Rock Armour, when and where these

19/06/2013

were emplaced and maintained)

- Information regarding former operational Building 26: according to MoD, Fife Council (or predecessor) took a responsibility for Building 26 (Please see attached location plan - located between the area currently known as Taxi Way and Merlin Way (NGR NT 16100 84107)) and other areas. In addition, they took responsibilities for coastal defence.
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Your help would be much appreciated. If you have any queries about the above please do not hesitate to contact me.

Regards
Nina

Nina Patton

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t: 0131 449 8578

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Fife Council

From:
Sent: 25 March 2013 14:56
To: Patton, Nina
Subject: RE: Dalgety Bay Information

Hi Nina,

Please accept my apologies for not replying sooner. I have been with the council for 5 years and can only comment on the extent of records that we currently hold.

Answers to your questions as follows:

- 1) We do not hold any records of coastal defence works in the vicinity of the Sailing Club. The closest records are at St David's Bay, at the west of Dalgety Bay.
- 2) We do not have any records of dates or permissions for the slipways and rock armour, other than referring to historic OS maps. The reclaimed land in front of the clubhouse is a landfill tip between 1959 & 1967, noted as disused by 1970. There are two slipways at the headland, either side of the IRB station. The eastern slipway appears between 1970 & 1978 and the western slipway is some time after that. There is a change in the MHWS at the headland between 1970 & 1978 whereafter it adopts the current location.
- 3) We are not aware of any proposed works in the area.
- 4) The Fife Shoreline Management Plan is available at www.fifedirect.org.uk/shoreline. Please refer to unit 13 in the summary plan which allows for a policy of Hold the Line, with reference to your work. There is a potential for flooding/intertidal gain at Ross Plantation which may or may not be possible dependant on your recommendations.

I would, of course, be interested in anything that you can turn up. Feel free to call if you would like to discuss anything.

Regards,

From: Patton, Nina [mailto:Nina.Patton@sepa.org.uk]
Sent: 25 March 2013 13:53
To:
Subject: RE: Dalgety Bay Information

Just chasing whether or not you had come across any information on the following for the Dalgety Bay site:

19/06/2013

1. Any works carried out to coastal defences in the Dalgety Bay vicinity
2. Any information regarding the slipways and rock armour emplaced by Dalgety Bay Sailing Club (dates, permissions)
3. Any proposed works coming up in the near future
4. Fife Council policy for the area in terms of coastal erosion i.e. permitted retreat of the coastline or defend the current coastline from coastal erosion

If you want to discuss this further then please feel free to call me – my contact details are below.

Regards
Nina

Nina Patton

Senior Policy Officer - Radioactive Substances Unit

Scottish Environment Protection Agency,

Clearwater House, Heriot Watt Research Park,

Avenue North, Riccarton, Edinburgh, EH14 4AP

t: 0131 449 8578

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From: Patton, Nina
Sent: 13 February 2013 13:25
To
Subject: RE: Dalgety Bay Information

Just chasing whether or not you had come across any information on the following for the Dalgety Bay site:

5. Any works carried out to coastal defences in the Dalgety Bay vicinity
6. Any information regarding the slipways and rock armour emplaced by Dalgety Bay Sailing Club (dates, permissions)
7. Any proposed works coming up in the near future
8. Fife Council policy for the area in terms of coastal erosion i.e. permitted retreat of the coastline or defend the current coastline from coastal erosion

If you want to discuss this further then please feel free to call me – my contact details are below.

Regards
Nina

Nina Patton

Contaminated Land Specialist (East Region)

Scottish Environment Protection Agency,

Clearwater House, Heriot Watt Research Park,

Avenue North, Riccarton, Edinburgh, EH14 4AP

19/06/2013

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From: Patton, Nina
Sent: 14 January 2013 10:22
To: '
Subject: RE: Dalgety Bay Information

Basically we're looking for information on the following:

9. Any works carried out to coastal defences in the Dalgety Bay vicinity
10. Any information regarding the slipways and rock armour emplaced by Dalgety Bay Sailing Club (dates, permissions)
11. Any proposed works coming up in the near future
12. Fife Council policy for the area in terms of coastal erosion i.e. permitted retreat of the coastline or defend the current coastline from coastal erosion

If you want to discuss this further then please feel free to call me – my contact details are below.

Regards
Nina

Nina Patton
Contaminated Land Specialist (East Region)
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From:
Sent: 08 January 2013 12:16
To: Patton, Nina
Subject: Re: Dalgety Bay Information

Hi Nina,

Please give me a call to discuss what you need,

19/06/2013

Thanks,

Winners of Scottish Transport Local Authority of the Year 2010 and 2011

"Think Green" and only print this email if absolutely necessary

>>> "Patton, Nina" <Nina.Patton@sepa.org.uk> 21/12/2012 13:15 >>>

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Your help would be much appreciated. If you have any queries about the above please do not hesitate to contact me.

Regards
Nina

Nina Patton

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Avenue North, Riccarton, Edinburgh, EH14 4AP

t: 0131 449 8578

e: nina.patton@sepa.org.uk web: www.sepa.org.uk

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19/06/2013

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Fife Council

From: Patton, Nina
Sent: 03 April 2013 14:29
To:
Subject: RE: Dalgety Bay Information
Attachments: DB Radius.doc; Copy of File Req to Fife Council.xls

Hi

Thanks for getting back to me.

We have been requesting information from Fife Council Archive (see attached list). This mainly covers building warrants up to 1968.

In addition it would be helpful if you could search for planning applications from major development (i.e. by housing developers) for between 1945 and 1980 in the vicinity of Dalgety Bay – please see attached location map for radius. It is a large area and we are not looking for individual house planning applications or extensions rather any permissions for the larger scale developments that would give rise to large volumes of spoil.

At [redacted] the owner of this house told us that [redacted] was told to install a surface water drain as part of [redacted] planning consent. During the construction of the drain, [redacted] advised that the workmen removed all sorts of instrument panels/dials and rock. This drains directly onto the beach through a flange. The coordinates of this point are [redacted]. We would be interested in any documentation relating to this.

Let me know if there are any problems with this or whether you need further information.

Regards
Nina

Nina Patton
Senior Policy Officer - Radioactive Substances Unit
Scottish Environment Protection Agency,
Clearwater House, Heriot Watt Research Park,
Avenue North, Riccarton, Edinburgh, EH14 4AP
t: 0131 449 8578
e: nina.patton@sepa.org.uk web: www.sepa.org.uk

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From:
Sent: 02 April 2013 13:56
To: Patton, Nina
Subject: FW: Dalgety Bay Information

Hi Nina

I have picked up your email below

19/06/2013

Could you clarify what you are hoping to locate though our planning history search so that we could search our records more efficiently.

Also, a timeframe and radius would also assist.

Regards

From: Patton, Nina [Nina.Patton@sepa.org.uk]

Sent: 25 March 2013 13:46

To:

Subject: RE: Dalgety Bay Information

I wonder if you could let me know if you have any information pertaining to the email I sent on 21/12/12 regarding planning permissions for Dalgety Bay?

Just to re-cap:

SEPA are currently undertaking an Appropriate Persons investigation as part of their duties under Part IIA for the Dalgety Bay site. As part of this we are currently looking at the land history and also the activities that were carried out at the site.

Following email dated 21/12/12 giving your contact details would you be able to provide any information regarding the following:

- Planning Applications, Developments (house extensions) in the vicinity of the site. Particularly the owner of this house told us that was told to install a surface water drain as part of planning consent. During the construction of the drain, advised that the workmen removed all sorts of instrument panels/dials and rock. This drains directly onto the beach through a flange. The coordinates of this point are

Your help would be much appreciated. If you have any queries about the above please do not hesitate to contact me.

Regards
Nina

Nina Patton

Senior Policy Officer - Radioactive Substances Unit

Scottish Environment Protection Agency,

Cleanwater House, Heriot Watt Research Park,

Avenue North, Riccarton, Edinburgh, EH14 4AP

t: 0131 449 8578

e: nina.patton@sepa.org.uk web: www.sepa.org.uk

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SEPA registered office, Crown Court, Castle Business Park, Strath, FK9 4JH. Under the Regulation of Investigatory Powers Act 2000, the above

19/06/2013

system at SEPA may be subject to monitoring from time to time.

From:
Sent: 14 February 2013 09:09
To: Patton, Nina
Subject: RE: Dalgety Bay Information

Hi Nina

This was passed on to our Technicians to deal with. I will chase up.

Regards

From: Patton, Nina [Nina.Patton@sepa.org.uk]
Sent: 13 February 2013 13:27
To:
Subject: RE: Dalgety Bay Information

I wonder if you could let me know if you have any information pertaining to the email I sent on 21/12/12 regarding planning permissions for Dalgety Bay?

Just to re-cap:

SEPA are currently undertaking an Appropriate Persons investigation as part of their duties under Part IIA for the Dalgety Bay site. As part of this we are currently looking at the land history and also the activities that were carried out at the site.

Following email dated 21/12/12 giving your contact details would you be able to provide any information regarding the following:

- Planning Applications, Developments (house extensions) in the vicinity of the site. Particularly the owner of this house told us that was told to install a surface water drain as part of planning consent. During the construction of the drain, advised that the workmen removed all sorts of instrument panels/dials and rock. This drains directly onto the beach through a flange. The coordinates of this point are

Your help would be much appreciated. If you have any queries about the above please do not hesitate contact me.

Regards
Nina

Nina Patton
Contaminated Land Specialist (East Region)
Scottish Environment Protection Agency,
Cleanwater House, Heriot Watt Research Park,
Avenue North, Riccarton, Edinburgh, EH14 4AP

: 0131 449 8578
e: nina.patton@sepa.org.uk web: www.sepa.org.uk

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From: Patton, Nina
Sent: 21 December 2012 13:16
To:
Subject: Dalgety Bay Information

SEPA are currently undertaking an Appropriate Persons investigation as part of their duties under Part IIA for the Dalgety Bay site. As part of this we are currently looking at the land history and also the activities that were carried out at the site.

Following email dated 21/12/12 giving your contact details would you be able to provide any information regarding the following:

- Planning Applications, Developments (house extensions) in the vicinity of the site. Particularly the owner of this house told us that was told to install a surface water drain as part of planning consent. During the construction of the drain, he advised that the workmen removed all sorts of instrument panels/dials and rock. This drains directly onto the beach through a flange. The coordinates of this point are

Your help would be much appreciated. If you have any queries about the above please do not hesitate to contact me.

Regards
Nina

Nina Patton
Contaminated Land Specialist (East Region)
Scottish Environment Protection Agency,
Clearwater House, Heriot Watt Research Park,
Avenue North, Riccarton, Edinburgh, EH14 4AP

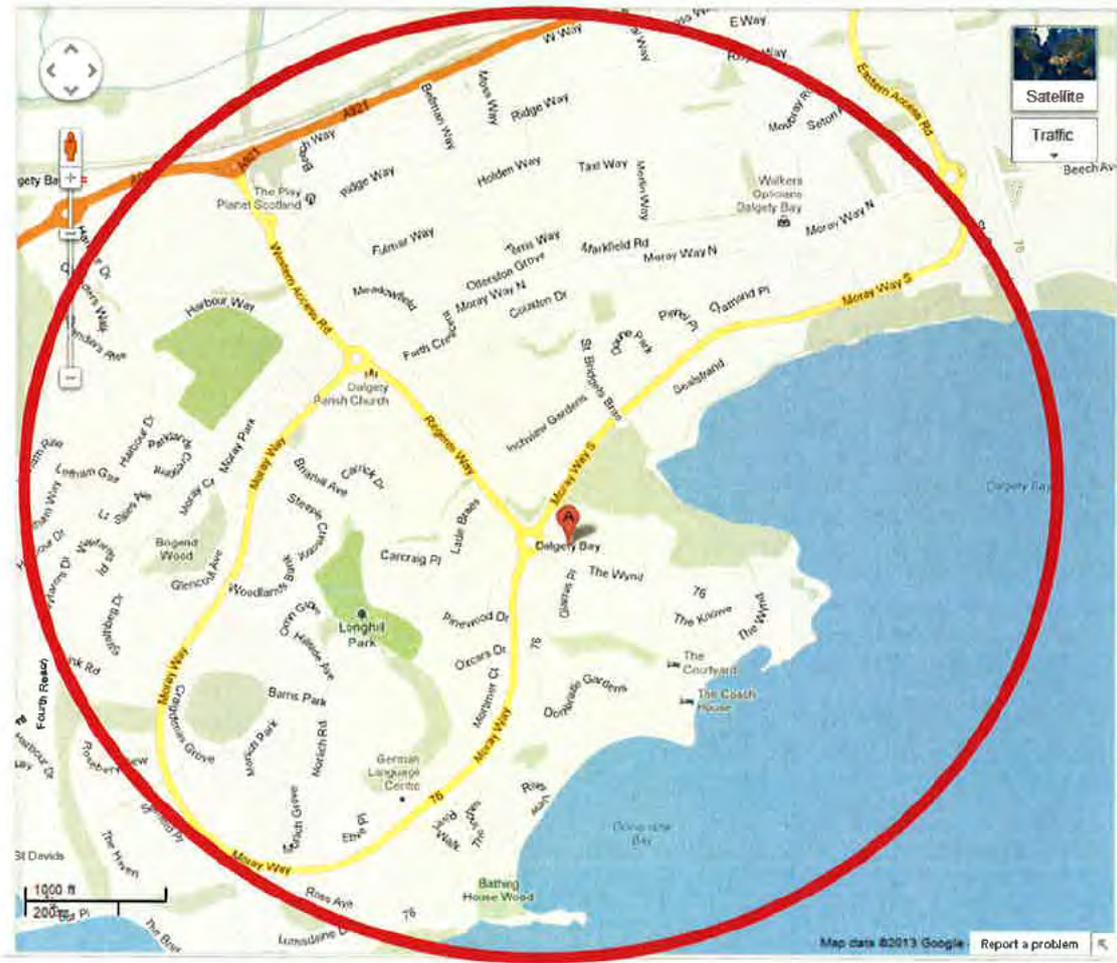
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e: nina.patton@sepa.org.uk web: www.sepa.org.uk

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Fife Council



From:
Sent: 07 January 2013 13:49
To: Patton, Nina
Subject: Re: Fwd: Dalgety Bay Information

Nina. Apologies for the delay in getting back to you but you will see we have drawn a blank. I was involved many years ago when this problem first appeared but there was very little concern at the time other than as a precautionary measure we stopped any community planting or works by our staff that might involve staff handling the soil and avoiding any contamination under their nails. We were responsible for the woods but next to no work was ever actioned here. I seem to recall a document from the radiological protection board comparing radioactivity in Dalgety bay with unaffected woodlands elsewhere but this will have predated email and will now have been disposed of long ago.

"Think Green" and only print this email if absolutely necessary

>>> , 1/7/2013 12:23 pm >>>
I have nothing at all on tis matter. Sorry

Beach & Coastal Officer

Fife Coast and Countryside Trust is a Company Limited by Guarantee, Scottish Company No. SC216254 and a Registered Scottish Charity, Charity No. SC031247. Its registered office is at The Harbourmaster's House, Dysart, Fife, KY1 2TQ.

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19/06/2013

www.tbgfs.co.uk

"Think Green" and only print this email if absolutely necessary

>>> 12/21/2012 1:46 pm >>>

Do you have anything here?

I was involved in discussions a long time ago but i think all the files will now be lost. this largely predates email!

"Think Green" and only print this email if absolutely necessary

>>> "Patton, Nina" <Nina.Patton@sepa.org.uk> 12/21/2012 1:15 pm >>>

SEPA are currently undertaking an Appropriate Persons investigation as part of their duties under Part IIA for the Dalgety Bay site. As part of this we are currently looking at the land history and also the activities that were carried out at the site.

Following email dated 21/12/12 giving your contact details would you be able to provide any information regarding the following:

- Correspondence with Dalgety Bay Sailing Club (re: Slipways, Rock Armour, when and where these were emplaced and maintained);
- Information regarding responsibilities for coastal defence in the Dalgety Bay vicinity and any works carried out.

Your help would be much appreciated. If you have any queries about the above please do not hesitate to contact me.

Regards
Nina

Nina Patton

Contaminated Land Specialist (East Region)
Scottish Environment Protection Agency,
Clearwater House, Heriot Watt Research Park,
Avenue North, Riccarton, Edinburgh, EH14 4AP

t: 0131 449 8578

e: nina.patton@sepa.org.uk web: www.sepa.org.uk

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From:
Sent: 10 June 2013 07:17
To: Dale, Paul
Subject: DBSC Ltd Response

Paul

Please see below responses to your questions.

This information has been collected from several of the longer standing members who were actually involved in much of this work at the time.

As a result this information is provided to the best of our ability and without prejudice.

If you require any additional information please contact DBSC Ltd and we will as ever do all we can to assist with this project.

1: who was contracted to build the clubhouse? **To the best of our knowledge no outside contractors were appointed, the work was carried out by the members, subject to meeting normal statutory requirements..**

2: Prior to the construction was the site fairly level? **We do not hold records or topographical information relating to our land before the clubhouse was built. We understand that sepa now hold detailed historical information and aerial photographs which may assist**

3: Was any levelling carried out prior to construction? **To the best of our knowledge the only part of the club grounds which had any significant ground works was the ground directly under the**

clubhouse prior to the building work being started.

4: Where was the material from the excavation of the foundation trenches disposed? **This was backfilled round the club and can be seen as the mounding to the south west and northern parts of the clubhouse at ground floor level**

5: The mound to the southern elevation of the clubhouse is constructed on – was this here prior to construction or created during construction? **As per point 4: this was created during the building phase of the club house utilising material from the foundation excavation. No additional fill materials were imported to site.**

6: Was material imported to create the mound or was onsite material re-used? **As per points 4: & 5: all the material contained within the southern mound is from the digging of the foundations both the main clubhouse and the later addition.**

7: How were the slipways and jetty constructed? Was this directly onto the beach? **The East Slip is built of concrete laid on the beach with re-bar reinforcement, the beach had a shallow (about 30cm deep) trench dug into the beach that runs down either side of the slipway to in effect form a shallow 'U' shape upside down. The West (or middle) slipway is also built directly onto the beach with out any reinforcement or side trenches. The Jetty I know it is built from 2 walls with "rubble" (taken from the beach) between and a concrete top.**

8: The renovation of the New Harbour – was any material brought onto site or was the onsite material re-used? **All the material used was recovered from the harbour. With the exception of the concrete capping that was added.**

9: When was the rock armour first placed on the Headland / Boat Park? **To the best of our recollection, the boat park was done in the early 80's. The headland I don't know about. Bar point 10**

10: Are there any dates and details as to when the rock armour was replenished over the years? **The original additional ground that was added to the headland (understood to be mainly small rocks and shale) was added from the construction site of the Forth Road Bridge. This was added to about 8-10 years ago with larger rocks armour which this rock also came from some additional work done for the forth road bridge.**

11: Provenance of material moved onto the site over the years? **As per the points above.**

Regards

Our Ref: JRH/BK
Your Ref:

Airwork Limited
33 Wigmore Street
LONDON
W1U 1QX

If telephoning ask for:
James Hamilton

28 March 2013

Dear Sirs

INVESTIGATION OF POTENTIALLY RADIOACTIVE CONTAMINATED LAND DALGETY BAY, FIFE

SEPA is Scotland's Environmental Regulator with wide ranging duties and powers relating to the protection of the environment. One of the more recent duties given to SEPA is the regulation of land which has been contaminated with radioactivity under the Radioactive Contaminated Land (Scotland) Regulations, which provide SEPA with powers to investigate potential radioactive contaminated land sites.

You may be aware that SEPA is involved in the investigation of potentially radioactive contaminated land at Dalgety Bay, Fife. There have been a number of reports in the public domain, some of which are available on our website, which relate to historic radium contamination of an area of beach at Dalgety Bay.

The Dalgety Bay Beach is near the former Royal Naval Air Station (RNAS) Donibristle, where radioactive radium based paints were used as a luminising agent on aircraft instruments.

To date, the MoD has not denied that the radium contamination is linked to historic MoD activities at RNAS Donibristle. However, part of SEPA's role under the Radioactive Contaminated Land Regulations is to fully investigate the chain of events that have led to the current presence of contaminants at the Dalgety Bay Beach.

SEPA has been investigating the clearance of the Air Station and the subsequent development of Dalgety Bay New Town in the 1960s. We understand that your company was contracted by the Ministry of Defence to run the airfield from around 1953 to 1959, which includes the period in which some of the buildings on the airfield would have been demolished. The demolition of these buildings, and the disposal of waste (including demolition waste) from the site, is going to be an important part of our investigation.

I would therefore like to discuss your knowledge of the site, including your involvement with the site, the history of the site, the development of the site, and whether you were or are aware of any existing contamination on the site or in the area.

Continued....



Chairman
David Sigsworth

Chief Executive
James Curran

Edinburgh Office

Clearwater House, Heriot Watt Research Park
Avenue North, Riccarton, Edinburgh EH14 4AP
tel 0131 449 7296 fax 0131 449 7277
www.sepa.org.uk

I would be grateful if you could confirm receipt of this letter, and advise whom should be the primary contact within your organisation to discuss this matter further.

Thank you for your assistance and I look forward to hearing from you.

Yours faithfully

James Hamilton
Solicitor

Fife Coast and Countryside Trust
The Harbourmaster's House,
Hot Pot Wynd
DYSART
Fife KY1 2TQ

If telephoning ask for:
James Hamilton

7 June 2013

Dear Sir/Madam

LAND INVESTIGATION AT DALGETY BAY, FIFE

As you are probably aware, SEPA is Scotland's Environmental Regulator with wide ranging duties and powers relating to the protection of the environment. One of the more recent duties given to SEPA is the regulation of land which has been contaminated with radioactivity under the Radioactive Contaminated Land (Scotland) Regulations, which provide SEPA with powers to investigate potential radioactive contaminated land sites.

You may also be aware that SEPA is involved in the investigation of potentially radioactive contaminated land at Dalgety Bay, Fife. There have been a number of reports in the public domain, some of which are available on our website, which relate to historic radium contamination of an area of beach at Dalgety Bay.

The Dalgety Bay Beach is near the former Royal Naval Air Station (RNAS) Donibristle, where radioactive radium based paints were used as a luminising agent on aircraft instruments.

To date, the MoD has not denied that the radium contamination is linked to historic MoD activities at RNAS Donibristle. However, part of SEPA's role under the Radioactive Contaminated Land Regulations is to fully investigate the chain of events that have led to the current presence of contaminants at the Dalgety Bay Beach.

I understand that the Trust maintains the Fife Coastal Path which runs close to the Dalgety Bay Beach and through the nearby Ross Plantation, which is part of the area SEPA has been investigating. I would therefore like to discuss your knowledge of the site, including your involvement with the site, and whether you were or are aware of any existing contamination on the site or in the area.

I would be grateful if you could confirm receipt of this letter, and advise whom should be the primary contact within your organisation to discuss this matter further.

Thank you for your assistance.

Yours faithfully

James Hamilton
Solicitor



Chairman
David Sigsworth

Chief Executive
James Curran

Edinburgh Office

Clearwater House, Heriot Watt Research Park
Avenue North, Riccarton, Edinburgh EH14 4AP
tel 0131 449 7296 fax 0131 449 7277
www.sepa.org.uk

Our Ref: JRH
Your Ref:

Anchor Construction Company Limited
15 Melville Street
Edinburgh
EH3 7PE

If telephoning ask for:
James Hamilton

6 March 2013

Dear Sirs

**Investigation of Potentially Radioactive Contaminated Land
Dalgety Bay, Fife**

As you are probably aware, SEPA is Scotland's Environmental Regulator with wide ranging duties and powers relating to the protection of the environment. One of the more recent duties given to SEPA is the regulation of land which has been contaminated with radioactivity under the Radioactive Contaminated Land (Scotland) Regulations, which provide SEPA with powers to investigate potential radioactive contaminated land sites.

You may also be aware that SEPA is involved in the investigation of potentially radioactive contaminated land at Dalgety Bay, Fife. There have been a number of reports in the public domain, some of which are available on our website, which relate to historic radium contamination of an area of beach at Dalgety Bay .

The Dalgety Bay Beach is near the former Royal Naval Air Station (RNAS) Donibristle, where radioactive radium based paints were used as a luminising agent on aircraft instruments. .

To date, the MoD has not denied that the radium contamination is linked to historic MoD activities at RNAS Donibristle. However, part of SEPA's role under the Radioactive Contaminated Land Regulations is to fully investigate the chain of events that have led to the current presence of contaminants at the Dalgety Bay Beach.

SEPA has been investigating the development of Dalgety Bay New Town in the 1960s and has been reviewing the available planning documentation. It appears that your company applied for Planning Consents for Plots 22, 23 and 26 of Phase 1 at Dalgety Bay in 1966.

I would therefore like to discuss your knowledge of the site, including your involvement with the site, the history of the site, the development of the site, and whether you were or are aware of any existing contamination on the site or in the area. To this end we seek to obtain information land ownership details and what files you may have that would assist with the investigation.

I would be grateful if you could confirm receipt of this letter, and advise whom should be the primary contact within your organisation to discuss this matter further.

Thank you for your assistance and I look forward to hearing from you.

Yours sincerely

James Hamilton
Solicitor

Our Ref: JRH
Your Ref:

John Sim
Commodore
Dalgety Bay Sailing Club
The Wynd
Dalgety Bay
KY11 9SJ

If telephoning ask for:
James Hamilton

26 March 2013

Dear Mr Sim

Dalgety Bay

I am writing to advise you that SEPA is currently investigating the history of the contamination at Dalgety Bay, and to invite you to submit any information which you think SEPA should take into account.

In terms of its duties under the Radioactive Contaminated Land (Scotland) Regulations 2007 SEPA is currently investigating the chain of events which led to the presence of radium contamination in the beach area at Dalgety Bay. Once that has been established, SEPA will be able to identify the persons responsible for the contamination. In terms of the legislation, those responsible are called "appropriate persons."

An "appropriate person" is any person who caused or knowingly permitted the substances by which the land is contaminated to be in, on or under that land and is responsible for the cost of any remediation required. If no such person can be found, then the owners and occupiers of the land are appropriate persons.

If you would like more information about the context and scope of our investigation, there is Statutory Guidance associated with the contaminated land legislation (Environment Protection Act 1990: Part IIA Contaminated Land Statutory Guidance: Edition 2, and Environment Protection Act 1990: Part IIA Contaminated Land The Radioactive Contaminated Land (Scotland) Regulations 2007 Statutory Guidance).

Chapter D of the Statutory Guidance explains the process by which SEPA is to attribute liability for contaminated land. There are three stages of this process which are relevant to Dalgety Bay:-

1. The identification of appropriate persons;
2. The exclusion of appropriate persons. The Statutory Guidance contains six Tests by which an appropriate person may be excluded from liability for contaminated land.
3. The apportionment of liability between any remaining appropriate persons.

If the land were formally designated as radioactive contaminated land, SEPA would be required to consult with anyone who would be affected by any identification, exclusion or apportionment. One of the reasons for doing so is to allow those affected an opportunity to provide SEPA with any information it thinks is relevant, and to make representations. This is set out in paragraphs D.36 and D.37 of the Statutory Guidance.

This is your opportunity to submit any information which you wish to be taken into account regarding the ongoing investigation.

The Ministry of Defence has not so far denied that the radium contamination is linked to the site for the former Royal Naval Air Station (RNAS) Donibristle, where radioactive radium based paints were used as a luminising agent on aircraft instruments. However SEPA is also investigating the development of the RNAS Donibristle site, including the demolition of buildings, disposal of any resulting wastes, earth movements, the use of the headland area where Dalgety Bay Sailing Club is now located as a refuse tip and the dates between which that tip was in use.

Please feel free to give me a call if there's anything in this letter which you would like to discuss further, and thank you for your assistance.

Yours sincerely

James Hamilton
Solicitor

Cc _____, CKD Galbraith

Our Ref: JRH
Your Ref: DMcL/MR/0039

Douglas McLeod
Managing Director
Barratt Homes
Blairton House
Old Aberdeen Road
Balmedie
Aberdeenshire
AB23 8SH

If telephoning ask for:
James Hamilton

14 February 2013

Dear Mr McLeod

**Investigation of Potentially Radioactive Contaminated Land
Dalgety Bay, Fife**

Thank you for your letter dated 14 January 2013.

I am well aware that no development was carried out on the beach. The closest buildings to the contaminated areas that SEPA is investigating are Dalgety Bay Sailing Club and The Wynd.

You mention that the development of Dalgety Bay was carried out by several house builders, one of which was Barratt. I would be grateful if you would confirm which other companies were involved, which areas they developed, and which areas were developed by Barratt.

Please also:-

1. Provide SEPA with a copy of the sale missives for the purchase by James Harrison Contracts Ltd of land at Dalgety Bay from Moray Estates Development Company, to allow SEPA to establish whether Moray Estates Development Company disclosed any information relating to potential contamination.
2. Provide SEPA with copies of the sale missives for the areas of land sold by James Harrison Contracts Ltd to H Richmond & Co and to Dalgety Bay Sailing Club.
3. Confirm whether the Dalgety Bay Sailing Club buildings were constructed by a Barratt company. I believe that James Harrison Contracts Ltd owned the Sailing Club land until 1986.
4. Provide SEPA with copies of the planning consents for any buildings constructed by James Harrison Contracts Ltd at Dalgety Bay.
5. Confirm whether you have any records of soil excavations in the Dalgety Bay area during the housing construction.

