Copy 1.

Sub. 32 officer

Hand's Lane
Rush
Co. Dublin
Tel 01 8437512
31/09/2006

The Environmental Protection Agency
Waste Licensing Section
Johnstown Castle Estate
County Wexford

Dear Sirs,

Ref. Application by Fingal County Council for a Landfill at Nevitt, Co. Dublin.

This submission is based entirely on the Hydrogeological issues raised by the proposal to locate a municipal landfill at Nevitt, Lusk,County Dublin for the greater Dublin region.

References

- The EIS prepared by RPS MCOS
- The Geological Survey of Ireland report on The Bog of the Ring Groundwater Source Protection Zones, March 2005.
- The GSI publication "The Geology of Meath" and the bedrock geology map Sheet 13, Meath.
- Reference to "Introducing Groundwater", by Michael Price, Taylor and Francis.
- The well drilling records of Dunnes Drilling, Drumiskin, Co. Louth.
- Data on the Fingal Horticultural Industry collected by the Nevitt/Lusk Action Group.
- Photos are by Bernadette McNally, Tooman, Lusk, County Dublin.

Signed,

Patrick Boyle, B.E.

Declan White, B.Sc. Eng.

CONTENTS

1. The Gravel Aquifer Underlying the Landfill Site

The EIS fails to establish the extent and importance of a large gravel aquifer which underlies the proposed dump site.

This aquifer connects northward with the Bog of the Ring public water supply and may extend southwards for a considerable distance. The deepest deposits of gravel, which exceed 20 metres in places lie alongside the North / South rock fault in the Courtlough Valley. This fault-line presents a wall of highly fractured rock some 20 metres high running along the eastern edge of the Courtlough valley. (Figure 1, EIS Vol. 5, Tech. Apps. H&I, Appendix AI, Geological cross section B-B')

The gravel bed lies to the west of the rock fault which extends southwards past the Nevitt a further 3km to Annsbrook. (Figure 2, EIS Vol2, Main Report, page310, Bedrock Geology).

A gravel bed is classified as an aquifer if it is greater than 1km^2 in extent and contains more the 5 metres depth of saturated gravel. The EIS resistivity profiles and borehole data, and the Bog of the Ring GIS report of 2005, both indicate gravel at an average thickness of approximately 10 metres and extending northwards through the Courtlough Valley and into the Bog of the Ring.

- Figure 1, as above.
- Figure 3, EIS Vol.5, Supporting Documents, 2-D Resistivity Profiles.
- Figure 4, EIS Vol 5, Ground Investigations, Borehole ER07.
- GIS Report, Bog of the Ring Groundwater Source Protection Zones, March 2005, page 29 and 33.
- Information obtained from John Landy, a horticultural grower at Corduff, 2.5km south-east and down gradient of the dump site reported gravel at a depth of 12 metres while well drilling on his land by Dunnes Drilling. Other producers south of the landfill site reported similar gravel strikes during drilling i.e. Kerrigans, Johnstown (10,000 gals/hr); Keoghs, Westpalstown (10,000 gals/hr); Bergins, Roscall (25,000 gals/hr).

Whilst the GIS report states that the gravel is an important contributor to the water supply at the Bog of the Ring (page 29), and that a groundwater divide exists within it some 200 metres south of the natural topographic divide in the Courtlough Valley, i.e. directly to the East of the dump, (page 30, Model Boundaries, southwest, point 3), the full extent of the aquifer has not been established by either the EIS or GSI reports.

The GSI publication 'Geology of Meath' notes on page 3, "Large expanses of glaciofluvial sands and gravels deposited by meltwater streams flowing from a glacier are common in the area. The most striking of these occur around Gormanstown ..." and "Meltwater erosion has cut some spectacular meltwater channels in the area, e.g. the Delvin River ..."

On page 55 sand and gravel deposits are referred to at Naul, North Dublin and Tobersool (adjacent to and just North of the Bog of the Ring).

Whilst on page 58, "Locally Important Quaternary sand / gravel aquifers – have been successfully exploited for irrigation of market gardens near Rush in North County Dublin. Similarly, productive gravel aquifers may exist elsewhere but have not been identified."

The EIS and GSI reports have identified such a large productive gravel aquifer in the Bog of the Ring/Courtlough Valley. It was most probably formed by the escape of some of the vast quantities of gravel contained in the Delvin River Valley southwards through the Courtlough Valley, and is likely to have formed a delta to the south of the proposed dumpsite extending at least as far south as Corduff. The highly productive horticultural well at Bergins, Keoghs and Kerrigans may owe much of their excellent outputs to the existence of this gravel delta.

There is ample evidence in the EIS that the entire Landfill site is underlain by a continuous layer of gravel/weathered rock.

- The Resistivity results already referred to, (Figure 3), can be used to construct a contour map of this underlying high permeability deposit (Figure 5).

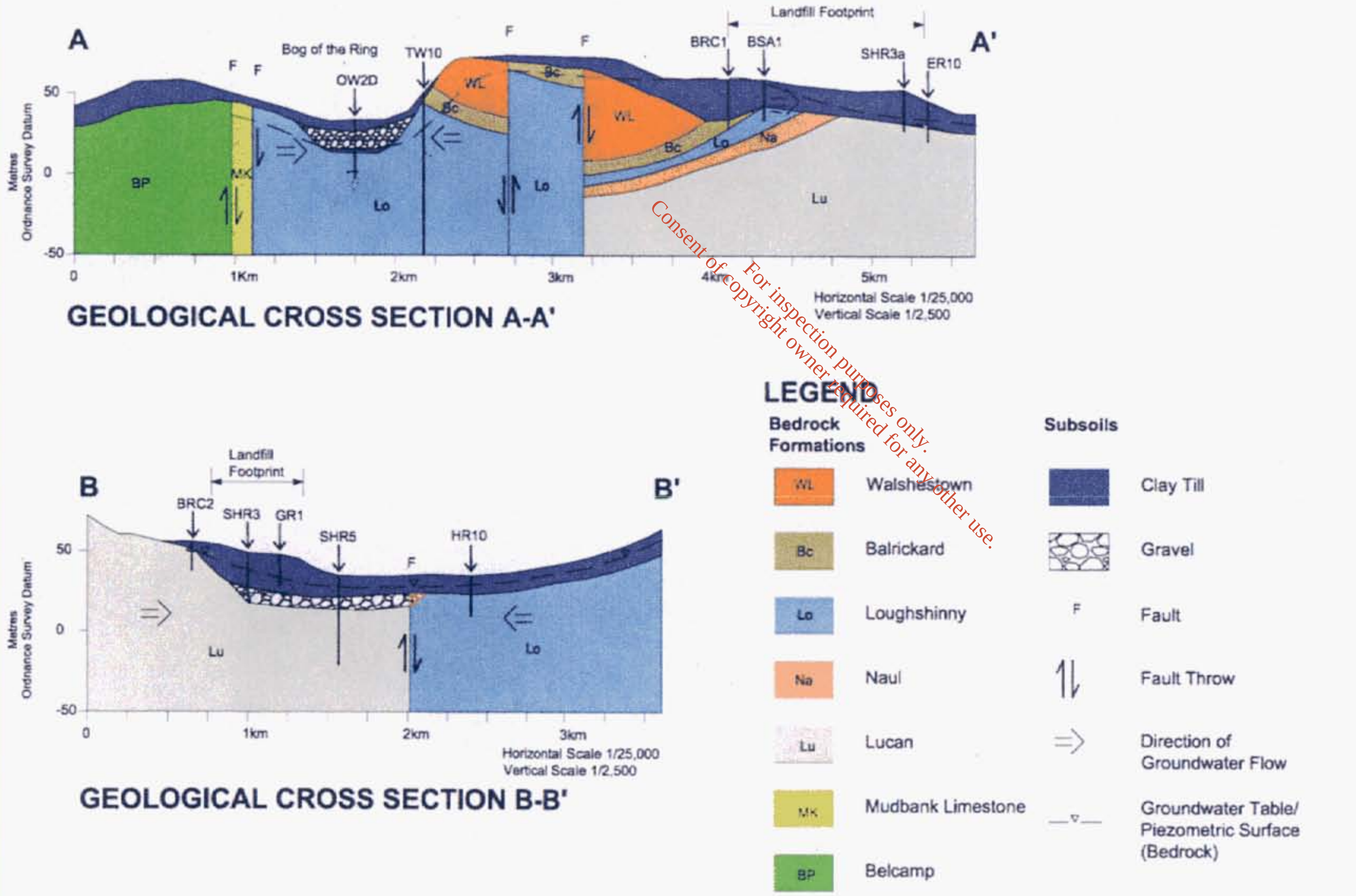
- Some borehole results also confirm the presence of gravel e.g. Figure 6, **AGB10** – inexplicably not shown on the main borehole location map in Vol 5, Ground Investigations Vol 1 (Part A), (which is almost impossible to read even with the aid of a magnifying glass), but is shown in the centre of the site in Vol 5, Ground investigations Factual Report (No.05-271) – Exploratory hole location map. **The depth of gravel is 2.3 meters**.
- Despite the impossible task of interpreting the main borehole location map a summary of those boreholes within the landfill footprint can be obtained in Vol 5 Technical Appendices H & I, Appendix 1, Soils, Table 4.2. (North of Nevitt Road), (Figure 7). **Of the 12 boreholes listed not meeting with an obstruction, 10 are underlain by gravel e.g. ASA1 (9m), ER02 (0.75 m), ER03 (4.75m), ER04 (1m), ER06 (2.6), (Figures 8-12).**

Given all this evidence for the presence of extensive continuous deep gravel, and the high yielding wells of The Bog of Ring (3.5Ml/d), Nevitt test wells (1.5 Ml/d), and the high yielding wells to the south (4.75Ml/d) then the Gravel Aquifer is very possibly regional in extent (>10km^2 and with a potential yield >10megalitres/day). In these circumstances the landfill would have a minimum Response of R3 to the gravel alone.

However, since the gravel aquifer overlies the Bog of the Ring Water Supply and the horticultural well sources to the south, and that the landfill site is connected to both through gravel and is up gradient to both sources, a Response of R4 is indicated, depending on the vulnerability rating.

The EIS failure to acknowledge the significance of this gravel deposit is not understood.

FIGURE 1.


A
A'
Bog of the Ring
F
TW10
OW2D
BRC1
BSA1
SHR3a
ER10
Landfill Footprint
BP
MK
Lo
WL
Bc
Na
Lu
Metres Ordnance Survey Datum
50
0
-50
0
1Km
2km
3km
4km
5km
Horizontal Scale 1/25,000
Vertical Scale 1/2,500
GEOLOGICAL CROSS SECTION A-A'
B
B'
Landfill Footprint
BRC2
SHR3
GR1
SHR5
HR10
1km
2km
3km
GEOLOGICAL CROSS SECTION B-B'
LEGEND
Bedrock Formations
Walshestown
Balrickard
Loughshinny
Naul
Lucan
Mudbank Limestone
Belcamp
Subsoils
Clay Till
Gravel
Fault
Fault Throw
Direction of Groundwater Flow
Groundwater Table/ Piezometric Surface (Bedrock)

