

## **I.5 Ground and/or groundwater contamination**

### **I.5.1 Ground Contamination**

It is envisaged that the inert materials used for the restoration of the site will not cause a pollution risk to the ground/groundwater in the area of the site.

Dr. Robert T. Meehan, Consultant Geologist was commissioned to undertake a detailed ground investigation study of the land at Thornberry. This report provides a description of the geological character of the already-infilled subsoils on the site. Trial pits and a visual assessment of the site were completed in the field.

A copy of this report is included as Attachment I.5.1). Trial pit locations are highlighted in the Attached Figure I 5.1 - Soil Investigation Plan.

The lands have been progressively restored subject to successive Waste Management Permits dating back to 2001. Trial pits were excavated to depths ranging from 2.6m to 3.3m below ground level. The imported subsoil material across the site is relatively consistent. In general the overall amount of inert construction and demolition waste within on-site is very small and the material has been well emplaced and well separated and sorted. In an overall sense, the amount of construction and demolition material is estimated as less than 10% over much of the facility. Much of this material is close to the surface, and it is proposed that this material is recovered for use for construction of haul roads and for secondary aggregates. These measures should result in a reduction of the overall percentage of construction and demolition material within the site to less than 5%.

The main emphasis with respect to water management is on prevention to ensure that the proposed development will have no effect on the groundwater table.

## **Attachment I.5.1.1**

### **ASSESSMENT OF FILLED SUBSOILS FOR WASTE LICENCE APPLICATION AT THORNBERRY, COUNTY KILDARE**

**Dr. Robert T. Meehan, Consultant Geologist**

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**ASSESSMENT OF FILLED SUBSOILS FOR WASTE LICENCE APPLICATION  
AT  
THORNBERRY, KILL, COUNTY KILDARE**

**FINAL REPORT**

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Prepared for:  
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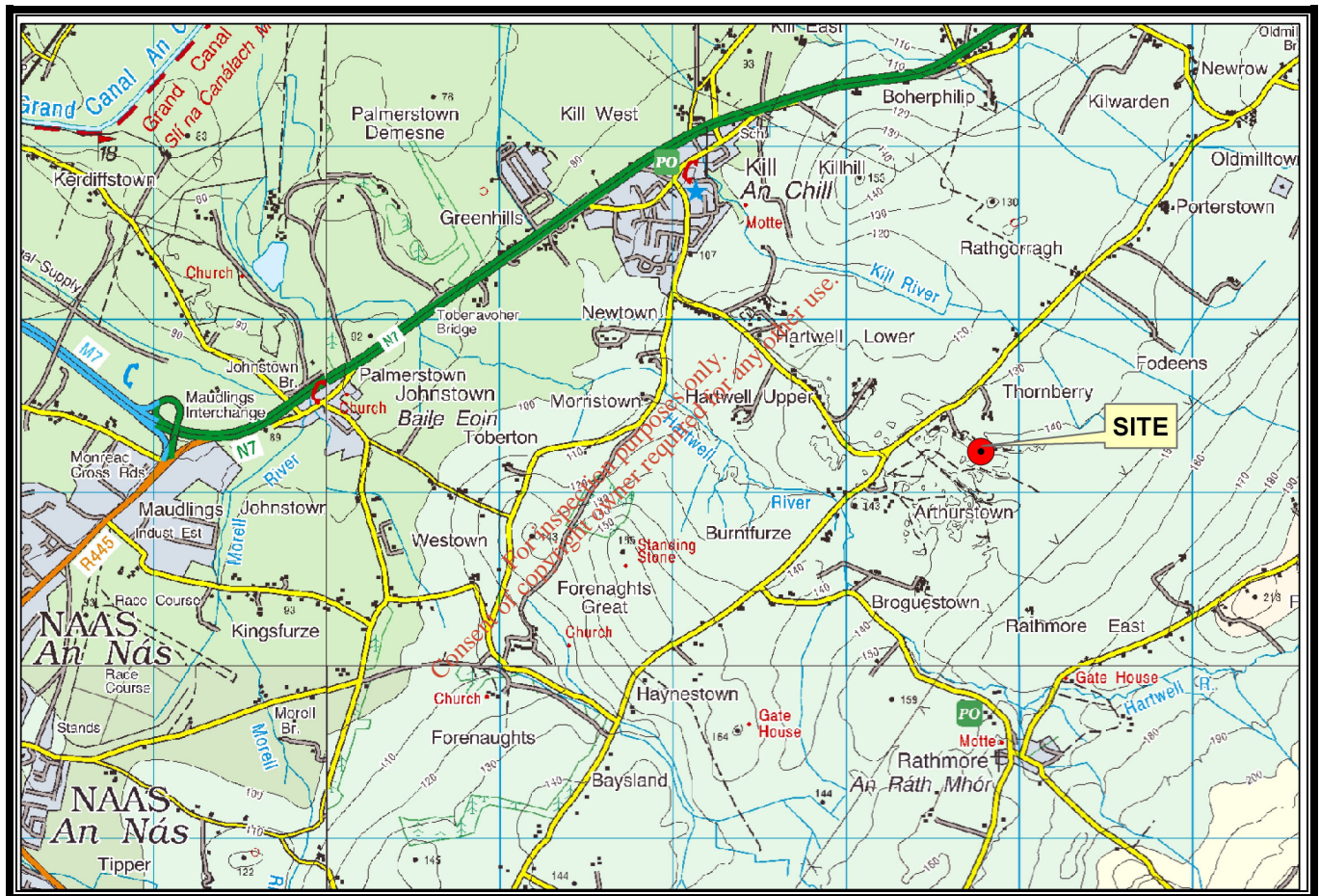
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<b>Project No.:</b>	17004
<b>Report Title:</b>	Assessment of filled subsoils for Waste Licence Application at Thornberry, Kill, County Kildare
<b>Report Status:</b>	FINAL
<b>Date:</b>	10/02/2009
<b>Prepared by:</b>	 _____ Dr. Robert Meehan

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## 1.0 INTRODUCTION

EurGeol. Dr. Robert Meehan, PGeo. was retained by John Sheils Planning and Environmental Limited on behalf of Tom Gavin to undertake an assessment of infilled subsoils as part of an application for a Waste Licence for the Land Restoration of a Sand and Gravel Pit at Thornberry Townland, Kill, Co. Kildare (NGR 296095-221287). The site is located approximately 2.1 km southeast of the village of Kill at an elevation of approximately 135-150m AOD and is approached by a third class road (Figure 1). The closest surface watercourse as seen on the Discovery Series Map is an unnamed stream c. 150m to the northeast of the site. A full set of site location maps and drawings of the layout of the development are contained in the accompanying waste licence application.



**Figure 1** Location of site at Thornberry, Kill, illustrating surrounding topography and surface water stream and river features (OS Licence EN 0057908).

This report provides a description of the geological character of the already-infilled subsoils on the site and details the nature, extent and complexity of the geological material from the surface downwards through this mineral subsoil. Trial pits and a visual assessment of the site were completed in the field.

## 2.0 SUBSOIL STRATIGRAPHY

Initially, a walk-over survey was conducted across the entire site to examine the ground conditions and salient features on-site. The site comprises an existing, operational sand and gravel pit in its' western portion and a recently-filled, worked-out sand and gravel pit area at the east. Within the old pit, 2 no. distinct fill areas, oriented north-south, have been created.

From the walkover survey, sites were selected for excavation and 10 no. trenches were excavated:

- 1 no. in the easternmost fill area, which is vegetated with grass cover;
- 4 no. in the central fill area, part-vegetated at the north and bare at the south, and;
- 5 no. in the westernmost, and largest, recently-filled portion of the site.

As well as this, 8 no. sections from the faces around the edge of the filled areas were also logged.

These intrusive site investigations, comprising trial pitting, profile logging and walkover survey, were therefore carried out by Robert Meehan in association with John Sheils Planning and Environmental Ltd. at the subject site on 26<sup>th</sup> January 2009. Trenches were dug using a Komatsu PC 340 LC Track Excavator. Based on the materials logged from the 10 no. trial pits dug within the site, the imported subsoil material across the site is relatively consistent, with the eastern portion of the site being dominated by re-laid topsoil from the existing gravel pit. This will be used to veneer the entire area when backfilling is complete.

The trial pits were excavated to depths ranging from 2.6m to 3.3m below ground level. The profiles logged from the faces were logged in the cleanest areas along relatively evenly-spaced intervals.

The pits allow a detailed investigation into the class and quality of the subsoils under the site. The geological logs showing descriptions of the subsoils encountered in the pits are presented in Appendix A. All subsoils encountered were described in accordance with the British Standards Institution Code of Practice for Site Investigations (BS 5930, 1999) which gives a geotechnical classification of the materials encountered, in particular bulk density, structure and textural characteristics. Bulk samples were collected and retained for analysis from both topsoil and subsoil in each pit, should it be required. A summary of the conditions encountered under each of the areas on-site follows.

### 2.1. Cluster 1: eastern fill area.

The eastern fill area forms part of a high ridge feature. 1 no. trial pit was excavated in the southernmost, highest zone. As well as this, a profile was logged from an already excavated face in its northern zone.