I would remind you that SEPA has powers under section 108 of the Environment Act 1995 to require the production of records and information relevant to a SEPA investigation. Should we exercise those powers, failure to comply with these requirements is a criminal offence.

If it would help you comply with these requests, I would be happy to meet at your offices.

Thank you for your assistance and I look forward to hearing from you.

Yours sincerely

James Hamilton
Solicitor

Our Ref: JRH
Your Ref: DMcL/MR/0039

Douglas McLeod
Managing Director
Barratt Homes
Blairton House
Old Aberdeen Road
Balmedie
Aberdeenshire
AB23 8SH

If telephoning ask for:
James Hamilton

26 March 2013

Dear Mr McLeod

**Investigation of Potentially Radioactive Contaminated Land
Dalgety Bay, Fife**

I refer to previous correspondence.

I am writing to advise you that SEPA is currently investigating the history of the contamination at Dalgety Bay, and to invite you to submit any information which you think SEPA should take into account.

In terms of its duties under the Radioactive Contaminated Land (Scotland) Regulations 2007 SEPA is currently investigating the chain of events which led to the presence of radium contamination in the beach area at Dalgety Bay. Once that has been established, SEPA will be able to identify the persons responsible for the contamination. In terms of the legislation, those responsible are called "appropriate persons."

An "appropriate person" is any person who caused or knowingly permitted the substances by which the land is contaminated to be in, on or under that land and is responsible for the cost of any remediation required. If no such person can be found, then the owners and occupiers of the land are appropriate persons.

If you would like more information about the context and scope of our investigation, there is Statutory Guidance associated with the contaminated land legislation (Environment Protection Act 1990: Part IIA Contaminated Land Statutory Guidance: Edition 2, and Environment Protection Act 1990: Part IIA Contaminated Land The Radioactive Contaminated Land (Scotland) Regulations 2007 Statutory Guidance).

Chapter D of the Statutory Guidance explains the process by which SEPA is to attribute liability for contaminated land. There are three stages of this process which are relevant to Dalgety Bay:-

1. The identification of appropriate persons;
2. The exclusion of appropriate persons. The Statutory Guidance contains six Tests by which an appropriate person may be excluded from liability for contaminated land.
3. The apportionment of liability between any remaining appropriate persons.

If the land were formally designated as radioactive contaminated land, SEPA would be required to consult with anyone who would be affected by any identification, exclusion or apportionment. One

of the reasons for doing so is to allow those affected an opportunity to provide SEPA with any information it thinks is relevant, and to make representations. This is set out in paragraphs D.36 and D.37 of the Statutory Guidance.

This is your opportunity to submit any information which you wish to be taken into account regarding the ongoing investigation.

The Ministry of Defence has not so far denied that the radium contamination is linked to the site for the former Royal Naval Air Station (RNAS) Donibristle, where radioactive radium based paints were used as a luminising agent on aircraft instruments. However SEPA is also investigating the development of the RNAS Donibristle site, including the demolition of buildings, disposal of any resulting wastes, earth movements, the use of the headland area where Dalgety Bay Sailing Club is now located as a refuse tip and the dates between which that tip was in use.

Please feel free to give me a call if there's anything in this letter which you would like to discuss further, and thank you for your assistance.

Yours sincerely

James Hamilton
Solicitor

Our Ref: JRH
Your Ref: DMcL/MR/0039

Douglas McLeod
Managing Director
Barratt Homes
Blairton House
Old Aberdeen Road
Balmedie
Aberdeenshire
AB23 8SH

If telephoning ask for:
James Hamilton

9 January 2013

Dear Mr McLeod

**Investigation of Potentially Radioactive Contaminated Land
Dalgety Bay, Fife**

Thank you for your letter dated 13 December 2012 to my colleague, Dr Paul Dale.

The company which SEPA is investigating is James Harrison (Contracts) Limited, which has registered number SC03761. I understand that this company was formerly called Copthall Holdings (Dalgety) Developments Limited. Unfortunately, in our earlier letter "Copthall" was erroneously referred to as "Copthorne".

By 1975, Copthall Holdings (Dalgety) Developments Limited had changed its name to Donibristle Investments Limited. By 1986, the company had changed its name again to James Harrison (Contracts) Limited.

James Harrison (Contracts) Limited has its registered office at 7 Buchanan Gate, Cumbernauld Road, Stepps, which I believe is the office of your company's West of Scotland Division.

One of the directors of James Harrison (Contracts) Limited is a Mr Douglas McLeod.

SEPA is investigating radium contamination of an area of beach at Dalgety Bay in Fife. The Dalgety Bay Beach is near the former Royal Naval Air Station (RNAS) Donibristle, where radioactive radium based paints were used as a luminising agent on aircraft instruments.

To date, the MoD has not denied that the radium contamination is linked to historic MoD activities at RNAS Donibristle. However, part of SEPA's role under the Radioactive Contaminated Land Regulations is to fully investigate the chain of events that have led to the current presence of contaminants at the Dalgety Bay Beach.

In 1967, James Harrison (Contracts) Limited (then called Copthall Holdings (Dalgety) Developments Limited) bought land at Dalgety Bay from Moray Estates Development Company. Significant residential development was then carried out on this land throughout the 1970s.

SEPA is required, in terms of its duties under the Radioactive Contaminated Land (Scotland) Regulations 2007, to investigate the chain of events which led to the presence of radium contamination at the beach area at Dalgety Bay.

SEPA would therefore like to discuss James Harrison (Contracts) Limited's involvement with the site, the history of the site, the development of the site (both by them and by other companies), and whether it was or is aware of any existing contamination on the site or in the area.

I would therefore be grateful if you could review your records for information on James Harrison (Contracts) Limited and their involvement in the development of Dalgety Bay. Please confirm receipt of this letter and confirm to us what information you hold, or are aware of, in relation to these matters.

Thank you for your assistance and I look forward to hearing from you.

Yours sincerely

James Hamilton
Solicitor



Registered Office:
Muir House
Belleknowes Industrial Estate
Inverkeithing
Fife KY11 1HY

Tel 01383 416191
Fax 01383 410193

www.muirgroup.co.uk

Mr James Hamilton, Solicitor
SEPA
Clearwater House
Heriot Watt Research Park Avenue North
Riccarton
Edinburgh
EH14 4AP

Your Ref: JRH/BK
Our Ref: JW/smb

12 March 2013

Dear Mr Hamilton

**INVESTIGATION OF POTENTIALLY RADIOACTIVE CONTAMINATED LAND
DALGETY BAY, FIFE
ALBERT THAIN LTD**

I write with reference to your letter of 7 March 2013.

I can confirm that Albert Thain Ltd is part of the Muir group of companies, however, we have no details of the site intimated in Dalgety Bay. Muir acquired the Thain companies several years after the period mentioned.

The previous principal of the Thain Group, Dennis Thain, is still around and I understand he lives in Edinburgh although I have no exact address.

Yours sincerely

**John Watt
Finance Director
Muir Group plc**



Our Ref: JRH
Your Ref: NJA/MDR0001
X0892

Nick Atkins
Morton Fraser
Quartermile Two
2 Lister Square
Edinburgh
EH3 9GL

If telephoning ask for:
James Hamilton

26 March 2013

Dear Nick

**Ministry of Defence
Dalgety Bay**

As you know, SEPA is currently investigating the chain of events which led to the presence of radium contamination in the beach area at Dalgety Bay with a view to identifying the parties responsible.

As you will also know, if SEPA were regulating land which had been formally designated as a special site under the contaminated land legislation, SEPA would be required to make reasonable enquiries to identify any appropriate persons responsible for remediation. SEPA would then be required to consult any parties who may be affected by any attribution of liability, apportionment of liability, or exclusion of appropriate persons from liability.

You have already made some representations to SEPA in connection with the history of the site, but if there is any further any information which you wish to be taken into account regarding the ongoing investigation, or if you would like to make any further representations, then please let me know.

In the interests of transparency, I enclose a letter I have sent to the other parties potentially affected by the appropriate person investigation. It contains more background information, with which you will already be familiar.

Yours sincerely

James Hamilton
Solicitor

Our Ref: JRH/BK
Your Ref:

Larry Irwin
Doune Estates Manager
Moray Estates Development Company Limited
Doune Estate Office
Home Farm Building
DOUNE
FK16 6HD

If telephoning ask for:
James Hamilton

26 March 2013

Dear Larry

DALGETY BAY

I am writing to advise you that SEPA is currently investigating the history of the radioactive contamination at Dalgety Bay, and to invite you to submit any information which you think SEPA should take into account.

In terms of its duties under the Radioactive Contaminated Land (Scotland) Regulations 2007 SEPA is currently investigating the chain of events which led to the presence of radium contamination in the beach area at Dalgety Bay. Once that has been established, SEPA will be able to identify the persons responsible for the contamination. In terms of the legislation, those responsible are called "appropriate persons."

An "appropriate person" is any person who caused or knowingly permitted the substances by which the land is contaminated to be in, on or under that land and is responsible for the cost of any remediation required. If no such person can be found, then the owners and occupiers of the land are appropriate persons.

If you would like more information about the context and scope of our investigation, there is Statutory Guidance, which is available on the Scottish Government website, associated with the contaminated land legislation (Environment Protection Act 1990: Part IIA Contaminated Land Statutory Guidance: Edition 2, and Environment Protection Act 1990: Part IIA Contaminated Land The Radioactive Contaminated Land (Scotland) Regulations 2007 Statutory Guidance).

Chapter D of the Statutory Guidance explains the process by which SEPA is to attribute liability for contaminated land. There are three stages of this process which are relevant to Dalgety Bay:-

1. The identification of appropriate persons;
2. The exclusion of appropriate persons. The Statutory Guidance contains six Tests by which an appropriate person may be excluded from liability for contaminated land.
3. The apportionment of liability between any remaining appropriate persons.

If the land were formally designated as radioactive contaminated land, SEPA would be required to consult with anyone who would be affected by any identification, exclusion or apportionment. One of the reasons for doing so is to allow those affected an opportunity to provide SEPA with any information it thinks is relevant, and to make representations. This is set out in paragraphs D.36 and D.37 of the Statutory Guidance.

Continued...



Chairman
David Sigsworth

Chief Executive
James Curran

Edinburgh Office

Clearwater House, Heriot Watt Research Park
Avenue North, Riccarton, Edinburgh EH14 4AP
tel 0131 449 7296 fax 0131 449 7277
www.sepa.org.uk

This is your opportunity to submit any information which you wish to be taken into account regarding the ongoing investigation.

The Ministry of Defence has not so far denied that the radium contamination is linked to the site for the former Royal Naval Air Station (RNAS) Donibristle, where radioactive radium based paints were used as a luminising agent on aircraft instruments. However SEPA is also investigating the development of the RNAS Donibristle site, including the demolition of buildings, disposal of any resulting wastes, earth movements, the use of the headland area where Dalgety Bay Sailing Club is now located as a refuse tip and the dates between which that tip was in use.

Could you please let me know whether Moray Estates have any plans from the period from 1945 to the 1960s of that area? That would be very useful.

Please feel free to give me a call if there's anything in this letter which you would like to discuss further, and thank you for your assistance.

Yours sincerely

James Hamilton
Solicitor

Cc: Gillespie Macandrew, Solicitors

Our Ref: JRH
Your Ref:

JW Muir Group plc
Muir House
Belleknowes Industrial Estate
Inverkeithing
Fife KY11 1HY

If telephoning ask for:
James Hamilton

6 March 2013

Dear Sirs

**Investigation of Potentially Radioactive Contaminated Land
Dalgety Bay, Fife**

As you are probably aware, SEPA is Scotland's Environmental Regulator with wide ranging duties and powers relating to the protection of the environment. One of the more recent duties given to SEPA is the regulation of land which has been contaminated with radioactivity under the Radioactive Contaminated Land (Scotland) Regulations, which provide SEPA with powers to investigate potential radioactive contaminated land sites.

You may also be aware that SEPA is involved in the investigation of potentially radioactive contaminated land at Dalgety Bay, Fife. There have been a number of reports in the public domain, some of which are available on our website, which relate to historic radium contamination of an area of beach at Dalgety Bay .

The Dalgety Bay Beach is near the former Royal Naval Air Station (RNAS) Donibristle, where radioactive radium based paints were used as a luminising agent on aircraft instruments. .

To date, the MoD has not denied that the radium contamination is linked to historic MoD activities at RNAS Donibristle. However, part of SEPA's role under the Radioactive Contaminated Land Regulations is to fully investigate the chain of events that have led to the current presence of contaminants at the Dalgety Bay Beach.

SEPA has been investigating the development of Dalgety Bay New Town in the 1960s and has been reviewing the available planning documentation. It appears that Albert Thain Limited (registered number SC019774) obtained Planning Consent in 1967 for Phase 1 at Dalgety Bay (ref DG/FCC/1/67/8) in 1967 and another Planning Consent (ref DG/FCC/1/68/87) in 1968 for Plots 10 and 12, St Colme Road, Dalgety Bay.

I understand that Albert Thain Limited is now part of your group.

I would therefore like to discuss your knowledge of the site, including your involvement with the site, the history of the site, the development of the site, and whether you were or are aware of any existing contamination on the site or in the area. I am also interested in any earth movements that may have been carried out during the development. To this end we seek to obtain information land ownership details and what files you may have that would assist with the investigation.

I would be grateful if you could confirm receipt of this letter, and advise who should be the primary contact within your organisation to discuss this matter further.

Thank you for your assistance and I look forward to hearing from you.

Yours sincerely

James Hamilton
Solicitor

Our Ref: JRH
Your Ref:

Royal Incorporation of Architects in Scotland
15 Rutland Square
Edinburgh
EH1 2BE

If telephoning ask for:
James Hamilton

6 March 2013

Dear Sirs

**Investigation of Potentially Radioactive Contaminated Land
Dalgety Bay, Fife**

As you are probably aware, SEPA is Scotland's Environmental Regulator with wide ranging duties and powers relating to the protection of the environment. One of the more recent duties given to SEPA is the regulation of land which has been contaminated with radioactivity under the Radioactive Contaminated Land (Scotland) Regulations, which provide SEPA with powers to investigate potential radioactive contaminated land sites.

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The Dalgety Bay Beach is near the former Royal Naval Air Station (RNAS) Donibristle, where radioactive radium based paints were used as a luminising agent on aircraft instruments.

To date, the MoD has not denied that the radium contamination is linked to historic MoD activities at RNAS Donibristle. However, part of SEPA's role under the Radioactive Contaminated Land Regulations is to fully investigate the chain of events that have led to the current presence of contaminants at the Dalgety Bay Beach.

Part of that investigation is the development of Dalgety Bay New Town. SEPA has now obtained some of the planning documentation for the development, and it appears that a firm of architects called W. Rossell Orme of Dalgety House, Viewfield, Dunfermline was involved.

I am trying to establish whether this firm is still in business and would be grateful if you could check your records and let me have any information which you might hold in relation to that firm.

Thank you for your assistance and I look forward to hearing from you.

Yours sincerely

James Hamilton
Solicitor

Sanctuary Scotland
Sanctuary House
7 Freeland Drive
GLASGOW
G53 6PG

If telephoning ask for:
James Hamilton

7 March 2013

Dear Sirs

INVESTIGATION OF POTENTIALLY RADIOACTIVE CONTAMINATED LAND DALGETY BAY, FIFE

As you are probably aware, SEPA is Scotland's Environmental Regulator with wide ranging duties and powers relating to the protection of the environment. One of the more recent duties given to SEPA is the regulation of land which has been contaminated with radioactivity under the Radioactive Contaminated Land (Scotland) Regulations, which provide SEPA with powers to investigate potential radioactive contaminated land sites.

You may also be aware that SEPA is involved in the investigation of potentially radioactive contaminated land at Dalgety Bay, Fife. There have been a number of reports in the public domain, some of which are available on our website, which relate to historic radium contamination of an area of beach at Dalgety Bay.

The Dalgety Bay Beach is near the former Royal Naval Air Station (RNAS) Donibristle, where radioactive radium based paints were used as a luminising agent on aircraft instruments.

To date, the MoD has not denied that the radium contamination is linked to historic MoD activities at RNAS Donibristle. However, part of SEPA's role under the Radioactive Contaminated Land Regulations is to fully investigate the chain of events that have led to the current presence of contaminants at the Dalgety Bay Beach.

SEPA has been investigating the development of Dalgety Bay New Town in the 1960s and has been reviewing the available planning documentation. It appears that Scottish Special Housing (having an address at 15/21 Palmerston Place, Edinburgh) was granted planning consent for 25 houses at Dalgety Bay in 1968 (ref DG/FCC/1/68/90). I understand that you are the successor organisation to Special Housing Scotland.

I would therefore like to discuss your knowledge of the site, including your involvement with the site, the history of the site, the development of the site, and whether you were or are aware of any existing contamination on the site or in the area. I am particularly interested in trying to establish whether there were significant earth movements during the development. To this end we seek to obtain information land ownership details and what files you may have that would assist with the investigation.

Continued....



Chairman
David Sigsworth

Chief Executive
James Curran

Edinburgh Office

Clearwater House, Heriot Watt Research Park
Avenue North, Riccarton, Edinburgh EH14 4AP
tel 0131 449 7296 fax 0131 449 7277
www.sepa.org.uk

-2-

I would be grateful if you could confirm receipt of this letter, and advise who should be the primary contact within your organisation to discuss this matter further.

Thank you for your assistance and I look forward to hearing from you.

Yours faithfully

James Hamilton
Solicitor

Our Ref: JRH
Your Ref:

Sanctuary Scotland
Sanctuary House
7 Freeland Drive
Glasgow
G53 6PG

If telephoning ask for:
James Hamilton

6 March 2013

Dear Sirs

**Investigation of Potentially Radioactive Contaminated Land
Dalgety Bay, Fife**

As you are probably aware, SEPA is Scotland's Environmental Regulator with wide ranging duties and powers relating to the protection of the environment. One of the more recent duties given to SEPA is the regulation of land which has been contaminated with radioactivity under the Radioactive Contaminated Land (Scotland) Regulations, which provide SEPA with powers to investigate potential radioactive contaminated land sites.

You may also be aware that SEPA is involved in the investigation of potentially radioactive contaminated land at Dalgety Bay, Fife. There have been a number of reports in the public domain, some of which are available on our website, which relate to historic radium contamination of an area of beach at Dalgety Bay.

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I would therefore like to discuss your knowledge of the site, including your involvement with the site, the history of the site, the development of the site, and whether you were or are aware of any existing contamination on the site or in the area. I am particularly interested in trying to establish whether there were significant earth movements during the development. To this end we seek to obtain information land ownership details and what files you may have that would assist with the investigation.

I would be grateful if you could confirm receipt of this letter, and advise who should be the primary contact within your organisation to discuss this matter further.

Thank you for your assistance and I look forward to hearing from you.

Yours sincerely

James Hamilton
Solicitor

Our Ref: JRH
Your Ref:

Fife Coast and Countryside Trust
The Harbourmaster's House,
Hot Pot Wynd
Dysart
Fife KY1 2TQ

If telephoning ask for:
James Hamilton

7 June 2013

Dear Sir/Madam

Land Investigation at Dalgety Bay, Fife

As you are probably aware, SEPA is Scotland's Environmental Regulator with wide ranging duties and powers relating to the protection of the environment. One of the more recent duties given to SEPA is the regulation of land which has been contaminated with radioactivity under the Radioactive Contaminated Land (Scotland) Regulations, which provide SEPA with powers to investigate potential radioactive contaminated land sites.

You may also be aware that SEPA is involved in the investigation of potentially radioactive contaminated land at Dalgety Bay, Fife. There have been a number of reports in the public domain, some of which are available on our website, which relate to historic radium contamination of an area of beach at Dalgety Bay.

The Dalgety Bay Beach is near the former Royal Naval Air Station (RNAS) Donibristle, where radioactive radium based paints were used as a luminising agent on aircraft instruments.

To date, the MoD has not denied that the radium contamination is linked to historic MoD activities at RNAS Donibristle. However, part of SEPA's role under the Radioactive Contaminated Land Regulations is to fully investigate the chain of events that have led to the current presence of contaminants at the Dalgety Bay Beach.

I understand that the Trust maintains the Fife Coastal Path which runs close to the Dalgety Bay Beach and through the nearby Ross Plantation, which is part of the area SEPA has been investigating. I would therefore like to discuss your knowledge of the site, including your involvement with the site, and whether you were or are aware of any existing contamination on the site or in the area.

I would be grateful if you could confirm receipt of this letter, and advise whom should be the primary contact within your organisation to discuss this matter further.

Thank you for your assistance

Yours faithfully

James Hamilton
Solicitor

3 May 2013

Our ref: AMcQ/AM/

Your ref: JRH/CSM/LJM

Director of Operations
Corporate Office
Erskine Court
Castle Business Park
STIRLING, FK9 4TR

INFORMATION REQUEST: Investigation of Radioactive Contaminated Land – Dalgety Bay, FIFE

Thank you for your letter of 26 March regarding the above. Scottish Enterprise (SE) is responding on the basis that your request is "pursuant to the Freedom of Information Act 2002 and the Environmental Information Regulations 2004" with regards to the context of your investigations and Statutory Guidance under which you are pursuing your task. We have considered your request under The Freedom of Information (Scotland) Act 2002 (FOISA).

I confirm that SE holds certain information within scope of your request, although unclear as to the specific geographical relevance. It is considered that the information requested is not entirely environmental information in nature as defined in Regulation 2(1) of the EIRs. I must advise that I am therefore offering this information on CD under FOISA (SE contact: Stephen Middleton, Business Infrastructure, Scottish Enterprise, New Lanarkshire House, Dove Wynd, Strathclyde Business Park, BELLSHILL ML4 3AD, tel 0141 228 2595, <mailto:stephen.middleton@scotent.co.uk>)

The Environmental Information Regulations 2004 (the EIRs)

I have gone on to consider your request under the EIRs and I am pleased to provide copy on CD of the following reports from our file archives:

Ground Investigation:

<u>Ref</u>	<u>Town</u>	<u>Site/Estate</u>	<u>Date</u>	<u>Title</u>	<u>Author</u>	<u>Consultant</u>
594	Donibristle	Donibristle I.E.	Sep-84	S.I. Report	Nicholson	SDA
939	Dalgety Bay	Hillend I.E.	May-85	Geotectech. Rpt	Ove Arup /Wimpey	Ove Arup

It should be recognised that these reports were commissioned and written between 1984 -1985 and should be treated as reflecting indicative ground conditions at that time. The contents of the reports are believed to have been accurate at the time and are now not warranted or guaranteed.

Additionally we have some basic information on the historical 'acquisition / disposal' of land and property during and prior to Scottish Development Agency (SDA) existence. It is believed that SDA disposed of all land and property at Donibristle Industrial Estate in 1990. SE recognises this is outwith the scope of your request, however it is perceived as potentially of interest to you in your task.

TOWN/CITY	LOCAL NAME	AREA ACQUIRED	AREA DISPOSED	DATE OF ENTRY	SELLER/PURCHASER
DONIBRISTLE	DONBRISTLE ESTATE		INDUSTRIAL		
FE		52.850A		10.10.67	Secretary of State for SCOT
		0.758H		22.05.79	Donibristle Investments Ltd
		0.089H		11.07.79	TRANE LTD
		1.25A		31.03.81	TRANE LTD
		8.19A		13.11.81	TRANE LTD
		807SQM		14.12.87	JW MUIR (Property Invest)Ltd
			22.42A	25.01.68	TRANE LTD
			115SQM	02.08.72	Secretary of State for SCOT
			0.069H	26.06.79	Secretary of State for SCOT
			0.255H	30.05.81	NORTHERN CIRCUITS LTD
			1.09H		DUNFERMLINE D.C.
			1.02H	05.07.85	JAMES MOFFAT & SONS LTD
	(B9)		0.82H	25.02.86	FORTRONIC TECHNOLOGY HOLDINGS LTD
	(B4)		0.96H	25.03.86	FORTRONIC TECHNOLOGY HOLDINGS LTD
			0.3H+0.01H	1987	NYLEAF/LI COMPONENTS
(B1, 2, 2A, 4, 5,13,16 &17)			10.47H	08.03.90	BSP NO 1 LTD
			5.16H	17.04.90	Marconi Instruments Ltd
			0.41H	26.06.90	GRANT CONSTRUCTION
			0.49H	10.07.90	FIFE REGIONAL COUNCIL

Under FOISA/ the EIRs you have the right to request a review of this decision. A request for review must be submitted in writing or other permanent form within 40 working days of receipt of this letter and should be addressed to:

Lena Wilson
Chief Executive
Scottish Enterprise
Atrium Court
50 Waterloo Street
Glasgow G2 6HQ

It must include your name and an address for correspondence, and specify the request for information to which the requirement for review relates and the matter which gives rise to your dissatisfaction with the decision. SE will respond to any request for review within 20 working days of receipt.

Your right to apply to the Scottish Information Commissioner

If you are dissatisfied with the outcome of the review you have the right under the EIRs to apply to the Scottish Information Commissioner for a decision. If you wish to do so, you must appeal to the Commissioner within six months following the date of receipt of the review notice. The Commissioner's contact details are:

The Scottish Information Commissioner
Kinburn Castle
Doubledykes Road
St Andrews
Fife KY16 9DS
Email: enquiries@itspublicknowledge.info
Tel: 01334 464610

Yours sincerely

Allan McQuade
Director of Business Infrastructure
Direct Tel No: 0141 228 7427
E-mail address: allan.mcquade@scotent.co.uk

SITE INVESTIGATION REPORT

DONIBRISTLE INDUSTRIAL ESTATE, FIFE.

This Report provided by the
Scottish Development Agency is
for information only and while
the contents are believed to be
accurate they are not Warranted
or Guaranteed.

Scottish Development Agency,
120 Bothwell Street,
GLASGOW, G2 7JP.

**This report should be returned to
the Civil Engineering Department
Scottish Development Agency.**

NICHOLSON (SITE INVESTIGATION) LIMITED
BATHGATE ROAD, ARMADALE
WEST LOTHIAN, EH48 2PY

11th September, 1984.

INTRODUCTION

It is proposed to build light industrial units at Donibristle Industrial Estate, Fife. At the request of the Scottish Development Agency, boreholes were sunk, trial pits were excavated and insitu and laboratory tests were made by Nicholson (Site Investigation) Limited to provide information on the ground conditions for design purposes.

It should be noted that this report does not consider the mineral stability of the site.

GENERAL GEOLOGY OF THE AREA

The site lies just to the south of the Rosyth Fault, and is underlain by sedimentary rocks of the Lower Oil-Shale Group. There are many igneous intrusions in this area.

Bedrock was left with a covering of boulder clay at the end of the last ice-age, though this is quite thin over the harder igneous rocks. More recent alluvium has been deposited along watercourses, and there are some patches of peat.

SITE INVESTIGATION

The site work was carried out in accordance with BS CP 2001 (1957) "Site Investigations". The laboratory testing was carried out in accordance with BS 1377 (1975) "Methods of test for soils for civil engineering purposes".

Twelve boreholes were sunk using a Pilcon Wayfarer shell and auger drilling rig and five trial pits were mechanically excavated during July 1984. The borehole and trial pit positions were selected by the Scottish Development Agency and set out by Nicholson (Site Investigation) Limited as shown on Drawing 4933/1. Ground levels at the borehole and pit positions were taken by Nicholson (Site Investigation) Limited and referred to Ordnance Datum.

The depths of the boreholes and trial pits, the descriptions of the materials encountered, observations of the groundwater conditions and the results of insitu and laboratory tests are shown on the borehole and trial pit records and separate sheets appended to this report.

SUMMARY OF BOREHOLE AND TRIAL PIT RECORDS

The site is covered with few hundred millimetres of topsoil or thin asphalt surfacing, the latter being laid on a hardcore base. Some levelling of the site appears to have been done prior to surfacing, and clay or ash filling was found in many places. However, the total thickness of made ground only exceeds 750mm at Boreholes 9 and 11, where there is 1400mm of it.

Below the filling or topsoil is a bed of firm to stiff sandy clay up to two metres thick. In places this contains, or is entirely replaced by, pockets of sand and gravel. Patches of softer clay were also found quite frequently within this stratum. This layer was, however, missing below the deeper filling in Boreholes 9 and 11.

Stiff or very stiff boulder clay was reached at a depth of around two metres in all boreholes and pits except Borehole 3. The thickness of the boulder clay deposit increases from virtually nothing in the west to more than six metres in the east of the site.

The boulder clay lies on sedimentary bedrock, which comes as close as three metres to ground level at Borehole 3 and Pit A. Shale and sandstone are interbedded, and some of the former in particular has become soft and weathered near rockhead. Although this weathered layer is generally barely a metre thick, there was nearly three metres of it in Borehole 1.

Groundwater was reported only from Boreholes 5 and 6, where it was as shallow as two metres below the surface, and Pit E. An active tile drain was broken in Pit C, which flooded that pit within an hour.

SUMMARY OF TEST RESULTS

Laboratory test results on samples of filling gave very variable results, with moisture contents between 17% and 31% and bulk densities of 2.1Mg/m^3 to 1.9Mg/m^3 . There was a negligible angle of friction in undrained triaxial compression, whilst cohesions ranged from 26kN/m^2 to 83kN/m^2 . Coefficients of volume compressibility of two samples were $0.3\text{m}^2/\text{MN}$ and $0.4\text{m}^2/\text{MN}$.

Three Standard Penetration Tests also carried out in the filling recorded N values between 6 and 14. These compare with two tests in sandy areas of the underlying subsoil, in which values of 9 and 13 were recorded.