NOTES

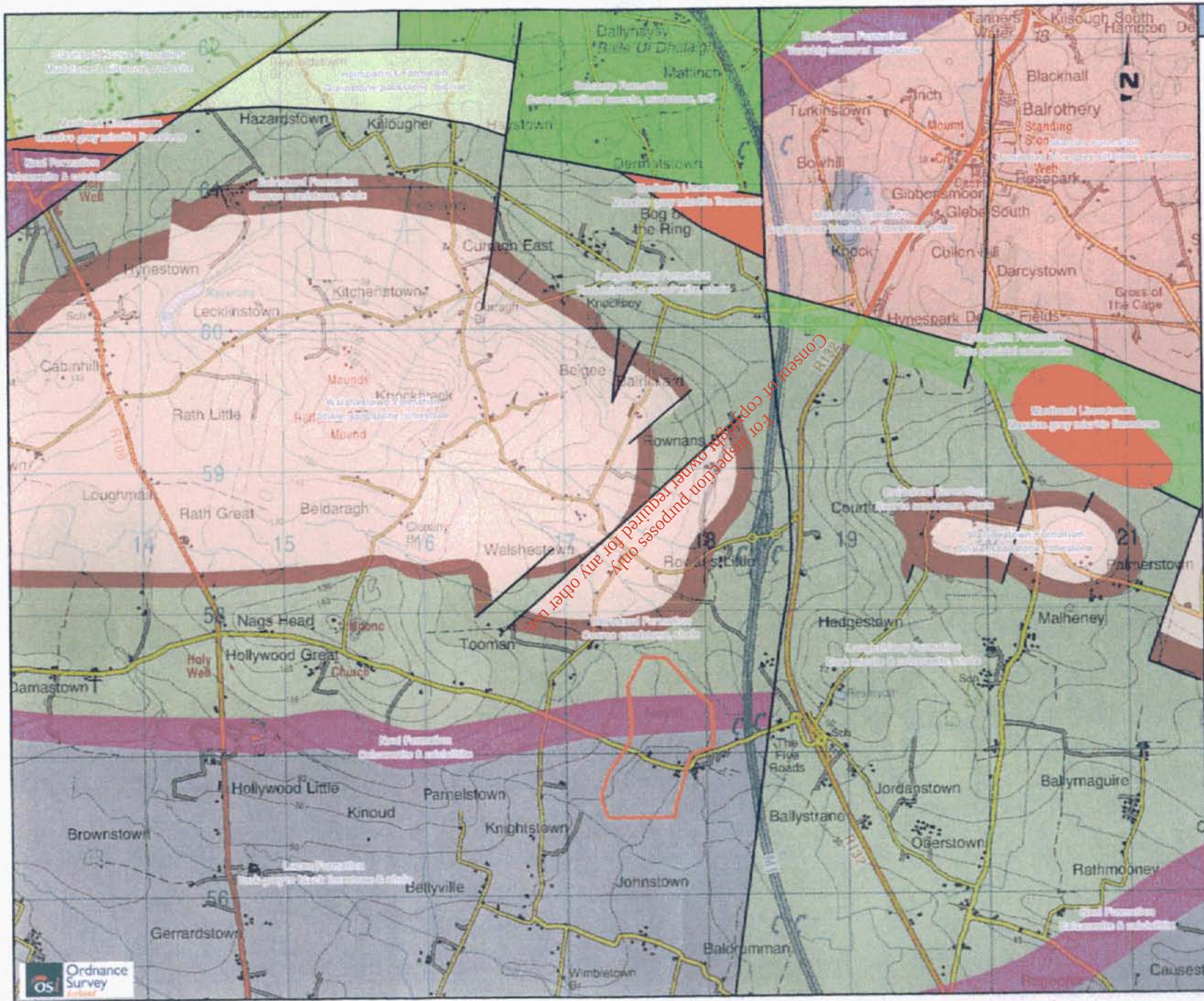
Fingal County Council

RPS Consulting Engineers

Fingal Landfill Project

GEOLOGICAL CROSS SECTIONS

Appendix A1.1



Legend

Bedrock Geology

Proposed Landfill Footprint

Fingal County Council

Project: **Fingal Landfill**

Title: **Bedrock Geology**

Figure 3.18.2

RPS Consulting Engineers

Issue Details

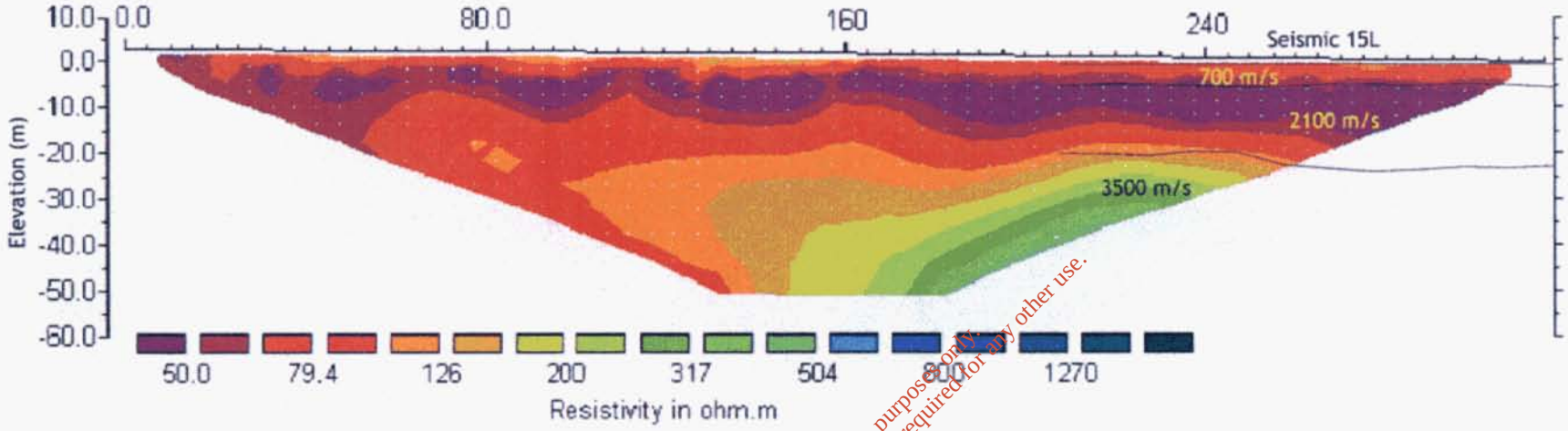
FIGURE 2

2D-Resistivity Profile 15 Long

317757 E
257777 N

318034 E
257636 N

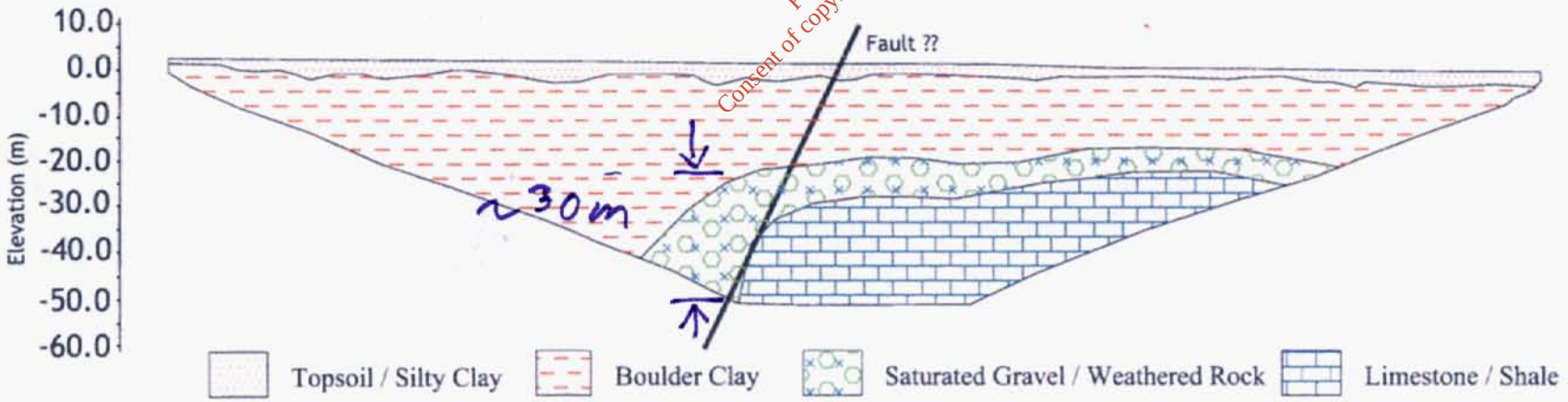
Inverted Data



West

Interpreted Data

East



Topsoil / Silty Clay

Boulder Clay

Saturated Gravel / Weathered Rock

Limestone / Shale

BMA GeoServices Ground Engineering Consultants	RMS ERROR 1.9 %	SECTION 15 LONG INTERPRETATION 2D-RESISTIVITY PROFILE 15 LONG	FINGAL LANDFILL SITING STUDY (SITE B)	RPS-MCOS	BMA GeoServices Ground Engineering Consultants

FIGURE 3

8

Glover Site Investigations Ltd

Machine : HANS ENGLAND Flush : AIR-MIST Core Dia : 75 Method : SYMMETRIX DRILLING & CORING	Casing Diameter: 114mm cased to 21.50m Location: 318178.9 E 257128.7 N	Ground Level (mOD): 34.95 Dates: 21/06/2005-22/06/2005	Site: FINGAL LANDFILL PROJECT Client: FINGAL COUNTY COUNCIL Engineer: RPS-MCOS

Borehole Number: ER07
Job Number: 05-271
Sheet: 2/4

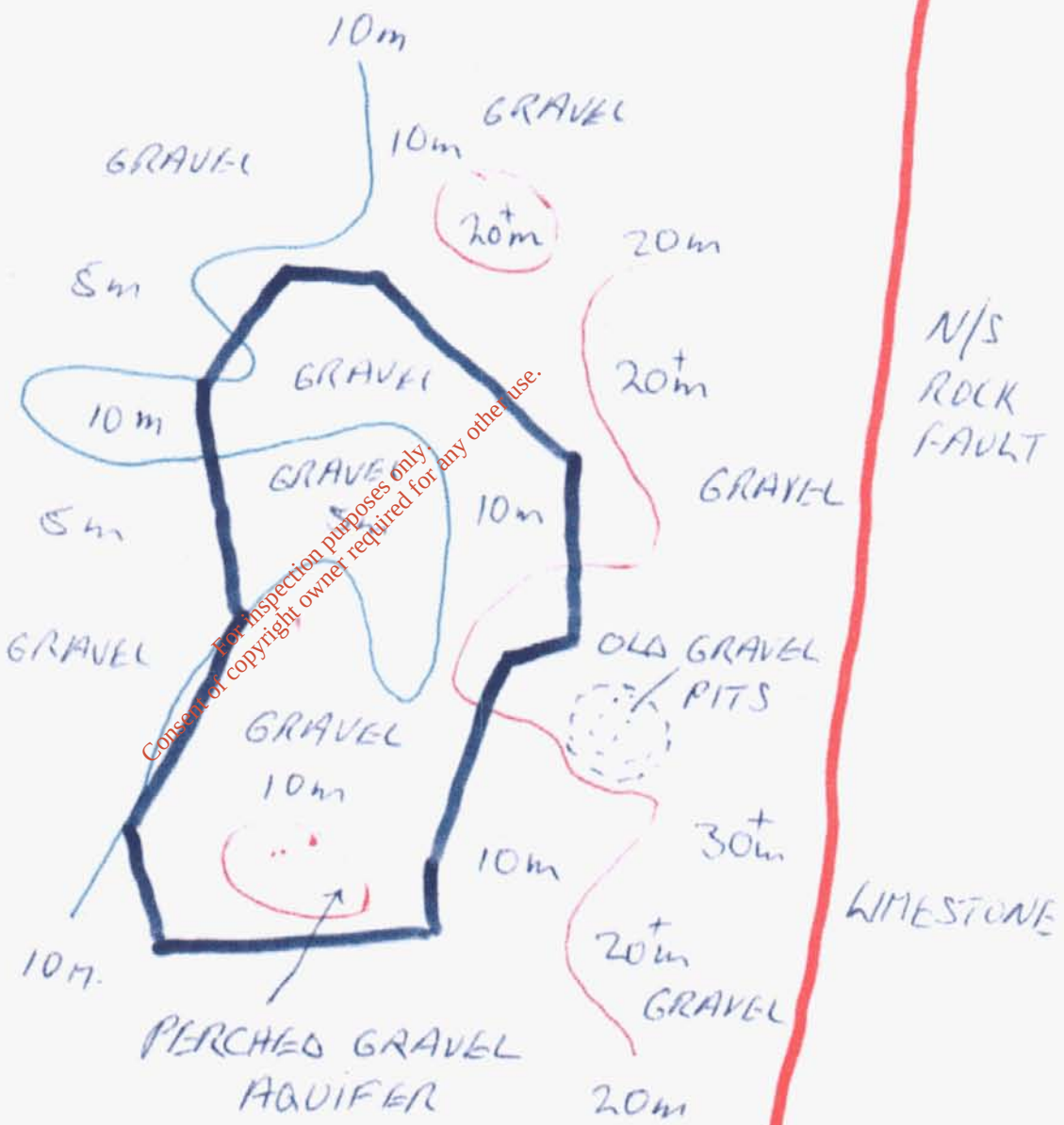
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							(2.30)	DRILLER'S DESCRIPTION: Sandy GRAVEL		
						22.65	12.30	DRILLER'S DESCRIPTION: Gravel with traces of clay		
						19.65	15.30	DRILLER'S DESCRIPTION: Sand and gravel with occasional cobble or boulder		
							(4.70)			
						14.95	20.00			

Remarks

Scale (approx)	Logged By
1:50	AM

Figure No.: 05-271.ER07

FIGURE 5.



GRAVEL BED UNDERLYING LANDFILL SITE

DEPTH OVER BEDROCK (M)

DATA SOURCE - EIS RESISTIVITY PROFILES VOL 5 - EIS

P Coyle BE 2/10/06

FIGURE 6

Glover Site Investigations Ltd

Site: ADDITIONAL WORKS AT FINGAL LANDFILL SITE			Borehole Number: AGB10
Machine: COMMACHIO Flush: AIR/MIST Core Dia: 102 Method: GEOBORE-S	Casing Diameter: 146mm cased to 30.00m	Ground Level (mOD): 45.80	Client: FINGAL COUNTY COUNCIL
	Location: 317699.8 E 256964.1 N	Dates: 10/02/2006-13/02/2006	Engineer: RPS
			Job Number: 06-074
			Sheet: 3/3

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
								Stiff grey sandy gravelly CLAY with occasional smooth sub-rounded cobbles and boulders. Gravel is sub-rounded fine to coarse		
20.70	60						(1.70)			
						24.10	21.70	Dark brown sandy silty fine to coarse sub-rounded GRAVEL containing occasional smooth sub-rounded cobbles		
22.20	40						(2.30)			
23.70	100									
24.00				18		21.80	24.00	Moderately strong to strong grey to dark grey fine grained LIMESTONE with occasional calcite veining.		
24.39	100	66	63	Non-Intact				Discontinuity Set 1 is very close to medium spaced, dipping 20-40 degrees, smooth planar, tight, clean.		
24.79				10				Discontinuity Set 2 is medium spaced, dipping 70 degrees to sub-vertical, rough planar, tight to moderately open, clean.		
25.20				Non-Intact				Discontinuity Set 3 is medium spaced, dipping 10 degrees, smooth to rough planar, tight to moderately open, clean.		
25.26				5						
25.38				92						
25.50				6						
25.61				43						
25.72	100	96	85	2				Discontinuities occasionally infilled with layers of clay		
26.67				23						
26.80				27						
27.02				4			(6.00)			
27.56	100	73	53	Non-Intact						
27.75				15						
28.15										
28.40				Non-Intact						
28.90				5						
29.02				29						
29.14	100	100	79	4						
29.54										
29.74				33						
30.00				12	13/02/2006	15.80	30.00			

Remarks

Scale (approx)	Logged By
1:50	TR/HD

Figure No. 06-074.AGB10

FIGURE 7.