Both sections showed very deep topsoil, with subsoil visible at the base of the profile to the north only. The uppermost topsoil encountered in these faces was dark yellowish brown to dark brown, sandy loam to loam, and was up to 0.41m deep. This was compact to very soft and was generally of crumb

structure, with abundant roots and rootlets. This material is of good quality and promotes adequate grass growth.

Within both profiles, the lower units of filled topsoil was recorded as being dominated by unmottled loam, silty SAND or sandy SILT, and was very soft to soft in bulk density (as per BS5930, 1999). Pockets and pods of silty SAND also occur within this material. This material has been stripped from just below the surface within the main gravel pit area further west, and has been stockpiled for use in the final veneering of the pit when reclamation is complete.

At the base of the profile to the north of this area, massive, very dark greyish brown sandy SILT/CLAY subsoil was seen. No construction and demolition material was seen in this eastern fill area.

Neither bedrock nor groundwater was met in either profile.

## 2.2. Cluster 2: central fill area.

4 no. trial pits were excavated in the central fill area, through its central axis. This area is vegetated in its' northern half (where 2 no. pit were dug), but forms rough, bare ground in its' southern portion (again, where 2 no. pits were dug). The fill forms a high, narrow ridge topographically.

No side profiles were logged along this ridge, as the sides were either heavily vegetated or covered in rubble which obscured the filled subsoil.

The topsoil encountered in the northernmost 2 no. pits was black to very dark greyish brown, organic loam to loam material which was up to 0.71m deep. The topsoil in this northern area was uncompact to very soft and well aerated, being of crumb to subangular blocky structure.

Within these trial pits, the subsoil showed 2 no. layers, being comprised of a deep topsoil fill to 1.84m-2.42m depth, which is very soft to soft gravelly sandy SILT. The lowermost subsoil unit comprised CLAY with gravels or gravelly sandy SILT/CLAY material, which was massive to subangular blocky and stiff to hard. This material has pieces of concrete (<5% of all material) and occasional cavities within.

In the southern portion of this central fill area, virtually no topsoil has been spread across the imported material. The subsoil comprises alternating layers of gravelly sandy SILT and sandy clayey GRAVEL, with much concrete, sack cloth, plastic ties and plastic bags (but still at <10% of all material). Cobbles and boulders are common. The material is organised in layers owing to its emplacement as horizontal 'lifts' of fill. The material is variable firm to very stiff, and is generally very dark greyish brown with pockets of bluish grey.

No groundwater was seen in any of the trial holes excavated into this central fill area. Bedrock was not met in any of the pits either.

### 2.3. Cluster 3: western fill area.

5 no. trial pits were excavated in the western fill area, which has only recently been filled and is the largest of the filled areas on-site. This forms a gently sloping plateau area topographically, with bare ground cover. As well as this, 7 no. profiles were logged from around the edges of this area.

Topsoil was only encountered in 1 no. of these pits (no. 7). This extended to 1.02m depth and was very soft to soft, massive, dark yellowish brown, gravelly silty SAND.

The subsoil here comprised alternating layers of compacted, filled subsoil material. The material in the sides of the pits varied from being very soft to very stiff and was fissile owing to its' layering in 'lifts'. It was generally very dark greyish brown in colour, with some units of very dark grey and dark yellowish brown. The composition ranged from sandy SILT to gravelly sandy SILT/CLAY to gravelly silty SAND to SILT/CLAY with gravels.

Varying amounts of construction and demolition material were seen in these pits, with the cleanest material at the northernmost end. Pieces of concrete, blocks, bricks, branches, wire, plastic bags and pipes were all seen in various localities. Overall the fill is moderately clean (10%-15% construction and demolition material within), with all of the pockets of this inert

Wet bases were seen in 3 no. of the holes, with the southernmost 2 no. holes being dry. Bedrock was not met in any of the pits.

#### **2.3.1 Profiles around the edge of the main, western fill area.**

7 no. profiles were logged from around the edge of the high fill area.

Topsoil was only seen as a localised smear at the northwestern edge of the pile.

The subsoil was in generally very dark greyish brown to very dark brown to dark yellowish brown, and was unmottled gravelly silty SAND, gravelly sandy SILT and gravelly sandy SILT/CLAY.

Fragments of construction and demolition material were commonly scattered across the profiles, comprised of pieces of tarmacadam, concrete, as well as concrete blocks, bricks, pieces of plastic bags and pipes, sackcloth and tiles. The material behind this (the filled subsoil) was however relatively clean along the entire length of the exposure (<5% construction and demolition material within). Some areas were partially revegetated which helped in stabilising the material.



### 3.0 SUMMARY AND CONCLUSIONS

An assessment of infilled subsoils as part of an application for a Waste Licence for the Land Restoration of a Sand and Gravel Pit at Thornberry, Kill, Co. Kildare, using walkover survey, visual assessment and trial pitting methods, allowed a description of the geological character of the already-infilled subsoils on the site be completed..

Trial pits were excavated to depths ranging from 2.6m to 3.3m below ground level. The imported subsoil material across the site is relatively consistent, with the eastern portion of the site being dominated by re-laid topsoil from the existing gravel pit which will be used to veneer the entire area when backfilling is complete.

In the central fill area, the subsoil in the northern half of the area showed 2 no. layers, being comprised of deep topsoil fill over CLAY-rich subsoil. This material had occasional pieces of concrete (<5% of all material) and occasional cavities within. In the southern portion of the area, virtually no topsoil has been spread across the imported material, and the subsoil comprised alternating subsoil layers, with concrete, sack cloth, plastic ties and plastic bags within. Overall, inert construction and demolition material still forms less than 10% of all material. The material is organised in layers owing to its emplacement as horizontal 'lifts' of fill.

Within the western fill area, topsoil was only encountered in 1 no. of the pits. The subsoil here comprised alternating layers of compacted fill and varying amounts of construction and demolition material were seen, with the cleanest of the material at the northernmost end. Pieces of concrete, blocks, bricks, branches, wire, plastic bags and pipes were all seen in various localities, with an overall percentage of construction and demolition material of c. 10%-15%. All material was inert.

Around the edges of this high fill area, fragments of construction and demolition material are commonly scattered across the face, comprised of pieces of tarmacadam, concrete, as well as concrete blocks, bricks, pieces of plastic bags and pipes, sackcloth and tiles. However, the material behind this (filled subsoil) was relatively clean along the entire length of the exposure (<5% construction and demolition material within) and some areas were partially revegetated which helped in stabilising the material.

In general the overall amount of waste on-site is very small and the material has been well emplaced and well separated and sorted. In an overall sense, the amount of construction and demolition material is estimated as less than 10% over much of the facility. Much of this material is close to the surface, and it is proposed that this material is recovered for use for construction of haul roads and for secondary aggregates. These measures should result in a reduction of the overall percentage of construction and demolition material within the site to less than 5%.

**NOTES:**

Neither the whole nor any part of this report or any reference thereto may be included in any document, circular or submission, without our prior written consent as to the form and context in which it appears. This report is for the use solely of the party to whom it is addressed and no responsibility is accepted to any third party.

All information supplied by the Client, the Client's staff and professional advisers, local authorities, other statutory bodies, investigation agencies and other stated sources is accepted as being correct unless otherwise specified.

This report is not a design specification for surface water or foul water drainage systems and as such should not be used as one.

All data and methods of analysis presented are, to the best of my knowledge, valid at the time of report generation.

Areas presented, off site distances and elevations are generally computed from Ordnance Survey maps and not from physical surveys. They are approximate unless otherwise stated.

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## REFERENCES

British Standards, BS5930 (1999). Code of Practice for Site Investigations.

Teagasc, 2006. Digital soil map of County Kildare. Prepared as part of the EPA Soil and Subsoil Mapping Project, Teagasc, Kinsealy, Dublin.

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# Appendix A

## Trial pit logs

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# TRIAL PIT RECORD TP1

Project: Waste Licence Application at Thornberry

Site: Thornberry  
 Client: John Sheils Planning/Env. Ltd.  
 Project No.: 17/004

Method and Equipment: Komatsu PC 340 LC Track Excavator

Logged by: R. Meehan




Date: 26/1/2009

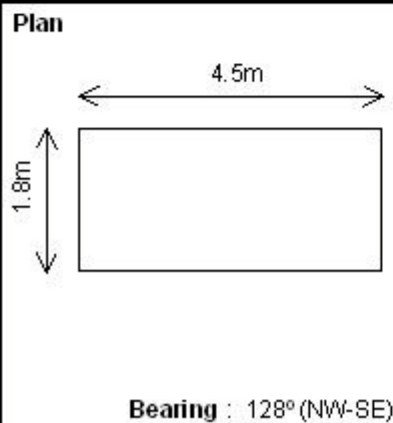
Easting: 296 164

Northing: 22 12 10

All dimensions on this sheet are in metres unless otherwise stated

Grid level IOD: 147.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5							TOPSOIL 'A' horizon: very soft, crumb to subangular blocky, black (2/1, 10YR) organic loam with abundant grass roots and rootlets.	
0.61-0.71				146.3				
1.0							'B' horizon (SUBSOIL): very soft, subangular blocky, dark yellowish brown (3/4 10YR) gravelly sandy SILT with occasional roots and rootlets to 1.3m depth.	
1.5							Subsoil is unmottled.	
1.84-1.96				145.2				
2.0							'C' horizon (SUBSOIL): stiff, massive (yet fissile owing to layering from 'lifts'), <b>unmottled</b> very dark greyish brown (3/2, 10YR) gravelly sandy SILT/CLAY with occasional pieces of concrete and cavities up to 0.2m across.	
2.5								
2.6				144.4				
3.0							<b>Trial pit completed at 2.6m on very dark greyish brown, massive, stiff to very stiff boulder clay 'fill'.</b>	
3.5								
4.0								
4.5								
5.0								



**Stability :**  
 Trial pit walls consolidated, but upper material prone to collapse. Subsoil material very competent.

**General remarks :**  
 Dug in central portion of the central fill area, into a dry, grass-covered pile. Dug on a 33° slope, falling southeastwards.