In general the clay above the boulder clay has a moisture content of 15% to 20% and a bulk density of the order of 2.1Mg/m^3 . Angles of friction were mainly insignificant, with cohesions between 50kN/m^2 and 100kN/m^2 . The average shear strength parameters in eleven tests were a cohesion of 80kN/m^2 and angle of friction of 7 degrees. Coefficients of volume compressibility of most samples were around $0.25\text{m}^2/\text{MN}$, but as high as $0.35\text{m}^2/\text{MN}$ in two tests.

On the whole, the samples which were described as rather softer than usual had very similar results to the other. Tests on a very sandy sample from Borehole 3 did produce a low shear strength, and the N value of 19 is probably a more reliable guide for this stratum.

Much of the boulder clay has a moisture content of 15% and a bulk density of just over 2.1Mg/m^3 , though the thicker deposits tended to be a little drier and denser. Angles of friction averaged 7 degrees and cohesions, which ranged from 53kN/m^2 to 305kN/m^2 , averaged 170kN/m^2 . The coefficient of volume compressibility of a typical sample was only $0.1\text{m}^2/\text{MN}$.

A few Standard Penetration Tests were carried out in the softer rock, though the full penetration of 300mm could not always be achieved. The N values in completed tests are of the order of 40 to 60.

Chemical tests on representative samples show that the soil and water is mildly alkaline, though two samples of filling had a slightly acid pH of 6.5. Sulphate contents are little more than nominal, with maximum concentrations of 0.03% in a solid sample and 0.02g/litre in groundwater.

RECOMMENDATIONS FOR FOUNDATIONS

The tests that could be carried out on the filling from this site show that it is quite variable, and it would be unwise to rely upon it. It is therefore recommended that all footings should be taken below it, and that it should be entirely removed from beneath load-bearing ground slabs. Since it is little more than half a metre thick in most places, and not much thicker than one metre at worst, it will not be very difficult or expensive to remove it.

Below the filling is mainly firm sandy clay, containing patches of sand. Although some areas were described as soft, the test results show that its safe bearing capacity is comfortably in excess of 100kN/m^2 . This should be perfectly adequate for light industrial units.

On the whole it should not be necessary to take foundations down to the boulder clay or rock. If there are any very heavy loads, or structures that are particularly sensitive to settlement, it might be worth founding them on the boulder clay, which has a safe bearing capacity of 300kN/m^2 .

Settlements of individual foundations could be calculated from the data given in this report. Compressibilities are relatively low, and the presence of the boulder clay or rock not far below the footings should restrict settlement to small amounts.

It seems unlikely that much groundwater will be encountered, except possibly in any excavations to the boulder clay. The test results suggest that apparently soft spots in the formations are not particularly weak, but it is assumed that obviously poor subsoil will actually be removed on site.

CONCLUSIONS

Below the topsoil or surfacing there may be as much as a metre of filling, lying on a metre or two of firm clay with sandy patches. This in turn lies on stiff boulder clay, with sedimentary bedrock at three or four metres depth in the west and about eight metres in the east.

All foundations should be placed below any filling and obviously soft clay, assuming a safe bearing capacity of 100kN/m^2 . Heavier loadings up to 300kN/m^2 can be founded on the boulder clay.

for NICHOLSON(SITE INVESTIGATION) LIMITED.

BOREHOLE RECORD

LOCATION: Donibristle Industrial Estate JOB NO.: 4933 DATES: COMMENCED: 16.7.84 WATER LEVELS: INITIAL: Dry FINAL: Dry
 BOREHOLE NO.: J. DIAMETER: 150 mm SURFACE LEVEL: 36.99 m COMPLETED: 16.7.84

Description	Depth (m)	Thick-ness (m)	Level (m)	Samples	N	w (%)	ρ (Mg/m ³)	c (kN/m ²)	ϕ (deg.)	LL (%)	PL (%)	PI (%)	Indicated Safe Bearing Capacity (kN/m ²)	
													Strip	Squa
Topsoil	0.30	0.30	36.69	U		21.2	2.02	89	2	33	22	11	160	190
Stiff mottled brown sandy clay containing gravel	1.80	1.50	35.19	0.50 D 0.95 U		15.5	2.14	138	10	30	18	12	360	430
Stiff to very stiff dark brown sandy boulder clay	2.80	1.00	34.19	1.50 D 1.95 U 2.50 D		14.7	2.16	164	2				300	360
Soft dark grey clayey shale with thin layers of hard shale	5.70	2.90	31.29	2.95 D+B 3.00 D+B 4.50	30* 3.15 48* 4.65								500	500
Hard dark grey shaley sandstone	7.20	1.50	29.79	D 7.50										

Remarks: * N values at 3.15metres and 4.65metres = 30 and 48 for 20mm and 95mm below seating drive respectively
 SO₃ at 0.50metres = 0.01%
 pH at 0.50metres = 7.0

Symbols: N - Number of blows in Standard Penetration Test w - Natural moisture content ρ - Natural bulk density ϕ - Apparent cohesion ϕ - Angle of internal friction
 LL - Liquid limit PL - Plasticity limit U - 100 mm diameter undisturbed sample D - Disturbed sample D - Bulk sample B - Bulk sample

BOREHOLE RECORD

LOCATION: Donibristle Industrial Estate JOB NO.: 4933 DATES: COMMENCED: 19.7.84 WATER LEVELS: INITIAL: Dry m
 BOREHOLE NO.: 2 DIAMETER: 150 mm SURFACE LEVEL: 36.62 m COMPLETED: 19.7.84 FINAL: Dry m

Description	Depth (m)	Thick-ness (m)	Level (m)	Samples	N	w (%)	ρ (Mg/m ³)	c (kN/m ²)	ϕ (deg.)	LL (%)	PL (%)	PI (%)	Indicated Safe Bearing Capacity (kN/m ²)	
													Strip	Square
Topsoil	0.30	0.30	36.32											
Stiff mottled brown sandy clay containing gravel	1.45	1.45		U		17.5	2.09	69	11				190	230
				D										
				U										
Stiff to very stiff dark brown sandy boulder clay with traces of shale	1.75	2.00	34.87	1.50		16.3	2.11	78	8	30	19	11	185	225
				D										
				U										
Soft dark grey shale	3.75	1.25	32.87	2.50										
				D										
				2.95										
	5.00		31.62	D+B									1000	1000
				4.00	30*									
					4.15									

Remarks: * N value at 4.15metres = 30 for 40mm below seating drive

Symbols: N - Number of blows in Standard Penetration Test w - Natural moisture content ρ - Natural bulk density c - Apparent cohesion ϕ - Angle of internal friction
 LL - Liquid limit PL - Plastic limit PI - Plasticity index U - 100 mm diameter undisturbed sample D - Disturbed sample B - Bulk sample

BOREHOLE RECORD

LOCATION: Donibristle Industrial Estate JOB NO.: 4933 DATES: COMMENCED: 16.7.84 WATER LEVELS: INITIAL: Dry m
 BOREHOLE NO.: 3 DIAMETER: 150 mm SURFACE LEVEL: 37.48 m COMPLETED: 16.7.84 FINAL: Dry m

Description	Depth (m)	Thickness (m)	Level (m)	Samples	N	w (%)	ρ (Mg/m ³)	c (kN/m ²)	ϕ (deg)	LL (%)	PL (%)	PI (%)	Indicated Safe Bearing Capacity (kN/m ²)	
													Strip	Square
Filling:- Topsoil	0.30	0.30	37.18											
Filling:- Firm brown sandy clay	0.75	0.45	36.73	U		19.3	1.98	72	4	34	21	13	140	170
Stiff mottled brown sandy clay containing gravel with patches of sand	1.75	1.00		0.50 D 0.95 U										
Compact fine to medium brown clayey sand with occasional gravel	2.90	1.15	35.73	1.50 D 1.95 D+B 2.50	19 2.65	7.0	1.77	5	30				50	60
Soft dark grey clayey shale	4.10	1.20	33.38	3.00 D+B 4.50	41 3.15 61 4.65								360	360
Soft dark grey shale	5.00	0.90	32.48										410	410
													610	610

Remarks: SO₃ at 0.50metres = 0.03%
 pH at 0.50metres = 7.0

Symbols: N - Number of blows in Standard Penetration Test w - Natural moisture content ρ - Natural bulk density c - Apparent cohesion ϕ - Angle of internal friction
 LL - Liquid limit PL - Plastic limit U - 100 mm diameter undisturbed sample D - Disturbed sample B - Bulk sample

BOREHOLE RECORD

LOCATION: Donibristle Industrial Estate JOB NO.: 4933 DATES: COMMENCED: 19.7.84 WATER LEVELS: INITIAL: Dry m
 BOREHOLE NO.: 4..... DIAMETER: 150..... mm SURFACE LEVEL: 36.98..... m COMPLETED: 19.7.84 FINAL: Dry..... m

Description	Depth (m)	Thickness (m)	Level (m)	Samples	N	w (%)	ρ (Mg/m ³)	c (kN/m ²)	ϕ (deg.)	LL (%)	PL (%)	PI (%)	Indicated Safe Bearing Capacity (kN/m ²)	
													Strip	Square
Surfacing:- Asphalt	0.10	0.10	36.88											
Bottoming:- Hardcore	0.30	0.20	36.68											
Firm brown very sandy clay containing gravel	0.80	0.50	36.18	U 0.50		18.7	2.10	49	6	30	20	10	105	125
Stiff mottled brown sandy clay containing gravel with pockets of sand		1.30		D 0.95 U 1.50 D 1.95 U		17.6	2.11	97	3				180	215
Stiff to very stiff dark brown sandy boulder clay with pockets of sand	2.10	1.80	34.88											
Compact broken and weathered sandstone	3.90	1.10	33.08	D 2.50										
				D+B 2.95										
				4.00										
	5.00		31.98		52 4.15									

Remarks:

Symbols: N - Number of blows in Standard Penetration Test w - Natural moisture content ρ - Natural bulk density c - Apparent cohesion ϕ - Angle of internal friction
 LL - Liquid limit PL - Plastic limit PI - Plasticity index U - 100 mm diameter undisturbed sample D - Disturbed sample B - Bulk sample

BOREHOLE RECORD

LOCATION: Donibristle Industrial Estate JOB NO.: 4933 DATES: COMMENCED: 13.7.84 WATER LEVELS: INITIAL: 3.30 m
 BOREHOLE NO.: 5 DIAMETER: 150 mm SURFACE LEVEL: 37.78 m COMPLETED: 13.7.84 FINAL: 3.30 m

Description	Depth (m)	Thick-ness (m)	Level (m)	Samples	N	w (%)	ρ (Mg/m ³)	c (kN/m ²)	ϕ (deg)	LL (%)	PL (%)	PI (%)	Indicated Safe Bearing Capacity (kN/m ²)	
													Strip	Square
Surfacing:- Asphalt	0.15	0.15	37.63											
Bottoming:- Hardcore	0.80	0.65	36.98											
Medium dense fine to medium brown (clayey) sand and gravel	1.20	0.40	36.58	D+B 1.00	9 1.15								260	260
Soft to firm mottled brown very sandy clay with patches of sand	2.30	1.10		U 1.50 D		16.0	2.12	55	8	26	15	11	130	155
Stiff to very stiff dark brown changing to dark grey sandy boulder clay	5.00	2.70	35.48	U 2.50 D 2.95 U 4.00 D 4.45		11.8	2.22	165	10	27	17	10	440	530
			32.78											

Remarks: Water sample taken
 SO₃ at 1.50metres = 0.02%
 pH at 1.50metres = 7.0

Symbols: N - Number of blows in Standard Penetration Test w - Natural moisture content ρ - Natural bulk density c - Apparent cohesion ϕ - Angle of internal friction
 LL - Liquid limit PL - Plastic limit U - 100 mm diameter undisturbed sample D - Disturbed sample D - Bulk sample B - Bulk sample

NICHOLSON (SITE INVESTIGATION) LIMITED, BATHGATE ROAD, ARMADALE

BOREHOLE RECORD

LOCATION: Donibristle Industrial Estate 4933 19.7.84 WATER LEVELS: INITIAL: 2.00 m
 JOB NO.: DATES: COMMENCED: FINAL: 2.00 m
 BOREHOLE NO.: 6 DIAMETER: 150 mm SURFACE LEVEL: 37.52 m COMPLETED: 19.7.84

Description	Depth (m)	Thick-ness (m)	Level (m)	Samples	N	w (%)	ρ (Mg/m ³)	c (kN/m ²)	ϕ (deg)	LL (%)	PL (%)	PI (%)	Indicated Safe Bearing Capacity (kN/m ²)	
													Strip	Squat
Surfacing:- Asphalt	0.10	0.10	37.42											
Bottoming:- Hardcore	0.45	0.35	37.07											
Filling:- Firm clay and ashes	0.90	0.45	36.62	D+B 0.50	14 0.65								140	140
Soft to firm brown sandy clay	2.00	1.10	35.52	U 1.50 D 1.95		15.0	2.15	109	4	28	18	10	210	250
Stiff to very stiff dark brown sandy boulder clay	5.00	3.00	32.52	U 2.50 D 2.95 U 4.00 D 4.45		15.2	2.14	124	7				280	340

Remarks: Water sample taken
 SO₃ at 0.50metres = 0.01% pH at 0.50metres = 6.5
 SO₃ on water sample = 0.02g/litre pH on water sample = 7.5

Symbols: N - Number of blows in Standard Penetration Test w - Natural moisture content ρ - Natural bulk density c - Apparent cohesion ϕ - Angle of internal friction
 LL - Liquid limit PL - Plastic limit Pt - Plasticity index U - 100 mm diameter undisturbed sample D - Disturbed sample B - Bulk sample

NICHOLSON (SITE INVESTIGATION) LIMITED, BATHGATE ROAD, ARMADALE

BOREHOLE RECORD

LOCATION: Donibristle Industrial Estate JOB NO.: 4933 DATES: COMMENCED: 18.7.84 WATER LEVELS: INITIAL: DRY FINAL: DRY
 BOREHOLE NO.: 7 DIAMETER: 150 mm SURFACE LEVEL: 39.25 m COMPLETED: 19.7.84

Description	Depth (m)	Thickness (m)	Level (m)	Samples	N	w (%)	ρ (Mg/m ³)	c (kN/m ²)	ϕ (deg.)	LL (%)	PL (%)	PI (%)	Indicated Safe Bearing Capacity (kN/m ²)	
													Strip	Squa
Surfacing:- Asphalt	0.10	0.10	39.15											
Bottoming:- Hardcore	0.40	0.30	38.85											
Compact fine to medium brown (clayey) sand and gravel	0.75	0.35	38.50	D+B 0.50	13 0.65								370	37
Firm brown sandy clay containing gravel	1.35	0.60	37.90	U		14.8	2.12	91	15				325	390
Stiff to very stiff dark brown changing to dark grey sandy boulder clay		6.65		1.00 D 1.45 U 2.00 D 2.45 U 3.50 D 3.95 U 5.00 D 5.45 U 6.50		10.9	2.19	186	8	28	17	11	440	530
						11.1	2.24	261	8				500	600
Continued/														

Remarks:

Symbols: N - Number of blows in Standard Penetration Test w - Natural moisture content ρ - Natural bulk density c - Apparent cohesion ϕ - Angle of internal friction
 LL - Liquid limit PL - Plastic limit PI - Plasticity index U - 100 mm diameter undisturbed sample D - Disturbed sample B - Bulk sample

NICHOLSON (SITE INVESTIGATION) LIMITED, BATHGATE ROAD, ARMADALE

BOREHOLE RECORD

LOCATION: Donibristle Industrial Estate JOB NO.: 4933 DATES: COMMENCED: 18.7.84 WATER LEVELS: INITIAL: DRY m
 BOREHOLE NO.: 7 Cont DIAMETER: 150 mm SURFACE LEVEL: 39.25 m COMPLETED: 19.7.84 m FINAL: DRY m

Description	Depth (m)	Thick-ness (m)	Level (m)	Samples	N	w (%)	ρ (Mg/m ³)	c (kN/m ²)	ϕ (deg)	LL (%)	PL (%)	PI (%)	Indicated Safe Bearing Capacity (kN/m ²)	
													Strip	Squar
Stiff to very stiff dark brown changing to dark grey sandy boulder clay	8.00	6.65		D										
			31.25	6.95 D+B	43								430	430
	8.80	0.90	30.45	8.00	8,15									
Hard dark grey shaley sandstone with thin layers of shale	10.00	1.20	29.25	D										
				9.00										

Remarks:

Symbols: N - Number of blows in Standard Penetration Test w - Natural moisture content ρ - Natural bulk density c - Apparent cohesion ϕ - Angle of internal friction
 LL - Liquid limit PL - Plastic limit PI - Plasticity index U - 100 mm diameter undisturbed sample D - Disturbed sample B - Bulk sample

BOREHOLE RECORD

LOCATION: Donibristle Industrial Estate

JOB NO.: 4933

DATES: COMMENCED: 13.7.84

WATER LEVELS: INITIAL: DRY

BOREHOLE NO.: 8 DIAMETER: 150 mm SURFACE LEVEL: 37.73 m

COMPLETED: 13.7.84

FINAL: DRY

Description	Depth (m)	Thick-ness (m)	Level (m)	Samples	N	w (%)	ρ (Mg/m ³)	c (kN/m ²)	ϕ (deg.)	LL (%)	PL (%)	PI (%)	Indicated Safe Bearing Capacity (kN/m ²)	
													Strip	Squa
Filling:- Topsoil and gravel	0.40	0.40	37.33	U		19.0	2.03	94	6	27	19	8	200	240
Firm to stiff brown sandy clay containing gravel with pockets of sand	2.40	2.00		0.50 D 0.95 U 1.50 D 1.95 U 2.50 D 2.95 U 4.00 D 4.45 U 5.50 D 5.95 U 7.00		16.0	2.14	82	4	26	18	8	160	190
Stiff to very stiff dark brown changing to dark grey sandy boulder clay with pockets of firm very sandy clay	5.70	5.70	35.33			14.5	2.16	111	10				300	360
Continued/														

Remarks:

 SO₃ at 0.50metres = 0.01%
 pH at 0.50metres = 7.0

 Symbols: N - Number of blows in Standard Penetration Test w - Natural moisture content ρ - Natural bulk density c - Apparent cohesion ϕ - Angle of internal friction
 LL - Liquid limit PL - Plastic limit U - 100 mm diameter undisturbed sample D - Disturbed sample B - Bulk sample

BOREHOLE RECORD

LOCATION: Donibristle Industrial Estate JOB NO.: 4933 DATES: COMMENCED: 13.7.84 WATER LEVELS: INITIAL: DRY m
 BOREHOLE NO.: 8 Cont. DIAMETER: 150 mm SURFACE LEVEL: 37.73 m COMPLETED: 13.7.84 FINAL: DRY m

Description	Depth (m)	Thickness (m)	Level (m)	Samples	N	w (%)	ρ (Mg/m ³)	c (kN/m ²)	ϕ (deg.)	LL (%)	PL (%)	PI (%)	Indicated Safe Bearing Capacity (kN/m ²)	
													Strip	Squar
Stiff to very stiff dark brown changing to dark grey sandy boulder clay with pockets of firm very sandy clay	5.70			D										
	8.10	0.40	29.63	7.45										
	8.50	1.50	29.23	8.30										
Soft dark grey shale with thin layers of soft sandstone	10.00			D										
			27.73	9.00										
Hard dark grey shaley sandstone with thin layers of shale														

Remarks:

Symbols: N - Number of blows in Standard Penetration Test w - Natural moisture content ρ - Natural bulk density c - Apparent cohesion ϕ - Angle of internal friction
 LL - Liquid limit PL - Plastic limit PI - Plasticity index U - 100 mm diameter undisturbed sample D - Disturbed sample B - Bulk sample

BOREHOLE RECORD

LOCATION: Donibristle Industrial Estate JOB NO: 4933 DATES: COMMENCED: 17.7.84 WATER LEVELS: INITIAL: DRY
 BOREHOLE NO.: 9 DIAMETER: 150 mm SURFACE LEVEL: 37.79 m COMPLETED: 17.7.84 FINAL: DRY

Description	Depth (m)	Thickness (m)	Level (m)	Samples	N	w (%)	ρ (Mg/m ³)	c (kN/m ²)	ϕ (deg.)	LL (%)	PL (%)	PI (%)	Indicated Safe Bearing Capacity (kN/m ²)	
													Strip	Square
Surfacing:- Asphalt	0.10	0.10	37.69											
Filling:- Hardcore	0.40	0.30	37.39											
Filling:- Ashes	0.60	0.20	37.19	D+B 0.50	8									
Filling:- Soft brown sandy clay with occasional gravel	1.40	0.80	36.39	U 1.00 D	0.65	30.8	1.92	26	4	34	20	14	80 50	80 60
Stiff to very stiff dark brown changing to dark grey sandy boulder clay	5.00	3.60	32.79	1.45 U 1.50 D 1.95 U 2.50 D 2.95 U 4.00 D 4.45		14.9	2.20	53	12	27	18	9	155	185

Remarks: SO₃ at 0.50metres = 0.01%
 pH at 0.50metres = 7.0

Symbols: N - Number of blows in Standard Penetration Test w - Natural moisture content ρ - Natural bulk density c - Apparent cohesion ϕ - Angle of internal friction
 LL - Liquid limit PL - Plastic limit PI - Plasticity index U - 100 mm diameter undisturbed sample D - Disturbed sample B - Bulk sample

BOREHOLE RECORD

LOCATION: Donibristle Industrial Estate JOB NO: 4933 DATES: COMMENCED: 17.7.84 WATER LEVELS: INITIAL: DRY m
 BOREHOLE NO.: 10 DIAMETER: 150 mm SURFACE LEVEL: 37.37 m COMPLETED: 18.7.84 FINAL: DRY m

Description	Depth (m)	Thick-ness (m)	Level (m)	Samples	N	w (%)	ρ (Mg/m ³)	c (kN/m ²)	ϕ (deg.)	LL (%)	PL (%)	PI (%)	Indicated Safe Bearing Capacity (kN/m ²)	
													Strip	Squar
Surfacing:- Asphalt	0.10	0.10	37.27											
Bottoming:- Hardcore	0.35	0.25	37.02											
Filling:- Soft and firm clay with ashes	0.75	0.40	36.62	U 0.50 D		18.3	2.09	83	0				140	170
Soft and stiff brown sandy clay containing gravel	2.00	1.25	35.37	0.95 U 1.50 D		15.1	2.18	50	11	26	12	14	140	170
Stiff to very stiff dark brown changing to dark grey sandy boulder clay	5.00	3.00	32.37	1.95 U 2.50 D 2.95 U 4.00 D 4.45		11.9	2.23	174	5				360	430

Remarks: $S_{0.3}$ at 0.50metres = 0.01%
 pH at 0.50metres = 7.5

Symbols: N - Number of blows in Standard Penetration Test w - Natural moisture content ρ - Natural bulk density c - Apparent cohesion ϕ - Angle of internal friction
 LL - Liquid limit PL - Plastic limit PI - Plasticity index U - 100 mm diameter undisturbed sample D - Disturbed sample B - Bulk sample

BOREHOLE RECORD

LOCATION: Donibristle Industrial Estate
 JOB NO.: 4933
 DATES: COMMENCED: 17.7.84
 WATER LEVELS: INITIAL: DRY
 BOREHOLE NO.: 11
 DIAMETER: 150 mm
 SURFACE LEVEL: 37.99 m
 COMPLETED: 17.7.84
 FINAL: DRY

Description	Depth (m)	Thickness (m)	Level (m)	Samples	N	w (%)	ρ (Mg/m ³)	c (kN/m ²)	ϕ (deg.)	LL (%)	PL (%)	PI (%)	Indicated Safe Bearing Capacity (kN/m ²)				
													Strip	Squat			
Surfacing:- Asphalt	0.10	0.10	37.79														
Bottoming:- Hardcore	0.40	0.30	37.49														
Filling:- Loose whin and ashes	1.40	1.00	36.49	D+B 0.50	6 0.65								60	60			
Stiff to very stiff dark grey sandy boulder clay	5.40			U		12.0	2.21	172	6				370	440			
				1.50													
				D													
				1.95													
				U					11.4	2.24	228	4				440	530
				D													
Hard grey sandstone	6.80			2.95													
				U													
				D													
				4.00													
	8.30	1.50	29.59	4.45													
				U													
				D													
				7.00													

Remarks: $S_{0.3}$ at 0.50metres = 0.01%
 pH at 0.50metres = 7.5

Symbols: N - Number of blows in Standard Penetration Test
 w - Natural moisture content
 LL - Liquid limit
 PL - Plastic limit
 PI - Plasticity index
 U - 100 mm diameter undisturbed sample
 D - Disturbed sample
 D+B - Bulk sample
 D - Bulk sample
 c - Apparent cohesion
 ϕ - Angle of internal friction

BOREHOLE RECORD

LOCATION: Donibristle Industrial Estate JOB NO: 4933 DATES: COMMENCED: 18.7.84 WATER LEVELS: INITIAL: DRY
 BOREHOLE NO.: 12 DIAMETER: 150 mm SURFACE LEVEL: 37.50 COMPLETED: 18.7.84 FINAL: DRY

Description	Depth (m)	Thick-ness (m)	Level (m)	Samples	N	w (%)	ρ (Mg/m ³)	c (kN/m ²)	ϕ (deg.)	LL (%)	PL (%)	PI (%)	Indicated Safe Bearing Capacity (kN/m ²)	
													Strip	Squat
Surfacing:- Asphalt	0.10	0.10	37.40											
Bottoming:- Hardcore	0.25	0.15	37.25											
Fillling:- Soft brown sandy clay	0.75	0.50	36.75	U 0.50 D		17.2	2.10	39	5	27	15	12	80	95
Soft and very soft dark brown sandy clay containing gravel	2.10	1.35	35.40	0.95 U 1.50 D 1.95 U		15.8	2.15	110	5	32	18	14	225	270
Stiff and very stiff dark brown changing to dark grey sandy boulder clay	5.00	2.90	32.50	2.50 D 2.95 U 4.00 D 4.45		12.7	2.19	305	7				500	600
						12.7	2.23	248	4				480	580

Remarks: SO₃ at 0.50metres = 0.01% pH at 0.50metres = 6.5
 SO₃ at 1.50metres = 0.01% pH at 1.50metres = 8.0

Symbols: N - Number of blows in Standard Penetration Test w - Natural moisture content ρ - Natural bulk density c - Apparent cohesion ϕ - Angle of internal friction
 LL - Liquid limit PL - Plastic limit PI - Plasticity index U - 100 mm diameter undisturbed sample D - Disturbed sample B - Bulk sample

NICHOLSON (SITE INVESTIGATION) LIMITED, BATHGATE ROAD, ARMADALE

Trial Pit Record

LOCATION :- Donibristle Industrial Estate

JOB NO. :- 4933

TRIAL PIT A.

Surface Level:- 36.71metres

	Thickness (m)	Depth (m)	Level (m)
Sandy topsoil	0.25	0.25	36.46
Medium dense fine uniform brown sand	0.35	0.60	36.11
Firm mottled brown and dark brown and grey sandy clay containing gravel with patches of sand	1.20	1.80	34.91
Stiff dark greyish brown sandy boulder clay	0.55	2.35	34.36
Stiff to very stiff dark grey sandy boulder clay	0.45	2.80	33.91
Soft dark grey clayey shale with broken shale and sandstone	0.30	3.10	33.61

TRIAL PIT DRY

TRIAL PIT B.

Surface Level:- 37.52metres

Topsoil	0.15	0.15	37.37
Bottoming:- Hardcore	0.10	0.25	37.27
Medium dense fine to coarse brown sand and gravel	0.50	0.75	36.77
Firm brown sandy clay containing gravel	0.50	1.25	36.27
Stiff dark brown brittle boulder clay	0.65	1.90	35.62
Very stiff dark brown and grey sandy boulder clay and boulders with traces of clayey shale at base	0.70	2.60	34.92

TRIAL PIT DRY
(Slight traces of water at 0.90metres)

Trial Pit Record

LOCATION :- DONIBRISTLE INDUSTRIAL ESTATE

JOB NO. - 4933

Surface Level: 37.66metres

TRIAL PIT C.

	Thickness (m)	Depth (m)	Level (m)
Topsoil	0.20	0.20	37.46
Filling:- Stiff brown sandy clay containing gravel and boulders	0.30	0.50	37.16
Firm brown sandy clay containing gravel	0.30	0.80	36.86
Soft to firm dark greenish brown and brown silty sandy clay with traces of organic matter and broken rock and pockets of sand	0.70	1.50	36.17
Loose fine to medium brown sand and gravel with occasional cobbles and boulders	1.10	2.60	35.07
Stiff to very stiff dark grey sandy boulder clay	0.30	2.90	34.77

Traces of water from sand(sides falling in)
TILE DRAIN broken at 1.40metres
Water level after 1 hour 0.90metres

TRIAL PIT D.

Surface Level:- 37.16metres

Filling:- Topsoil and gravel	0.25	0.25	36.91
Filling:- Mainly loose sand with gravel, boulders and patches of very sandy clay	0.35	0.60	36.56
Stiff brown sandy clay with patches of sand	0.80	1.40	35.76
Very stiff dark greyish brown brittle sandy boulder clay	0.40	1.80	35.36
Very stiff dark grey sandy boulder clay	0.50	2.30	34.86

TRIAL PIT DRY

Trial Pit Record

LOCATION :- DONIBRISTLE INDUSTRIAL ESTATE

JOB NO. :- 4933

TRIAL PIT E.