Hole	Depth of Clay	Underlain by	Location within Footprint			
			Adjacent to Waste Boundary	Waste Boundary to 3m Cut Contour	Within 5m Cut Contour	Within 10m Cut Contour
ER1	Clay to 21m	Rock		x		
ES1	Clay to 12.3m	*		x		
BSA1	Clay to 16.6m	*	x			
ER2	Clay to 25m	Gravel				x
ER3	Clay to 21.45m	Gravel		x		
ES2	Clay to 9.4m	*		x		
ER4	Clay to 25.75m	Gravel				x
BSA6	Clay to 14m	*				x
ES3	Clay to 13.8m	*		x		
AGB1	Clay to 20.65m	Gravel			x	
ES4	Clay to 13m	*		x		
BRC5	Clay to 20.2m **	Gravel			x	
AGB2	Clay to 27.25	Gravel				x
ASA1	Clay to 11m	Gravel	x			
ER6	Clay to 21m	Gravel				x
ER5	Clay to 21.2m	*				x
ER11	Clay to 13.5m	Gravel		x		
ES5	Clay to 20.5m	*				x
AGB9	Clay to 24.9m	Rock				x
AGB10	Clay to 21.7m	Gravel				x
ES7	Clay to 14.7m	*		x		

* refusal on boulder / obstruction ** drilled using open-hole techniques *** scheduled depth

Table 4.2: Depth of Overburden within Footprint (North of Nevitt Road)

FIGURE 8

13

Glover Site Investigations Ltd

Site	Borehole Number
FINGAL LANDFILL PROJECT	ASA1

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	300mm cased to 11.00m 250mm cased to 20.00m	38.45	FINGAL COUNTY COUNCIL	05-271
	Location	**Dates**	**Engineer**	**Sheet**
	318087 E 257171.2 N	21/06/2005- 27/06/2005	RPS-MCOS	2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(1.00)	Stiff to very stiff dark grey/black fine to medium sandy fine to coarse gravelly CLAY with occasional subangular and subrounded cobbles and boulders		
11.00-11.45 11.00 11.30	SPT N=36 J1 B1			4,7/7,9,8,12	27.45	11.00	Medium dense brown grey slightly fine to coarse gravelly fine to coarse GRAVEL		
						(0.90)			
12.00	B2				26.55 26.45	11.90 12.00	Dense grey brown fine to coarse gravelly fine to coarse SAND with numerous cobbles		
12.20-12.32 50/0	CPT 23°/120			8,15/50			Dense slightly fine to coarse sandy slightly fine to coarse gravelly cobbly BOULDERS		
12.80	B3								
						(2.50)			
13.50-13.75 50/120 13.80	CPT 25°/130 B4			10,15/22,28					
					23.95	14.50	Dense grey fine to coarse sandy fine to coarse GRAVEL with numerous cobbles		
14.80 14.90 15.00	J2 B5 J3					(1.30)			
15.80	B6				22.65	15.80	Stiff to very stiff dark grey/black fine to medium sand fine to coarse gravelly CLAY with few cobbles and small boulders		
16.60 16.70	J4 B7								
						(2.80)			
17.80 17.90	J5 B8								
18.60 18.70	J6 B9				19.85	18.60	Dense grey fine to coarse sandy fine to coarse GRAVEL with numerous cobbles		
						(1.40)			
20.00 20.00	J7 B10				18.45	20.00			

Remarks
Borehole terminated on Engineer's instruction.
Chiselling from 12.40m to 13.10m for 1.5 hours. Chiselling from 13.10m to 13.50m for 1 hour. Chiselling from 13.80m to 14.20m for 1.5 hours. Chiselling from 14.40m to 14.60m for 0.75 hours. Chiselling from 15.50m to 15.80m for 0.5 hours. Chiselling from 16.40m to 16.60m for 0.5 hours. Chiselling from 16.80m to 17.00m for 0.5 hours. Chiselling from 17.00m to 17.20m for 0.5 hours. Chiselling from 18.20m to 18.40m for 1.5 hours.

Scale (approx)	Logged By
1:50	TR

Figure No. 05-271 ASA1

FIGURE 9. 14

Glover Site Investigations Ltd

Site: FINGAL LANDFILL PROJECT			Borehole Number: ER02
Machine : COMMACHIO Flush : POLYER GEL Core Dia: 102 Method : GEOBORE-S	Casing Diameter: 146mm cased to 25.75m	Ground Level (mOD): 46.37	Client: FINGAL COUNTY COUNCIL
	Location: 317728.5 E 257527.9 N	Dates: 30/05/2005-31/05/2005	Engineer: RPS-MCOS
			Job Number: 05-271
			Sheet: 3/3

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	100	0	0					Very stiff black sandy gravelly CLAY containing occasional smooth sub-rounded cobbles and boulders. Gravel is sub-rounded fine to medium		
21.25	100	0	0				(5.00)			
22.70	100	0	0							
24.25	66	0	0			21.12	25.00	Medium dense brown sandy fine to coarse sub-rounded GRAVEL containing occasional smooth sub-rounded cobbles and boulders		
							(0.75)			
25.75					31/05/2005	20.62	25.75	Complete at 25.75m		

Remarks
Geobore S unable to penetrate gravel
Borehole terminated at 25.75m.

Scale (approx)	Logged By
1:50	AM

Figure No. 05-271.ER02

FIGURE 10

Glover Site Investigations Ltd

Machine : COMMACHIO Flush : POLYMER GEL Core Dia : 102 Method : GEOBORE-S	Casing Diameter 146mm cased to 36.40m	Ground Level (mOD) 56.75	Site FINGAL LANDFILL PROJECT
	Location 317471.3 E 257461.8 N	Dates 15/06/05- 16/06/05	Client FINGAL COUNTY COUNCIL
			Engineer RPS-MCOS

Borehole Number: ER03
Job Number: 05-271
Sheet: 3/4

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	100	0	0					Very stiff dark grey to black gravelly sandy CLAY containing occasional smooth sub-rounded cobbles and boulders. Gravel is sub-rounded fine to coarse		
							(1.45)			
21.15	100	0	0			35.30	21.45			
21.45	29	0	0					Medium dense greyish brown sandy fine to coarse sub-rounded GRAVEL containing occasional cobbles and boulders		
22.80	45	0	0							
23.90	60	0	0				(4.75)			
24.65	66	0	0							
25.40	87	0	0							
26.20	100	0	0			30.55	26.20	Moderately strong dark grey fine to medium grained micrite LIMESTONE. Moderately weathered.		
27.00	100	0	0		15/06/05 16/06/05			Highly fractured, thinly bedded fractures, closely spaced, smooth planar, ligh, clean		
28.00	100	0	0				(3.80)			
28.60	100	0	0							
28.90	100	0	0	Non-Intact						
29.80						26.75	30.00			

Remarks

Scale (approx)	Logged By
1:50	AM

Figure No. 05-271.ER03

FIGURE 11 16

Glover Site Investigations Ltd

Machine : COMMACHIO Flush : POLYMER GEL Core Dia : 102 Method : GEOBORE-S	Casing Diameter: 146mm cased to 26.75m Location: 317847.7 E 257418.3 N	Ground Level (mOD): 44.90 Dates: 01/06/05-02/06/05	Site: FINGAL LANDFILL PROJECT Client: FINGAL COUNTY COUNCIL Engineer: RPS-MCOS

Borehole Number: ER04
Job Number: 05-271
Sheet: 3/3

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	100	0	0					Very stiff dark grey to black sandy gravelly CLAY containing occasional smooth sub-rounded cobbles and boulders. Gravel is sub-rounded fine to coarse		
21.35	100	0	0							
22.90	100	0	0				(5.75)			
24.35	100	0	0							
25.75	30	0	0			19.15	25.75	Medium dense brown sandy fine to coarse sub-rounded GRAVEL containing occasional smooth cobbles and boulders		
26.75					02/06/05	18.15	(1.00) 26.75	Complete at 26.75m		

Remarks
Geobore S unable to penetrate gravel.
Borehole terminated at 26.75m.

Scale (approx): 1:50
Logged By: AM
Figure No.: 05-271.ER04

FIGURE 12

Glover Site Investigations Ltd

Machine : COMMACHIO Flush : POLYMER MUD Core Dia : 102 Method : GEOBORE-S	Casing Diameter 146mm cased to 23.60m	Ground Level (mOD) 44.65	Site FINGAL LANDFILL PROJECT
	Location 317851.2 E 257136.3 N	Dates 25/05/2005- 26/05/2005	Client FINGAL COUNTY COUNCIL
			Engineer RPS-MCOS

Borehole Number: ER06
Job Number: 05-271
Sheet: 3/3

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
	100	0	0				(1.00)	Stiff to very stiff dark brown to black slightly sandy gravelly CLAY containing occasional smooth sub-rounded cobbles and boulders. Gravel is sub-rounded fine to medium		
						23.65	21.00	Dense dark brown silty sandy fine to coarse sub-rounded GRAVEL containing occasional smooth sub-rounded cobbles and boulders		
21.50	50	0	0				(2.60)			
23.60					26/05/2005	21.05	23.60	Complete at 23.60m		

Remarks
Geobore S unable to penetrate gravel.
Borehole terminated at 23.60m.

Scale (approx)	Logged By
1:50	AM

Figure No.
05-271 ER06

2. The Vulnerability Rating of a Landfill Site underlain by Gravel

The EIS claims that the vulnerability rating of the site should be considered low due to a substantial overburden of clay.

However, the resistivity profiles show a large number of high permeability anomalies within this clay overburden. Again using the data in the resistivity profiles their presence can be mapped (Figure 13). No test drilling to check on the nature or extent of any of these has been carried out in the EIS.

Of particular interest is the large high permeability anomaly shown in Resistivity Profile 6 (EIS 2005) in the southern section of the site which looks like a very large perched gravel bed (Figure 14).

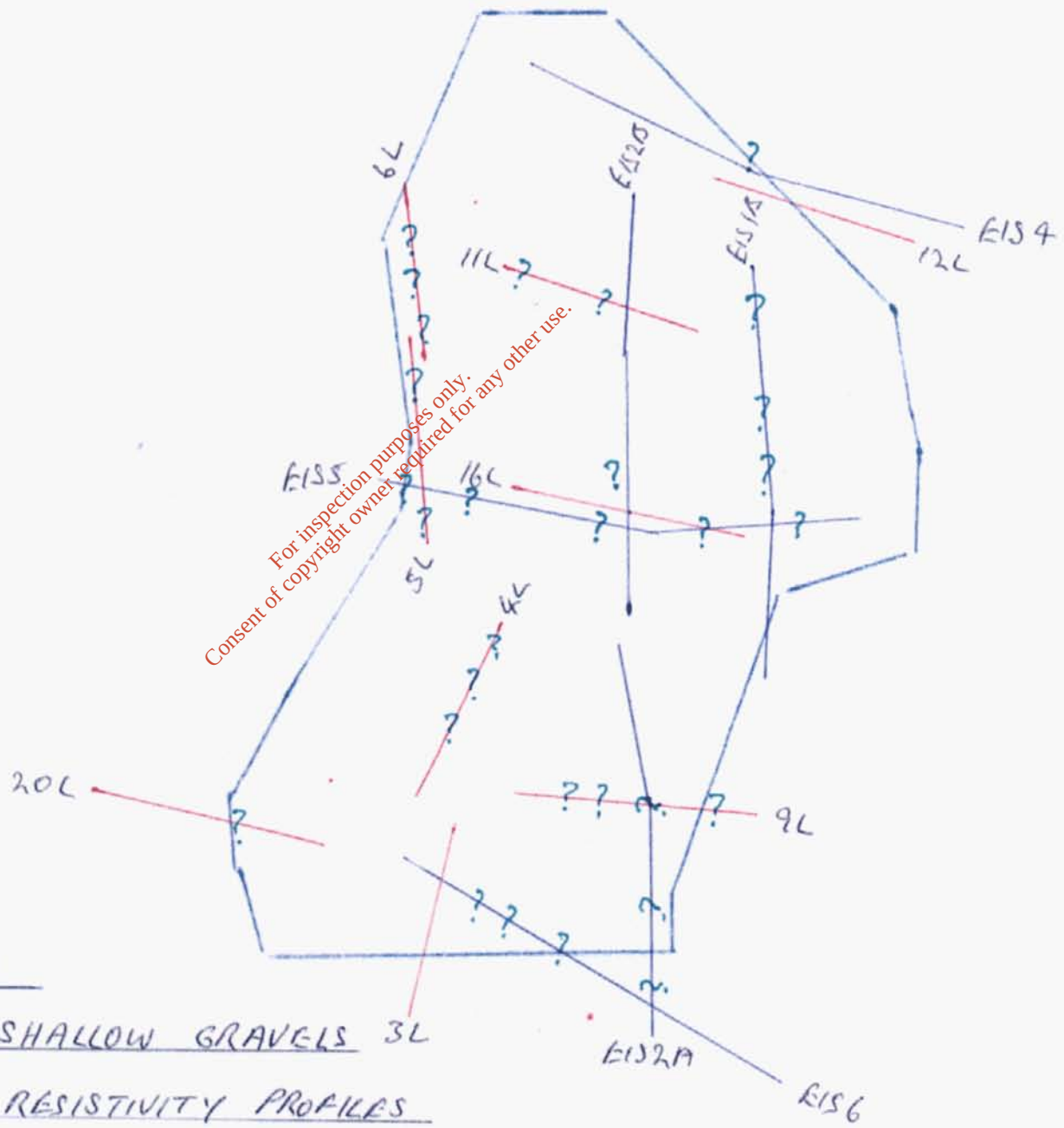
Also of interest is the borehole data for AGB4, which shows gravel near the centre of the site at a depth of only 0.7m and a depth of 3.8m before drilling was discontinued (Figure 15).