**Groundwater :**  
 Dry.

**Sequence summary :**  
 Well drained, deep, 'filled' topsoil over filled boulder clay, 'lifted' on-site.

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**Plate A1: Profile of deep, imported topsoil overlying subsoil in trial hole no. 1. See the absence of construction and demolition material from the profile and the well aerated nature of the material, with no groundwater seepages throughout the sequence.**

# TRIAL PIT RECORD TP2

Site: Thornberry  
 Client: John Sheils Planning/Erw. Ltd.  
 Project No.: 17/004

Project: Waste Licence Application at Thornberry

Method and Equipment: Komatsu PC 340 LC Track Excavator

Logged by: R. Meehan







Date: 26/01/2009

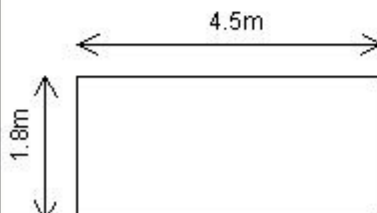
Easting: 296209

Northing: 221258

All dimensions on this sheet are in metric unless otherwise stated

Ground level IOD: 147.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.35-0.42 0.5						146.6	TOPSOIL/A' horizon: uncompact to compact, crumb, very dark greyish brown (3/2, 10 YR) loam with abundant grass roots and rootlets.	
1.0							'B' horizon (SUBSOIL): very soft to soft, massive (yet fissile owing to layering from 'lifts'), <b>mottled</b> very dark greyish brown (3/2, 10YR) and dark yellowish brown (4/4, 10YR) and dark brown (3/3, 10YR) gravelly sandy SILT.	
1.5								
2.0								
2.1-2.42						144.8	'C' horizon (SUBSOIL): very stiff to hard, massive (yet fissile owing to layering from 'lifts'), unmottled very dark grey (3/1, 10 YR) CLAY with gravels and occasional cobbles and pieces of concrete, and pockets of sandy GRAVEL up to 0.3m across.	
2.5								
2.6						144.4	<b>Trial pit completed at 2.6m on very dark grey, massive, very stiff to hard boulder clay 'fill'.</b>	
3.0								
3.5								
4.0								
4.5								
5.0								

<p><b>Plan</b></p>  <p><b>Bearing</b> : 135° (NW-SE)</p>	<p><b>Stability :</b></p> <p>Trial pit walls consolidated, but upper material prone to collapse. Subsoil material very competent.</p>	
	<p><b>General remarks :</b></p> <p>Dug in northern portion of the central fill area, into a dry, grass-covered pile. Dug on a 33° slope, falling eastwards.</p>	
	<table border="1"> <tr> <td> <p><b>Groundwater :</b></p> <p>Dry.</p> </td> <td> <p><b>Sequence summary:</b></p> <p>Well drained, deep, 'filled' topsoil over filled boulder clay, 'lifted' on-site.</p> </td> </tr> </table>	<p><b>Groundwater :</b></p> <p>Dry.</p>
<p><b>Groundwater :</b></p> <p>Dry.</p>	<p><b>Sequence summary:</b></p> <p>Well drained, deep, 'filled' topsoil over filled boulder clay, 'lifted' on-site.</p>	





**Plate A2: Profile of deep, imported topsoil overlying subsoil in trial hole no. 2. See the absence of construction and demolition material from the profile and the well aerated nature of the material, again with no groundwater seepages throughout the sequence.**

# TRIAL PIT RECORD TP3



Project: Waste Licence Application at Thornberry

Site: Thornberry  
 Client: John Sheils Planning/Env. Ltd.  
 Project No.: 17/004

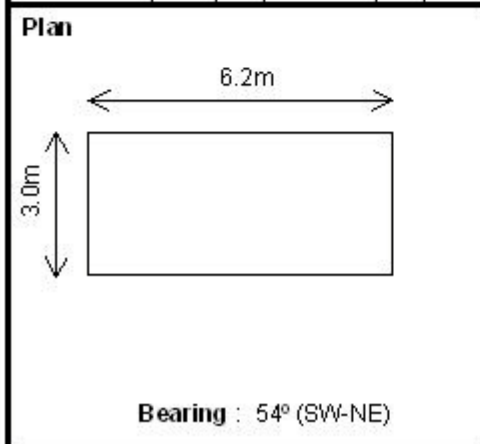
Method and Equipment: Komatsu PC 340 LC Track Excavator  
 Logged by: R. Meehan Date: 26/01/2009  
 Easting: 296164 Northing: 221074

All dimensions on this sheet are in metric unless otherwise stated.

Ground level LOD: 152.5m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details		
Depth taken	Type	No			O.D. Level	Legend	Depth
0.15-0.2					152.3		TOPSOIL 'A' horizon: compact, crumb, dark brown (S.S. 10YR) sandy loam and SAND with abundant grass roots and rootlets.
0.5							
1.0							'C' horizon (SUBSOIL): very soft, granular, dark brown (3/3 10YR) silty SAND with occasional roots and rootlets to 1.0m depth.
1.5							Subsoil is unmottled.
2.0							Clusters of buried topsoil sod.
2.5							
3.0							
3.3					149.2		Trial pit completed at 3.3m on dark brown, granular, very soft, silty SAND 'fill'.
3.5							
4.0							
4.5							
5.0							

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**Stability :**  
 Trial pit walls relatively consolidated, but material prone to collapse.

**General remarks :**  
 Dug in southeastern, highest portion of the site, into the southern portion of the eastern fill area (a dry, grass- covered pile. Dug in a flat plateau area on a ridge summit.

**Groundwater :**  
 Dry.

**Sequence summary:**  
 Well drained, deep, 'filled' silty SAND topsoil and subsoil.



**Plate A3: Profile of imported silty SAND topsoil and subsoil in trial hole no. 3. This is well drained topsoil taken from the adjacent gravel pit, with virtually no construction and demolition material within.**

# TRIAL PIT RECORD TP4

Project: Waste Licence Application at Thornberry

Site: Thornberry  
 Client: John Sheils Planning/Env. Ltd.  
 Project No.: 17/004

Method and Equipment: Komatsu PC 340 LC Track Excavator

Logged by: R. Meehan


Date: 26/01/2009

Easting: 296140

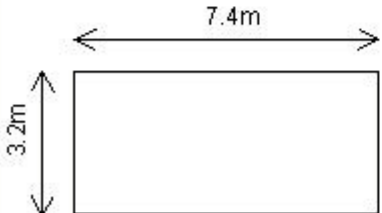
Northing: 221155

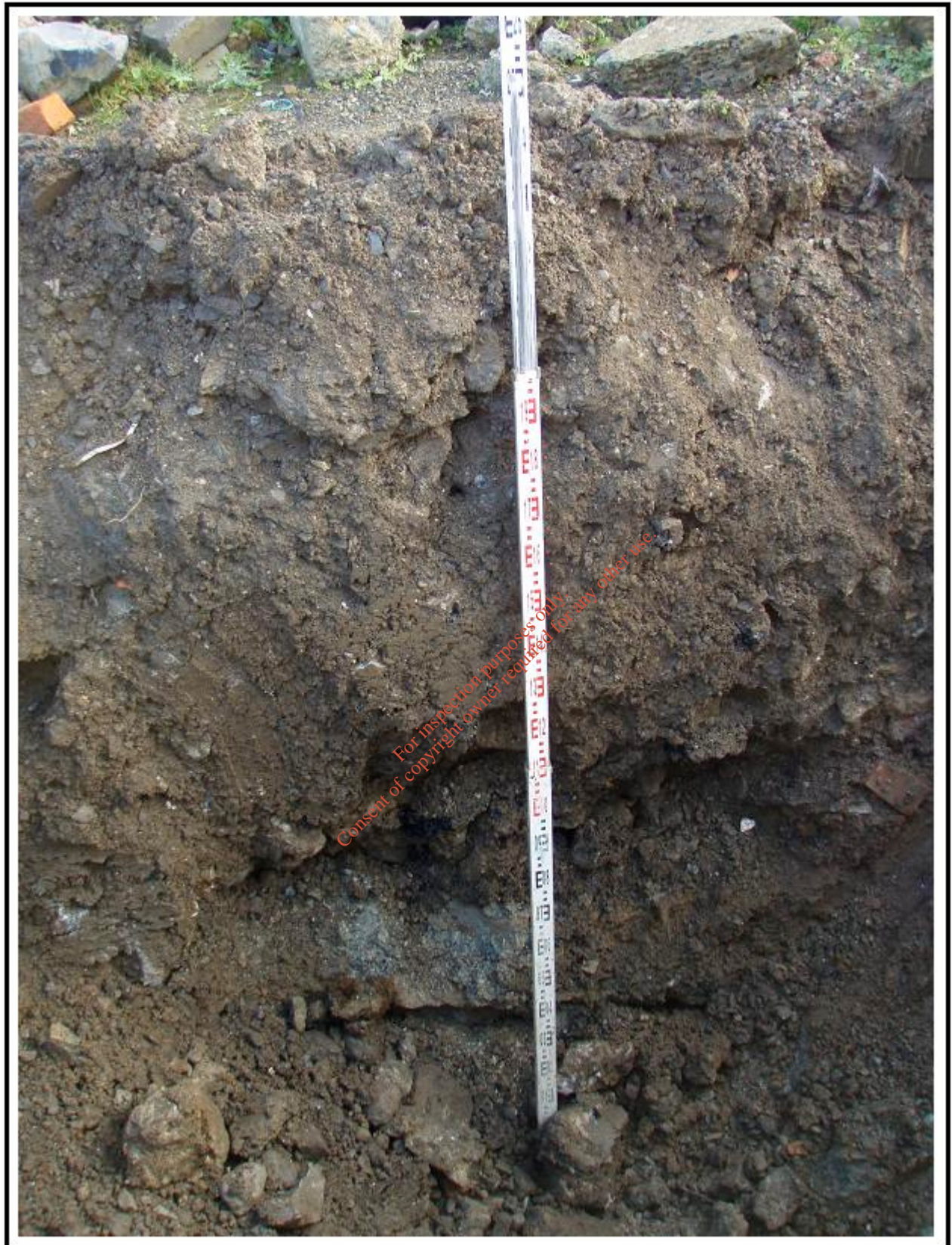
All dimensions on this sheet are in metres unless otherwise stated.