Surface Level:- 37.65metres

	Thickness (m)	Depth (m)	Level (m)
Surfacing:- Asphalt	0.20	0.20	37.45
Bottoming:- Hardcore	0.20	0.40	37.25
Soft to firm greenish brown silty sandy clay with traces of organic matter and brown sandy clay	0.60	1.00	36.65
Soft to firm mottled brown sandy clay containing gravel with pockets of sand, boulders and large broken sandstone	1.10	2.10	35.55
Stiff dark brown sandy boulder clay	0.30	2.40	35.25

Water entering pit at 1.80metres

CONSOLIDATION TEST RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO. 1

DIAMETER OF SAMPLE 76 mm

DEPTH OF SAMPLE 0.50 m

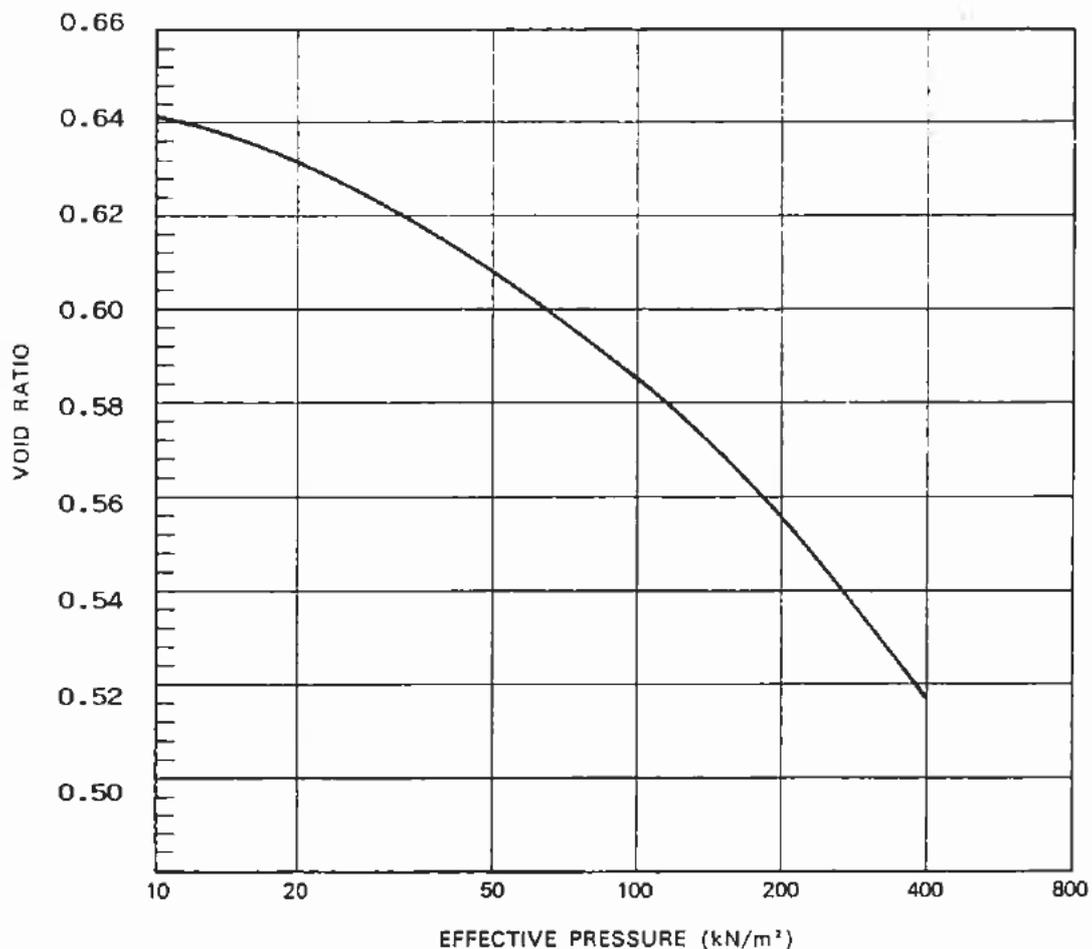
INITIAL MOISTURE CONTENT 24.2 %

SPECIFIC GRAVITY 2.69

FINAL MOISTURE CONTENT 22.3 %

NATURAL BULK DENSITY 2.02 Mg/m³

EFFECTIVE PRESSURE (kN/m ²)	CHANGE IN THICKNESS (mm)	VOID RATIO	THICKNESS OF SAMPLE (mm)	COEFFICIENT OF VOLUME COMPRESSIBILITY (m ² /MN)	COEFFICIENT OF CONSOLIDATION (m ² /year)
0		0.6516	19.050		
10	-0.120	0.6412	18.930		
20	-0.120	0.6308	18.810		
50	-0.266	0.6078	18.544		
100	-0.266	0.5848	18.278		
200	-0.316	0.5575	17.962		
400	-0.468	0.5170	17.494		
0	+0.958	0.5999	18.452		

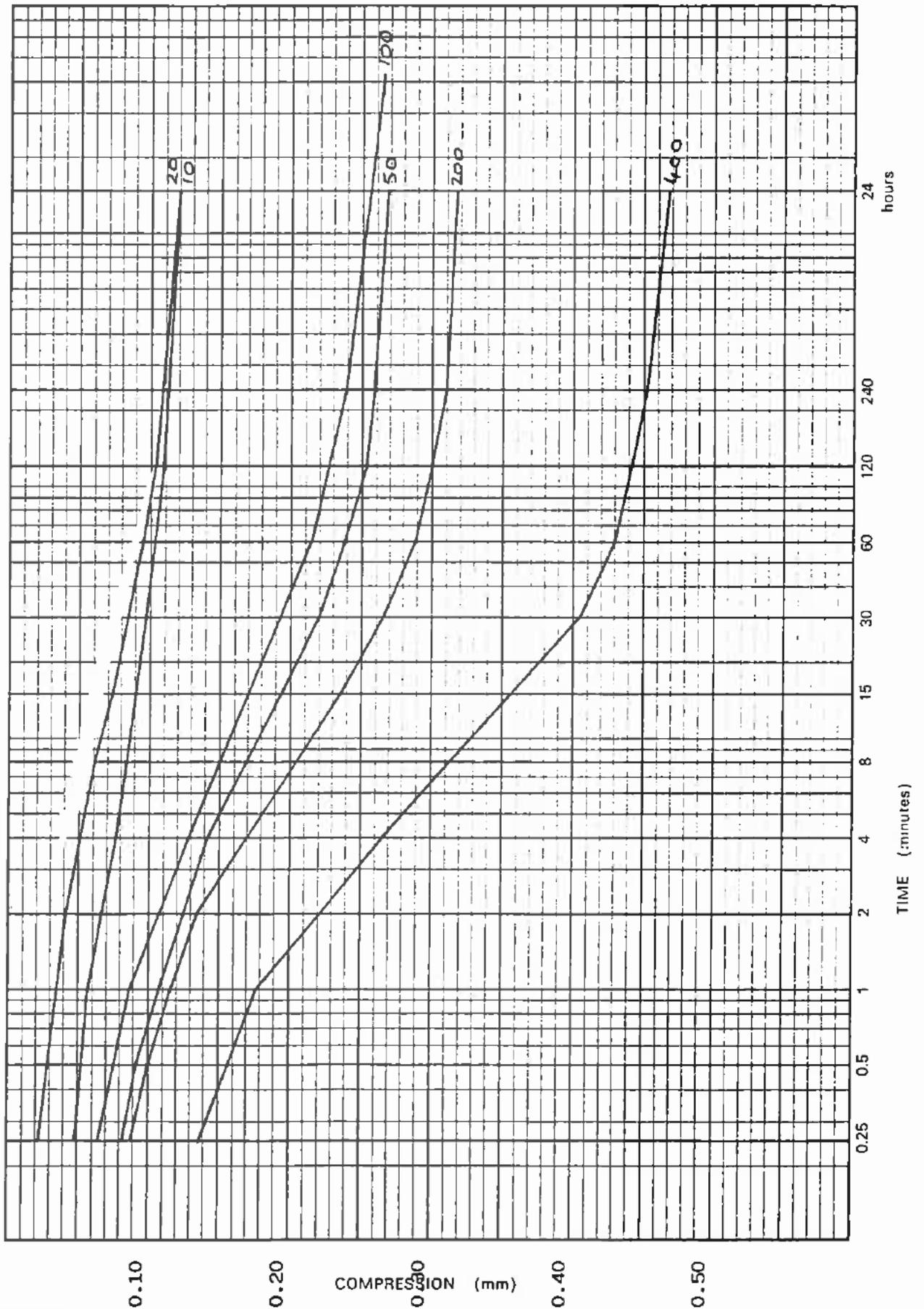


CONSOLIDATION TIME RESULTS

LOCATION: Donibristle Industrial Estate.

BOREHOLE NO.: 1

SAMPLE DEPTH: 0.50 m



CONSOLIDATION TEST RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO. 3

DIAMETER OF SAMPLE 76 mm

DEPTH OF SAMPLE 0.50 m

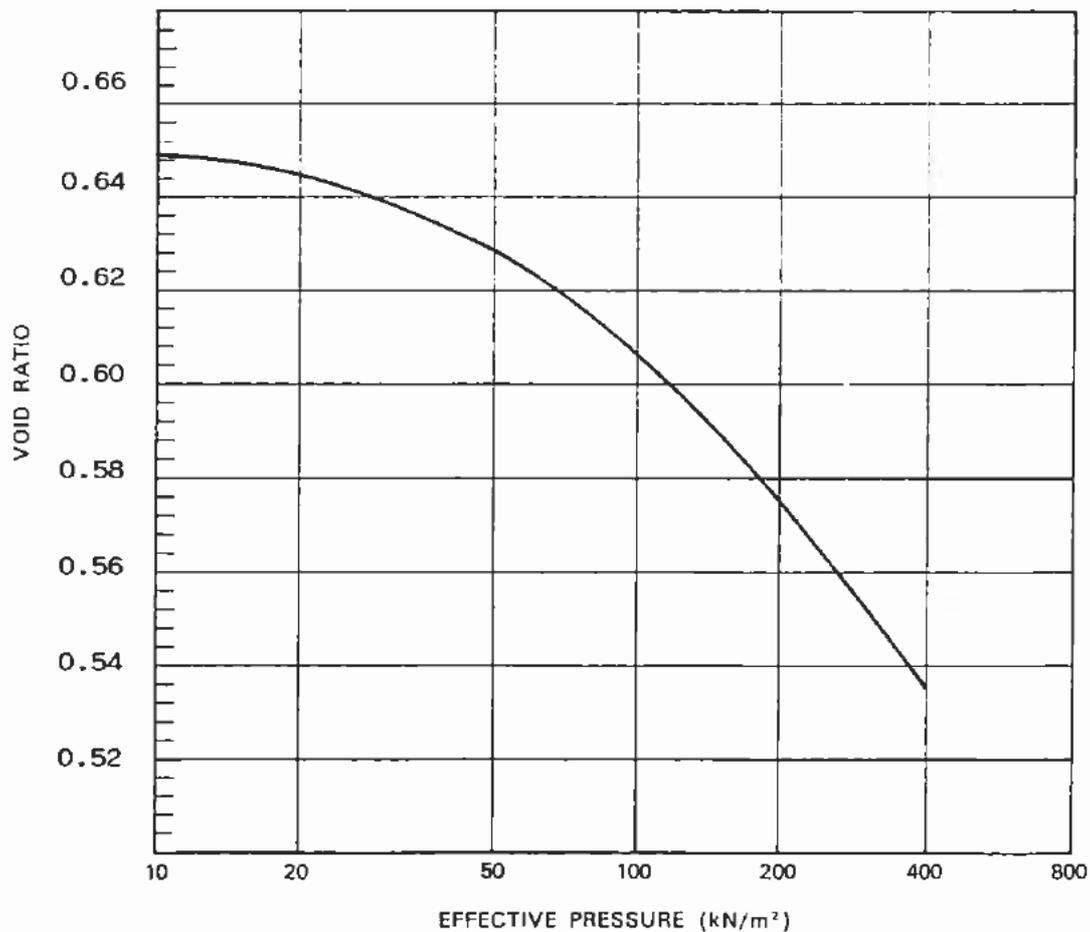
INITIAL MOISTURE CONTENT 23.8 %

SPECIFIC GRAVITY 2.69

FINAL MOISTURE CONTENT 22.9 %

NATURAL BULK DENSITY 2.01 Mg/m³

EFFECTIVE PRESSURE (kN/m ²)	CHANGE IN THICKNESS (mm)	VOID RATIO	THICKNESS OF SAMPLE (mm)	COEFFICIENT OF VOLUME COMPRESSIBILITY (m ² /MN)	COEFFICIENT OF CONSOLIDATION (m ² /year)
0		0.6538	19.050		
10	-0.053	0.6492	18.997		
20	-0.053	0.6446	18.944		
50	-0.178	0.6292	18.766		
100	-0.256	0.6070	18.510		
200	-0.340	0.5775	18.170		
400	-0.478	0.5360	17.692		
0	+0.922	0.6160	18.614		

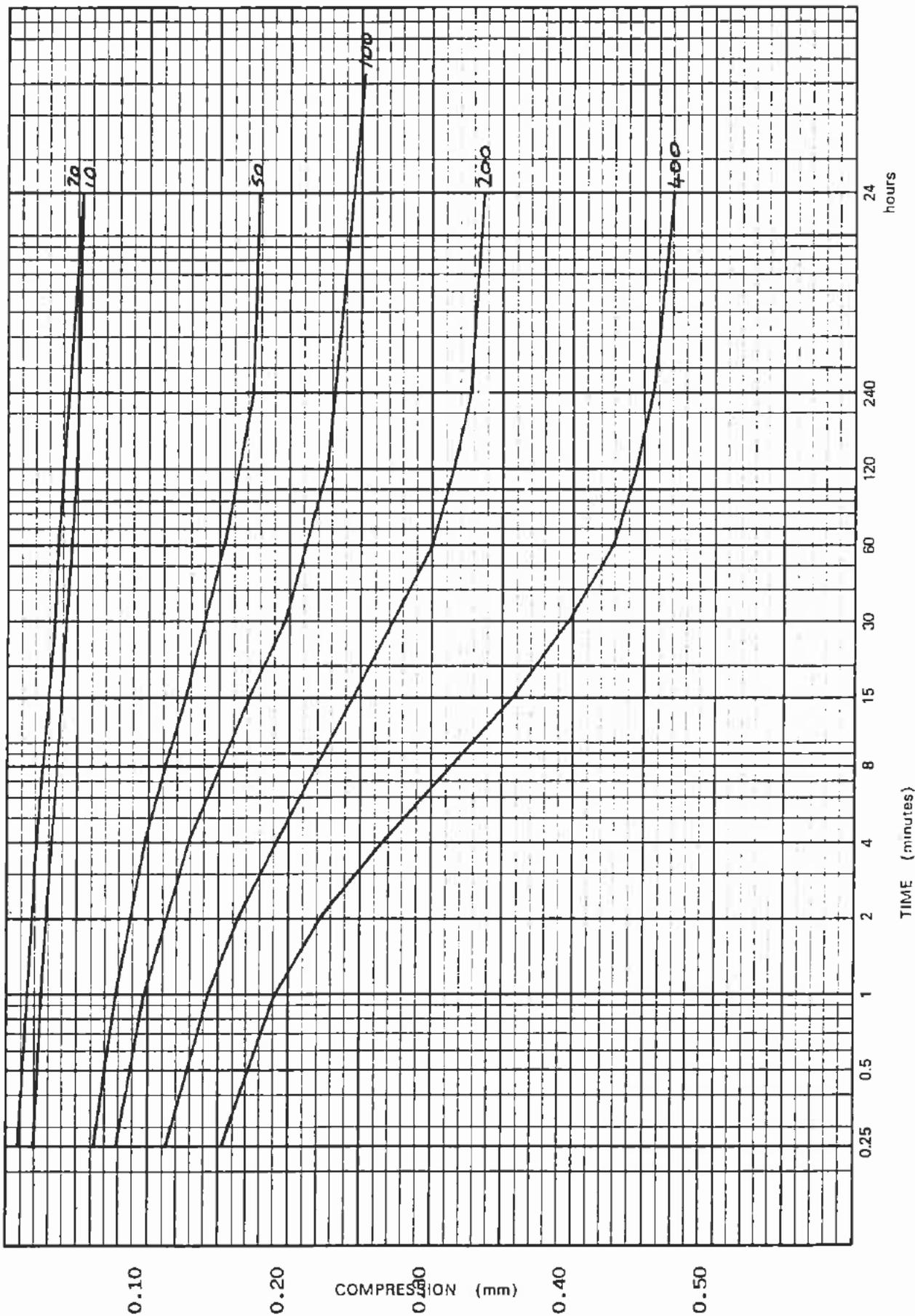


CONSOLIDATION TIME RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO.: 3

SAMPLE DEPTH: 0.50 m



CONSOLIDATION TEST RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO. 4

DIAMETER OF SAMPLE : 76 mm

DEPTH OF SAMPLE . 0.50 m

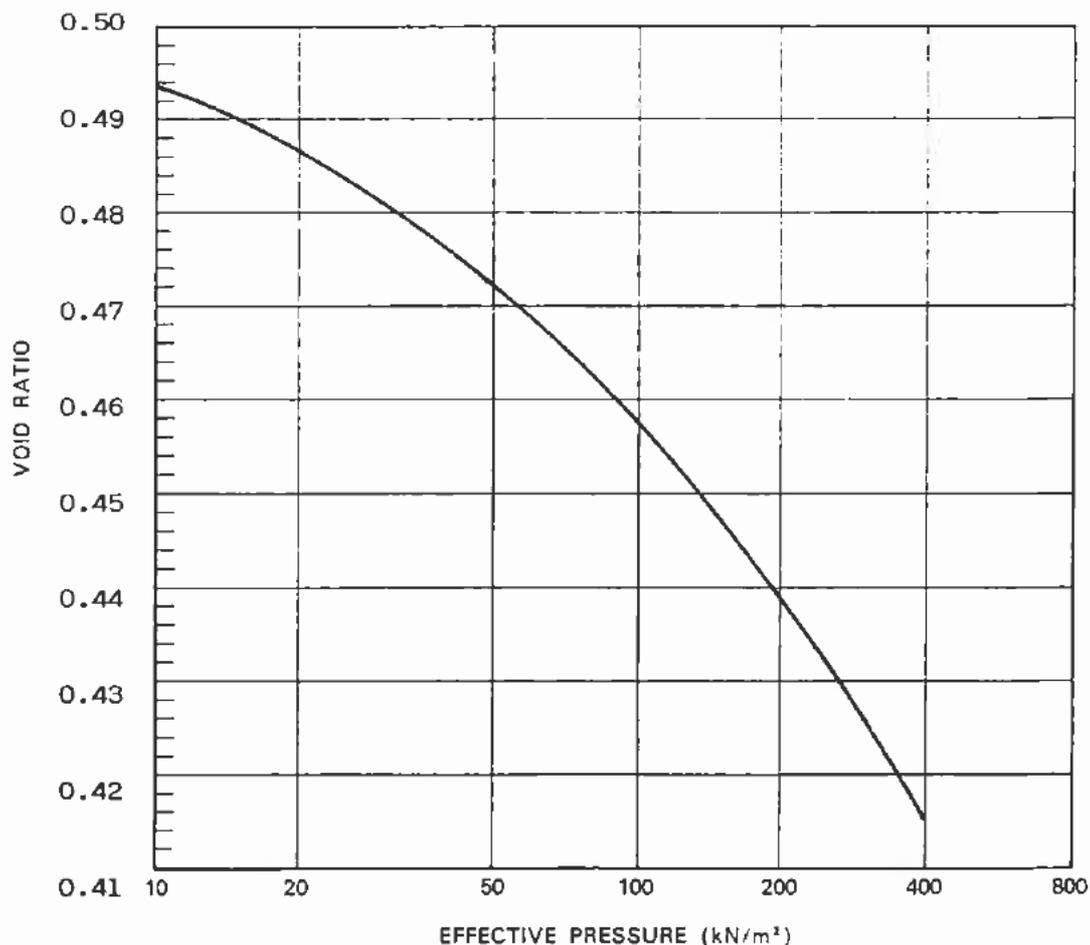
INITIAL MOISTURE CONTENT . 18.5 %

SPECIFIC GRAVITY . 2.71

FINAL MOISTURE CONTENT 17.0 %

NATURAL BULK DENSITY 2.13 Mg/m³

EFFECTIVE PRESSURE (kN/m ²)	CHANGE IN THICKNESS (mm)	VOID RATIO	THICKNESS OF SAMPLE (mm)	COEFFICIENT OF VOLUME COMPRESSIBILITY (m ² /MN)	COEFFICIENT OF CONSOLIDATION (m ² /year)
0		0.5025	19.050		
10	-0.114	0.4935	18.936		
20	-0.084	0.4869	18.852		
50	-0.185	0.4723	18.667		
100	-0.183	0.4579	18.484		
200	-0.231	0.4397	18.253		
400	-0.310	0.4152	17.943		
0	+0.576	0.4607	18.519		

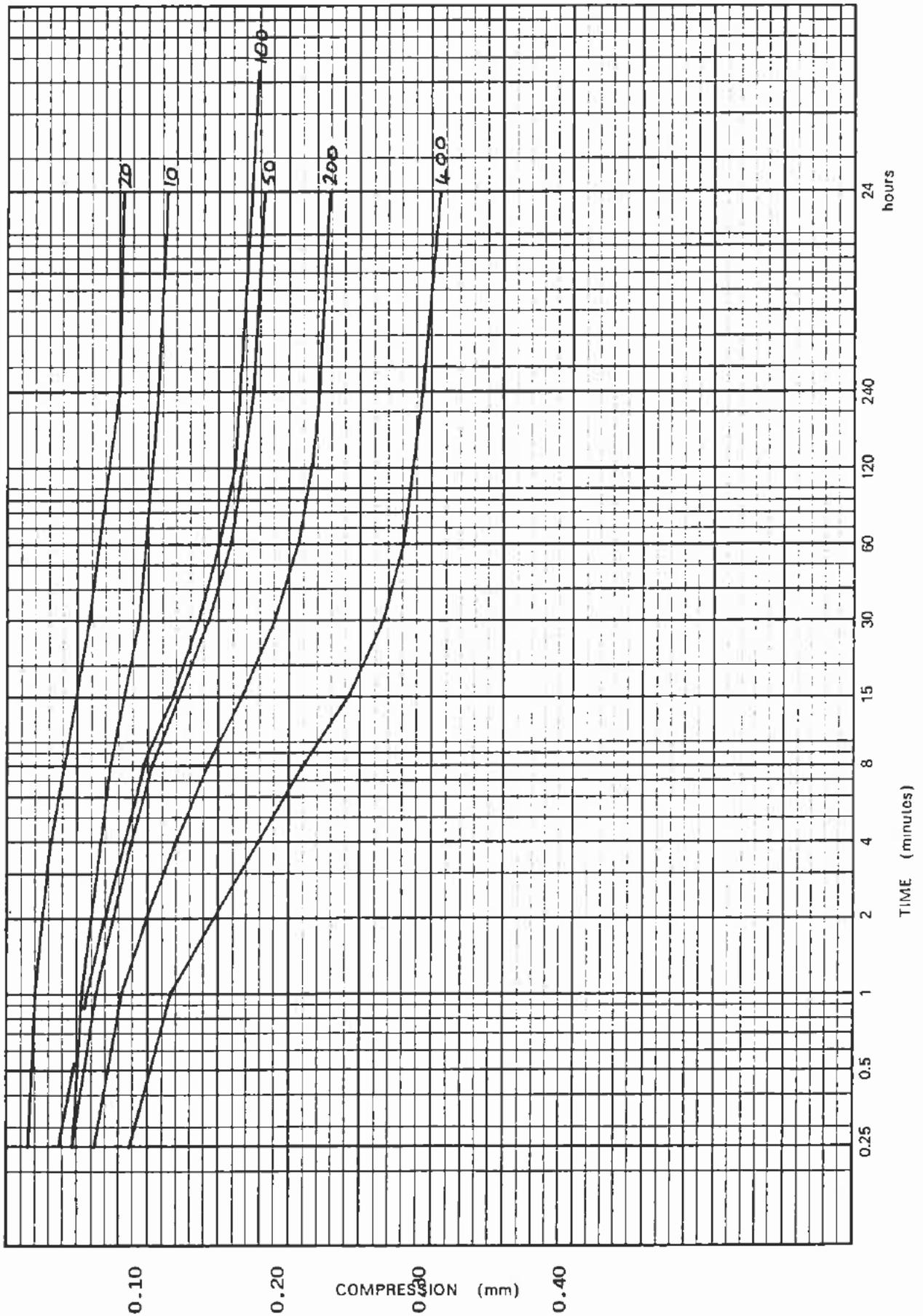


CONSOLIDATION TIME RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO.: 4

SAMPLE DEPTH: 0.50 m



CONSOLIDATION TEST RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO. 5

DIAMETER OF SAMPLE 76 mm

DEPTH OF SAMPLE 1.50 m

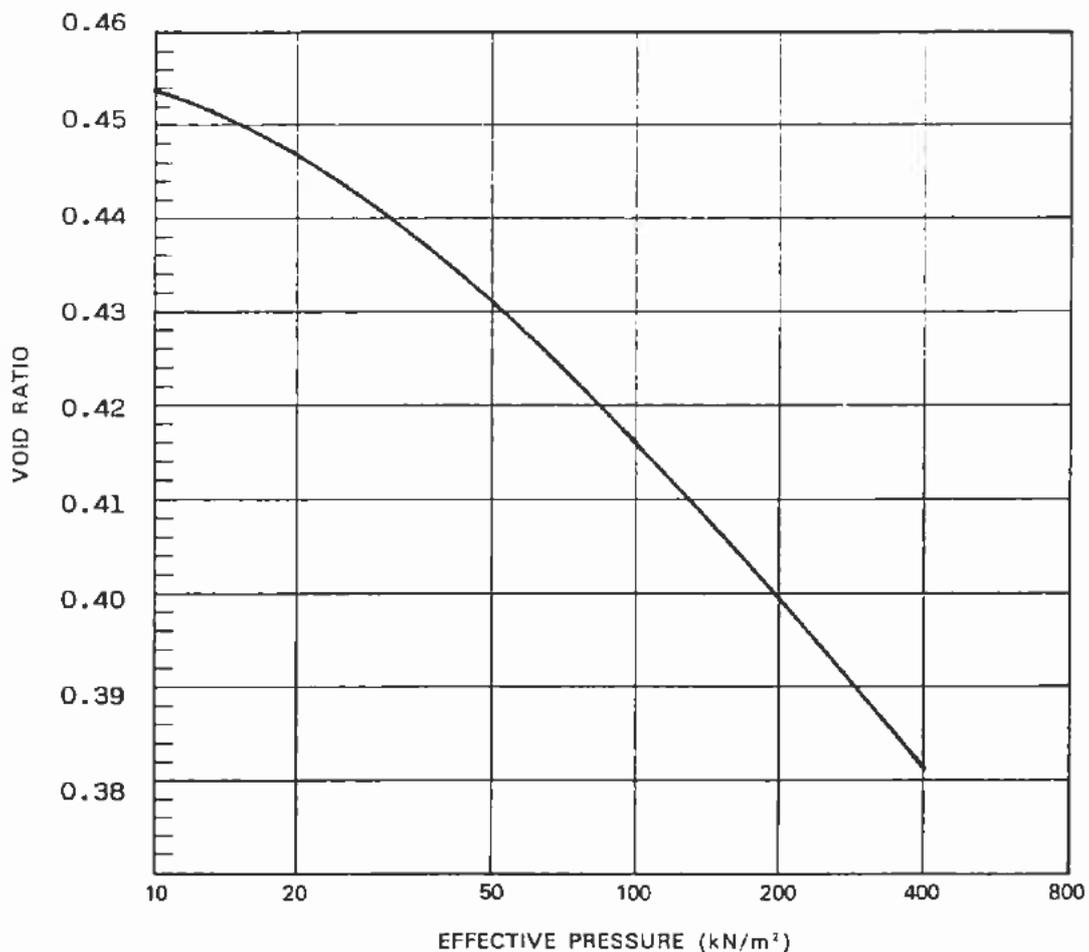
INITIAL MOISTURE CONTENT 16.9 %

SPECIFIC GRAVITY 2.69

FINAL MOISTURE CONTENT 15.2 %

NATURAL BULK DENSITY 2.12 Mg/m³

EFFECTIVE PRESSURE (kN/m ²)	CHANGE IN THICKNESS (mm)	VOID RATIO	THICKNESS OF SAMPLE (mm)	COEFFICIENT OF VOLUME COMPRESSION (m ² /MN)	COEFFICIENT OF CONSOLIDATION (m ² /year)
0		0.4603	19.050		
10	-0.084	0.4539	18.966		
20	-0.092	0.4469	18.874		
50	-0.206	0.4311	18.668		
100	-0.201	0.4157	18.467		
200	-0.211	0.3995	18.256		
400	-0.234	0.3816	18.022		
0	+0.356	0.4089	18.378		