The claim that the clay overburden is impermeable is not proven and the evidence is clear that there are areas of low permeability within the landfill footprint.

The overall vulnerability of the site, given the presence of underlying gravel is determined by the table given in EIS Vol. 5 Appendices H & I, appendix A13. High permeability subsoil (sand/gravel), overlain by poorly drained soil is given as 2.iii, High (Figure 16).

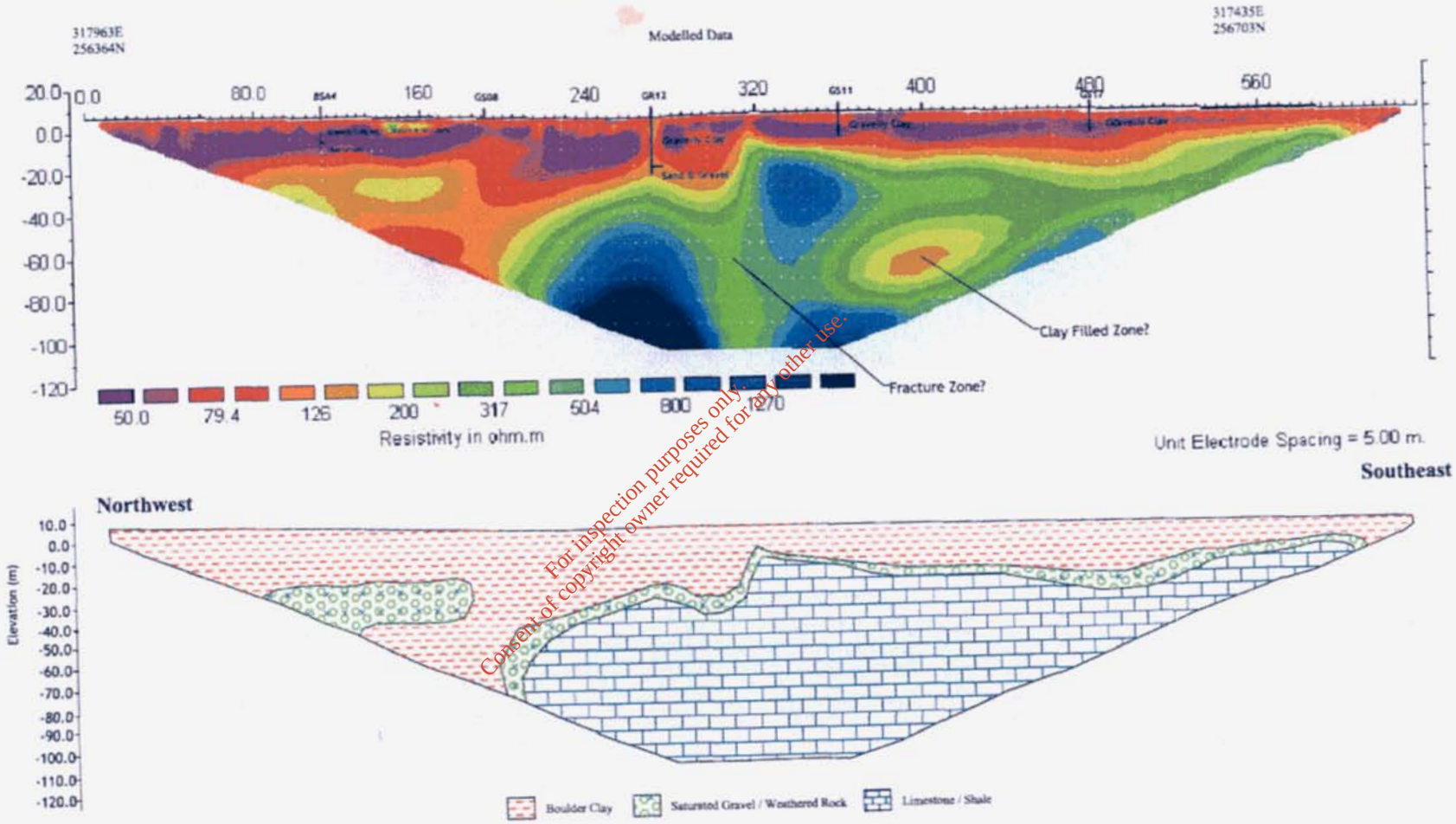
In such circumstances the response of this site to Lm/Lg is R3, to Rf/RG is R4, or to a Source is R4, and certainly not R1 as claimed in the EIS.

FIGURE 13



? AREAS OF POTENTIAL SHALLOW GRAVELS SHOWN ON RESISTIVITY PROFILES

2D-Resistivity Profile 6 (EIS_2005)



BMA GeoServices Ground Engineering Consultants	RMS ERROR 3.5%		SECTION 6 INTERPRETATION 2D-RESISTIVITY PROFILE 6(2005)	FINGAL LANDFILL SITING STUDY (SITE B)	RPS-MCOS

FIGURE 15

FIGURE 15

Glover Site Investigations Ltd

Site: FINGAL LANDFILL PROJECT			Borehole Number: AGB4
Machine : KNEBEL Flush : POLYMER MUD Core Dia: 102 Method : GEOBORE S	Casing Diameter: 146mm cased to 4.50m	Ground Level (mOD): 47.84	Client: FINGAL COUNTY COUNCIL
	Location: 317491.6 E 256919.3 N	Dates: 22/06/2005	Engineer: RPS-MCOS
			Job Number: 05-271
			Sheet: 1/1

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.30							(0.70)	TOPSOIL		
	70	0	0	0		47.14	0.70	Medium dense brown sandy fine to coarse GRAVEL containing occasional smooth subrounded cobbles		
1.50	66	0	0	0			(3.80)			
3.00	30	0	0	0						
4.50						43.34	4.50	Complete at 4.50m		

Remarks
Backfilled with bentonite
Geobore S unable to penetrate gravel.
Borehole terminated at 4.50m.

Scale (approx)	Logged By
1:50	TR

Figure No. 05-271.AGB4

FIGURE 16

Vulnerability category		Hydrogeological setting	Recharge coefficient (rc)		
			Min (%)	Inner Range	Max (%)*
Extreme	1.i	Areas where rock is at ground surface	60	80-90	100
	1.ii	Sand/gravel overlain by well drained soil	60	80-90	100
	1.iii	Till overlain by well drained soil	45	50-70	80
	1.iv	Till overlain by poorly drained (gley) soil	15	25-40	50
	1.v	Sand/ gravel aquifer where the water table is † 3*m below surface	70	80-90	100
	1.vi	Peat	15	25-40	50
High	2.i	Sand/gravel aquifer, overlain by well drained soil	60	80-90	100
	2.ii	High permeability subsoil (sand/gravel) overlain by well drained soil	60	80-90	100
	2.iii	High permeability subsoil (sand/gravel) overlain by poorly drained soil			
	2.iv	Moderate permeability subsoil overlain by well drained soil	35	50-70	80
	2.v	Moderate permeability subsoil overlain by poorly drained (gley) soil	15	25-40	50
	2.vi	Low permeability subsoil	10	20-30	40
	2.vii	Peat	0	5-15	20
Moderate	3.i	Moderate permeability subsoil and overlain by well drained soil	25	30-40	60
	3.ii	Moderate permeability subsoil and overlain by poorly drained (gley) soil	10	20-40	50
	3.iii	Low permeability subsoil	5	10-20	30
	3. iv	Basin peat	0	3-5	10
Low	4.i	Low permeability subsoil	2	5-15	20
	4.ii	Basin peat	0	3-5	10

Acknowledgement: many of the recharge coefficients in this table are based largely on material in Fitzsimons and Misstear (in press).

(WFD Groundwater Working Group, 2004)

3. The Fingal Locally Important Fissured Rock Aquifer.

An Aquifer crosses Fingal from the west around Garristown to the sea between Rush and Skerries. An extension to the aquifer stretches northward to Balbriggan and contains the Bog of the Ring public water supply (Figure 17). Whilst the aquifer is currently categorised by the GSI as Locally Important, i.e. capable of supplying a village or a small town, this aquifer produces vast amounts of water for use by the Fingal Horticultural Industry in the form of a network of private wells. It is for this reason that the Nevitt/Lusk Action Group were able to request the GSI to upgrade the aquifer to Regionally Important. The GSI requested detailed information on the location and output of the wells in question.

The location of all wells is known to An Bord Bia who inspect them annually, but consider the information confidential. Unfortunately the Local Authority did not keep a record of these wells as required under legislation, and the Group has had to undertake a survey using their own limited resources.

The Group concentrated on the area immediately down-gradient of the proposed landfill i.e. Garristown to the west and the Skerries /Balbriggan district were not included. However the results of the survey have been so impressive that the Group are intent on submitting them to the GSI immediately and are confident of a re-categorization of the aquifer to Regional.

The aquifer appears on he recent EPA publication "Water Quality in Ireland 2006" (Figure 18), and is of the highest quality and suitable for use in food production.

The Nevitt landfill site is located in the centre of this important aquifer (Figure 19).

FIGURE 1.7

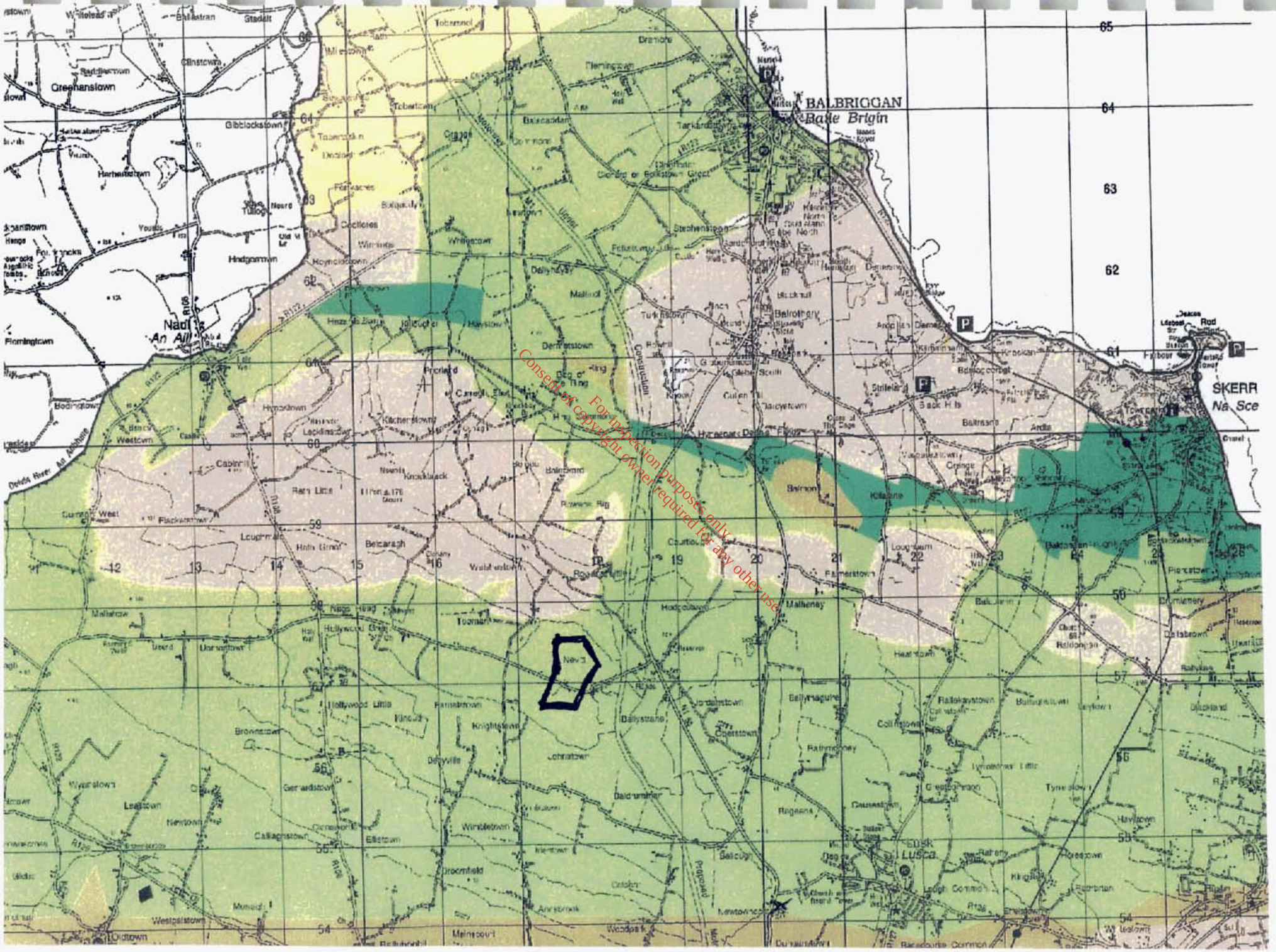
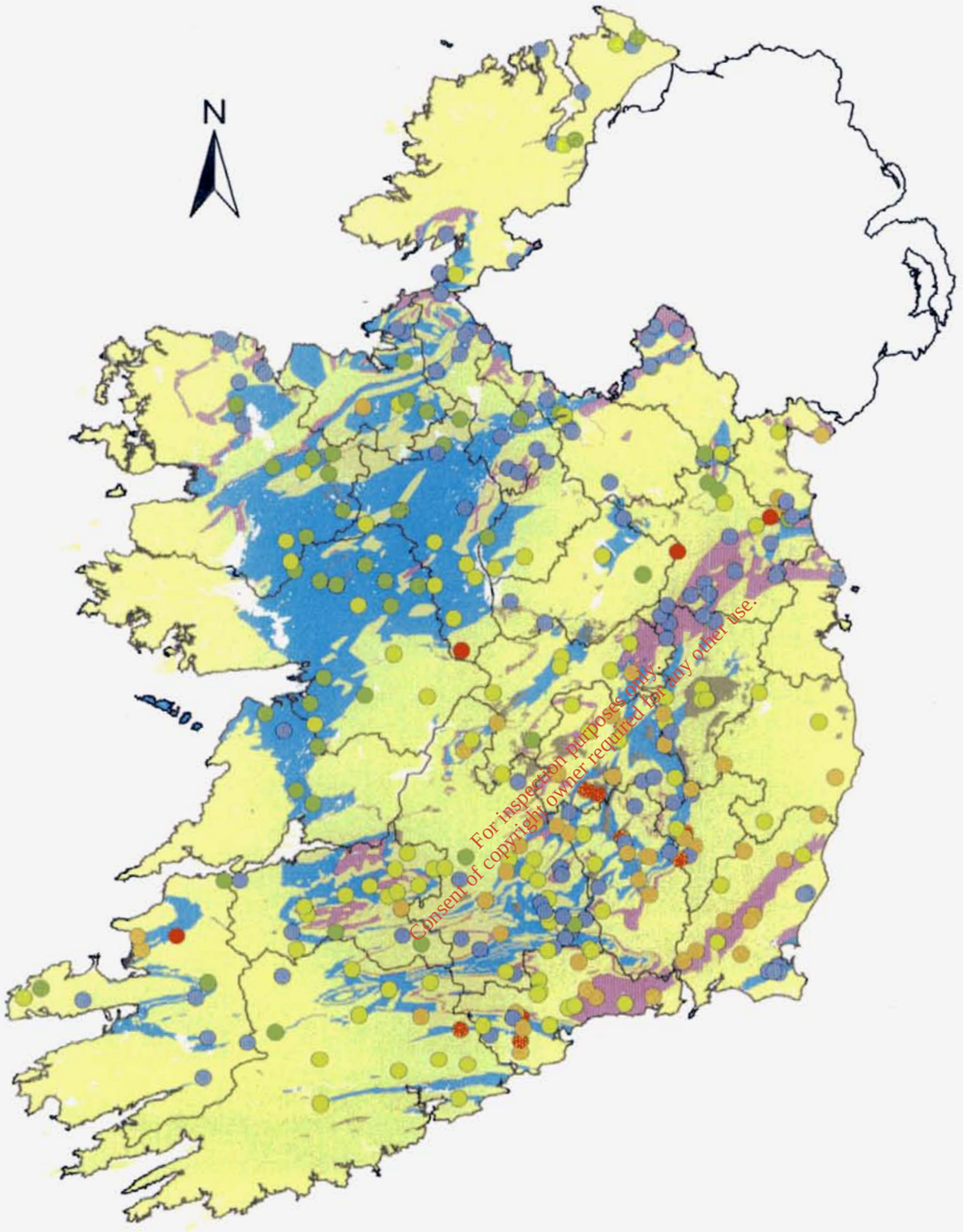