Ground level O.D.: 146.5m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.1-0.14					146.4			Topsoil 'A' horizon: firm to stiff, subangular blocky, very dark greyish brown (3/2, 10YR) gravelly sandy SILTCLAY with abundant grass roots and rootlets.
0.5								'C' horizon (SUBSOIL): firm to very stiff, massive (yet fissile owing to layering from 'lifts'), very dark greyish brown (3/2 10YR) sandy clayey GRAVEL with common cobbles and boulders.  Subsoil is unmottled. Pockets of bluish grey (6/1, GLEY 2) material up to 0.4m across.  Occasional pieces of concrete up to 0.95m across.  Tiles and plastic ties also seen.
1.0								
1.5								
2.0								
2.5								
2.6					143.9			<b>Trial pit completed at 2.6m on very dark greyish brown, massive, stiff to very stiff boulder clay 'fill'.</b>
3.0								
3.5								
4.0								
4.5								
5.0								

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<p><b>Plan</b></p>  <p><b>Bearing : 24° (NNE-SSW)</b></p>	<p><b>Stability :</b></p> <p>Trial pit walls consolidated, but material prone to collapse.</p>	
	<p><b>General remarks :</b></p> <p>Dug in southern portion of the central fill area, into a dry, bare, recently-filled area. Dug on a 2° slope, falling southwards.</p>	
	<table border="1"> <tr> <td> <p><b>Groundwater :</b></p> <p>Dry.</p> </td> <td> <p><b>Sequence summary:</b></p> <p>Well drained, shallow, 'filled' topsoil over filled boulder clay and rubble, 'lifted' on-site.</p> </td> </tr> </table>	<p><b>Groundwater :</b></p> <p>Dry.</p>
<p><b>Groundwater :</b></p> <p>Dry.</p>	<p><b>Sequence summary:</b></p> <p>Well drained, shallow, 'filled' topsoil over filled boulder clay and rubble, 'lifted' on-site.</p>	



**Plate A4: Profile of recently-filled topsoil and subsoil in trial hole no. 4. Pieces of concrete and boulders are common in this area of the site, with alternating compacted layers below ground level.**

Site: Thornberry  
 Client: John Sheils Planning/Erw. Ltd.  
 Project No.: 17/004

Project: Waste Licence Application at Thornberry

Method and Equipment: Komatsu PC 340 LC Track Excavator

Logged by: R. Meehan



Date: 26/01/2009

Easting: 296126

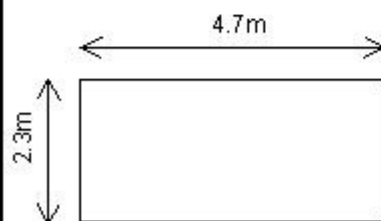
Northing: 221116

All dimensions on this sheet are in metric unless otherwise stated

Ground level IOD: 150.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5							'C <sub>1</sub> ' horizon (SUBSOIL): very soft to firm, massive, grey (5/1, 10YR) gravelly sandy SILT with abundant cobbles and boulders.	
1.0 1.12-1.27				148.8			'C <sub>2</sub> ' horizon (SUBSOIL): firm to very stiff, massive (yet fissile owing to layering from 'lifts'), very dark greyish brown (3/2, 10YR) gravelly sandy SILT with common cobbles and boulders.	
1.5							Subsoil is unmottled.	
2.0							Occasional sack cloth, plastic ties, plastic bags and concrete pieces.	
2.5 2.62-2.75							'C <sub>3</sub> ' horizon (SUBSOIL): very soft to firm, massive (yet fissile owing to layering from 'lifts'), unmottled very dark greyish brown (3/2, 10YR) sandy clayey GRAVEL with occasional pieces of concrete and cavities up to 0.1m across.	
3.0				146.8			<b>Trial pit completed at 3.2m on very dark greyish brown, massive, stiff to very stiff boulder clay 'fill'.</b>	
3.2								
3.5								
4.0								
4.5								
5.0								

**Plan**



Bearing : 4° (N-S)

**Stability :**

Trial pit walls consolidated, but alternating layers quite loose in places.

**General remarks :**

Dug in southernmost portion of the central fill area, into a dry, base, recently-filled area. Dug on a 3° slope, falling northwestwards.

**Groundwater :**

Dry.

**Sequence summary:**

Well drained, deep, 'filled' boulder clay subsoil, 'lifted' on-site.



**Plate A5: Profile of recently-filled subsoil in trial hole no. 5. Pieces of concrete and boulders are common in this area of the site also, with alternating compacted layers and occasional construction and demolition material.**

# TRIAL PIT RECORD TP6

Project: Waste Licence Application at Thornberry

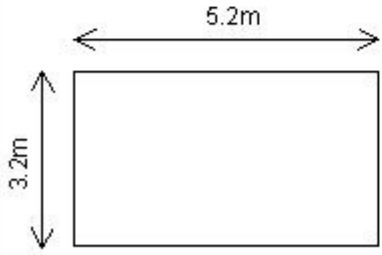
Site: Thornberry  
 Client: John Sheils Planning/Env. Ltd.  
 Project No.: 17/004

Method and Equipment: Komatsu PC 340 LC Track Excavator  
 Logged by: R. Meehan Date: 26/01/2009  
 Easting: 296090 Northing: 221094

All dimensions on this sheet are in metric unless otherwise noted.

Ground level (OD): 145.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5							'C <sub>1</sub> ' horizon: soft to firm, subangular blocky, very dark greyish brown (3/2, 10YR) sandy SILT with occasional gravels.	
1.0 1.11-1.27				143.8			'C <sub>2</sub> ' horizon (SUBSOIL): soft to stiff, massive (yet fissile owing to layering from 'lifts'), very dark greyish brown (3/2 10YR) gravelly sandy SILT/CLAY with occasional gravels and cobbles.	
1.5							Subsoil is unmottled.	
2.0							Pieces of concrete, with fragments of wire and plastic.	
2.5 2.54-2.65				142.5			'C <sub>3</sub> ' horizon (SUBSOIL): very stiff, massive (yet fissile owing to layering from 'lifts'), <b>unmottled</b> very dark grey (3/1, 10YR) SILT/CLAY with occasional gravels.	
3.0				141.8			<b>Trial pit completed at 3.2m on very dark grey, massive, very stiff boulder clay 'fill'.</b>	
3.2								
3.5								
4.0								
4.5								
5.0								

<p><b>Plan</b></p>  <p><b>Bearing : 172° (N-S)</b></p>	<p><b>Stability :</b></p> <p>Trial pit walls consolidated, and subsoil material very competent.</p>	
	<p><b>General remarks :</b></p> <p>Dug in southern portion of the main, western fill area, into a dry, bare, recently-filled pile. Dug in a flat summit area.</p>	
	<table border="1"> <tr> <td> <p><b>Groundwater :</b></p> <p>Dry.</p> </td> <td> <p><b>Sequence summary:</b></p> <p>Well drained, deep, 'filled' boulder clay subsoil, 'lifted' on-site.</p> </td> </tr> </table>	<p><b>Groundwater :</b></p> <p>Dry.</p>
<p><b>Groundwater :</b></p> <p>Dry.</p>	<p><b>Sequence summary:</b></p> <p>Well drained, deep, 'filled' boulder clay subsoil, 'lifted' on-site.</p>	





**Plate A6: Profile of recently-filled subsoil in trial hole no. 6. Pieces of concrete and boulders are common in this area of the site also, with alternating compacted layers and occasional construction and demolition material.**

# TRIAL PIT RECORD TP7

Project: Waste Licence Application at Thornberry

Site: Thornberry  
 Client: John Sheils Planning/Env. Ltd.  
 Project No.: 17/004