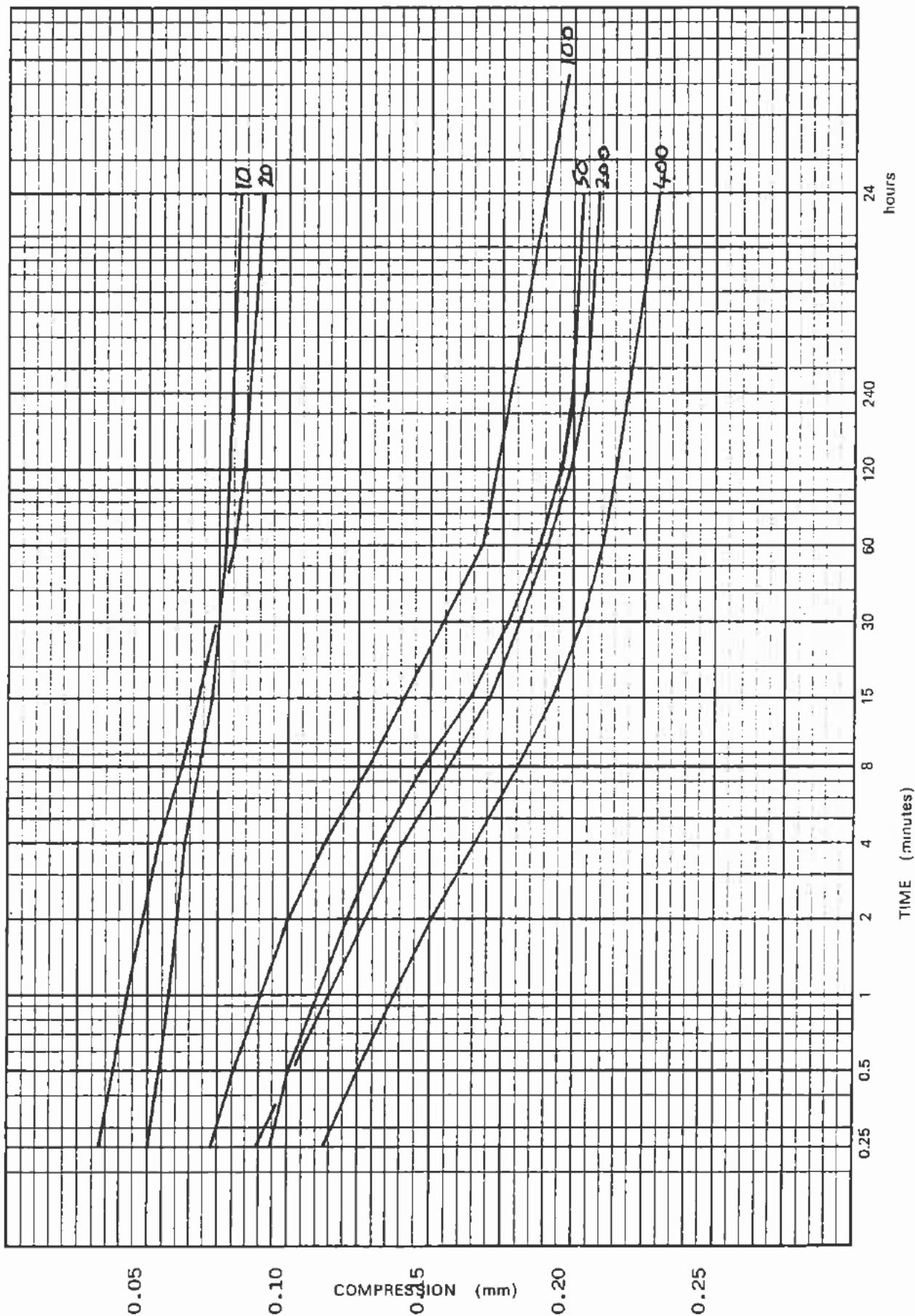


CONSOLIDATION TIME RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO.: 5

SAMPLE DEPTH: 1.50 m



CONSOLIDATION TEST RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO. 5

DIAMETER OF SAMPLE : 76 mm

DEPTH OF SAMPLE 2.50 m

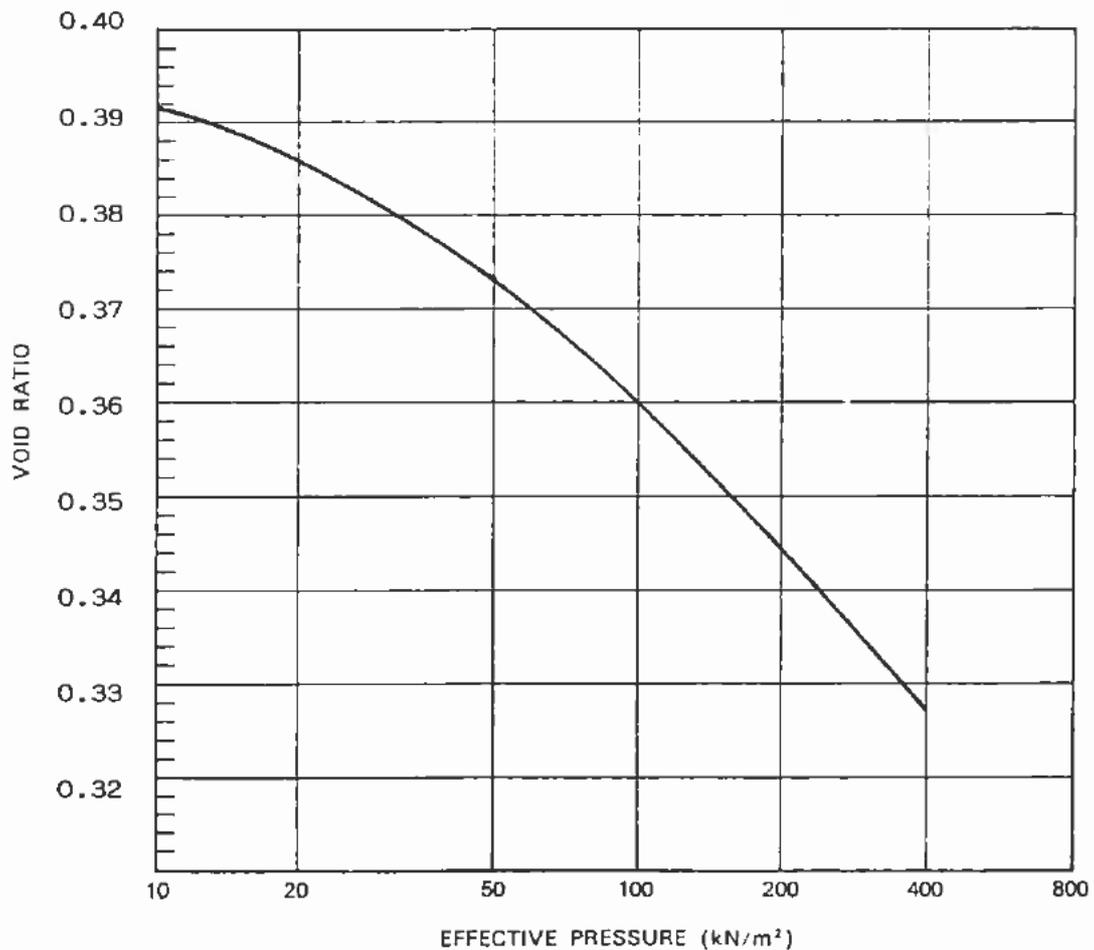
INITIAL MOISTURE CONTENT 13.4 %

SPECIFIC GRAVITY 2.72

FINAL MOISTURE CONTENT 13.1 %

NATURAL BULK DENSITY 2.17 Mg/m³

EFFECTIVE PRESSURE (kN/m ²)	CHANGE IN THICKNESS (mm)	VOID RATIO	THICKNESS OF SAMPLE (mm)	COEFFICIENT OF VOLUME COMPRESSIBILITY (m ² /MN)	COEFFICIENT OF CONSOLIDATION (m ² /year)
0		0.4032	19.050		
10	-0.155	0.3918	18.895		
20	-0.084	0.3856	18.811		
50	-0.173	0.3729	18.638		
100	-0.173	0.3602	18.465		
200	-0.206	0.3451	18.259		
400	-0.236	0.3277	18.023		
0	+0.389	0.3563	18.412		

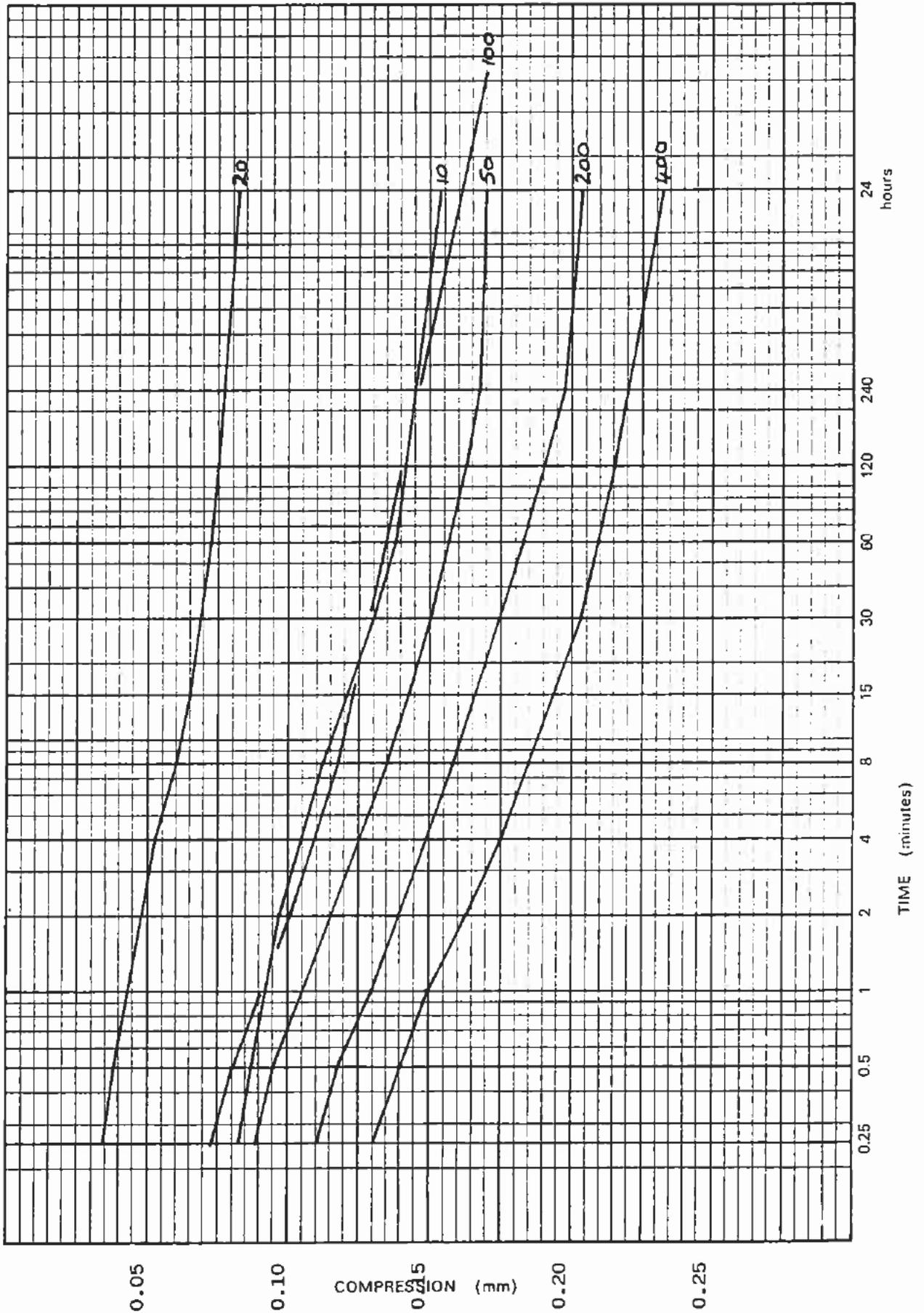


CONSOLIDATION TIME RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO.: 5

SAMPLE DEPTH: 2.50 m



CONSOLIDATION TEST RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO. 8

DIAMETER OF SAMPLE : 76 mm

DEPTH OF SAMPLE : 0.50 m

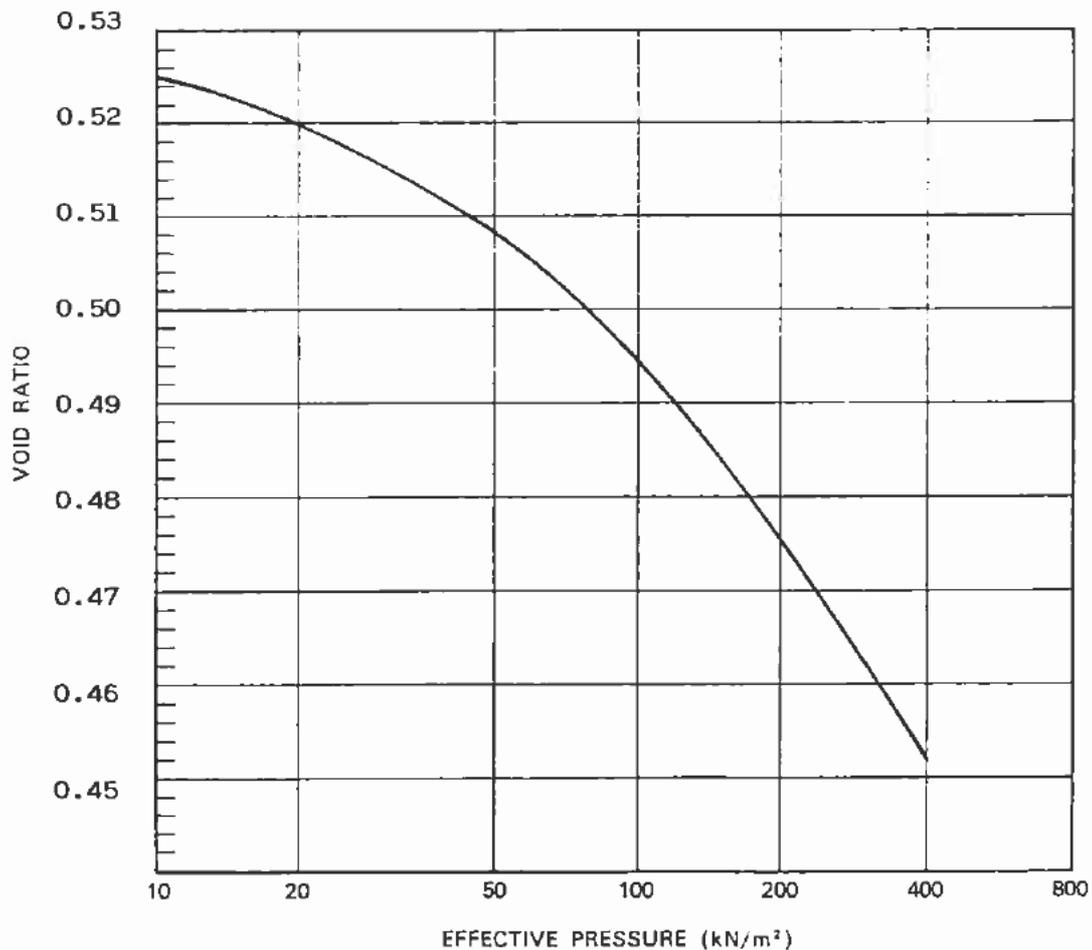
INITIAL MOISTURE CONTENT : 19.0 %

SPECIFIC GRAVITY 2.70

FINAL MOISTURE CONTENT 18.3 %

NATURAL BULK DENSITY 2.08 Mg/m³

EFFECTIVE PRESSURE (kN/m ²)	CHANGE IN THICKNESS (mm)	VOID RATIO	THICKNESS OF SAMPLE (mm)	COEFFICIENT OF VOLUME COMPRESSIBILITY (m ² /MN)	COEFFICIENT OF CONSOLIDATION (m ² /year)
0		0.5319	19.050		
10	-0.081	0.5254	18.969		
20	-0.064	0.5203	18.905		
50	-0.140	0.5091	18.765		
100	-0.178	0.4948	18.587		
200	-0.287	0.4717	18.300		
400	-0.244	0.4521	18.056		
0	+0.524	0.4941	18.580		

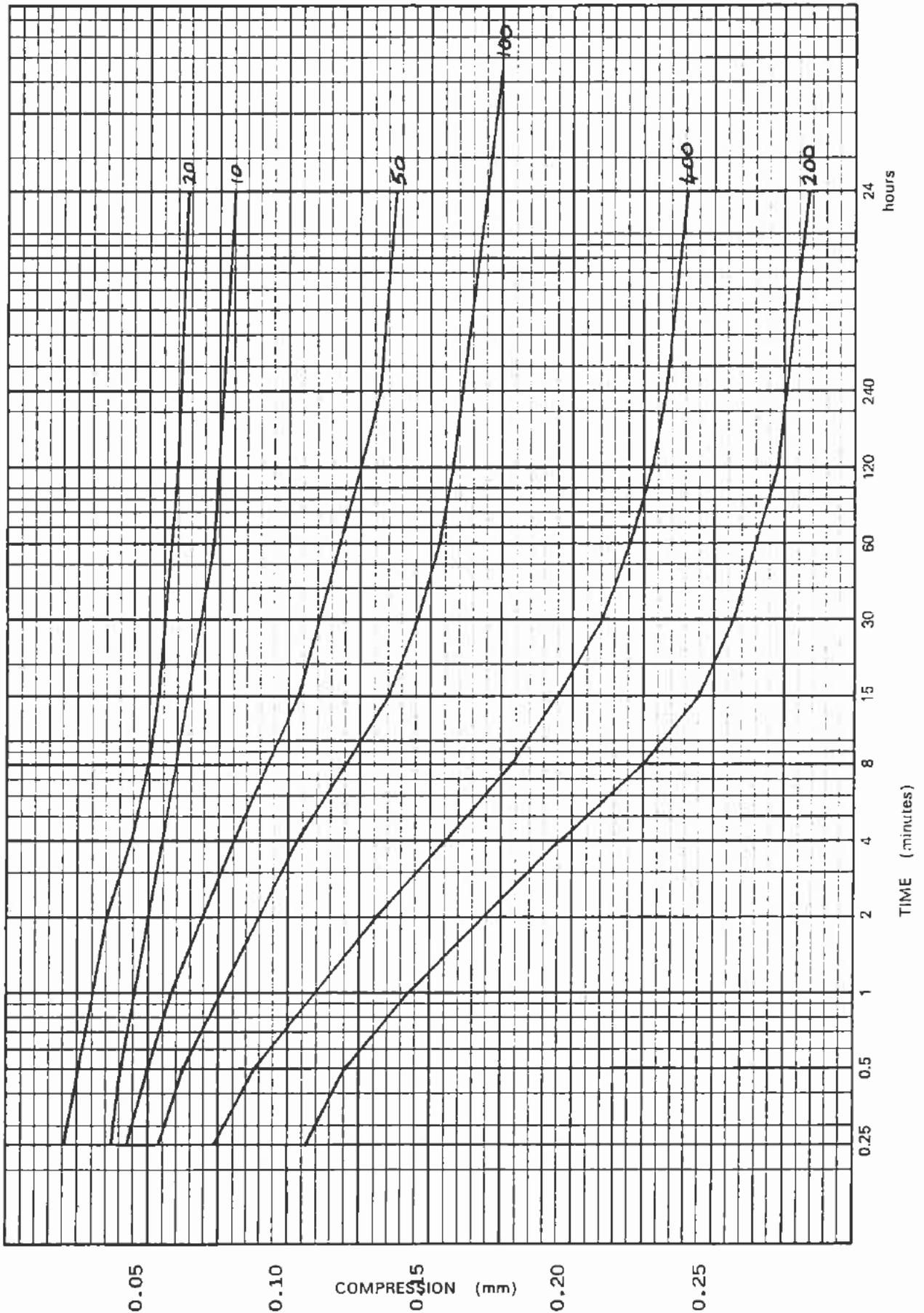


CONSOLIDATION TIME RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO.: 8

SAMPLE DEPTH: 0.50 m



CONSOLIDATION TEST RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO. 10

DIAMETER OF SAMPLE : 76 mm

DEPTH OF SAMPLE : 1.50 m

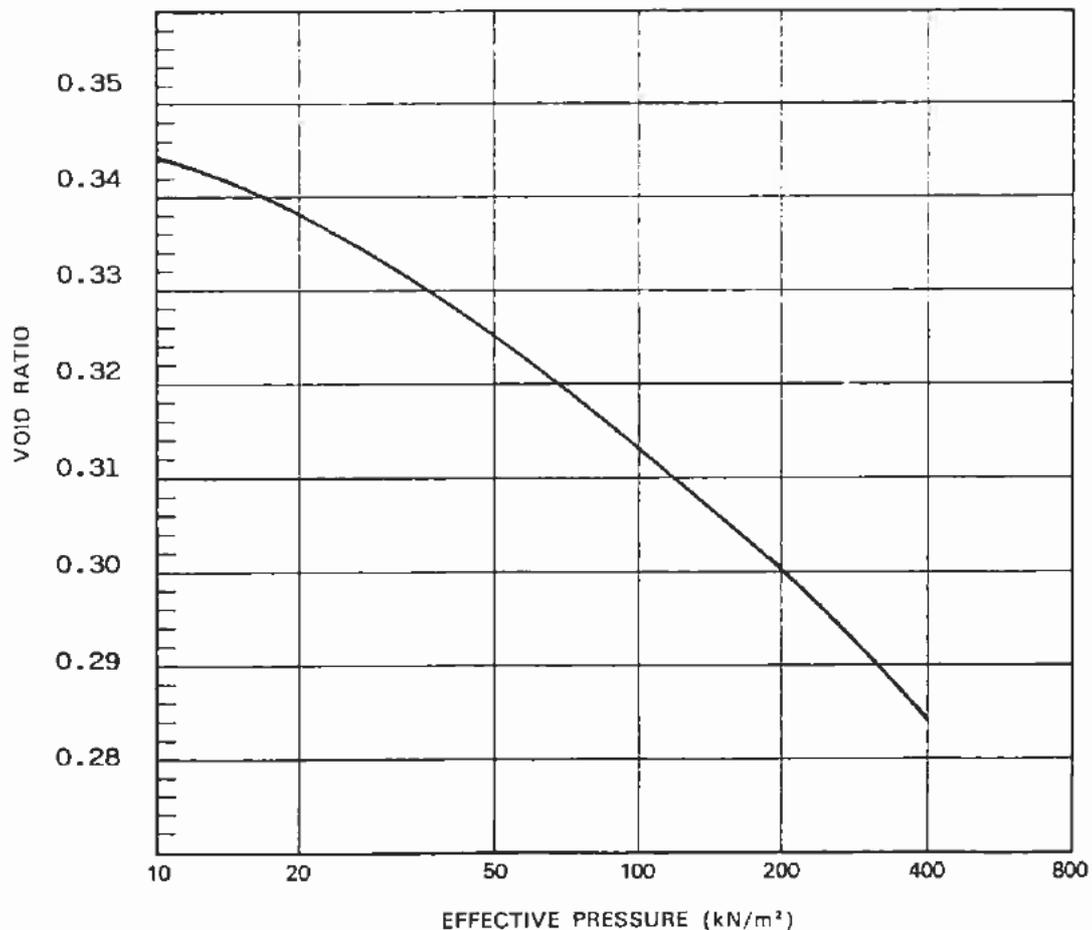
INITIAL MOISTURE CONTENT 15.7 %

SPECIFIC GRAVITY 2.72

FINAL MOISTURE CONTENT 13.9 %

NATURAL BULK DENSITY 2.17 Mg/m³

EFFECTIVE PRESSURE (kN/m ²)	CHANGE IN THICKNESS (mm)	VOID RATIO	THICKNESS OF SAMPLE (mm)	COEFFICIENT OF VOLUME COMPRESSIBILITY (m ² /MN)	COEFFICIENT OF CONSOLIDATION (m ² /year)
0		0.3622	19.050		
10	-0.249	0.3444	18.801		
20	-0.091	0.3379	18.710		
50	-0.173	0.3255	18.537		
100	-0.175	0.3130	18.362		
200	-0.165	0.3012	18.197		
400	-0.234	0.2845	17.963		
0	+0.239	0.3016	18.202		

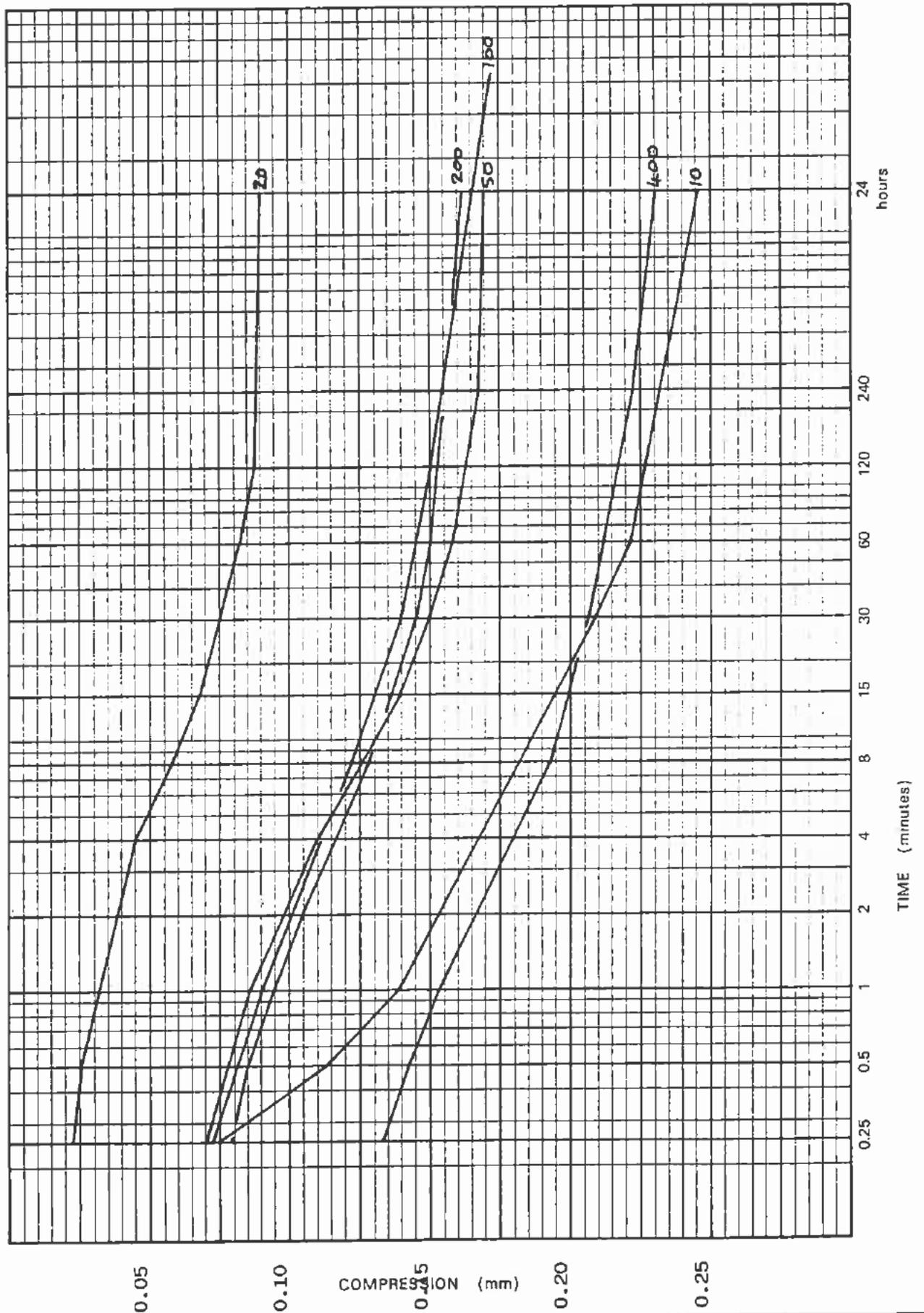


CONSOLIDATION TIME RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO.: 10

SAMPLE DEPTH: 1.50 m



CONSOLIDATION TEST RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO. 12

DIAMETER OF SAMPLE : 76 mm

DEPTH OF SAMPLE 0.50 m

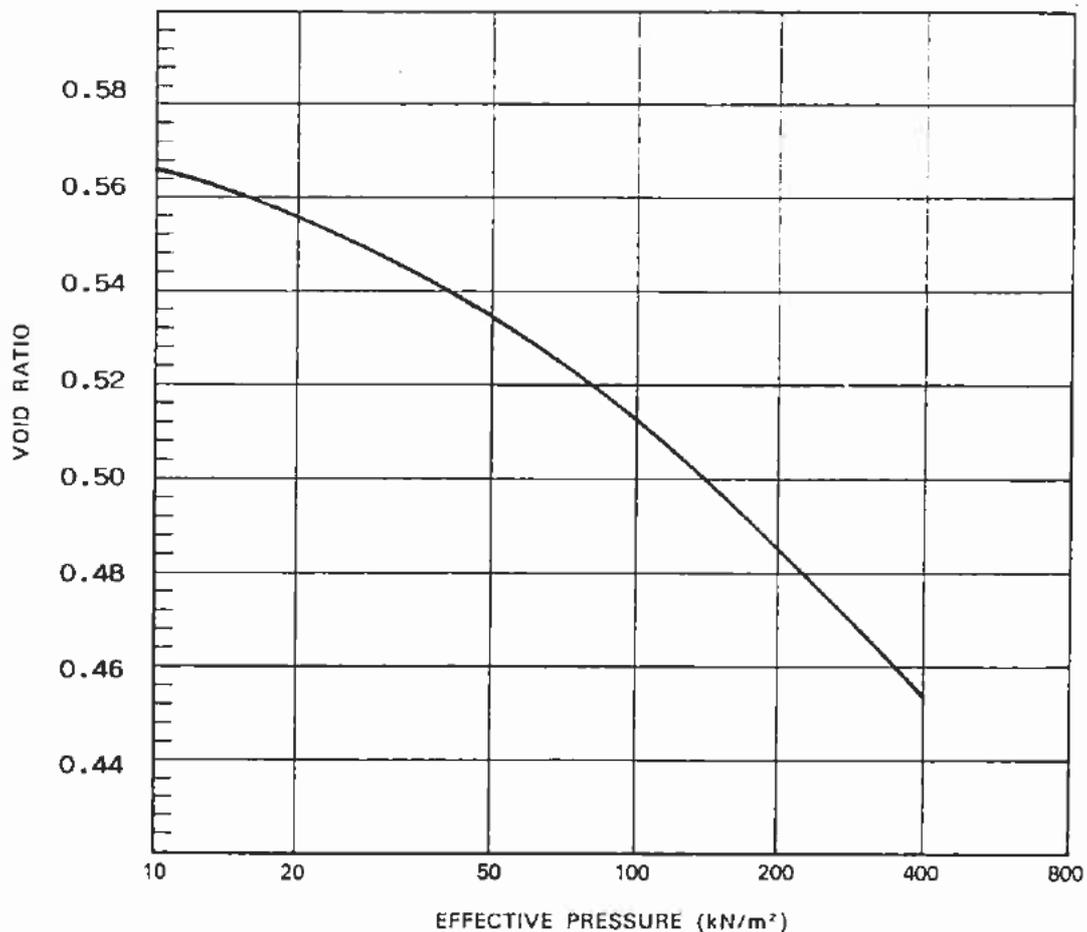
INITIAL MOISTURE CONTENT 21.9 %

SPECIFIC GRAVITY 2.72

FINAL MOISTURE CONTENT 18.6 %

NATURAL BULK DENSITY 2.08 Mg/m³

EFFECTIVE PRESSURE (kN/m ²)	CHANGE IN THICKNESS (mm)	VOID RATIO	THICKNESS OF SAMPLE (mm)	COEFFICIENT OF VOLUME COMPRESSIBILITY (m ² /MN)	COEFFICIENT OF CONSOLIDATION (m ² /year)
0		0.5775	19.050		
10	-0.137	0.5662	18.913		
20	-0.114	0.5568	18.799		
50	-0.259	0.5353	18.540		
100	-0.264	0.5134	18.276		
200	-0.310	0.4877	17.966		
400	-0.402	0.4544	17.564		
0	+0.622	0.5059	18.186		