FIGURE 1.7

FIGURE 18

Figure 10b Mean Nitrate Concentrations during 2003-2005



Aquifer Legend

- Gravel Aquifer
- Productive Fissured Bedrock Aquifer
- Productive Karstified Aquifer
- Poorly Productive Bedrock Aquifer

Mean Nitrate Concentration

- <5 mg/l NO_3
- 5-10 mg/l NO_3
- 10-25 mg/l NO_3
- 25-40 mg/l NO_3
- 40-50 mg/l NO_3
- >50 mg/l NO_3

Source: EPA (M. Craig)

4. The Threat to the Horticultural Industry Water Source to the South and Down -gradient of the Landfill Site

The survey of horticultural wells was carried out in the general area Rush, Lusk and Ballyboughill. Because of the location of the proposed landfill particular importance was given to those areas to the immediate west of the North/South faultline which are presumed to hold the deepest gravel deposits, areas within 3km immediately to the south an down-gradient of the landfill site and areas generally to the southeast of the landfill site below the 30meter contour line. Detailed results are contained in Appendix 'A'.

Five primary sources of data were used:

a. Records of Dunne's Drilling, Drumiskin.
b. Records of the yields obtained during testing contained in the EIS.
c. Reported outputs of the Bog of the Ring Water Supply by Fingal County Council.
d. Data collected locally by members of the Nevitt/Lusk Action Group.

The total well yields are summarised as follows:

	No. of Wells	No. of Wells exceeding 3500 gallons/hr	Total Yield ML/D
Dunnes	59	15	20.25
Group	66	27	21.50
Neviit (EIS)	6	2	1.50
Bog of Ring	4	4	3.50
Total	**135**	**48**	**46.75**

The total areas covered by the aquifer crossing Fingal from West to East from Garristown to Rush and including the proposed landfill sites of Nevitt and alternatively Annsbrook is approximately 150km^2. Hilly areas such as Knockbrack,

Man of War and the Black Hills contribute at least another 50km^2 to the zone of contribution of the aquifer giving a total Zone of Contribution in North County Dublin of 200km^2 approximately. The Zone of Contribution of the Bog of the Ring is approx. 20km^2 and yields 3,500m^3/day, i.e. 1/10 th of the total aquifer area.

The figures show that a vast sustainable yield of water is being extracted from this aquifer which is clearly regional in extent and output and should be reclassified as such by the GSI. Any landfill within its boundaries would therefore have an R3 response at minimum.

The following points regarding the present condition of the Horticultural Industry in the area are of note:

- Four companies are engaged in food processing within the area surveyed- Nugents, Moores, Country Crest and Kerrigans of which Moores and Kerrigans are immediately down gradient and within a kilometre of the landfill site. Moores supply many institutions such as hospitals, hotels and prisons with ready to use vegetables. Kerrigans produce washed vegetables, mainly potatoes.
- Tesco and other supermarket chains are seeking an increase in local production of vegetables and diversifications to new crops such as onions.
- An EC directed inspectorate is in operation regarding water quality. An Bord Bia is the "owner" of the scheme. The National Standards Authority of Ireland (NSAI) is the certification body. An independent auditor conducts at least one inspection of water quality on each producer per year.
- The Fingal area produces half of all vegetables grown in Ireland. Irrigation is an essential requirement during the Summer months and final washing is also used.
- The value of the Horticultural Industry in the area down gradient of the landfill is estimated at €500 million per annum and the industry is labour intensive.
- The Rush/Lusk area is the heartland of the greenhouse industry, producing most of the country's tomatoes, lettuce and cucumbers and is also highly dependent on private wells. Most producers have recently doubled their water pump ratings.

The location of this proposed landfill is a clear threat to the source of water used by the Horticultural industry, the livelihood of Fingal's farmers and farm workers and Ireland's International reputation for pollution free agricultural produce.

5. The Threat to the Bog of the Ring Public Water Supply Source Northwards through the Courtlough Valley

A water divide was established by the EIS in the Courtlough Valley some 1km to the north of the proposed landfill site. This was done by drilling a series of boreholes into the bedrock and fixing standpipes. The pipes were sealed from the overlying gravel by cement grouting.

The water divide thus measured the water heads of the underlying bedrock aquifer, and the divide did not move to any substantial degree over a period of a year, except for one month when its moved to the south.

However, this divide in the low permeability bedrock has nothing to do with the highly mobile divide within the overlying gravel aquifer, which the GSI report places directly in line east and down-gradient of the proposed dumpsite. Therefore, the landfill is clearly within the Zone of Contribution of the Bog of the Ring Water Supply. The presence of a North/South highly fractured rock-fault adds to the high transmissivity of the valley in the northwards direction. See GSI report (Figures 20 and 21).

The probable local groundwater movement for the northern half of the landfill based on the GSI model predictions is given in Figure 22.

FIGURE 20

(a) Permeability Map (m/d)

x	x	x	x	x	x	0.6	0.6	x	x	x	x	x	x	x	x
x	x	x	x	x	0.25	0.6	0.6	0.25	0.6	x	x	x	x	x	x
x	x	x	x	x	0.25	0.6	0.6	0.6	0.6	x	x	x	x	x	x
x	x	x	x	0.25	0.25	0.6	0.6	0.6	x	x	x	x	x	x	x
x	x	x	x	0.6	0.6	0.6	0.6	0.6	x	x	x	x	x	x	x
x	x	x	x	0.6	0.6	0.6	0.6	0.6	x	x	x	x	x	0.7	0.7
x	x	x	x	0.6	0.6	0.25	0.25	0.6	5	x	x	0.7	0.7	0.7	0.7
0.25	0.25	0.25	5	5	5	9	9	9	9	12	12	0.7	0.7	0.7	0.7
x	0.25	0.25	5	5	9	9	9	9	9	9	12	0.7	0.7	0.0313	0.0625
0.25	0.25	5	5	5	0.125	0.125	0.125	5	5	5	12	12	0.0313	0.0313	0.0625
0.25	9	9	0.125	0.085	0.085	0.125	0.125	0.125	0.085	5	0.085	12	0.7	0.7	0.7
5	9	0.0625	0.085	0.085	0.085	0.125	0.0625	0.125	0.125	0.125	0.0625	12	0.7	0.7	x
x	x	x	x	x	x	x	x	x	x	x	0.0625	12	0.7	x	x

(b) Transmissivity Map (m^2/d)

x	x	x	x	x	x	24	24	x	x	x	x	x	x	x	x
x	x	x	x	x	10	24	24	20	19	x	x	x	x	x	x
x	x	x	x	x	10	24	22	18	13	x	x	x	x	x	x
x	x	x	x	10	10	24	21	14	x	x	x	x	x	x	x
x	x	x	x	24	24	24	23	16	x	x	x	x	x	x	x
x	x	x	x	24	24	25	25	21	x	x	x	x	x	46	45
x	x	x	x	23	25	11	11	24	236	x	x	45	45	46	45
8.9	10	10	187	192	205	668	653	625	602	815	798	49	51	50	49
x	7.9	10	231	348	606	607	610	652	617	614	841	52	50	2.0	2.5
5.6	6.9	352	343	355	4.6	3.6	3.0	345	337	337	809	833	2.2	2.0	3.8
9.1	632	637	3.7	3.5	3.6	4.3	4.6	3.9	3.5	348	3.6	843	49	49	47
282	614	3.5	3.6	3.6	3.6	4.1	3.1	4.3	4.2	4.3	3.7	837	49	49	x
x	x	x	x	x	x	x	x	x	x	x	4.2	840	49	x	x

THE COURTLOUGH VALLEY.

Figure A.3: Maps showing (a) cell permeability (m/d) and (b) cell transmissivity (m^2/d) used in the numerical model. The 'x' represents inactive cells in the model.

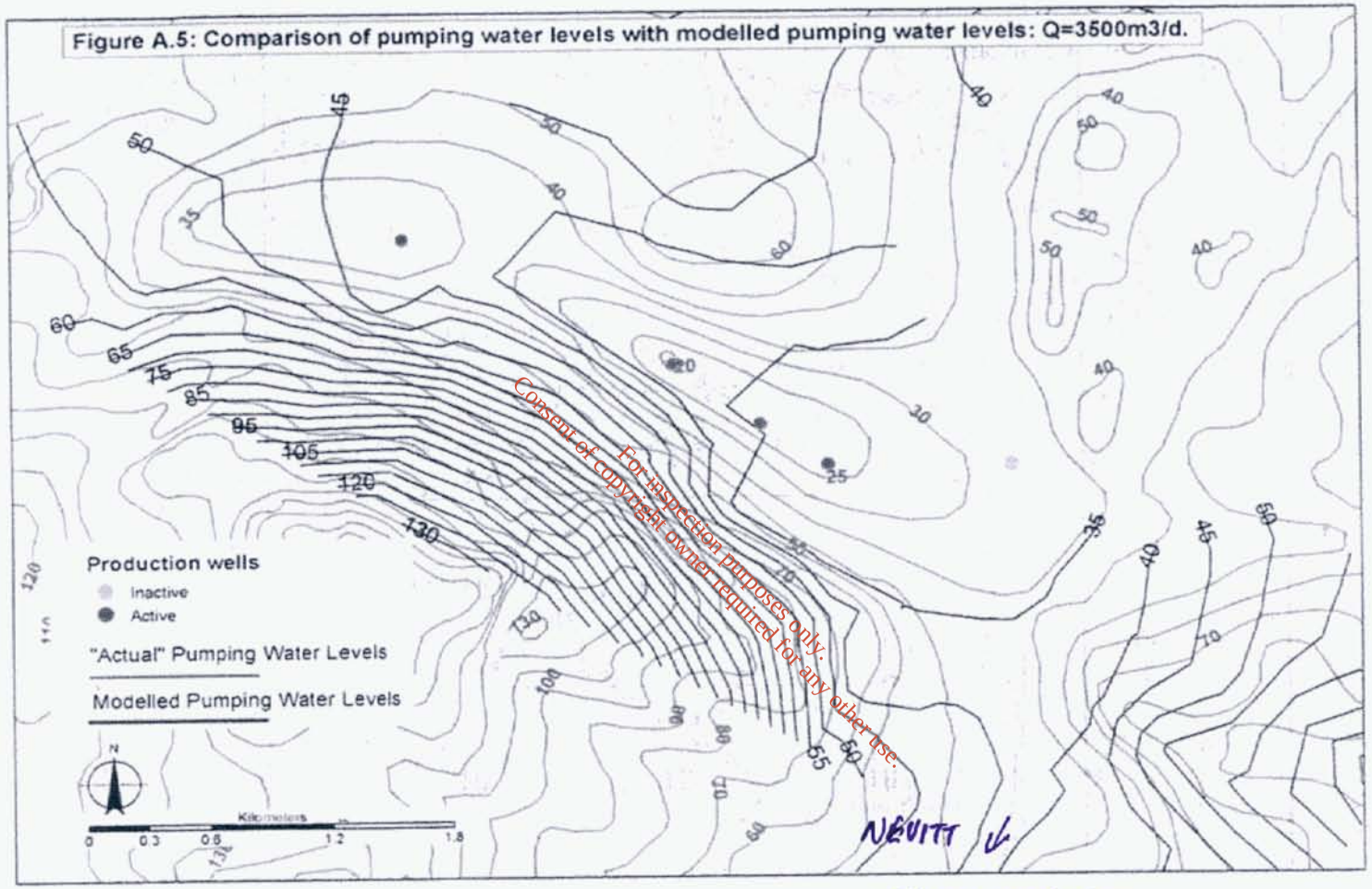


Figure A.5: Comparison of modelled and actual pumping water levels.