Method and Equipment: Komatsu PC 340 LC Track Excavator

Logged by: R. Meehan

Date: 26/01/2009

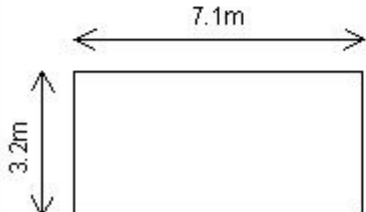
Easting: 296079

Northing: 221166

All dimensions on this sheet are in metric unless otherwise stated

Ground level IOD: 145.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5							TOPSOIL 'A' horizon: very soft to soft, massive, dark yellowish brown (4/4, 10YR) gravelly silty SAND.	
0.88-1.02 1.0				144.1			'C <sub>1</sub> ' horizon (SUBSOIL): very soft to firm, massive (yet fissile owing to layering in 'lifts'), very dark greyish brown (3/2 10YR) SILT/CLAY with abundant gravels.  Subsoil is unmottled.	
1.5							Occasional concrete blocks, steel, bricks, wire and plastic, and cavities up to 0.25m across.	
2.5 2.55-2.66				142.4			'C <sub>2</sub> ' horizon (SUBSOIL): firm to stiff, massive, very dark grey (3/1 10YR) gravelly sandy SILT/CLAY with occasional cobbles.	
3.0				141.8			<b>Trial pit completed at 3.2m on very dark grey, massive, firm to stiff boulder clay 'fill'.</b>	
3.2								
3.5								
4.0								
4.5								
5.0								

<p><b>Plan</b></p>  <p><b>Bearing</b> : 48° (SW-NE)</p>	<p><b>Stability :</b></p> <p>Trial pit walls consolidated, but uppermost material prone to collapse. Deep subsoil material very competent.</p>	
	<p><b>General remarks :</b></p> <p>Dug in south central portion of the main, western filled area, into a dry, bare pile. Dug on a 1° slope, falling southwards.</p>	
	<table border="1"> <tr> <td> <p><b>Groundwater :</b></p> <p>Dry at base, but seep seen at 1 m depth.</p> </td> <td> <p><b>Sequence summary:</b></p> <p>Well drained, deep, 'filled' topsoil over filled boulder clay and rubble, 'lifted' on-site.</p> </td> </tr> </table>	<p><b>Groundwater :</b></p> <p>Dry at base, but seep seen at 1 m depth.</p>
<p><b>Groundwater :</b></p> <p>Dry at base, but seep seen at 1 m depth.</p>	<p><b>Sequence summary:</b></p> <p>Well drained, deep, 'filled' topsoil over filled boulder clay and rubble, 'lifted' on-site.</p>	



**Plate A7: Profile of recently-filled topsoil and subsoil in trial hole no. 7. Pieces of concrete, bricks, steel, wire and plastic are seen occasionally, within alternating layers of compacted subsoil.**

# TRIAL PIT RECORD TP8




Project: Waste Licence Application at Thornberry

Site: Thornberry  
 Client: John Sheils Planning/Env. Ltd.  
 Project No.: 17/004

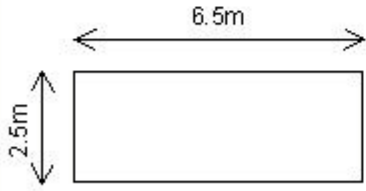
Method and Equipment: Komatsu PC 340 LC Track Excavator  
 Logged by: R. Meehan Date: 26/01/2009  
 Easting: 296098 Northing: 221198

All dimensions on this sheet are in metres unless otherwise stated

Ground level (OD): 146.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5							'C <sub>1</sub> ' horizon (SUBSOIL): very soft, massive, dark yellowish brown (3/4, 10YR) gravelly silty SAND with common cobbles and boulders and occasional cavities up to 0.2m across.	
0.8-1.11 1.0				145.0			'C <sub>2</sub> ' horizon (SUBSOIL): very soft to very stiff, massive (yet fissile owing to layering in 'lifts'), very dark greyish brown (3/2 10YR) to very dark grey (3/1, 10YR) gravelly sandy SILT/CLAY with occasional cavities up to 0.2m across. Subsoil is unmottled.	
1.5							Occasional concrete blocks, bricks, branches, wire and plastic piping.	
2.0								
2.22-2.45 2.5				143.7			'C <sub>3</sub> ' horizon (SUBSOIL): firm to very stiff, massive, very dark grey (3/1, 10YR) gravelly sandy SILT/CLAY with occasional cobbles.	
3.0				143.0			<b>Trial pit completed at 3.0m on very dark grey, massive, firm to very stiff boulder clay 'fill'.</b>	
3.5								
4.0								
4.5								
5.0								

**Plan**



**Bearing : 50° (SW-NE)**

**Stability :**  
 Trial pit walls consolidated, but uppermost material prone to collapse. Deep subsoil material very competent.

**General remarks :**  
 Dug in central portion of the main, western fill area, into a dry, bare pile. Dug on a 1° slope, falling southwards.

<b>Groundwater :</b> Wet base, following runoff entering hole from surface.	<b>Sequence summary:</b> Well drained, deep, 'filled' subsoil and rubble, 'lifted' on-site.
--	--



**Plate A8: Profile of recently-filled subsoil in trial hole no. 8. Pieces of concrete, bricks, wire, branches and plastic piping are seen occasionally, within alternating layers of compacted subsoil.**

# TRIAL PIT RECORD TP9

Project: Waste Licence Application at Thornberry

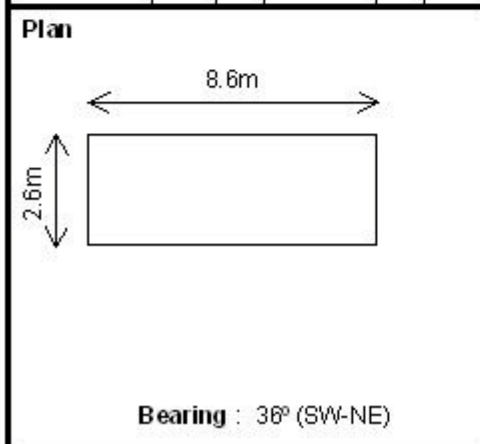
Site: Thornberry  
 Client: John Sheils Planning/Env. Ltd.  
 Project No.: 17/004

Method and Equipment: Komatsu PC 340 LC Track Excavator  
 Logged by: R. Meehan Date: 26/01/2009  
 Easting: 296113 Northing: 221229

All dimensions on this sheet are in metric unless otherwise stated

Ground level IOD: 146.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5							'C <sub>1</sub> ' horizon (SUBSOIL): very soft, massive, very dark brown (3/3, 10YR) gravelly silty SAND with common cobbles and boulders and occasional cavities up to 0.2m across.  Pods of gravelly sandy SILT up to 0.5m across.	
1.0 0.95-1.23				144.9			'C <sub>2</sub> ' horizon (SUBSOIL): very soft to stiff, massive (yet fissile owing to layering in 'lifts'), very dark greyish brown (3/2 10YR) to very dark grey (3/1, 10YR) gravelly sandy SILT/CLAY with occasional cavities up to 0.2m across.  Subsoil is unmottled.  Occasional concrete, steel and branches.	
1.5								
2.0 2.11-2.25				143.85			'C <sub>3</sub> ' horizon (SUBSOIL): firm to very stiff, massive (yet fissile), very dark grey (3/1, 10YR) gravelly sandy SILT/CLAY with occasional cobbles.	
2.5								
3.0				143.0			<b>Trial pit completed at 3.0m on very dark grey, massive, firm to very stiff boulder clay 'fill'.</b>	
3.5								
4.0								
4.5								
5.0								



**Stability :**  
 Trial pit walls consolidated, and deep subsoil material very competent.

**General remarks :**  
 Dug in northern portion of main, western fill area, into a dry, bare pile.  
 Dug on a 1° slope, falling southwards.