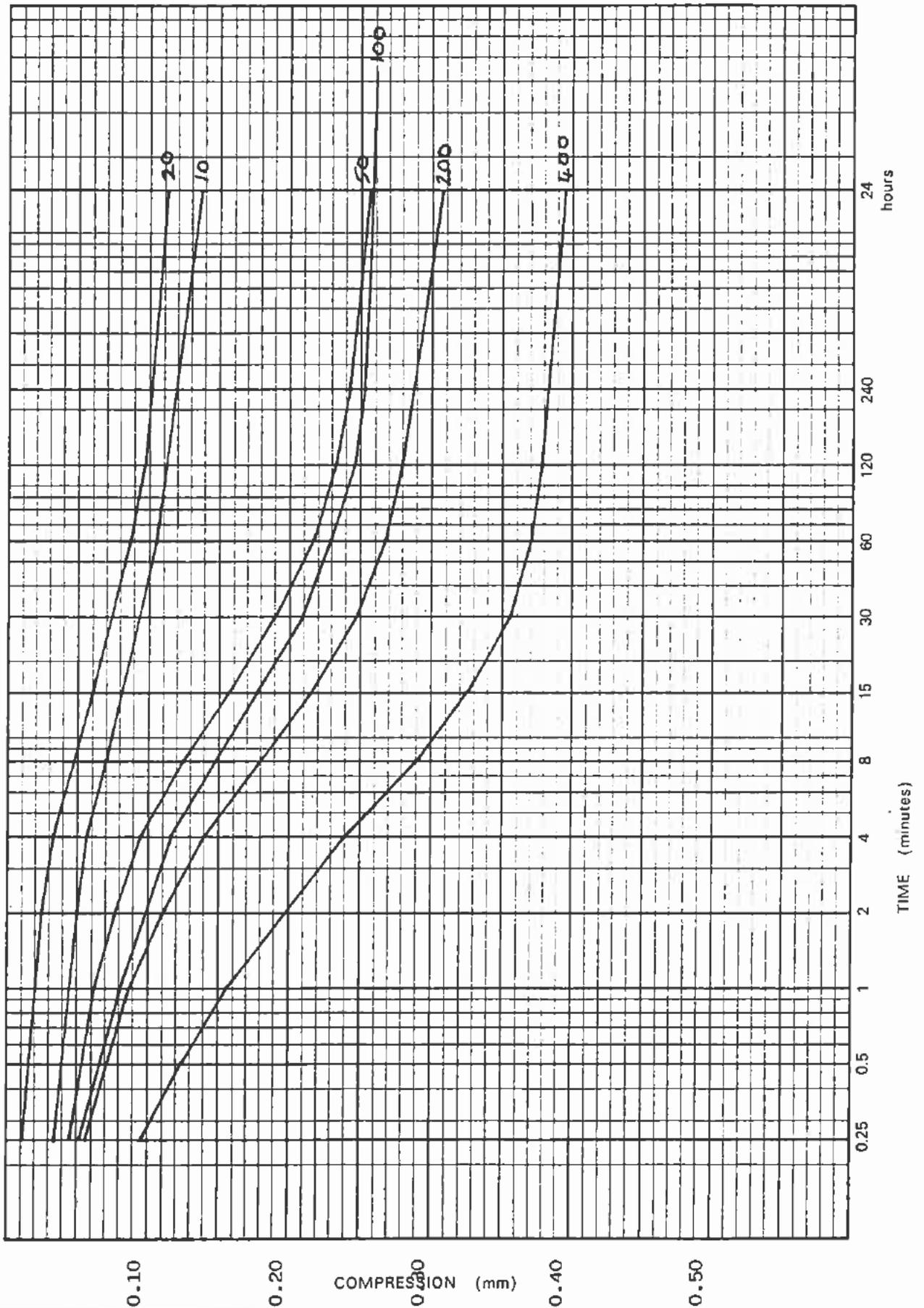


CONSOLIDATION TIME RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO.: 12

SAMPLE DEPTH: 0.50 m



CONSOLIDATION TEST RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO. 12

DIAMETER OF SAMPLE : 76 mm

DEPTH OF SAMPLE 1.50 m

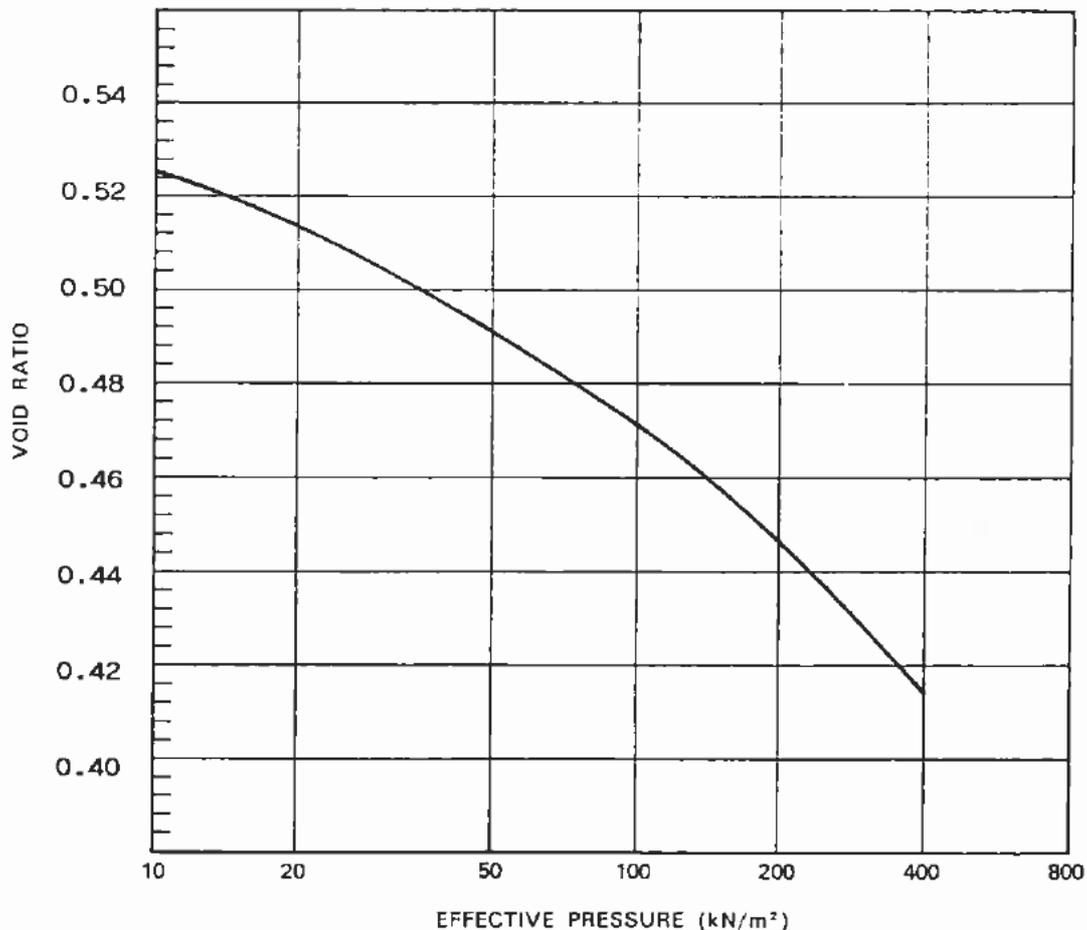
INITIAL MOISTURE CONTENT 20.7 %

SPECIFIC GRAVITY 2.72

FINAL MOISTURE CONTENT 17.1 %

NATURAL BULK DENSITY 2.08 Mg/m³

EFFECTIVE PRESSURE (kN/m ²)	CHANGE IN THICKNESS (mm)	VOID RATIO	THICKNESS OF SAMPLE (mm)	COEFFICIENT OF VOLUME COMPRESSIBILITY (m ² /MN)	COEFFICIENT OF CONSOLIDATION (m ² /year)
0		0.5397	19.050		
10	-0.183	0.5249	18.867		
20	-0.137	0.5138	18.730		
50	-0.267	0.4922	18.463		
100	-0.262	0.4710	18.201		
200	-0.302	0.4468	17.899		
400	-0.396	0.4148	17.503		
0	+0.622	0.4651	18.125		

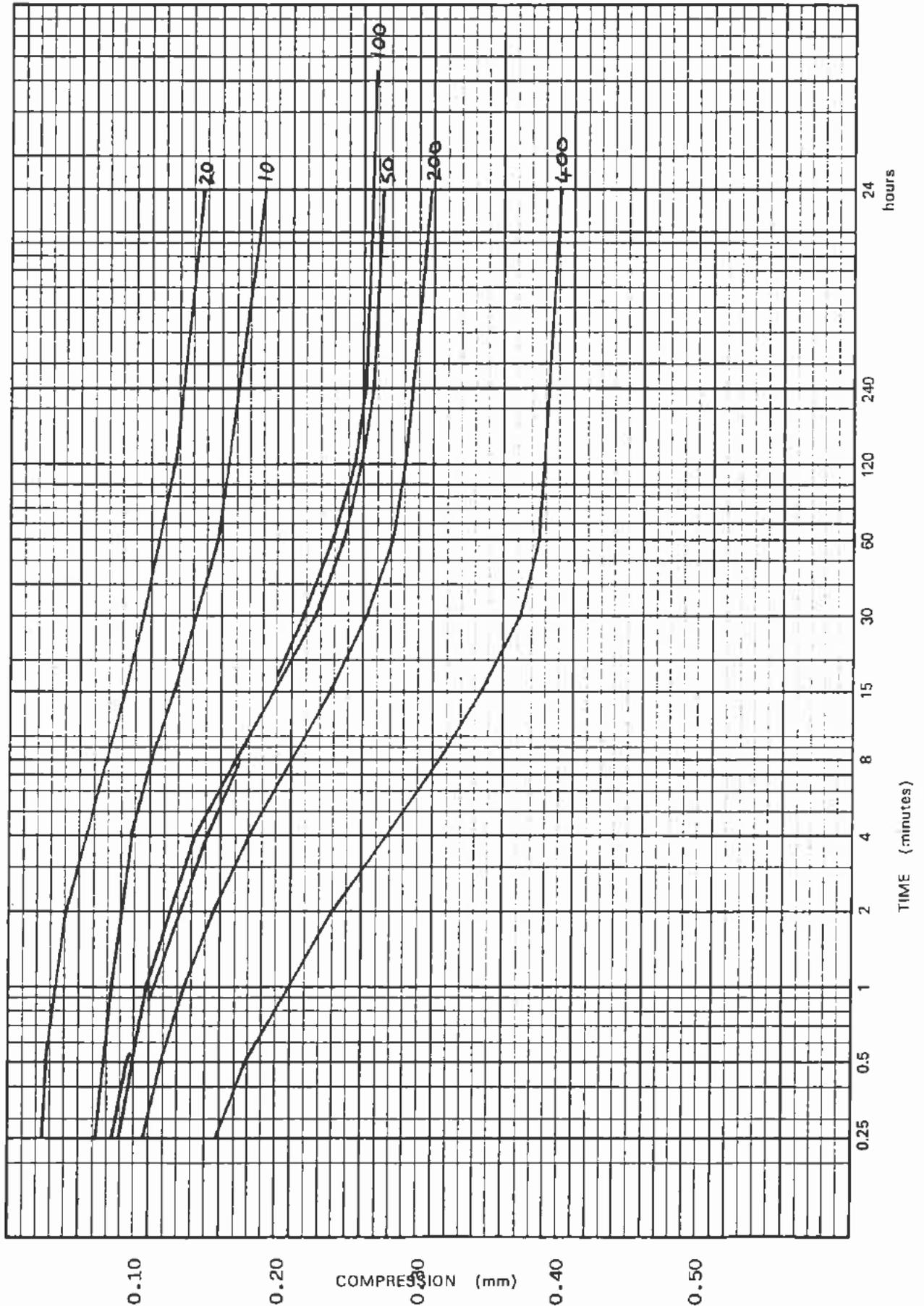


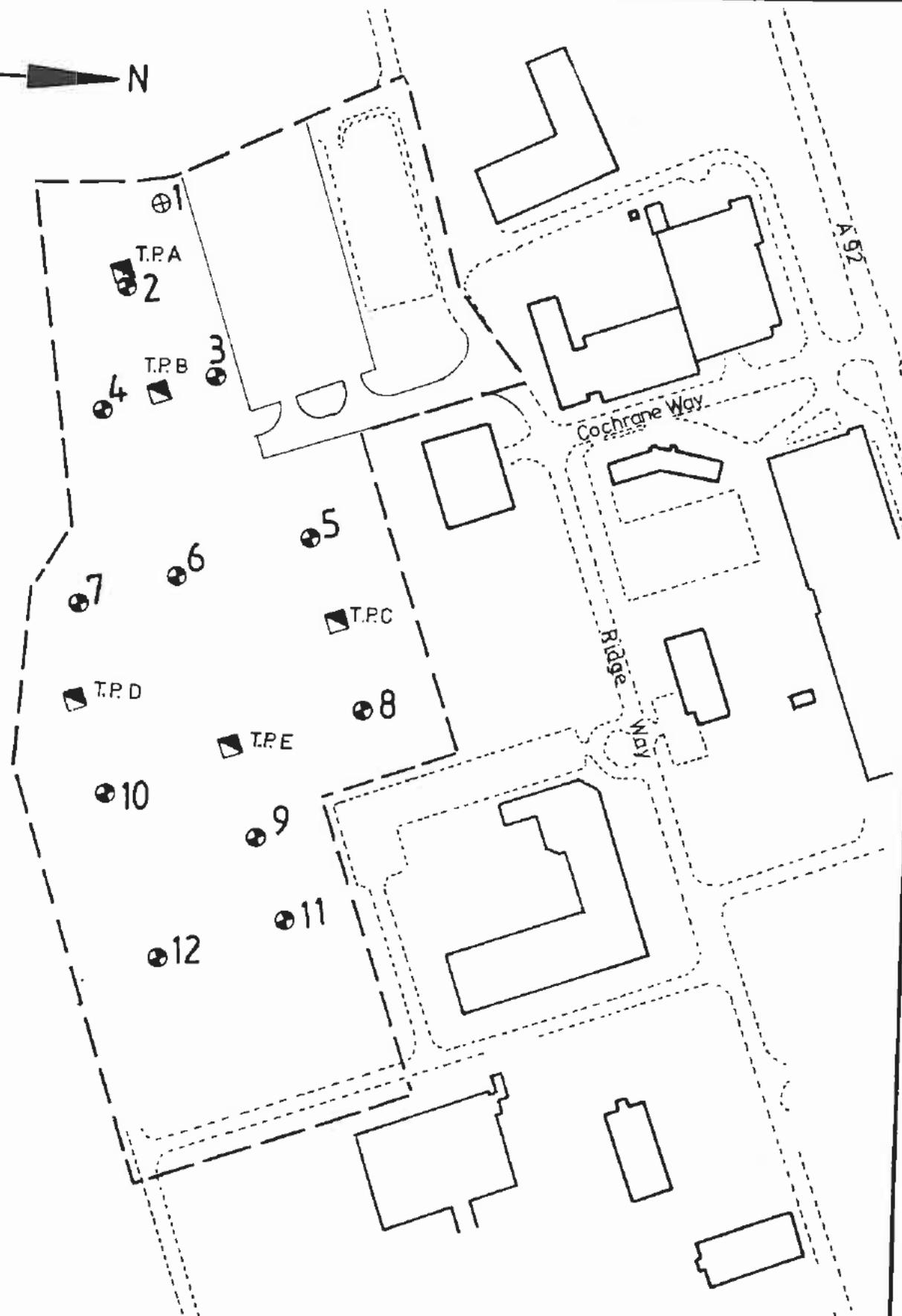
CONSOLIDATION TIME RESULTS

LOCATION: Donibristle Industrial Estate

BOREHOLE NO.: 12

SAMPLE DEPTH: 1.50 m





Donibristle Industrial Estate
Location of Boreholes

Scale 1:2500
Drawing no. 4933/1

Nicholson (Site Investigation) Limited
Bathgate Road, Armadale

REF. NO. 939

COPY NO. 1

O.C.L.I.

Industrial Premises
Hillend Industrial Estate
Dalgety Bay

This report should be returned to
the Civil Engineering Department
Scottish Development Agency.

Geotechnical Report

This report should be returned to
the Civil Engineering Department
Scottish Development Agency.

May 1985

This Report provided by the
Scottish Development Agency is
for information only and while
the contents are believed to be
accurate they are not Warranted
or Guaranteed.

OVE ARUP & PARTNERS SCOTLAND

Scotstoun House

South Queensferry

West Lothian

EH30 9SE

AEC/LJT/14049/HTS

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- 3.0 SITE INVESTIGATION
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- 4.0 GROUND CONDITIONS
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6.0 SUMMARY AND CONCLUSIONS

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FIGURES

- 1. Site Location
- 2. Site Plan
- 3. Geological Sections
- 4. Undrained Shear Strength
- 5. Plasticity Chart

INTRODUCTION

O.C.L.I. propose to develop a site at Hillend Industrial Estate, Dalgety Bay, in Fife Region, by the construction of single storey office and industrial premises. James Parr & Partners are the Architects for the scheme and Ove Arup & Partners Scotland have been appointed as Consulting Engineers. A site investigation has been conducted to establish the ground conditions on the site. This report, which is based upon the findings of the investigation, includes reference to documentary sources of information on the geology and history of the site, describes the ground conditions and makes recommendations for foundation design for the proposed development.

This report should be read in conjunction with the Factual Report prepared by Wimpey Laboratories Limited (Reference 1), who carried out the investigation.

2.0

THE SITE

2.1 Location and Topography

The site (National Grid Reference NT 165 846) is located immediately east of the existing Hillend Industrial Estate, as shown in Figure 1, and comprises a single field of approximately 4.9 hectares, presently used as pasture. It is bounded to the east by a road leading to Dalgety Bay and to the north by a strip of woodland, West Moss Plantation. The southern boundary follows a dirt road along a natural ridge, Barns Strip.

It is intended that access to the site will be provided by the construction of a new road from Ridgeway, in the Industrial Estate, and joining the Dalgety Bay road at a point about 50 m north of Barns Strip, at the northern end of an existing cutting.

The site falls steeply (approximately 1 in 8.5) northwards from Barns Strip, becoming less steep towards West Moss Plantation. A shallow depression exists across the site, from approximately mid-way along the western boundary and almost up to the north-east corner. Surface contours are shown on the site plan, Figure 2.

2.2 History

Old Ordnance Survey plans of the area, dated 1896, 1915, 1926 and 1962 (Reference 2) show the site to be unchanged from its present use as farmland. The areas immediately north and south are also unchanged. To the east of the site, the only recorded development is the construction of the road to Dalgety New Town which first appeared on the current edition, dated 1973.

Up until the 1926 edition of the OS plans, the area immediately west of the site is shown as open farmland. A small wooded area, approximately circular, 100 m wide, is shown at the west end of the Barns Strip. The 1962 edition shows this area occupied by the barracks associated with Donibristle airfield. The current plan, 1973, shows the barracks partly replaced by the new industrial estate. Some of the barracks buildings remain, in the south-east of this area, and are presently used as industrial premises (Fife Blinds, Halco Rock Drills, etc.).

A stream running through West Moss Plantation, north of the site, flows through farmland from Cauldback Hill in the east, and into Keithing Burn to the west.

2.3 Aerial Photographs

Stereo aerial photographs of the site (Reference 3) have been examined at the Scottish Office. Photographs dated April 1946 show little topographical detail on the site. West Moss Plantation is shown as low planting, possibly with some bushes. Later photographs, dated July 1971, again show no detail on the site, but by then West Moss Plantation was established with trees.

The most recent photographs, dated July 1977, define the topography of the site more clearly. There is evidence of the depression across the site, appearing as a narrow wedge from mid-way along the western boundary, with its apex approximately in the centre of the site. There are also two or three circular patches of lighter growth, one at the centre of the site, within the depression, and possibly two more roughly in line towards the north east. At least one of the circular patches may be as a result of previous site investigation. Alternatively, all of these features may be indicative of the naturally undulating ground surface. It is unlikely that they are due to any form of subsidence or locally weak ground.

2.4 Geology

The large scale geological map of the area (Reference 4) has been examined at the British Geological Survey (BGS), and shows the site to be underlain by Glacial Till (Boulder Clay) overlying rock of the Lower Oil Shale Group (Lower Carboniferous Age). The Rosyth Fault is shown to cross the north west corner of the site, with its downthrow to the north. The glacial till immediately north of the fault is shown to overlie rock of the Upper Oil Shale Group and rock exposed in the railway cutting to the north is not therefore representative of rockhead below the main area of the present site.

The dip of the rock strata is not defined in the immediate vicinity of the site. A boring about 1.2 km west south west of the site shows over 3 m depth of mudstone and shale, dipping north west at 10°, overlying 0.6 m of calciferous mudstone with marine fossils

(Fordell marine band), overlying interbedded mudstone and shales. A thin seam of Oil Shale, 0.15 m thick, is recorded 2.5 m below the marine band. The rocks which outcrop in Dalgety Bay are mainly sandstones and mudstones with dip varying from steeply east at 18°, to very steeply west at up to 50°.

West Moss Plantation, immediately north of the site, is shown to be underlain by alluvium and peat.

2.5 Previous Site Investigation

In May 1964, several boreholes were sunk in the vicinity of the site by D. Pollock and Company (Reference 5) as part of a site investigation by Blyth and Blyth for Dalgety New Town. The records of these boreholes have been examined at the BGS. The locations of boreholes 1, 2 and 3/3A are shown on the site plan, Figure 2. Boreholes 2 and 3/3A show a sequence of 0.15 m to 0.3 m of topsoil overlying brown sandy clay and stones, to a depth of 2.1 m to 2.4 m below ground level, underlain by firm boulder clay. Borehole 1 shows a different sequence of compact brown sands and loose grey silty sands to a depth of 6.1 m below ground level. Groundwater was reported at a depth of 1.67 m below ground level in borehole 1, but boreholes 2 and 3/3A remained dry.

The records of six trial pits at the Trane Land, Donibristle site (Reference 6), National Grid Reference NT 160 843, show a sequence of weathered lodgement till overlying unweathered lodgement till, to a depth of about 3m. This sequence differs from that of boreholes 2 and 3/3A of the 1964 investigation only in the fact that groundwater seepage was encountered in the clay, and that rock (very weak mudstone) was encountered in one pit at a depth of 2.8 m below ground level.

2.6 Mining

The BGS report no coal seams at reasonable depth below the site; neither is there evidence of mining in the very thin seam of oil shale underlying the area.

3.0

SITE INVESTIGATION

3.1 Trial Pits

Fifteen trial pits were excavated by Wimpey Laboratories Limited, using a JCB 3CX, during the 4th to 6th December 1984. The pits were logged in detail by a geotechnical engineer from Ove Arup & Partners Scotland, who also took representative hand, bulk and groundwater samples and carried out in-situ soil strength measurements.

The trial pit records are included in the Contractor's Factual Report (Reference 1). The locations of the trial pits are also shown on the site plan, Figure 2.

3.2 Laboratory Testing

Laboratory tests were carried out by Wimpey Laboratories Limited to determine the natural moisture content, Atterberg Limits and particle size distribution of representative soil samples and the sulphate content and pH value of selected soil and groundwater samples.

The results of these tests are included in the Contractor's Factual Report (Reference 1).

GROUND CONDITIONS

The trial pits encountered the following sequence of materials:

- i) Topsoil
- ii) Alluvial Sand and Gravel
- iii) Glacial Till
- iv) Bedrock

To the south of the site (TP's 1 to 6) the alluvial sand and gravel is absent, whilst to the north west of the site, the glacial till is absent.

Geological sections across the site are shown in Figure 3.

4.1 Topsoil

Topsoil was encountered in all trial pits to depths of between 0.25 m and 0.60m. The topsoil was generally a brown clayey loam to an average depth of 0.3m, but became lighter and more sandy towards the centre and north of the site (TP's 5, 9, 10A, 12 and 13). The thickness of the topsoil tended to increase within the shallow depression across the north west corner of the site (TP's 10A, 12 and 14).

4.2 Alluvial Sand and Gravel

In trial pits to the north of the site, the topsoil was underlain by alluvial sand and gravel generally comprising medium dense to dense gravel, cobbles and boulders in a matrix of clayey silty sand to depths of 1.1 m (TP 11) to 3.8 m (TP 13) below ground level. In trial pit 7, the deposits included a layer of loose silty sand, underlying the topsoil, to a depth of 1.5 m below ground level. Silty sand was also encountered in the base of the shallow trial pit 14. In trial pit 10, medium dense sand was encountered between a depth of 2.2 m and 3.0 m below ground level. The east side of the trial pit rapidly became unstable leading to collapse almost immediately after excavation.

4.2.1. Insitu Testing

Penetration testing was carried out through the base of trial pit 14 using the Mackintosh Probe and, after allowance for seating, an average M-value of 15 was recorded in the silty sand. The M-value represents the blow count for

successive penetrations of 75 mm and, for sand, may be related to the N-value of the Standard Penetration Test (Reference 7). Adopting an appropriate M/N ratio of about 2, the equivalent SPT N-value would be 7, indicating a loose sand with an angle of shearing resistance, ϕ , of 29°.

4.2.2. Classification Tests

Particle size distribution analysis was carried out on a sample of sand from trial pit 10, showing it to be a poorly graded slightly silty medium to fine grained sand with medium to coarse gravel. Samples of alluvial sand and gravel from trial pits 8 and 13 were both shown to be medium to coarse gravel in a well graded matrix of silt and sand.

4.3 Glacial Till

The glacial till (boulder clay) underlying the south of the site comprised a weathered layer of soft to firm brown silty sandy clay to depths of 1.3 m (TP 5) to 2.4 m (TP 4) below ground level, overlying very stiff to hard blue/grey silty sandy clay. In trial pits 1, 2 and 6, the weathered layer extended to depths of 2.6 m (TP 6) to 3.2 m (TP 2) below ground level, becoming firm to very stiff with depth. Occasional lenses of sand were encountered within the glacial till.

To the north east of the site, weathered glacial till was encountered, underlying the alluvial sand and gravel to depths of 2.3 m (TP 11) and 3.5 m (TP 12) below ground level.

4.3.1. Shear Strength Tests

In situ measurements of the undrained shear strength (c_u) of the weathered glacial till were carried out using the hand shear vane and the pocket penetrometer and results are shown in Figure 4. Mean strengths measured by the hand shear vane varied from 53 kN/m² to greater than 120 kN/m² (the maximum capacity of the apparatus). The pocket penetrometer gave consistently higher results.

The shear strength of the unweathered glacial till was beyond the capacity of both the hand shear vane and the pocket penetrometer.

4.3.2. Classification Tests

Samples of the glacial till were tested to determine the Atterberg Limits. The Liquid Limits were found to be 26% to 32%, whilst the Plasticity Indices were 11% to 16%. When plotted on the plasticity chart, Figure 5, the Atterberg Limits of the till indicate that it is an inorganic clay of low plasticity.