FIGURE 21

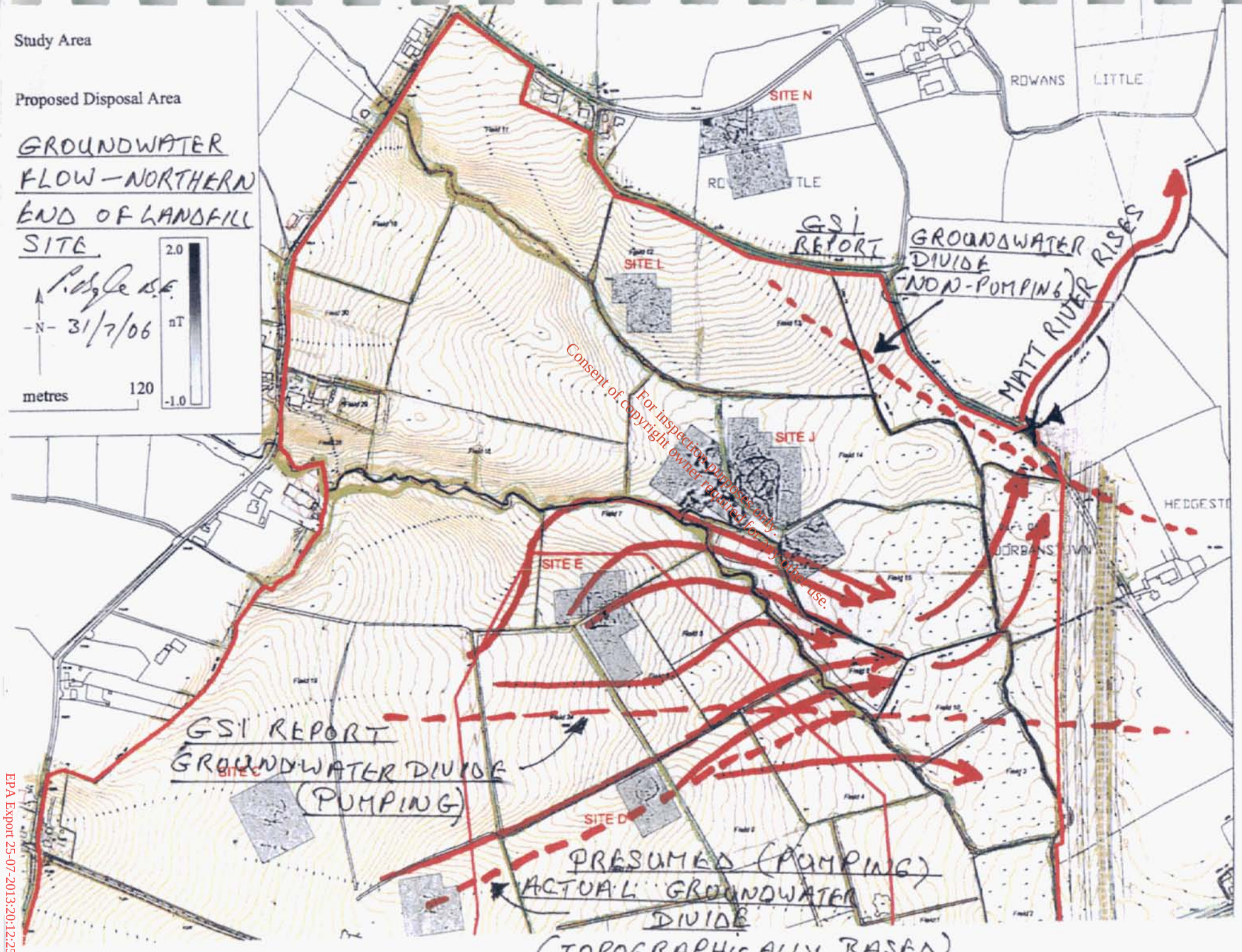


FIGURE 22

6. The Threat to the Bog of Ring Public Water Supply Source through the Bedrock beneath the Landfill Site.

The proposed landfill is partially sited on the Loughshinny Formation – the same rock formation which contains the Bog of the Ring Water Supply (Figure 2). The landfill site is connected to the Water Supply through a syncline in the Loughshinny Formation underlying the Hill of Knockbrack (Figure 1, Geological Cross Section A-A")

As the Bog of the Ring wells are directly down-gradient of the landfill through this syncline, pollution of the water supply is inevitable, depending largely on the unknown value of the permeability of the Loughshinny Formation in this underlying rock feature. But it is merely a question of time.

7. The Landfill Footprint Location beneath the Groundwater Table Contravenes the EC Groundwater Directive.

The landfill is sited partly below and partly above the groundwater level. Thus some leachate will enter the groundwater. It is accepted that no landfill can be guaranteed not to contain at least some 'List 1' and 'List 2' poisonous substances. "Because many of the listed substances are contained in landfill leachate, pressure mounted for an end to dilute and disperse landfill" – page 246, Introducing Groundwater, Michael Price, Second Edition, published by Taylor and Frances, Abingdon.

Thus any landfill sited in groundwater will contravene the EU Groundwater Directive. Such a landfill location is not allowed, for example, in the UK for this very reason. Other EC countries similarly forbid it.

8. The Longterm Loss of the Aquifer as a Future Resource

Given the very long period of time that constituents of leachate can exist at dangerous concentrations, and the inevitable breakdown of the protection system over time the total loss of the Regional Aquifer both as a potential public water supply and as a source of water to the Horticultural Industry is inevitable. Such an outcome is not acceptable and an alternative site must be sought.

We suggest an offshore site at the new deep water port to be built at Bremore in the manner of the Singapore landfill at Semakau.

Conclusion

- For a Locally Important Aquifer and a Vulnerability of High this landfill would have a Matrix Response rating of R3, not acceptable given the availability of an alternative site. The decommissioning of Gormanston Military Airfield opens up the possibility of a remote offshore site at a proposed deepwater port at Bremore.
- For a Regionally Important Gravel Aquifer the Response is R4.
- For a Regionally Important Fissured Rock Aquifer the Response is R4.
- For a Public Water Supply the Response is R4.
- For a Source of water to the Horticultural Industry the Response is R4.

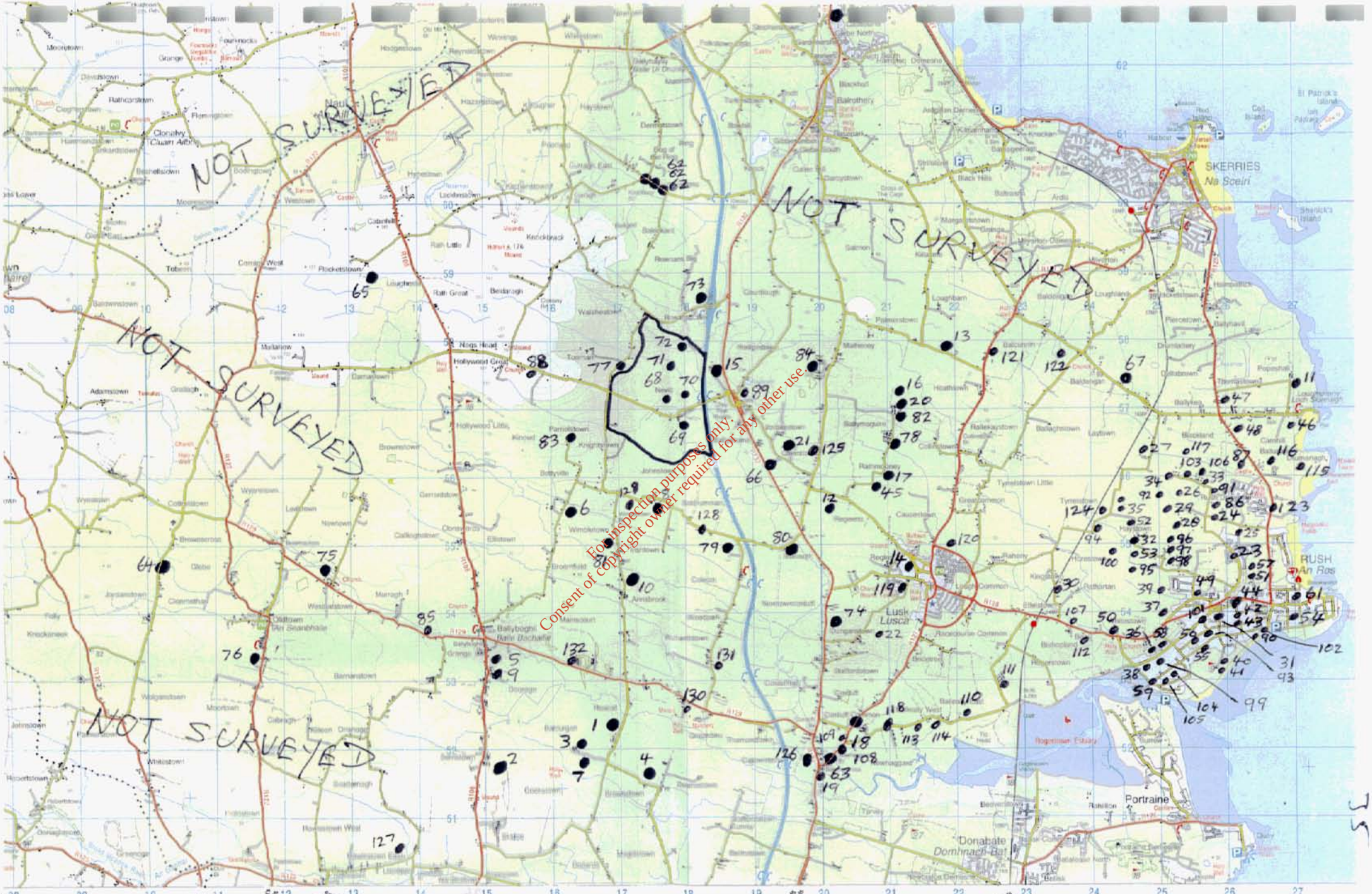
Signed,

Patrick Boyle, B.E.

Declan White, B.Sc.Eng.

APPENDIX

Horticultural Borehole Data and Photographs



Dunnes Drilling Services Ltd.

01/08/2006 14:38:01

Wells in Townland BALLYBOUGHAL With Depths (Mts) Between 0 And 9999999 And Yields (GPH) between 0 And 9999999

	Log No	Date	Customer	County	Townland	Yield GPH	Depth M	Steel Casing	PVC Casing	Diameter	Depth to rock
1	1962	25/05/2000	Bergin Tim	DUBLIN	BALLYBOUGHAL	25000 ✓	115.82	12.19	0	200	7.62
			Ballyboughal Swords Co. Dublin								
2	2371	24/11/2000	Farmvale	DUBLIN	BALLYBOUGHAL	500	121.92	92.97	0	150	21.37
			Skidoo Farm Yard Ballyboughal Co. Dublin Aidan Ryan (builder)								
			50-80gph at 304ft. Perforate 6" steel lining - 500gph								
3	2718	23/05/2002	Garrigan David	DUBLIN	BALLYBOUGHAL	2500	137.16	24.38	137.16	150	21.34
			Baldurgan house Ballyboughal Co Dublin								
			Water at - 270, 410 - 450ft in broken parts. Chlorine								
4	3584	12/05/2006	Weldon Brian	DUBLIN	BALLYBOUGHAL	1200	121.92	37.49	0	200	30.48
			Ballyboughall Co Dublin								
			Water at 150 & 200ft								
5	4556	25/06/2003	Donovan Gerry	DUBLIN	BALLYBOUGHAL	1460	85.34	6.1	85.34	150	3.66
			Ballyboughal Co Dublin								
			Install rubber seal on PVC at 25ft. 1 Bag bentonite grout + 1 gallon chlorine								
6	4613	11/09/2003	Hoey Gabriel	DUBLIN	BALLYBOUGHAL	1500	54.86	53.03	54.86	150	0
			Ballyboughal Co. Dublin								
			174ft of 8" & 14ft of 12". Chlorine								
7	4810	02/06/2004	Garrigan David	DUBLIN	BALLYBOUGHAL	1500	146.3	24.38	0	150	12.19
			Baldugan House Ballyboughal Co Dublin								
			No PVC Installed. 1 Bag Bentonite installed								
8	4991	13/12/2004	Kerrigan Thomas	DUBLIN	BALLYBOUGHAL	10000 ✓	109.73	67.06	76.2	200	0
			Johnstown Ballyboughal Co Dublin								
			1 gallon of chlorine								
9	5359	16/08/2005	Donovan Gerry	DUBLIN	BALLYBOUGHAL	400	76.2	30.48	76.2	150	22.86
			Ballyboughal Co Dublin								
			Water at 200 & 225ft. Bentonite pellets & chlorine installed								
10	2E+06	08/12/1994	Cooney Liam	DUBLIN	BALLYBOUGHAL	1000	45.72	29.26	35.05	150	0
			Annesbrook Ballyboughal Co. Dublin								
			Hit rock at 95ft. Lining very tight. Soft rock with good water.								