**Groundwater :**  
 Wet base, following runoff entering hole from surface.

**Sequence summary:**  
 Well drained, deep, 'filled' subsoil and rubble, 'lifted' on-site.



**Plate A9: Profile of recently-filled subsoil in trial hole no. 9. Occasional pieces of concrete, branches and steel are seen, within alternating layers of compacted subsoil.**

# TRIAL PIT RECORD TP10

Site: Thornberry  
 Client: John Sheils Planning/Env. Ltd.  
 Project No.: 17/004

Project: Waste Licence Application at Thornberry

Method and Equipment: Komatsu PC 340 LC Track Excavator

Logged by: R. Meehan



Date: 26/01/2009

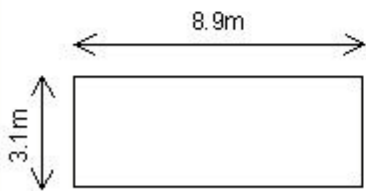
Easting: 296114

Northing: 221259

All dimensions on this sheet are in metric unless otherwise stated

Ground level OD: 146.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.35-0.4 0.5					145.6		'C <sub>1</sub> ' horizon (SUBSOIL): very soft, massive, dark yellowish brown (3/4, 10YR) gravelly silty SAND with common cobbles and boulders.	
1.0							'C <sub>2</sub> ' horizon (SUBSOIL): very soft to firm, massive (yet fissile owing to layering in 'lifts'), very dark greyish brown (3/2 10YR) to very dark grey (3/1, 10YR) gravelly sandy SILT with occasional cobbles and boulders.  Subsoil is unmottled.  Construction and demolition material rare in this layer.	
3.0					143.0		<b>Trial pit completed at 3.0m on very dark grey, massive, firm to very stiff boulder clay 'fill'.</b>	
5.0								

<p><b>Plan</b></p>  <p><b>Bearing</b> : 36° (SW-NE)</p>	<p><b>Stability :</b></p> <p>Trial pit walls consolidated, and subsoil below 0.5m depth very competent.</p>	
	<p><b>General remarks :</b></p> <p>Dug in northernmost extreme of main, western fill area, into a dry, bare pile. Dug on a 1° slope, falling southwards.</p>	
	<table border="1"> <tr> <td> <p><b>Groundwater :</b></p> <p>Wet base, following runoff entering hole from surface.</p> </td> <td> <p><b>Sequence summary:</b></p> <p>Well drained, deep, 'filled' subsoil, 'lifted' on-site.</p> </td> </tr> </table>	<p><b>Groundwater :</b></p> <p>Wet base, following runoff entering hole from surface.</p>
<p><b>Groundwater :</b></p> <p>Wet base, following runoff entering hole from surface.</p>	<p><b>Sequence summary:</b></p> <p>Well drained, deep, 'filled' subsoil, 'lifted' on-site.</p>	





**Plate A10: Profile of recently-filled subsoil in trial hole no. 10. This exposure shows little construction and demolition material, within alternating layers of compacted subsoil.**

Project: Waste Licence Application at Thornberry

Site: Thornberry  
 Client: John Sheils Planning/Erw. Ltd.  
 Project No.: 17/004

Method and Equipment:

Logged by: R. Meehan


Date: 26/01/2009

Easting: 296095

Northing: 221287

All dimensions on this sheet are in metric unless otherwise stated

Ground level (O.D. rtp): 143.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5								
1.0								
1.5								'C' horizon (SUBSOIL): very soft, granular, very dark greyish brown (3/2, 10YR) sandy GRAVEL with patches of dark yellowish brown (3/4, 10YR) topsoil strewn across the surface.
2.0								Subsoil is unmottled.
2.5								Many pieces of concrete at the surface, also with loose boulders and blocks, tiles and pipes in uppermost 2m.
3.0								
3.5								
4.0								
4.5								
5.0				138.0				

<b>Plan</b>           <b>Bearing : 43° (SW-NE)</b>	<b>Stability :</b>  Material consolidated and competent.	
	<b>General remarks :</b>  Profile is into the northwestern edge of the main (western) fill area.	
	<table border="1"> <tr> <td> <b>Groundwater :</b>                               Dry.                         </td> <td> <b>Sequence summary:</b>                               Well drained, deep, 'filled' topsoil over filled boulder clay, 'lifted' on-site.                         </td> </tr> </table>	<b>Groundwater :</b>  Dry.
<b>Groundwater :</b>  Dry.	<b>Sequence summary:</b>  Well drained, deep, 'filled' topsoil over filled boulder clay, 'lifted' on-site.	



**Plate A11: Profile of skim of recently-lain topsoil overlying consolidated subsoil at the northwestern corner of the main (western) fill area. Though containing much concrete at the face, this material is very clean throughout.**





**Plate A12: Profile of deep, recently-lain topsoil overlying consolidated subsoil at the northern edge of the eastern fill area. This material is very clean throughout.**

Project: Waste Licence Application at Thornberry

Site: Thornberry  
 Client: John Sheils Planning/Erw. Ltd.  
 Project No.: 17/004

Method and Equipment:

Logged by: R. Meehan


Date: 26/01/2009

Easting: 296098

Northing: 221118

All dimensions on this sheet are in metric unless otherwise stated.

Ground level (O.D. (top)): 145.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5							'C' horizon (SUBSOIL): compact, granular to massive, very dark brown (3/3, 10YR) gravelly silty SAND.  Subsoil is unmottled.  Many pieces of tarmac/adam, concrete also with loose boulders and blocks, plastic and pipes at the surface.	
1.0								
1.5								
2.0								
2.5								
3.0								
3.5				141.5			Section base at 3.5m on very dark brown, massive, very soft boulder clay 'fill'.	
4.0								
4.5								
5.0								

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<b>Bearing :</b> 100° (N-S)	<b>Plan</b>	<b>Stability :</b> Material consolidated and competent.	
		<b>General remarks :</b> Profile is into the southeastern edge of the main (western) fill area.	
		<table border="1" style="width: 100%;"> <tr> <td> <b>Groundwater :</b>                      Dry.                 </td> <td> <b>Sequence summary:</b>                      Well drained, deep, 'filled' boulder clay subsoil, 'lifted' on-site.                 </td> </tr> </table>	<b>Groundwater :</b> Dry.
<b>Groundwater :</b> Dry.	<b>Sequence summary:</b> Well drained, deep, 'filled' boulder clay subsoil, 'lifted' on-site.		




**Plate A13: Profile of recently-lain consolidated subsoil at the southeastern edge of the main (western) fill area. Though containing much construction and demolition material at the face, this material is again very clean throughout.**

Project: Waste Licence Application at Thornberry

Site: Thornberry  
 Client: John Sheils Planning/Erw. Ltd.  
 Project No.: 17/004

Method and Equipment:  
 Logged by: R. Meehan Date: 26/01/2009  
 Easting: 296094 Northing: 221153

All dimensions on this sheet are in metric unless otherwise stated. Ground level (O.D. (top)): 145.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5							'C' horizon (SUBSOIL): very soft, granular to massive, dark yellowish brown (3/3, 10YR) to very dark greyish brown (3/2, 10YR) gravelly sandy SILT.  Subsoil is unmottled.  Many pieces of concrete with loose boulders and blocks, plastic and pipes at the surface.	
1.0								
1.5								
2.0								
2.5								
3.0								
3.5				141.5			Section base at 3.5m on dark yellowish brown, massive, very soft boulder clay 'fill'.	
4.0								
4.5								
5.0								

<b>Plan</b>         <b>Bearing : 44° (SW-NE)</b>	<b>Stability :</b>  Material consolidated and competent, with vegetation adding extra stability.	
	<b>General remarks :</b>  Profile is into the eastern edge of the main (western) fill area.	
	<table border="1"> <tr> <td> <b>Groundwater :</b>                               Dry.                         </td> <td> <b>Sequence summary:</b>                               Well drained, deep, 'filled' boulder clay subsoil, 'lifted' on-site.                         </td> </tr> </table>	<b>Groundwater :</b>  Dry.
<b>Groundwater :</b>  Dry.	<b>Sequence summary:</b>  Well drained, deep, 'filled' boulder clay subsoil, 'lifted' on-site.	

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**Plate A14: Profile of recently-lain consolidated subsoil at the eastern edge of the main (western) fill area. Though containing much construction and demolition material at the face, this material is also relatively clean throughout.**

Project: Waste Licence Application at Thornberry

Site: Thornberry  
 Client: John Sheils Planning/Erw. Ltd.  
 Project No.: 17/004

Method and Equipment:  
 Logged by: R. Meehan Date: 26/01/2009  
 Easting: 296134 Northing: 221212

All dimensions on this sheet are in metric unless otherwise stated. Ground level (O.D. (top)): 145.0m