4.4 Bedrock

Bedrock was encountered in the base of all deep trial pits except Nos. 1, 3 and 5, to the south of the site. To the south west of the site, weathered broken rock was encountered at the base of trial pits 2 and 4, both at a depth of 3.9 m below ground level, and comprised a fine grained conglomerate. Below the rest of the site, bedrock generally consisted of medium dense to dense angular gravel and cobble size fragments of grey, moderately fresh, fine grained sandstone. The rock was generally bound in a stiff sandy clay matrix, which occasionally collapsed due to the rapid ingress of groundwater and obstructed further digging.

4.4.1. Classification Tests

Particle size distribution analysis was carried out on a sample of the weathered rock taken from trial pit 9 at a depth of 2.3 m below ground level. The sample was shown to be well graded gravel, sand and silt size particles with some cobbles and clay.

4.5 Groundwater

No groundwater seepage was encountered in trial pits 1, 2 and 5, in the south west corner of the site. Slight seepage of groundwater was observed from the glacial till in trial pits 3, 6 and 12, from the bedrock in trial pits 8 and 9, and from gravel in trial pit 13.

Rapid ingress of groundwater at bedrock occurred in trial pits 4, 7, 11, 12 and 13, often loosening the matrix and causing local collapse. In trial pit 4, the groundwater rose above the base of the overlying clay, to a level of 2.5 m below ground level after a period of six hours.

In trial pit 10, moderate seepage of groundwater from the sand at a depth of 2.6 m was observed before collapse of the pit.

4.6 Chemical Tests

Tests were carried out to determine the total sulphate content and pH value of soil samples from trial pits 2 and 5, at depths of 1.5 m and 2.3 m respectively, and groundwater samples from trial pits 3, 6, 8 and 10. Soil sulphate contents were 0.02% and 0.05% and groundwater sulphate contents were 0.12 g/l to 0.23 g/l. The sulphate contents are all therefore within Class 1, BRE Digest 250 (Reference 8). The pH values were near neutral, ranging from 6.8 to 7.6.

5.0

DISCUSSION AND RECOMMENDATIONS

5.1 Foundations

It is considered that traditional strip footings or pad foundations should be suitable for the proposed development. These should be placed at least 0.9 m below ground level and at this depth an allowable bearing pressure of 120 kN/m² may be assumed. At this bearing pressure, the overall settlement of strip footings up to 1 m wide or pad foundations up to 2 m wide should not exceed 20 mm. Up to half of the overall settlement of foundations in the clay soils may occur as long term consolidation. Differential settlements are likely to be small. Foundation formations should be inspected before concreting and any loose or firm ($c_u < 60$ kN/m²) spots removed and replaced by mass concrete or compacted hardcore. Formations should be blinded as soon as possible after exposure to minimise deterioration.

If this bearing pressure is insufficient, the depth of foundations should be increased. In clay soils, they should be founded on the blue/grey clay with an allowable bearing pressure of not more than 270 kN/m². A similar allowable bearing pressure may also be assumed for foundations in the sand and gravel at depths in excess of 2.5 m. At these higher bearing pressures, overall settlements again should not exceed 20 mm.

Excavations in sand and gravel may encounter groundwater seepage and the sides of such excavations are likely to be unstable and may require temporary support. Rapid ingress of groundwater would be expected in deep excavations down to bedrock.

5.2 Ground Slabs

It is considered that, after removal of topsoil, concrete floor slabs may be designed to be ground bearing.

When the subgrade is exposed or is close to formation level, it should be protected from deterioration and damage by construction traffic by a layer of properly compacted fill, particularly in wet or severe frosty weather. In the latter circumstance, at least 450 mm of non-frost susceptible material should be placed to prevent frost damage.

5.3 Roads

As with ground slabs, roads and areas of hardstanding may be constructed on existing subgrades, after removal of topsoil. CBR values of 2% for the Glacial Till and 10% for the sand and gravel may be assumed for design purposes. The formation must again be protected from deterioration after exposure. Subgrades should be regarded as frost susceptible.

5.4 Earthworks

The Glacial Till should be regarded as unsuitable fill material and should be used only in regrading of landscaped areas.

After removal of boulders and the layers of silty sand, the Alluvial Sand and Gravel may be considered suitable for fill below roads and areas of hardstanding provided that the moisture content is maintained near the optimum value during compaction.

Imported granular fill should be used where required below ground slabs in proposed buildings.

The drained shear strength of the Glacial Till may be estimated from the plasticity index (Reference 9). The long term stability of earth slopes and retaining walls in the Till should therefore be designed assuming drained values of cohesion, $c' = 5 \text{ kN/m}^2$. and angle of shearing resistance, $\phi' = 31^\circ$.

5.5 Concrete

Concrete for foundations may be designed to resist a Class 1 sulphate concentration, (Reference 8).

SUMMARY AND CONCLUSIONS

- i) It is proposed to construct new single storey office and industrial premises on the site.
- ii) The site comprises a single field of approximately 4.9 hectares, presently used as pasture. The site slopes steeply down from the south, becoming less steep towards the north.
- iii) The sequence of strata found during the investigation comprises:
 - a) Topsoil
 - b) Alluvial Sand and Gravel
 - c) Glacial Till
 - d) Bedrock
- iv) The structure may be supported on pad or strip foundations, not less than 0.9 m below ground level, at an allowable bearing pressure of 120 kN/m².

Foundations in the blue/grey (unweathered) Glacial Till or in the sand and gravel at depths in excess of 2.5 m below ground level may be designed to an allowable bearing pressure of 270 kN/m².

- v) At these bearing pressures, total settlements should not exceed 20 mm. Up to half the overall settlement of foundations in the clay soils may occur as long term consolidation. Differential settlements are likely to be small.
- vi) Significant ingress of groundwater into foundation excavations in the clay soils is not expected.

Groundwater seepage may occur into excavations into the sand and gravel, and the sides of these excavations are likely to be unstable.

Rapid ingress of groundwater is to be expected in deep excavations down to the bedrock.

vii) Foundation formations should be inspected and then blinded as soon as possible after exposure.

viii) Ground slabs may be designed to be ground bearing.

When the subgrade is exposed or is close to formation, it should be protected against traffic and frost attack by at least 450 mm of non-frost susceptible material.

ix) Roads and hardstandings may be constructed on the weathered glacial till, assuming a CBR value of 2%, or on the sand and gravel, assuming a CBR value of 10%. Subgrades should be regarded as frost susceptible.

x) The glacial till should be regarded as unsuitable fill material.

The sand and gravel may be suitable as fill below roads and areas of hardstanding.

Imported granular fill should be used below ground slabs.

xi) Long term stability of earth slopes or retaining walls in glacial till should be designed assuming drained values of cohesion, $c' = 5 \text{ kN/m}^2$, and angle of shearing resistance, $\phi' = 31^\circ$.

xii) Concrete for foundations may be designed to resist a Class 1 sulphate concentration.

REFERENCES

1. Site Investigation Report by Wimpey Laboratories Ltd,
Uphall Depot, Broxburn, dated January 1985, Ref. S/22458.

2. Ordnance Survey Maps:-
 - a) 1896, Fifeshire, Sheet 39.12, Scale 1:2500
 - b) 1915, Fifeshire, Sheet 39.12, Scale 1:2500
 - c) 1926, Fifeshire, Sheet 39.12, Scale 1:2500
 - d) 1962, Sheet NT 1684 - 1784, Scale 1:2500

3. Scottish Office (Aerial photographs):-
 - a) Sortie 106G/SCOT/UK10
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 - b) Sortie 114/71, Southern Scotland Area 2
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 - c) Fairey Survey, Scotland
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6th July 1977 (1:10,000; True colour)

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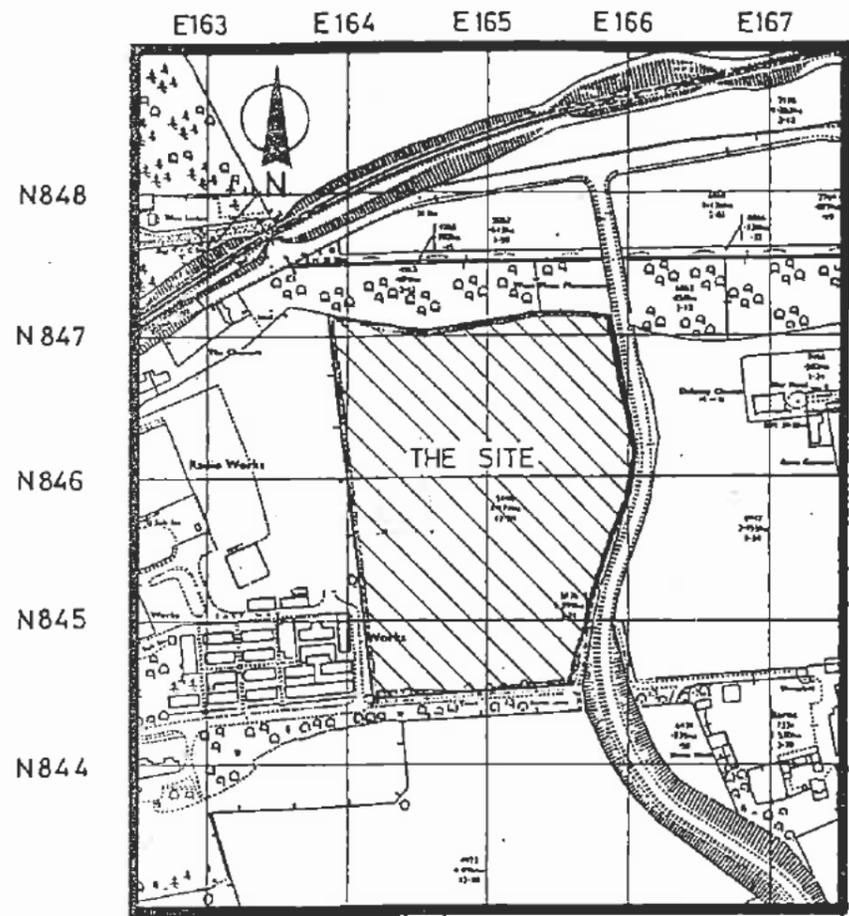
5. Dalgety New Town; Phase 1 bores, October 1966
Drawing No 193/108A
Scale, 1:2500
(Borings made 26th to 30th May 1964)

Borehole logs by D Pollock & Co.
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8. Concrete in Sulphate-bearing Soils and Groundwater,
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FIGURES

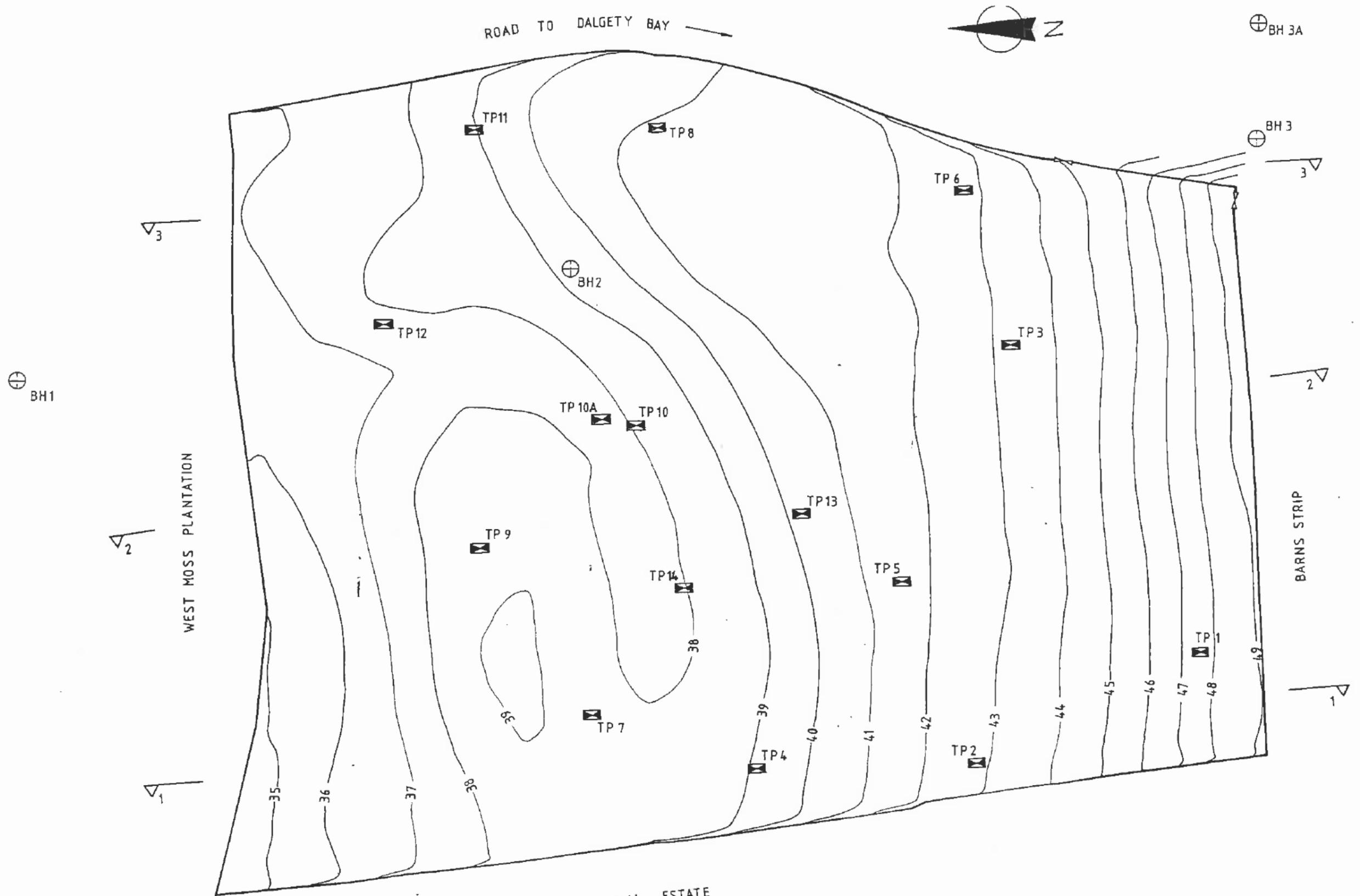


0 50m 100m 150m 200m

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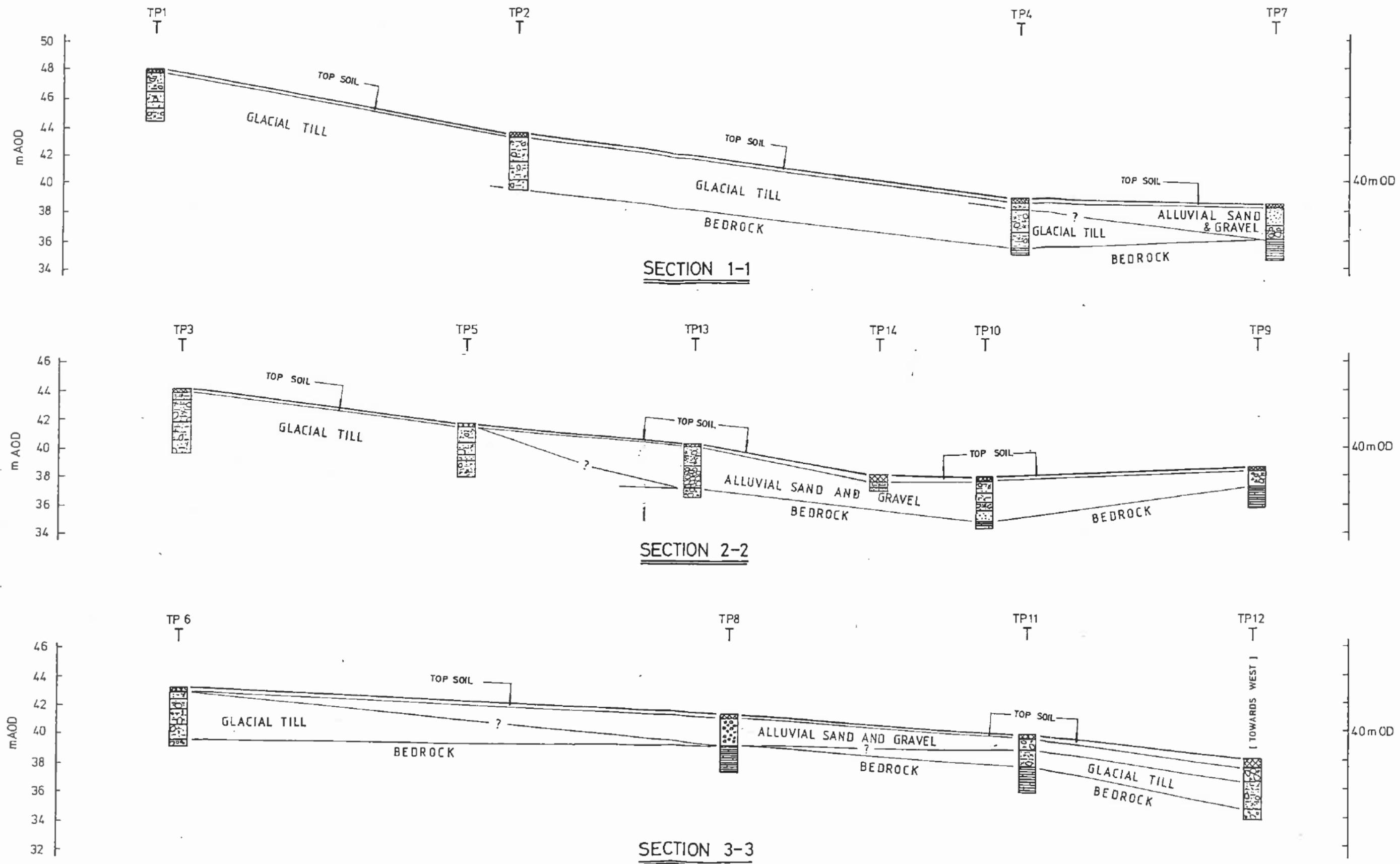
SCALE 1:5000

SITE LOCATION
14049 FIGURE 1



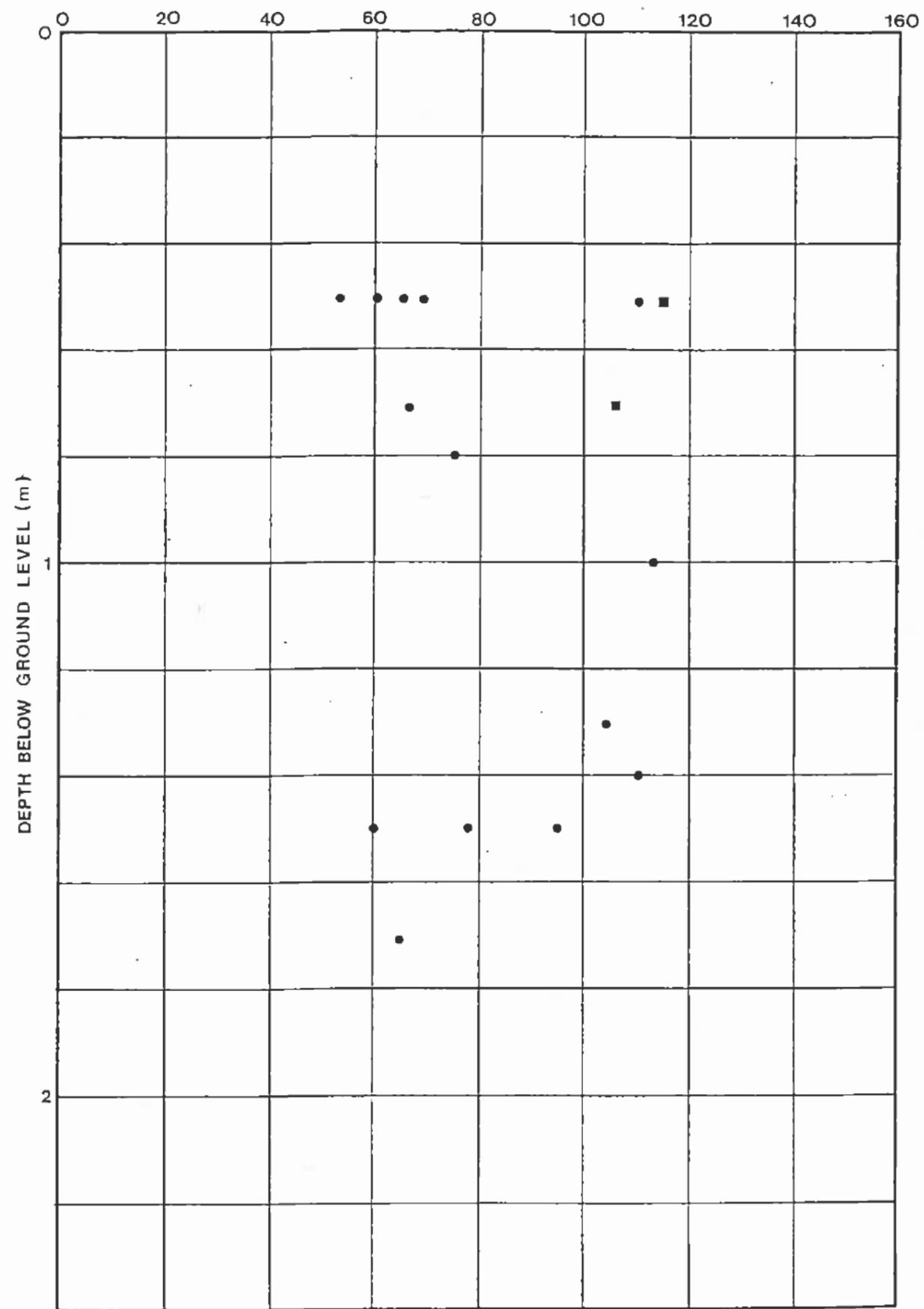
- LEGEND**
- ☒ denotes Trial Pit.
 - ⊕ denotes Boreholes by D. Pollock & Co., May 1964.
 - 35— denotes topographic contours at 1m intervals.
 - ∇ denotes geological section, see Figure 3.

SITE PLAN



SCALES: horizontal 1:500
vertical 1:250

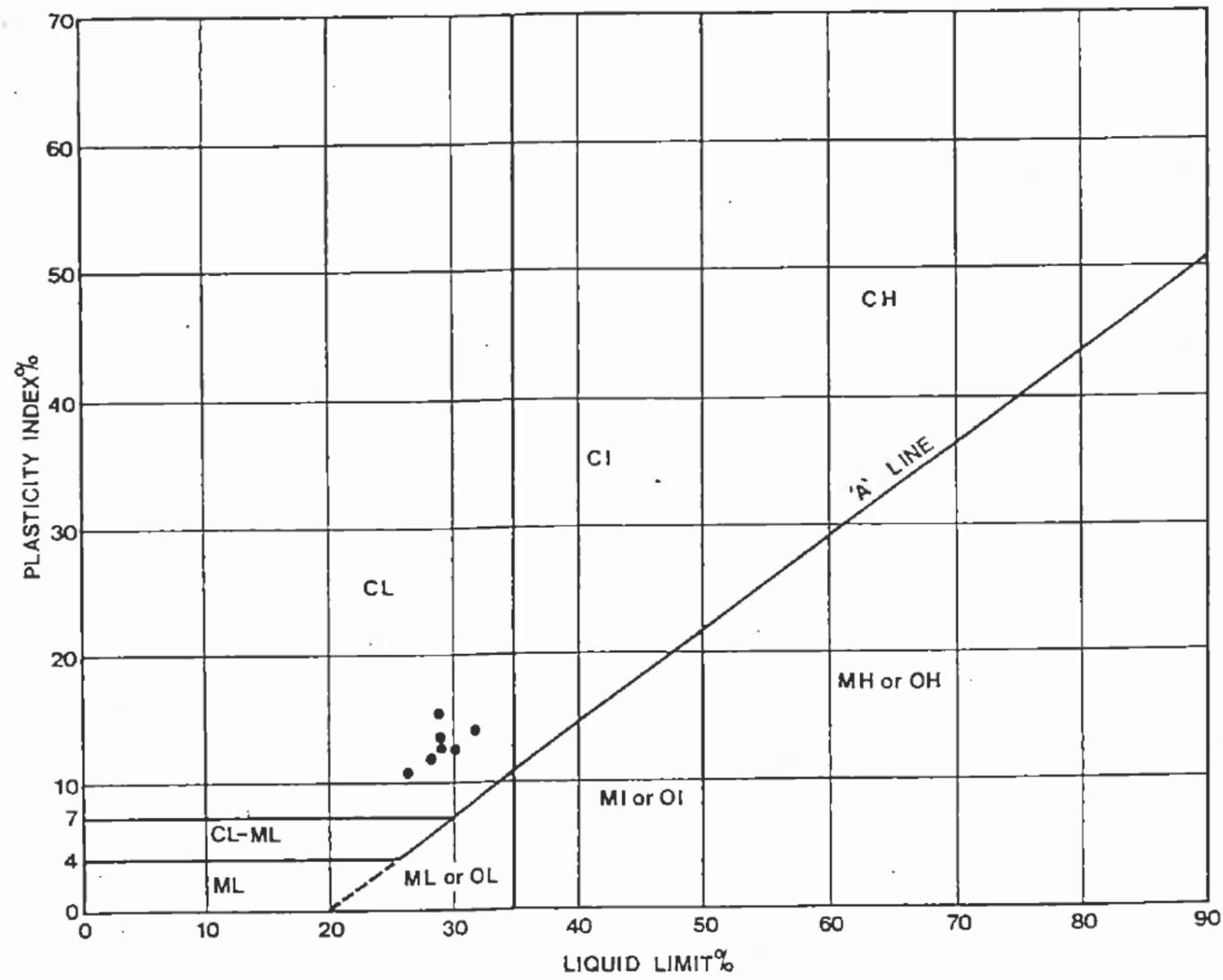
REFER TO FIGURE 2 FOR SECTION POSITIONS



LEGEND

- Hand Shear Vane
- Pocket Penetrometer

UNDRAINED SHEAR STRENGTH



The fine grained soils are divided into three groups: inorganic silts (M), inorganic clays (C), and organic silts and clays (O). The soils are further divided into those having liquid limits lower than 35% (L), between 35% and 50% (I) and higher than 50% (H)

PLASTICITY CHART

O.C.L.I.

PROPOSED SINGLE STOREY INDUSTRIAL PREMISES

AT HILLEN INDUSTRIAL ESTATE

DALGETY BAY, FIFE REGION

REPORT ON SITE INVESTIGATION

Lab. Ref. No. S/22458 January, 1985

PROPOSED SINGLE STOREY INDUSTRIAL PREMISES

AT HILLEND INDUSTRIAL ESTATE

DALGETY BAY, FIFE REGION

REPORT ON SITE INVESTIGATION

Lab. Ref. No. S/22458

January, 1985

1. Introduction

It is proposed to construct single storey industrial premises at Hillend Industrial Estate, Dalgety Bay, Fife Region (National Grid kilometre reference square NT 1684). On the instructions of Ove Arup and Partners Scotland, Consulting Engineers to O.C.L.I., an investigation was made to provide information on the ground conditions for foundation design of the proposed works. A factual report only was requested.

The comments given in this report and any opinions expressed are based on the ground conditions encountered during the site work and on the results of tests made in the laboratory. There may be, however, conditions obtaining at the site which have not been disclosed by the investigation and which therefore could not be taken into account. In particular it should be noted that ground-water levels vary due to seasonal or other effects and may at times be significantly different to those measured during the investigation.

2. Site Investigation

The site work was carried out during the period 4th to 6th December, 1984.

Fifteen trial pits were excavated by mechanical methods at the positions shown on the site plan (Fig. 5) under the supervision of the Consulting Engineers who returned the samples to the laboratory at Uphall for testing and supplied details of the trial pits which have been given in Appendix 1.

The ground levels at the trial pit positions, given on the records, were referred to a bench mark situated on the wall at the south-east corner of Dalgety Church, the value of which was understood to be +39.35m O.D. (Newlyn).

3. Laboratory Testing

The natural moisture content of seven selected samples was determined and the results are given in Table 1.

Liquid and plastic limit tests were made on the above samples and the results are included in Table 1.

The particle size distribution of four samples was determined by wet sieving and mechanical analysis. The grading curves have been plotted in Figs. 1 to 4.

Chemical analyses were made on four ground-water and two soil samples to determine their total sulphate contents and pH values. The results of these tests are given in Table 2.