45,060

Dunnes Drilling Services Ltd.

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Wells in Townland LUSK With Depths (Mts) Between 0 And 9999999 And Yields (GPH) between 0 And 9999999

	Log No	Date	Customer	County	Townland	Yield GPH		Depth M	Steel Casing	PVC Casing	Diameter	Depth to rock
11	3120	26/06/2001	McGuinness Johnny	DUBLIN	LUSK	2500		121.92	15.85	121.92	200	14.02
			Loughshinney Lusk Co. Dublin									
			Water entry at 120 & 240ft. Rock broken 275ft no change in water rate									
12	3258	09/05/2002	Llywellyn David	DUBLIN	LUSK	1080		60.96	36.58	60.96	150	21.34
			Lusk									
13	3486	03/07/2003	Thorne Vincent	DUBLIN	LUSK	2000		109.73	6.1	109.73	150	3.05
			Man O War Lusk Co Dublin									
14			Water at 40 + 160ft - Bentonite + Chlorine installed									
	3563	14/02/2006	Carroll Produce	DUBLIN	LUSK	7000	✓	91.44	13.72	91.44	200	7.62
			The Green Lusk Co Dublin									
			Water at 80, 220 and 265ft. Grout in casing with bentonite pellets									
15	3601	23/03/2006	Thorne John	DUBLIN	LUSK	6000	✓	91.44	16.46	89.92	150	0
			Five Roads Lusk Co Dublin									
			PVC stopped at 295 ft. Bentonite & chlorine installed									
16	4742	30/08/2004	Country Crest	DUBLIN	LUSK	10000	✓	91.44	44.5	0	150	42.67
			Man of War Lusk Co Dublin									
			Water at 180ft - 3000gph. Water at 200ft - 5000 gph. Water at 270 - 290ft -									
17	5366	08/09/2005	Hartford Colin	DUBLIN	LUSK	2000		68.58	56.39	68.58	150	30.48
			Rathmoney Lusk Co Dublin									
			Well No 2 - Rock very soft and broken. Water at 200 & 210ft. Chlorine									
18	87300	01/01/1989	Marion Nurseries	DUBLIN	LUSK	7000	✓	48.76	10.36	48.76	0	0
			Laddy Dejong Newhaggard Lusk Co. Dublin									
19	125400	18/07/1995	Butterley Niall	DUBLIN	LUSK	6500	✓	103.5	12	103.5	200	0
			Lusk Co. Dublin									
20	128100	31/08/1995	Hoey Michael Coun	DUBLIN	LUSK	20000	✓	91.5	44.2	91.5	200	0
			Man of War Lusk Co. Dublin									
			Rock very broken									

64080

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Wells in Townland LUSK With Depths (Mts) Between 0 And 9999999 And Yields (GPH) between 0 And 9999999

	Log No	Date	Customer	County	Townland	Yield GPH	Depth M	Steel Casing	PVC Casing	Diameter	Depth to rock
21	130400	08/09/1994	Leonard Thomas The Five Roads Lusk Co. Dublin Water at 100ft	DUBLIN	LUSK	1800	36.58	6.7	36.58	125	0
22	198600	18/01/1995	McLoughlan John Lusk co. dublin Water at 130ft.	DUBLIN	LUSK	500	47.5	24.38	47.2	150	0

2300.

85

Dunnes Drilling Services Ltd.

01/08/2006 16:43:53

Wells in Townland RUSH With Depths (Mts) Between 0 And 9999999 And Yields (GPH) between 0 And 9999999

	Log No	Date	Customer	County	Townland	Yield GPH	Depth M	Steel Casing	PVC Casing	Diameter	Depth to rock
23	1449	16/12/1998	Monks Colm Rush Co. Dublin	DUBLIN	RUSH	200	73.15	30.5	73.15	150	24.3
24	1573	22/03/1999	Water at 210 to 230ft. Archer Camelis Rush Co. Dublin	DUBLIN	RUSH	900	115.8	17	0	150	15.2
25	1922	20/10/1999	Water at 200ft 300gph. Nugent Joe The Avenue Palmer Road Rush Co. Dublin	DUBLIN	RUSH	1000	54.86	36.58	54.86	150	21.34
26	1963	29/05/2000	1 bag bentontie, 1 gallon chlorine. Install 7ft of 10" starter pipe. Pull 7ft Farrell Adrian Rush Co. Dublin	DUBLIN	RUSH	200	42.67	22.86	42.67	150	15.29
27	2077	12/07/2000	First water at 90ft. 1 bag of bentonite, chlorine Fagan Paudge Loughshinney Rush Co. Dublin	DUBLIN	RUSH	10000	106.68	18.29	106.68	200	15.24
28	2887	17/01/2003	Hit water at 80ft & 150ft. Hit main water at 230ft and 310ft. Flynn Martin Kemure Park Old Road Rush Co. Dublin	DUBLIN	RUSH	1800	137.16	362	0	150	0
29	3047	02/11/2000	29ft of 12"; 154ft of 8"; 180ft of 6" casing. Water at 260ft and 360ft and OHare Paul Kenure Park Rush Co. Dublin	DUBLIN	RUSH	2000	48.77	44.19	44.2	150	0
30	3110	01/06/2001	Install 35ft of 8" starter pipe. Pull 20ft of 8" starter pipe. Chlorine Ruirok Michael Rush Co. Dublin	DUBLIN	RUSH	2000	9144	51.82	91.44	150	48.76
31	3383	19/02/2004	Chlorine Corr Liam Corrs Lane Rush Co Dublin	DUBLIN	RUSH	2000	36.58	30.48	36.58	150	15.24
32	5223	20/05/2005	1 gal of chlorine installed Flynn Martin Hayestown Rush Co Dublin	DUBLIN	RUSH	4000	39.62	36.58	36.58	200	18.29

24,100.

Dunnes Drilling Services Ltd.

01/08/2006 16:43:53

Wells in Townland RUSH With Depths (Mts) Between 0 And 9999999 And Yields (GPH) between 0 And 9999999

	Log No	Date	Customer	County	Townland	Yield GPH	Depth M	Steel Casing	PVC Casing	Diameter	Depth to rock
33	5354	05/08/2005	Gilmartin Mark	DUBLIN	RUSH	1000	76.2	24.38	76.2	150	6.1
			Kemure Park Rush Co Dublin								
			Bentonite & chlorine installed								
34	42200	01/01/1986	Archer Nick	DUBLIN	RUSH	1200	54.86	0	0	0	0
			Rush Co. Dublin								
35	76500	01/01/1988	Ryan Luke	DUBLIN	RUSH	3000	60.96	7.62	60.96	0	0
			Rush Co. Dublin								
36	117100	19/05/1995	Weldon Jackie	DUBLIN	RUSH	2100	91.5	16	91.5	200	9
			Lower Church Road Rush Co. Dublin								
37	166000	26/10/1995	Flynn Paul	DUBLIN	RUSH	2500	103.6	0	103.6	200	0
			Rush Co. Dublin								
			Deepened well 80ft to 340ft								
38	169400	18/06/1996	Langan David	DUBLIN	RUSH	4000	97.53	11.58	97.53	200	0
			Chanel road Rush co. dublin								
			Soft broken black rock								
39	169500	20/06/1996	Hegarty Joan	DUBLIN	RUSH	3000	47.24	37.18	47.24	150	0
			Rush Co. Dublin								
			Pump should not be lower than 129ft to avoid lifting sand.								
40	183500	13/10/1993	Kelly Mickey	DUBLIN	RUSH	300	106.68	8.53	0	200	0
			Golf road Rush Co. Dublin 1st well								
			water at 200ft to 225ft								
41	183600	14/10/1993	Kelly Mickey	DUBLIN	RUSH	350	83.82	7.67	0	200	0
			Golf Road Rush Co. Dublin 2nd Well								
			not enough water in well								
42	187500	22/03/1994	Thorne Vincent	DUBLIN	RUSH	400	91.44	12.19	0	200	0
			Rush Co. Dublin No. 1								
43	187600	23/03/1994	Thorne Vincent	DUBLIN	RUSH	200	66.58	11.58	0	200	0
			Rush Co. Dublin 2nd Well								

18050

Dunnes Drilling Services Ltd.

01/08/2006 16:43:53

Wells in Townland RUSH With Depths (Mts) Between 0 And 9999999 And Yields (GPH) between 0 And 9999999

44

Log No	Date	Customer	County	Townland	Yield GPH	Depth M	Steel Casing	PVC Casing	Diameter	Depth to rock
240000	20/10/1992	Thorne Matt Rush Co. Dublin	DUBLIN	RUSH	2000	115.82	12.19	115.82	150	0

2000.

44153
Rush.

Dunnes Drilling Services Ltd.

01/08/2006 16:40:32

Wells in Townland rathmooney With Depths (Mts) Between 0 And 9999999 And Yields (GPH) between 0 And 9999999

45

Log No	Date	Customer	County	Townland	Yield GPH	Depth M	Steel Casing	PVC Casing	Diameter	Depth to rock
5365	06/09/2005	Hartford Colin	DUBLIN	RATHMOONEY	200	76.2	42.67	76.2	150	30.48

Balough Lusk Co Dublin

Well No 1 - Water at 205 & 225ft - Chlorine installed

Dunnes Drilling Services Ltd.

01/08/2006 16:43:27

Wells in Townland LOUGHSHINNEY With Depths (Mts) Between 0 And 9999999 And Yields (GPH) between 0 And 9999999

	Log No	Date	Customer	County	Townland	Yield GPH	Depth M	Steel Casing	PVC Casing	Diameter	Depth to rock
46	1303	19/02/1998	Butterley Patrick	DUBLIN	LOUGHSHINNEY	800	122	15.84	0		7.62
			Loughshinney Lusk Co. Dublin.								
			8" well. Water at 140 - 150ft 200gph 260 - 280ft 500 - 1,000gph								
47	3273	08/07/2002	Farmvale / Bobby Jo	DUBLIN	LOUGHSHINNEY	500	83.82	10.97	83.82	150	5.48
			Skerries Farm Loughshinney Co. Dublin								
			14ft of 8" and 22ft of 6".								

1300.

Dunnes Drilling Services Ltd.

01/08/2006 16:43:35

Wells in Townland LOUGHSHINNY With Depths (Mts) Between 0 And 9999999 And Yields (GPH) between 0 And 9999999

Log No	Date	Customer	County	Townland	Yield GPH	Depth M	Steel Casing	PVC Casing	Diameter	Depth to rock
182200	03/09/1993	Thorn Matt	DUBLIN	LOUGHSHINNY	10000	91.44	8.53	91.44	150	0

48

Washing Plant Loughshinny Co. Dublin

Dunnes Drilling Services Ltd.