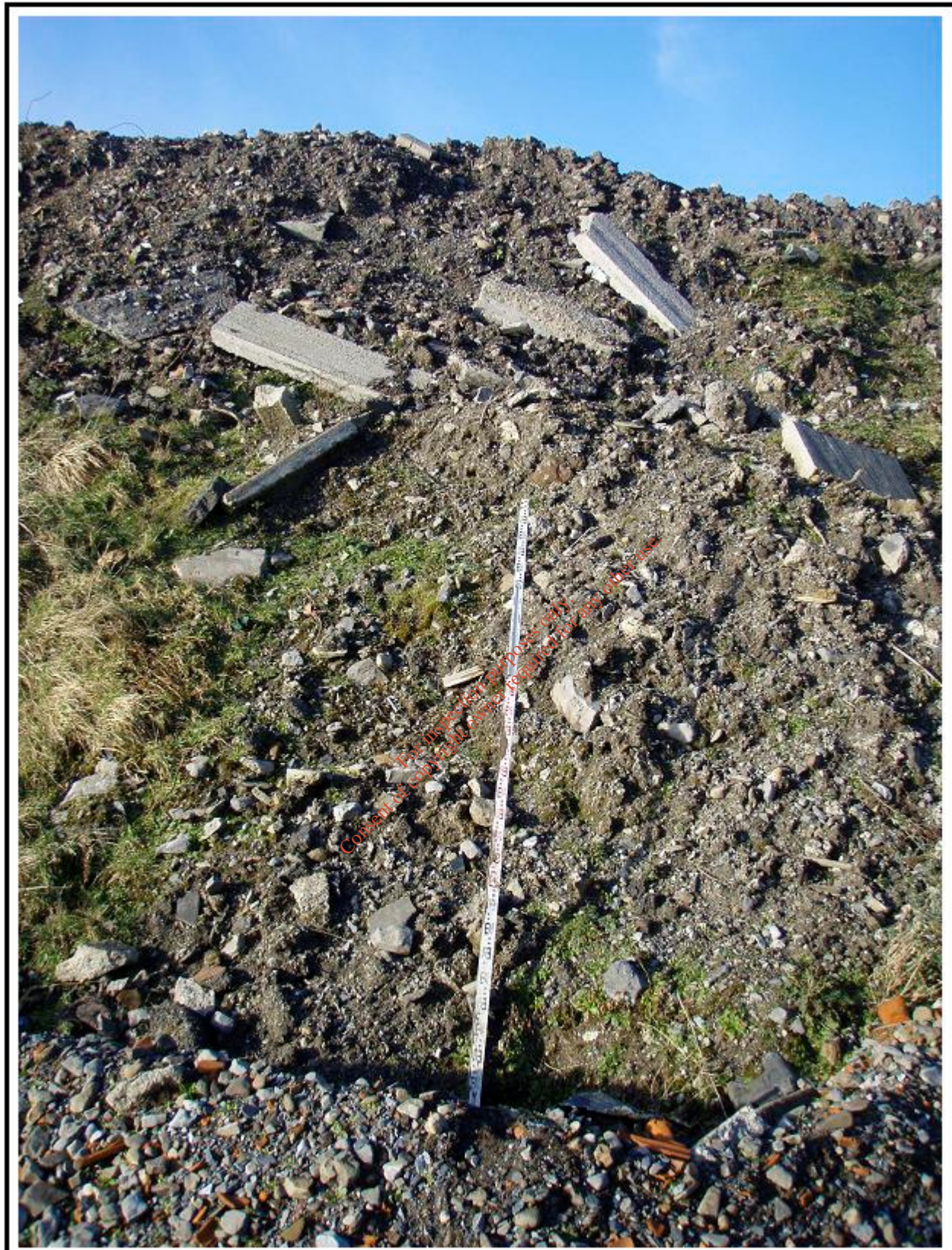
Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5								
1.0								
1.5								
2.0								
2.5								
3.0								
3.5								
4.0				141.0				
4.5								
5.0								

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'C' horizon (SUBSOIL): very soft, granular to massive, very dark greyish brown (3/2, 10YR) gravelly sandy SILT/CLAY with occasional cobbles and boulders.  
 Subsoil is unmottled.  
 Many pieces of concrete with loose boulders and blocks, and occasional pieces of plastic and pipes at the surface.

Section base at 4.0m on very dark greyish brown, granular to massive, very soft boulder clay 'fill'.

<p><b>Plan</b></p> <p style="text-align: right;"><b>Bearing : 46° (SW-NE)</b></p>	<p><b>Stability :</b></p> <p>Material consolidated and competent, with occasional vegetation adding extra stability.</p>	
	<p><b>General remarks :</b></p> <p>Profile is into the eastern edge of the main (western) fill area.</p>	
	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;"> <p><b>Groundwater :</b></p> <p>Dry.</p> </td> <td style="width: 50%;"> <p><b>Sequence summary:</b></p> <p>Well drained, deep, 'filled' boulder clay subsoil, 'lifted' on-site.</p> </td> </tr> </table>	<p><b>Groundwater :</b></p> <p>Dry.</p>
<p><b>Groundwater :</b></p> <p>Dry.</p>	<p><b>Sequence summary:</b></p> <p>Well drained, deep, 'filled' boulder clay subsoil, 'lifted' on-site.</p>	



**Plate A15: Profile of consolidated subsoil at the eastern edge of the main (western) fill area. This material is again relatively clean throughout.**

Project: Waste Licence Application at Thornberry

Site: Thornberry  
 Client: John Sheils Planning/Erw. Ltd.  
 Project No.: 17/004

Method and Equipment:

Logged by: R. Meehan


Date: 26/01/2009

Easting: 296175

Northing: 221251

All dimensions on this sheet are in metric unless otherwise stated.

Ground level (O.D. (top)): 145.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5								 <p>'C' horizon (SUBSOIL): very soft, granular to massive, very dark greyish brown (3/2, 10YR) gravelly sandy SILT/CLAY with occasional cobbles and boulders.</p> <p>Subsoil is unmottled.</p> <p>Many pieces of concrete with loose boulders, blocks and bricks, and occasional pieces of plastic and pipes at the surface.</p>
1.0								
1.5								
2.0								
2.5								
3.0								
3.5								
4.0								
4.5								
5.0				140.0				
							<p><b>Section base at 5.0m on very dark greyish brown, granular to massive, very soft boulder clay 'fill'.</b></p>	

<p><b>Plan</b></p> <p><b>Bearing : 38° (SW-NE)</b></p>	<p><b>Stability :</b></p> <p>Material consolidated and competent, with vegetation adding extra stability.</p>	
	<p><b>General remarks :</b></p> <p>Profile is into the northeastern edge of the main (western) fill area.</p>	
	<table border="1"> <tr> <td> <p><b>Groundwater :</b></p> <p>Dry.</p> </td> <td> <p><b>Sequence summary:</b></p> <p>Well drained, deep, 'filled' boulder clay subsoil, 'lifted' on-site.</p> </td> </tr> </table>	<p><b>Groundwater :</b></p> <p>Dry.</p>
<p><b>Groundwater :</b></p> <p>Dry.</p>	<p><b>Sequence summary:</b></p> <p>Well drained, deep, 'filled' boulder clay subsoil, 'lifted' on-site.</p>	



**Plate A16: Profile of consolidated subsoil at the northeastern edge of the main (western) fill area. This material is also relatively clean throughout.**

Project: Waste Licence Application at Thornberry

Site: Thornberry  
 Client: John Sheils Planning/Erw. Ltd.  
 Project No.: 17/004


Method and Equipment:

Logged by: R. Meehan Date: 26/01/2009

Easting: 296092 Northing: 221249

All dimensions on this sheet are in metric unless otherwise stated.

Ground level (O.D. (top)): 145.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5								 <p>'C' horizon (SUBSOIL): very soft, granular, very dark greyish brown (3/2, 10YR) gravelly sandy SILT and gravelly sandy SILT/CLAY with patches of dark yellowish brown (3/4, 10YR) topsoil strewn across the surface.</p> <p>Subsoil is unmottled.</p> <p>Many pieces of concrete at the surface, also with loose boulders, blocks, bricks, tiles, sack cloth and pipes.</p> <p><b>Section base at 5.0m on very dark greyish brown, massive, very soft boulder clay 'fill'.</b></p>
1.0								
1.5								
2.0								
2.5								
3.0								
3.5								
4.0								
4.5								
5.0				140.0				

<p><b>Plan</b></p> <p><b>Bearing : 20° (SSW-NNE)</b></p>	<p><b>Stability :</b></p> <p>Material consolidated and competent.</p>	
	<p><b>General remarks :</b></p> <p>Profile is into the western edge of the main (western) fill area.</p>	
	<table border="1"> <tr> <td> <p><b>Groundwater :</b></p> <p>Dry.</p> </td> <td> <p><b>Sequence summary:</b></p> <p>Well drained, deep, 'filled' topsoil over filled boulder clay, 'lifted' on-site.</p> </td> </tr> </table>	<p><b>Groundwater :</b></p> <p>Dry.</p>
<p><b>Groundwater :</b></p> <p>Dry.</p>	<p><b>Sequence summary:</b></p> <p>Well drained, deep, 'filled' topsoil over filled boulder clay, 'lifted' on-site.</p>	




**Plate A17: Profile of consolidated subsoil at the western edge of the main (western) fill area. This material is relatively clean throughout.**

Project: Waste Licence Application at Thornberry

Site: Thornberry  
 Client: John Sheils Planning/Erw. Ltd.  
 Project No.: 17/004

Method and Equipment:  
 Logged by: R. Meehan Date: 26/01/2009  
 Easting: 296059 Northing: 221205

All dimensions on this sheet are in metric unless otherwise stated. Ground level (O.D. (top)): 145.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5								'C' horizon (SUBSOIL): very soft, granular to massive, very dark greyish brown (3/2, 10YR) gravelly sandy SILT/CLAY with occasional cobbles and boulders.
1.0								Subsoil is unmottled.
1.5								Many pieces of concrete with loose boulders, blocks and bricks at the surface.
2.0								
2.5								
3.0								
3.5								
4.0								
4.5								
5.0				140.0				<b>Section base at 5.0m on very dark greyish brown, granular to massive, very soft boulder clay 'fill'.</b>

<p><b>Plan</b></p> <p><b>Bearing : 28° (SSW-NNE)</b></p>	<p><b>Stability :</b></p> <p>Material consolidated and competent, with vegetation adding extra stability.</p>	
	<p><b>General remarks :</b></p> <p>Profile is into the southwestern edge of the main (western) fill area.</p>	
	<table border="1"> <tr> <td> <p><b>Groundwater :</b></p> <p>Dry.</p> </td> <td> <p><b>Sequence summary:</b></p> <p>Well drained, deep, 'filled' boulder clay subsoil, 'lifted' on-site.</p> </td> </tr> </table>	<p><b>Groundwater :</b></p> <p>Dry.</p>
<p><b>Groundwater :</b></p> <p>Dry.</p>	<p><b>Sequence summary:</b></p> <p>Well drained, deep, 'filled' boulder clay subsoil, 'lifted' on-site.</p>	





**Plate A18: Profile of consolidated subsoil at the southwestern edge of the main (western) fill area. This material is also relatively clean throughout.**

## I.5.2 Groundwater Contamination

Risks to groundwater on site relate primarily to the use of hydrocarbon liquids.