Senior Engineer

WIG/LKR/ID
TB

Geoconsultancy Division
Wimpey Laboratories Limited
Uphall, West Lothian

TABLE 1

RESULTS OF INDEX PROPERTY TESTS

Trial Pit No.	Sample Depth (m)	Natural Moisture Content (%)	Index Properties			
			Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Passing 425 μ m Sieve (%)
2	2.50	12	29	16	13	90
4	1.30	17	30	17	13	92
5	2.00	11	29	13	16	75
6	2.00	13	29	15	14	80
10	1.20	18	26	15	11	95
11	1.30	12	32	17	15	49
12	2.00	19	28	15	13	96

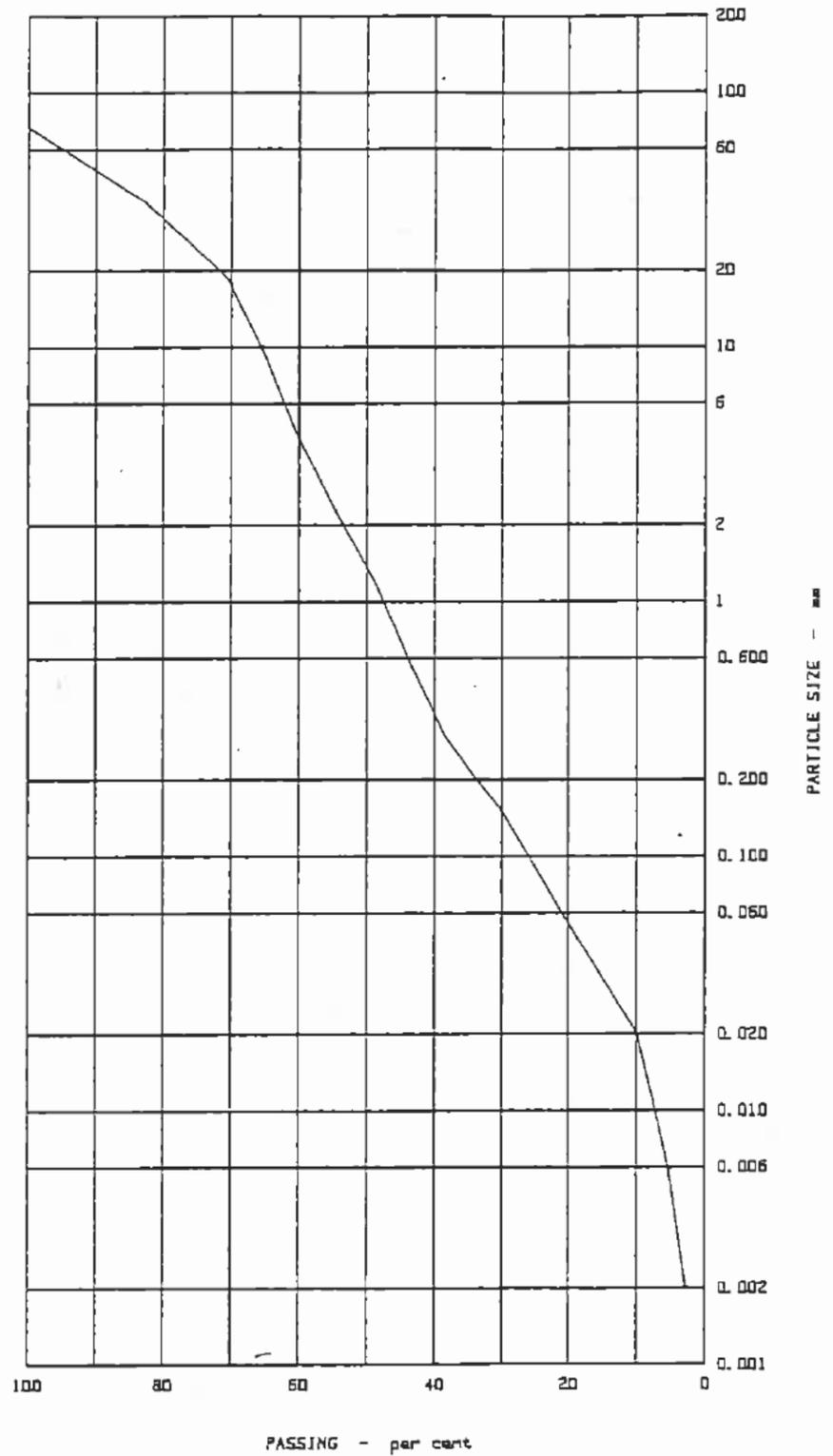
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TABLE 2

RESULTS OF CHEMICAL ANALYSES ON GROUND-WATER AND SOIL SAMPLES

Trial Pit No.	Sample Depth (m)	Total Sulphate Content (as SO ₃)		pH Value
		(g/l in ground-water sample)	(per cent dry weight of soil sample)	
2	1.50	-	0.02	6.8
3	2.00	0.12	-	7.2
5	2.30	-	0.05	7.5
6	3.40	0.23	-	7.6
8	2.30	0.12	-	6.8
10	2.60	0.15	-	6.9

CLAY	FINE	MEDIUM	COARSE	COARSE	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	COARSE	COARSE
	SILT			SAND			GRAVEL			COBBLES			



TRIAL PIT NO 8

DEPTH 1.70 m



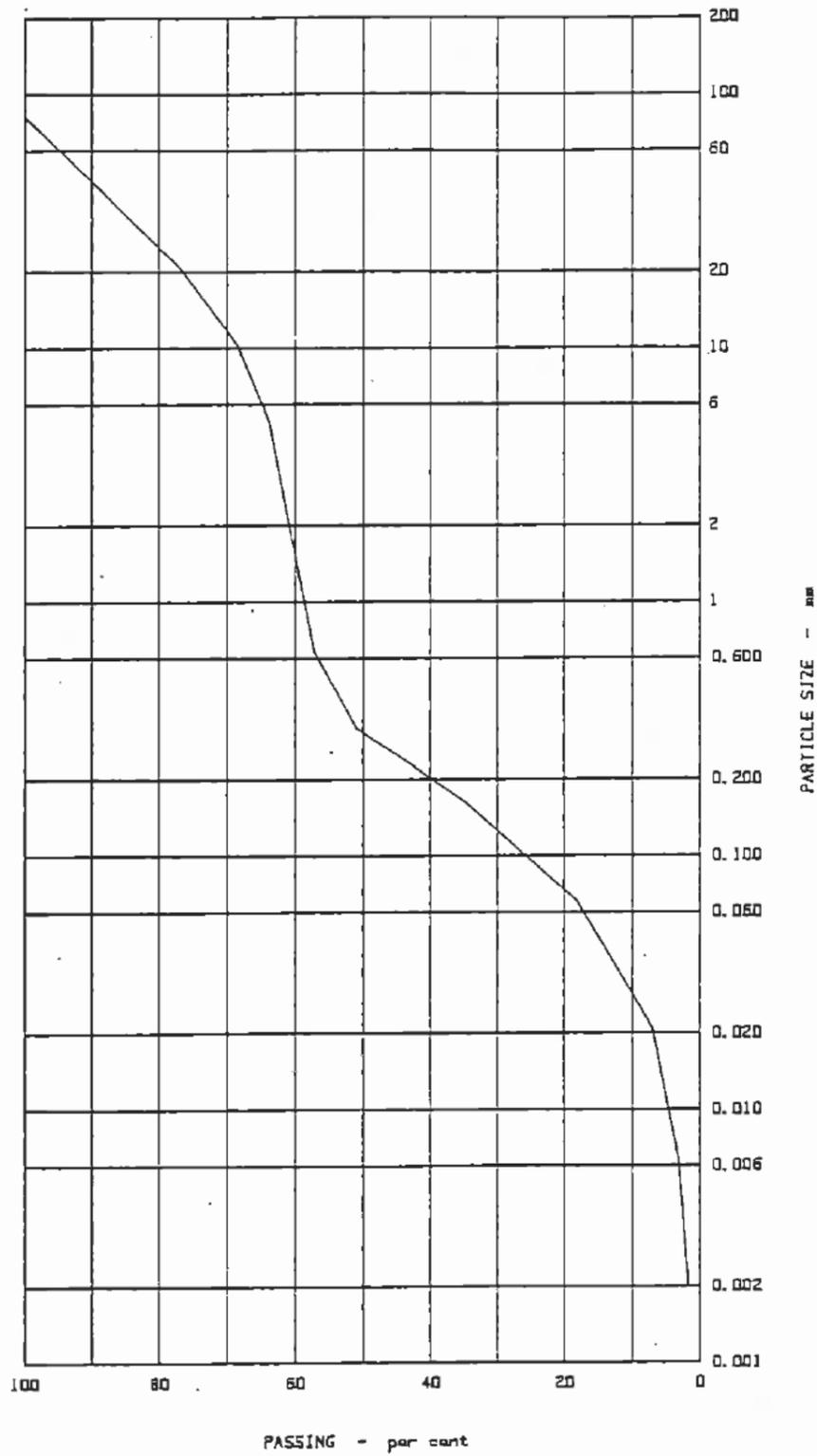
PARTICLE SIZE DISTRIBUTION

LAB REF NO
S/22458

HILLENDO. C. L. I.

FIG
1

CLAY		FINE SILT		COARSE SILT		FINE SAND		COARSE SAND		FINE GRAVEL		MEDIUM GRAVEL		COARSE GRAVEL		COBBLES	
------	--	-----------	--	-------------	--	-----------	--	-------------	--	-------------	--	---------------	--	---------------	--	---------	--



TRIAL PIT NO 10

DEPTH 2.90 m



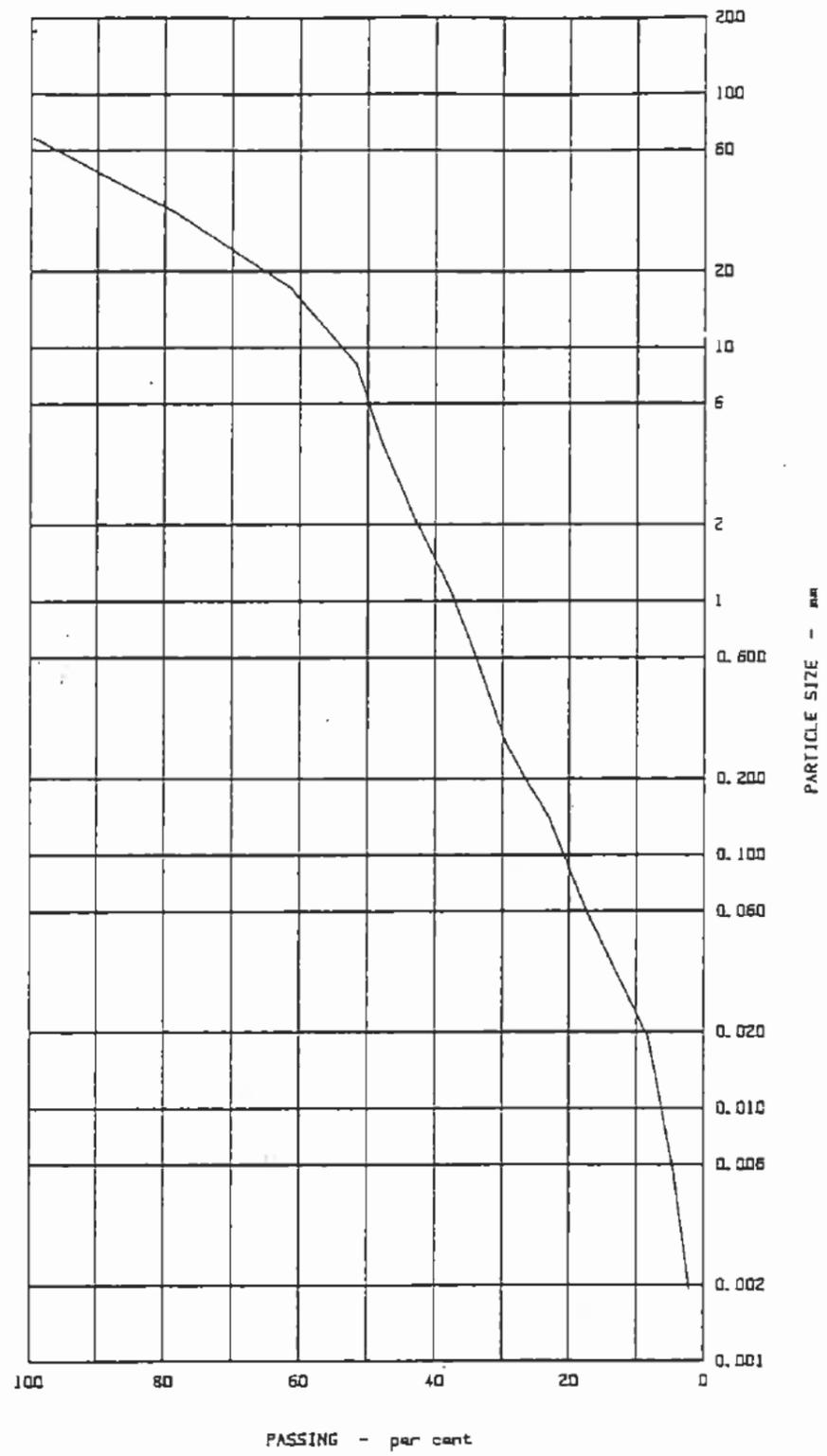
PARTICLE SIZE DISTRIBUTION

LAB REF NO
S/22458

HILLEN, O. C. L. I.

FIG
3

CLAY			SILT			SAND			GRAVEL			COBBLES
FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	



TRIAL PIT NO 13

DEPTH 3.40 m



PARTICLE SIZE DISTRIBUTION

LAB REF NO
S/22458

HILLEND, O. C. L. I.

FIG
4

APPENDIX 1

O.C.L.I. HILLENDE FACILITY
RECORD OF TRIAL PIT 1

APPENDIX
JOB NO 14049
MADE BY AEC
DATE MADE 4 DEC. 84

DAILY PROGRESS	DEPTH TO WATER	SAMPLES OR TESTS			LEG- END	DEPTH	REDUCED LEVEL	DESCRIPTION OF STRATA
		DEPTH		TYPE				
		FROM	TO					
	m	m	m		m		GROUND LEVEL 47.45m OD	
4.12.84					0			
					0.30	47.15	Topsoil	
		0.50		VH			Soft to firm light brown sandy CLAY with gravel	
		0.80		VH		0.70	46.75	Firm light grey very sandy CLAY
						1.00	46.45	Firm dark brown mottled sandy silty CLAY with gravel and occasional cobbles
		1.50		BVP		1.40	46.05	Very stiff brown silty sandy CLAY with gravel and cobbles, mostly of sandstone.
		2.00		H				Sand lens 0.1m thick to west side of pit only, at depth 1.6m
		2.50		H				
						2.70	44.75	Very stiff to hard blue/grey sandy silty CLAY with gravel and cobbles.
		3.00		H				
		3.30		B				
						3.50	43.95	(GLACIAL TILL)
								BASE

- REMARKS
- H = disturbed hand sample; B = disturbed bulk sample; V = hand shear vane test; P = pocket penetrometer test
 - Results of hand shear vane tests

Depth (m)	Undrained shear strength (KN/m ²)	Mean
0.50	64, 82, 63, 62	68
0.80	71, 74, 81	75
1.50	>120, >120, >120	>120
 - Results of pocket penetrometer test

Depth (m)	Undrained shear strength (KN/m ²)	Mean
1.50	>245, >245, >245	>245
 - Pit remained dry

METHOD OF EXCAVATION
Machine dug

TRIAL PIT 1

O.C.L.I. HILLENDE FACILITY
RECORD OF TRIAL PIT 2

JOB NO	14049
MADE BY	AEC
DATE MADE	4 DEC 84

DAILY PROGRESS	DEPTH TO WATER	SAMPLES OR TESTS			LEG- END	DEPTH	REDUCED LEVEL	DESCRIPTION OF STRATA
		DEPTH		TYPE				
		FROM	TO					
	m	m	m		m		GROUND LEVEL 43.35m OD	
4.12.84					0		Topsoil	
					0.30	43.05		
		0.50		VH			Soft to firm brown, mottled light brown and grey, sandy silty CLAY with gravel and weathered sandstone cobbles	
		1.50		VH				
					1.90	41.45		
		2.50		H			Stiff dark brown sandy silty CLAY with gravel, cobbles and occasional boulders, generally of sandstone and weathered	
		2.70		B				
		3.00		H				
					3.20	40.15		
		3.50		H			Very stiff to hard blue/grey sandy silty CLAY with gravel and cobbles	
		3.90		B			(GLACIAL TILL)	
					3.90	39.45	BASE: Weathered broken rock (Fine grained conglomerate)	

REMARKS

- H = disturbed hand sample: B = disturbed bulk sample:
V = hand shear vane test
- Results of hand shear vane tests

Depth (m)	Undrained shear strength (KN/m ²)	Mean
0.50	76, 62, 58, 59	64
1.50	61, 58, 91, 101	78
- Pit remained dry

METHOD OF EXCAVATION
Machine dug

TRIAL PIT 2

O.C.L.I. HILLENDE FACILITY
RECORD OF TRIAL PIT 3

JOB NO	14049
MADE BY	AEC
DATE MADE	4 DEC 84

DAILY PROGRESS	DEPTH TO WATER m	SAMPLES OR TESTS			LEG- END	DEPTH m	REDUCED LEVEL	DESCRIPTION OF STRATA
		DEPTH		TYPE				
		FROM m	TO m					
4.12.84					0		GROUND LEVEL 44.10m OD	
					0.30	43.80	Topsoil	
		0.50		V H			Soft light brown mottled very sandy silty CLAY with gravel	
					0.80	43.30		
							Soft brown/gray mottled sandy silty CLAY with gravel and cobbles	
		1.50		V B				
		2.00		H W				
					2.10	42.00		
		2.50		H			Very stiff dark grey sandy silty CLAY with gravel and cobbles	
		3.20		B				
		3.50		H			(GLACIAL TILL)	
		4.30		B				
					4.30	39.80		
							BASE	

REMARKS

- Slight seepage of ground water from depth 1.6m to 2.1m
- H = disturbed hand sample: B = disturbed bulk sample:
W = ground water sample : V = hand shear vane test :
- Results of hand shear vane tests

Depth (m)	Undrained shear strength (KN/m ²)	Mean
0.50	43, 57, 49, 67, 49	53
1.50	69, 84, 44, 48, 53	60

METHOD OF EXCAVATION
Machine dug

TRIAL PIT 3

O.C.L.I. HILLENDE FACILITY
RECORD OF TRIAL PIT 5

JOB NO 14049
MADE BY REC
DATE MADE 5 DEC 84

DAILY PROGRESS	DEPTH TO WATER	SAMPLES OR TESTS			LEG- END	DEPTH	REDUCED LEVEL	DESCRIPTION OF STRATA
		DEPTH		TYPE				
		FROM	TO					
	m	m	m		m		GROUND LEVEL 41.50m OD	
5.12.84					0			
					0.30	41.20	Sandy topsoil	
		0.50		VH P			Soft to firm brown mottled sandy silty CLAY with gravel and small cobbles	
		1.00		VH				
					1.30	40.20		
		1.40		VB			Very stiff dark grey sandy silty CLAY with gravel and cobbles	
		2.00		B				
					2.10	39.40	Medium dense brown silty SAND	
		2.30		H				
					2.50	39.00		
		2.80		B			Very stiff to hard blue/grey sandy silty CLAY with gravel and cobbles (GLACIAL TILL)	
		3.70		B		37.80		
							BASE: Further digging obstructed by boulders	

REMARKS

- H = disturbed hand sample: B = disturbed bulk sample:
V = hand shear vane test: P = pocket penetrometer test
- Results of hand shear vane tests

Depth (m)	Undrained shear strength (KN/m ²)	Mean
0.50	48, 60, 67, 66	60
1.00	120, >120, 95, 110, >120	113
1.40	79, >120, >120, >120	110
- Results of pocket penetrometer test

Depth (m)	Undrained shear strength (KN/m ²)	Mean
0.50	98, 98, 132, 132	115
- Pit remained dry

METHOD OF EXCAVATION
Machine dug

TRIAL PIT 5

O.C.L.I. HILLENDE FACILITY
 RECORD OF TRIAL PIT 6

JOB NO 14049
 MADE BY AEC
 DATE MADE 4 DEC 84

DAILY PROGRESS	DEPTH TO WATER	SAMPLES OR TESTS			LEG-ENO	DEPTH	REDUCED LEVEL	DESCRIPTION OF STRATA
		DEPTH		TYPE				
		FROM	TO					
	m	m	m		m		GROUND LEVEL 42.30m OD	
4.12.84					0			
					0.30	42.50	Topsoil	
		0.50		V H			Soft light brown mottled sandy silty CLAY with weathered gravel and cobbles	
					0.80	42.00		
		1.00		V H P			Soft brown sandy silty CLAY with weathered gravel and cobbles	
					1.50	41.30		
		1.50		B			Firm to stiff dark brown sandy silty CLAY with gravel and cobbles	
		2.00		H				
					2.60	40.20		
		3.00		H			Very stiff dark grey sandy silty CLAY with gravel and occasional cobbles (GLACIAL TILL)	
		3.40		H H			Lens of medium dense grey silty sand at depth 3.4m	
		3.50		B				
					3.60	39.20		
		4.00		B			Dense GRAVEL and COBBLES in a stiff dark grey clay matrix	
					4.10	38.70		
							BASE	

REMARKS

- Slight seepage from gravelly clay at depth 0.5m to 0.8m
- H = disturbed hand sample; B = disturbed bulk sample;
 V = hand shear vane test; P = pocket penetrometer test;
- Two disturbed hand samples of grey silty sand were taken from the lens at depth 3.4m, one at the natural moisture content, and the other as slurry formed by the ingress of ground water through the sand lens.
- Results of hand shear vane tests

Depth (m)	Undrained shear strength (KN/m ²)	Mean
0.50	>120, 110, >120, 79, >120	110
1.00	>120, >120, >120, >120	>120

- Results of pocket penetrometer test

Depth (m)	Undrained shear strength (KN/m ²)	Mean
1.00	245, 127, 147, 216, 167	180

METHOD OF EXCAVATION
 Machine dug

TRIAL PIT 6

O.C.L.I. HILLENDE FACILITY RECORD OF TRIAL PIT 7

JOB NO	14049
MADE BY	AEC
DATE MADE	5 DEC 84

DAILY PROGRESS	DEPTH TO WATER m	SAMPLES OR TESTS			LEG- END	DEPTH m	REDUCED LEVEL	DESCRIPTION OF STRATA
		DEPTH		TYPE				
		FROM	TO					
5.12.84							GROUND LEVEL 38.70m OD	
				☒	0			
				☒	0.30	38.40	Topsoil	
				o			Loose light brown slightly clayey silty medium to fine grained SAND with occasional cobbles	
				x				
				o				
		1.20		B				
				o	1.50	37.20		
				o			Medium dense angular sandstone COBBLES and BOULDERS, up to size 1m, in a clayey silty sand matrix	
				o				
				o				
				o				
				o	2.50	36.20		
		2.70		B			Dense fragmented rock, gravel and weathered angular boulders, up to size 0.6m in a grey/brown mottled sandy clay matrix	
				o				
				o				
				o				
				o				
		4.00		B	4.00	34.70		
							BASE	

REMARKS

- Sides of pit unstable over entire depth - logged from surface
- Seepage at depth 3.9m causing collapse of adjacent strata and preventing further excavation
- B - disturbed bulk sample

METHOD OF EXCAVATION
machine dug

TRIAL PIT 7

O.C.L.I. HILLENDE FACILITY
RECORD OF TRIAL PIT 8

JOB NO	14049
MADE BY	AEC
DATE MADE	5 DEC 84

DAILY PROGRESS	DEPTH TO WATER	SAMPLES OR TESTS			LEG-ENO	DEPTH	REDUCED LEVEL	DESCRIPTION OF STRATA
		DEPTH		TYPE				
		FROM	TO					
	m	m	m		m		GROUND LEVEL 41.30m OD	
5.12.84					0			
					0.30	41.00	Topsoil	
		0.60		B			Dense sub-angular GRAVEL in a light brown very sandy clay matrix with occasional cobbles	
		1.70		B				
		2.30		W	2.30	39.00		
							Fragmented rock gravel and cobbles in a stiff light brown sandy silty clay matrix	
		3.20		B				
		4.10		B	4.20	37.10		
							BASE	

REMARKS

- Ground water seepage at depth 2.3m and below: approx. 75mm deep after 1/2 hour
- B = disturbed bulk sample; W = ground water sample

METHOD OF EXCAVATION
Machine dug

TRIAL PIT 8

O.C.L.I. HILLENL FACILITY
RECORD OF TRIAL PIT 9

APPENDIX
JOB NO 14049
MADE BY AEC
DATE MADE 6 DEC 84

DAILY PROGRESS	DEPTH TO WATER	SAMPLES OR TESTS			LEG- END	DEPTH	REDUCED LEVEL	DESCRIPTION OF STRATA
		DEPTH		TYPE				
		FROM	TO					
	m	m	m		m		GROUND LEVEL 38.95m OD	
6.12.84					0			
					0.25	38.70	Sandy topsoil	
							Gravel and cobbles in a firm light brown sandy clay matrix, becoming more stoney with depth	
		1.00		B				
					1.40	37.55		
							Dense fragmented rock gravel and cobbles in a light brown sandy clay matrix	
		2.30		B				
		3.00		B W	3.00	35.95		
							BASE: hard grey fine grained sandstone along entire length of pit	

REMARKS
1. Slight seepage from depth 2.1m: approx. 150mm deep after 45 min.
2. B = disturbed bulk sample: W = ground water sample

METHOD OF EXCAVATION
Machine dug

TRIAL PIT 9

O.C.L.I. HILLENL FACILITY
 RECORD OF TRIAL PIT 10

JOB NO	14049
MADE BY	AEC
DATE MADE	5 DEC 84

DAILY PROGRESS	DEPTH TO WATER	SAMPLES OR TESTS			LEG- END	DEPTH	REDUCED LEVEL	DESCRIPTION OF STRATA
		DEPTH		TYPE				
		FROM	TO					
m	m	m		m				
5.12.84							GROUND LEVEL 38.05m OD	
					0		Topsoil	
					0.30	37.75		
		0.70		VH P			Firm light brown mottled very sandy silty CLAY with cobbles	
		1.20		H	1.10	36.95		
		1.50		VB			Firm grey/brown mottled very sandy silty CLAY with gravel and cobbles	
					1.70	36.35		
							Stiff grey sandy silty CLAY with gravel and cobbles	
					2.20	35.85		
		2.60		V			Medium dense grey fine grained SAND with gravel, becoming more gravelly to the North end of the pit	
		2.90		B				
					3.00	35.05		
							Fragmented dark grey rock in a grey clay matrix	
					3.50	34.55		
							BASE	

REMARKS

- The east side of the pit collapsed suddenly, almost immediately after completing excavation. The debris was excavated to allow final logging from the surface.
- Fairly fast seepage from a depth of 2.6m and below.
- H = disturbed hand sample: B = disturbed bulk sample:
V = hand shear vane test : P = pocket penetrometer test

4. Results of hand shear vane tests

Depth (m)	Undrained shear strength (KN/m ²)	Mean
0.7	64, 62, 68, 72, 68	67
1.5	69, 86, >120, 115, 86	95

5. Results of pocket penetrometer test

Depth (m)	Undrained shear strength (KN/m ²)	Mean
0.7	108, 98, 137, 98, 98	106

METHOD OF EXCAVATION

Machine dug

TRIAL PIT 10

O.C.L.I. HILLENDD FACILITY
RECORD OF TRIAL PIT 11

JOB NO	14049
MADE BY	AEC
DATE MADE	6 DEC 84

DAILY PROGRESS	DEPTH TO WATER m	SAMPLES OR TESTS			LEG. END	DEPTH m	REDUCED LEVEL	DESCRIPTION OF STRATA
		DEPTH		TYPE				
		FROM m	TO m					
							GROUND LEVEL 39.80m OD	
6.12.84					0			
					0.30	39.50	Topsoil	
		0.50		H			Medium dense sub-angular sandstone COBBLES and GRAVEL in a firm to stiff light brown sandy clay matrix, with occasional boulder	
					1.10	38.70		
		1.30		B			Firm to stiff light brown very sandy silty CLAY with sub-angular fine grained grey sandstone gravel and cobbles	
					2.30	37.50		
		2.30		B			Dense large angular COBBLES of fragmented grey sandstone in a stiff light brown sandy clay and gravel matrix	
					4.20	35.60		
		4.20		B W			BASE	

REMARKS
 1. Fairly rapid seepage from depth 2.3m and below.
 2. H = disturbed hand sample; B = disturbed bulk sample;
 W = ground water sample

METHOD OF EXCAVATION
 Machine dug

TRIAL PIT 11

O.C.L.I. HILLENDE FACILITY
RECORD OF TRIAL PIT 13

JOB NO	14049
MADE BY	AEC
DATE MADE	6 DEC 84

DAILY PROGRESS	DEPTH TO WATER	SAMPLES OR TESTS			LEG- END	DEPTH	REDUCED LEVEL	DESCRIPTION OF STRATA
		DEPTH		TYPE				
		FROM	TO					
	m	m	m		m		GROUND LEVEL 39.90m OD	
6.12.84					0			
					0.25	39.65	Sandy topsoil	
				o			Loose to medium dense angular grey sandstone GRAVEL and COBBLES in a soft to firm grey/brown mottled sandy silty clay matrix with occasional boulders up to size 0.5m	
				o				
				o				
				o				
				o				
				o				
				o				
				o				
				o				
				o				
		1.10		B				
				o			Loose to medium dense large angular COBBLES in a grey/brown sandy clay matrix	
				o				
				o				
				o				
				o				
				o				
				o				
				o				
				o				
				o				
				o				
		2.80		B				
				o			Medium dense angular GRAVEL and COBBLES in a blue/grey sandy silty clay matrix	
				o				
				o				
				o				
				o				
				o				
				o				
				o				
				o				
				o				
				o				
				o				
		3.40		B				
				o			Dense angular GRAVEL and COBBLES of hard grey fine grained sandstone	
				o				
				o				
				o				
				o				
				o				
				o				
				o				
				o				
				o				
				o				
				o				
		4.00		BW	4.00	35.90		
							BASE	

REMARKS
 1. Slight seepage from depth 1.7m. Rapid ingress of groundwater from depth 3.3m and below.
 2. B = disturbed bulk sample; W = groundwater sample

METHOD OF EXCAVATION
 Machine dug

TRIAL PIT 13