01/08/2006 16:43:53

Wells in Townland RUSH With Depths (Mts) Between 0 And 9999999 And Yields (GPH) between 0 And 9999999

	Log No	Date	Customer	County	Townland	Yield GPH	Depth M	Steel Casing	PVC Casing	Diameter	Depth to rock
49	244	01/01/1984	Flynn Jim Rush Co. Dublin	DUBLIN	RUSH	1200	42.67	19.5	24.38	0	0
50	314	23/07/1996	Jones Christopher Rush Co. Dublin	DUBLIN	RUSH	3600 ✓	42.67	27.43	42.67	150	0
51	315	25/07/1996	Archibold james 56 Main Street Rush Co. Dublin	DUBLIN	RUSH	540	109.7	10.66	109.7	150	0
52	594	20/01/1997	Butterley William Haystown Rush Co. dublin Water at 100/180ft.	DUBLIN	RUSH	2000	61	10.97	61		0
53	595	21/01/1997	Butterley william Channel Road Rush Co. Dublin	DUBLIN	RUSH	1000	73.15	15.24	0		0
54	642	06/03/1997	water at 160 180ft. Water Salty Harford Noel Old Barrack Rd. Rush co. dublin	DUBLIN	RUSH	4000 ✓	61	54.25	0	150	0
55	643	12/03/1997	8" cassing 40ft 6" casing 60ft Slotted 6" casing Archer Camillus Old Barrack Rd. Rush Co. Dublin	DUBLIN	RUSH	6000 ✓	91.5	85.03	0	150	0
56	645	20/03/1997	56ft 200mm Casing. 279 ft 150mm casing. Morris Leonard Willobank South Shore Rd. Rush Co. Dublin	DUBLIN	RUSH	900	91.5	11.25	91.5	150	0
57	964	23/04/1996	200mm Casing 37ft. 6" casing 60ft. Farrell Dessie Rush Co. Dublin	DUBLIN	RUSH	1500	66.35	42.67	66.35	200	0
58	1409	17/07/1998	Weldon Jackie Lower Channell Road Rush Co.Dublin	DUBLIN	RUSH	2000	109.72	11.5	109.72	200	10
59	1448	11/12/1998	Butterley Liam Rush Co. Dublin Water at 220/295 and 318ft.	DUBLIN	RUSH	2000	42.67	12.8	42.67	150	11

24740

Well	Name	Townland	Capacity	Notes
60	WAVIN	BALBRIGGAN	N/K	INDUSTRIAL
61	P J JONES	RUSH	6000 GPH	
62	BOG OF RING	RING COMMONS	33000	PUBLIC
63	N BUTTERLY	LUSK	6500	
64	S DENNIGAN	OLDTOWN	10000	PROCESSOR
65	M FLYNN	NAUL	5000	
66	T MOORE	BALLOUGH	10000	PROCESSOR
67	J ROONEY	LOUGHSHINNY	N/K	ARTESIAN
68	EIS	NEVITT	4000	TEST WELL
69	EIS	NEVITT	6000	"
70	EIS	NEVITT	3100	"
71	EIS	NEVITT	N/K	ARTESIAN
72	EIS	NEVITT	N/K	"
73	EIS	NEVITT	N/K	"
74	J LANDY	CORDUFF	2000	
75	P KEOGH	OLDTOWN	10000	
76	S MC'CUSKER	OLDTOWN	6000	ARTESIAN
77	T BRODERICK	TOOMAN	1000	ARTESIAN
78	J MURRAY	BALLYMAGUIRE	6000	TWO WELLS
79	J ARCHBOLD	BALLOUGH	N/K	
80	P WHITE	BALLOUGH	N/K	
81	T DOCKRELL	WIMBLETOWN	N/K	
82	M HOEY	BALLYMAGUIRE	4500	3RD WELL
83	N/K	PARNELLSTOWN	N/K	
84	PRISON	OBERSTOWN	N/K	
85	ROGERS	BALLYBOUGHILL	N/K	POTATOES
86	D MCNALLY	KENURE	3000	
87	C CARRICK	KENURE	5000	
88	O'CONNOR	FIVE ROADS	N/K	
89	F FARREN	RUSH	2000	
90	B HAYES	KENURE	4500	
92	M MCCANN	KENURE	4000	
93	J MCGUINNESS	SUNDRIVE	6000	
94	P MCGUINNESS	HEYESTOWN	1500	
95	P CARRICK	"	6000	
96	MCNAMARA	"	6000	
97	M MCGUINNESS	"	5000	
98	M MCGUINNESS	"	6000	
99	T BUTTERLEY	CHANNEL	1800	
100	N LEONARD	HEYESTOWN	6000	
101	P FARREN	SUNDRIVE	3500	
102	K CARRICK	SHORE	2000	
103	M FOLEY	KENURE	8000	
104	L ARCHER	RUSH	2500	

105	P KERRIGAN	RUSH	500	
106	J FARRELL	HEYESTOWN	3000	
107	J FARRELL	WHITESTOWN	6000	
108	J BUTTERLEY	LUSK	4000	
109	J BUTTERLEY	LUSK	6000	
110	B LEONARD	LUSK	I500	
111	P BUTTERLEY	LUSK	2800	
112	C JONES	LUSK	8000	
113	F RUIGROK	LUSK	2000	
114	P RUIGROK	LUSK	2000	
115	J FARRELL	DRUMANAGH	2000	
116	B JONES	CAIRN HILL	1500	
117	N ARCHER	HEYESTOWN	2000	
118	M BUTTERLEY	WBD LUSK	1500	
119	D MCNALLY	LUSK	3000	
120	N LEONARD	LUSK	3500	
121	B LEONARD	SKERRIES	2000	
122	D BOYLAN	SKERRIES	2000	
123	J FYNNES	RUSH	3000	
124	N LEONARD	HEYESTOWN	3000	
125	ROONEYS	OBERSTOWN	1000	
126	ESSO	LUSK	1800	
127	R ROONEY	ROLESTOWN	1000	
128	N REILLY	BALDRUMMAN	N/K	FARMER
129	P JENKINSON	JOHNSTOWN	N/K	GREENHOUSES
130	J BYRNE	GRACEDIEU	N/K	FARMER
131	M TULLY	RICHARDSTOWN	N/K	HORTICULTURE
132	D ROGERS	CHAIRMAN IFA	N/K	POTATOES

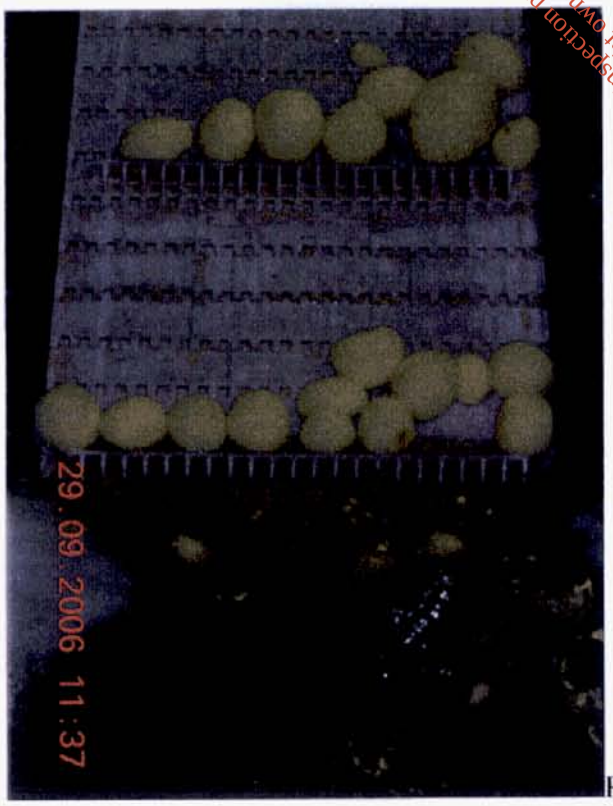
Potatoes being washed in well water, Country Crest, Rathmooney.

Leeks being washed in well water, Kerrigans, Annsbrook.

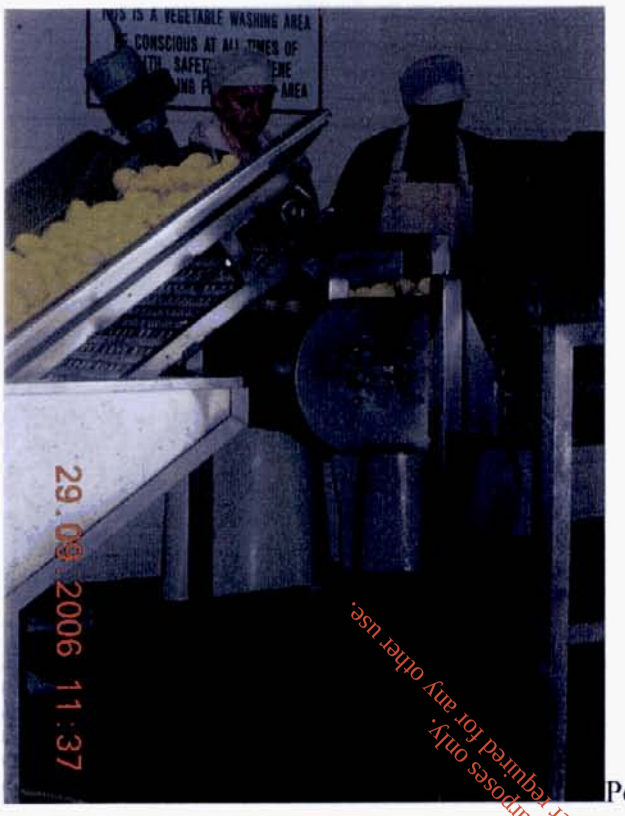
Celery, washed and ready for the Market, Landys, Corduff

Potato crates, Country Crest, Rathmooney.

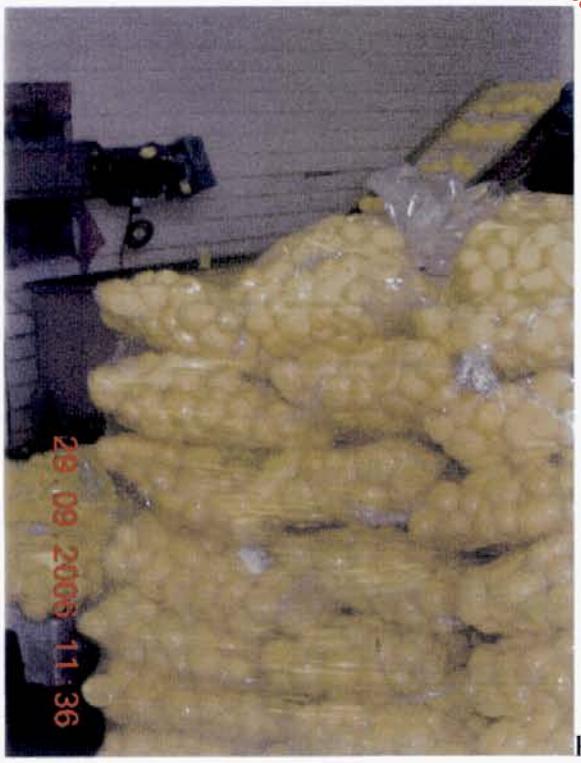
Potatoes being peeled at Moores, Ballough



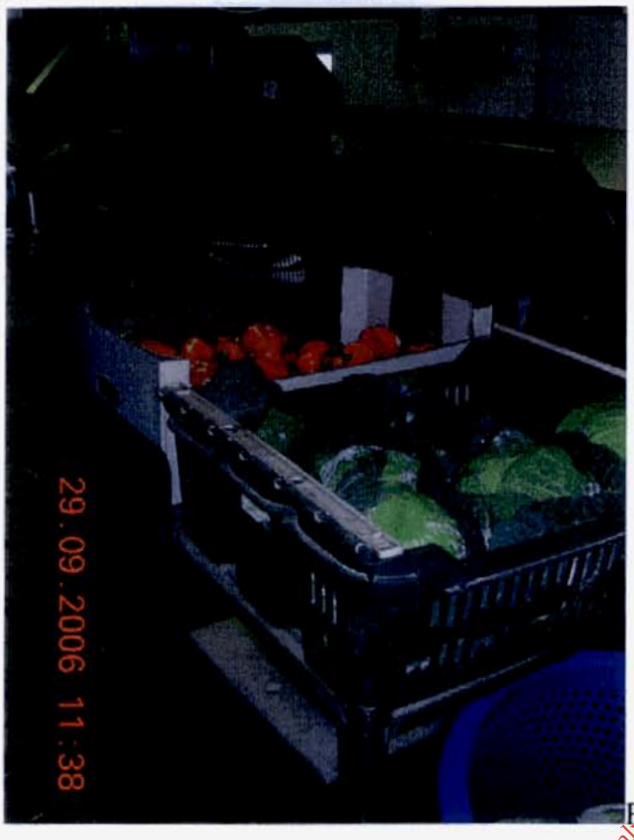
Potatoes being washed Moores, Ballough.



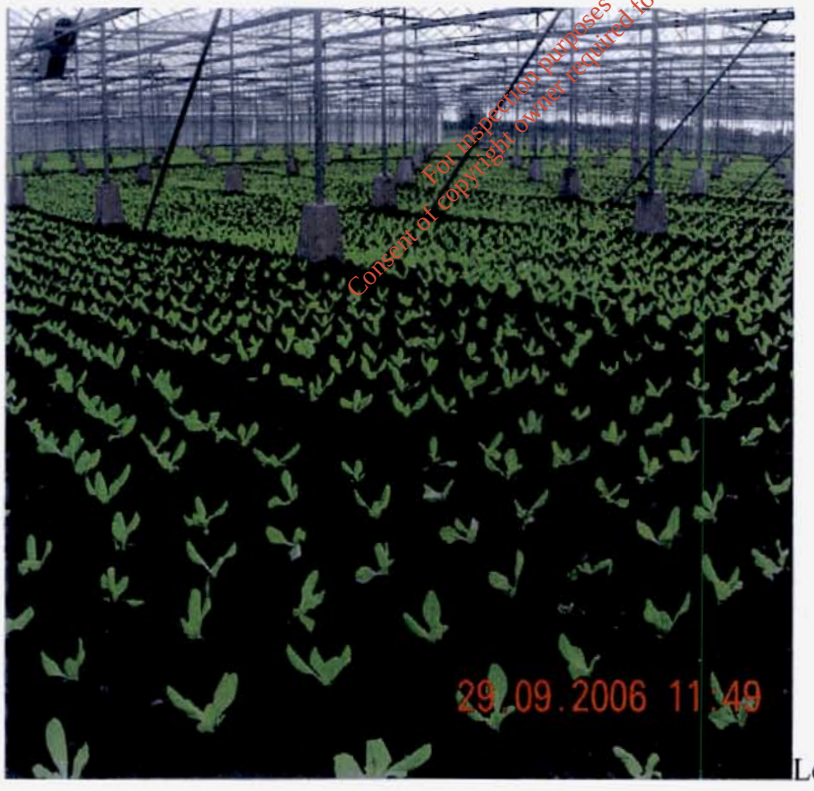
Potatoes being sorted, Moores, Ballough.



Potatoes ready for delivery. Moores, Ballough



Produce ready for the Market, Moores, Ballough.



Lettuce, Landys, Corduff.

Carrots being washed in well water, Kerrigans, Annsbrook.

Carrots being washed and prepared, Kerrigans, Annsbrook.

Cabbage growing at Landys, Corduff.

New store being built at Country Crest, Rathmooney.