With respect to the existing waste permitted area the following measures are in place/proposed:

- A mobile double skinned (integrated bunding) fuel bowser will be used to refuel mobile plant on site.
- Re-fuelling and maintenance of mobile plant will take place with due care and diligence to avoid spillages.
- Waste oil products are stored within the existing container on site. Waste oils are disposed of by a licensed waste contractor and removed off site.
- All oil barrels and lubricants are stored on spill pallets/ spill trays. .
- The operator will put in place an emergency response procedure for hydrocarbon spills and appropriate training of site staff in its implementation.
- Groundwater quality is currently monitored at the site in compliance with the Waste Management Licence for the adjoining Arthurstown Landfill Facility (EPA Registration No. W0004-03). A groundwater monitoring programme will also be put in place to ensure that there is no impact on water quality as a result of the recovery operations (Refer to Table I.4.6) above.

## **I.6 Noise Impact.**

### **I.6.1 Introduction**

This section of the report deals with the issue of noise. It will assess the levels of noise associated with the existing recovery facility at Thornberry.

### **I.6.2 Methodology**

The purpose of the baseline study is to assess the existing levels of noise. Continuous noise monitoring has been carried out using a Larson Davis Model 812 Sound Level Meter which was calibrated using a Larson Davis Acoustic Calibrator CAL 200.

This data was then analysed to determine the current noise conditions. From these results assessments could be made of the impact of noise from the continuance of recovery operations at this location.

### **I.6.3 Receiving Environment**

The lands are to be restored to agricultural use by importation and recovery of inert materials in accordance with a phased restoration scheme. Designated internal haul roads are used to direct site traffic to the current tipping area. A bulldozer is used to appropriately grade and compact the material to the desired profile as shown by the detailed plans and sections (Refer to Figures B.2.4 and B.2.5). There is also intermittent noise associated with the sand and gravel pit and Construction and Demolition processing operations.

The principle concern in respect of potential noise emissions from the development is the effect on residential amenity. Properties within the vicinity of the development are shown on Figure B.2.2. As shown the nearest noise sensitive locations are to the north and west. The residence to the north belongs to the landowner of the application site.

The main noise sources in the area are from the Country Road and an adjacent Arthurstown Landfill Facility. Noise monitoring to date has shown that site activity at the existing facility are within accepted thresholds for this type of development (Refer to Section I.6.4 below).

### **I.6.4 Ambient Noise levels**

Background noise monitoring was carried out on the site boundaries adjoining the two nearest noise sensitive residences (including the landowner's) two locations (Refer to Figure F.1). Continuous noise monitoring is carried out in accordance with ISO 1996/1 – 1982 "Acoustics – Description and Measurement of Environmental Noise" using a Larson Davis Model 812 Sound Level Meter which was calibrated using a Larson Davis Acoustic Calibrator CAL 200. The results of recent noise monitoring (26/01/2009) are included in Table I.6.(i) below.

**Table I.6(i) Ambient Noise Assessment**

**Date:** 26/01/09

Station	National Grid Reference	Sound Pressure Levels		
		$L(A)_{eq}$	$L(A)_{10}$	$L(A)_{90}$
<b>N4</b> 1030-1130 hrs	296170E, 221067N	51.2	54.7	46.7
<b>Site Entrance</b> 1200-1300 hrs	221410E, 295588E	43.8	50.6	36.3

- NOTE:**
1. All locations are identified on accompanying Figure F.1.
  2. Weather Conditions – dry and overcast with sunny spells, Wind < 5 m/s, 5-6°C.
  3. Sand & Gravel Pit & Recovery Operations were taken place for all monitoring periods

#### Noise Measurement Parameters

During the survey the following environmental noise parameters ( $L_{Aeq,T}$ ,  $L_{A10,T}$ ,  $L_{A90,T}$ ) were measured. These are defined below:

$L_{Aeq,T}$  is the "A-weighted" equivalent continuous steady sound level during the sample period and effectively represents an "average" value.

$L_{A10,T}$  is the "A-weighted" noise level that is exceeded for 10% of the specific measurement period (T). This parameter is typically used to quantify traffic noise.

$L_{A90,T}$  is the "A-weighted" noise level that is exceeded for 90% of the specific measurement period (T). This parameter is typically used to quantify background noise.

All noise levels are quoted in dB (A) relative to a sound pressure of 20KPa.

The noise levels measured are in compliance with the Environmental Protection Agency Integrated Pollution Control Licensing Guidance note for Noise in relation to Scheduled Activities 2<sup>nd</sup> Edition (2006) *“the noise attributable to on-site activities should not generally exceed a free-field L<sub>A</sub>,T value of 55 dB by daytime (08:00 – 22:00), at any noise sensitive location. During night-time (22:00 – 08:00), the noise attributable to on-site activities should not exceed a free-field L<sub>A</sub>eq, T value of 45 dB”*.

The results of monitoring to date shows that the development can comply with the noise level threshold as specified and as a consequence the development will have no significant effects regards noise levels in the area.

## I.6.5 Assessment of Impacts

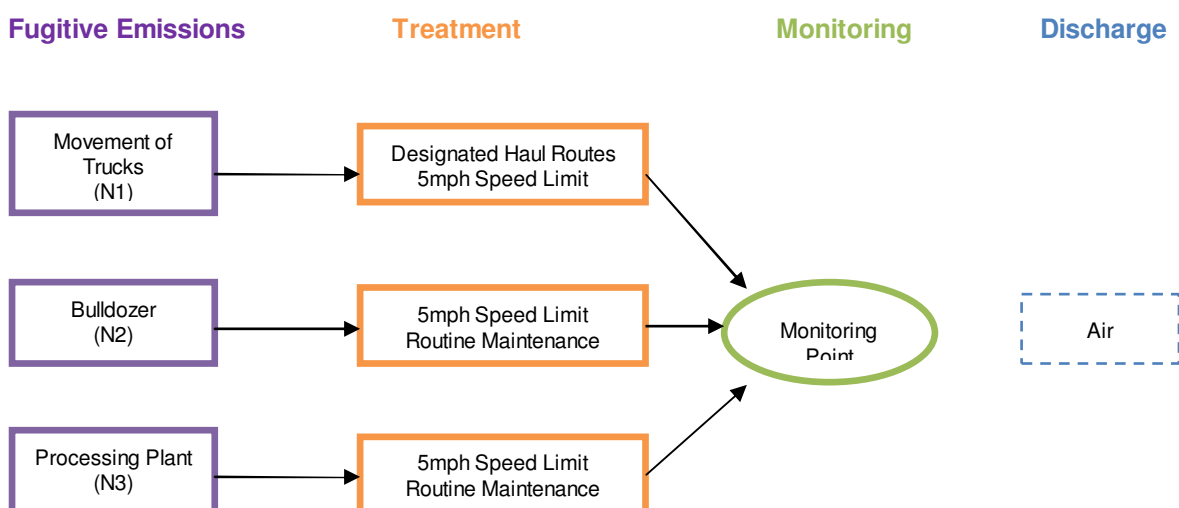
### I.6.5.1 Direct Impacts

The main source of noise and vibration on site is from:

- Movement of trucks on internal haul roads and tipping of material (N1)
- Bulldozer placing and grading the infill material (N2)
- Processing Plant (N3)

Given the nature of the development the location of the above will vary dependent on area of site being restored (Refer to Figure B.2.1). Relevant details with respect to noise sources are provided in Table E.5.(i).

The following flow diagram shows the main sources of noise emissions arising on site and the methods of treatment/abatement employed.



The existing facility has been in continuous operation under successive Waste Management Permits since 2001. Noise monitoring to date has shown that noise levels due to site activity are within acceptable thresholds for this type of development.

### **I.6.5.2 Indirect Impacts**

The main noise sources in the area are from the associated sand and gravel extraction operation, County Road and the adjacent Arthurstown Landfill Facility.

Noise monitoring to date has shown that site activity at the existing facility including the influence of the above extraneous sources are within accepted thresholds for this type of development (Refer to Section I.6.4 above).

### **I.6.5.3 Interaction with other Impacts**

There are no interactions with other impacts associated with noise at the site.

### **I.6.6 Abatement**

Noise resulting from the operations can be kept to acceptable levels by the implementation of good design, effective operation and management and by the adoption of 'best practices'. Reducing noise at source wherever possible is the most effective way of minimising the impact but barriers and screens between noise source and receptor can also be used to very good effect.

A number of noise containment measures are proposed:

- The provision of temporary peripheral screen banks to screen site activities from outside views as necessary.
- General site activity will be within the existing pit and below the level of the nearest residences.
- The use of designated haul roads to ensure that site traffic is removed from nearest noise sensitive receptors.
- Regular maintenance of all plant and machinery is an integral part of site management and is important in helping to minimise noise impact.
- All plant and equipment will conform to noise emission limits set out in Statutory Instrument No. 320 of 1998 European Communities Construction Plant and Equipment- Permissible Noise Levels (Regulations, 1998) and amendment set out in Statutory Instrument No. 359 of 1996.

### I.6.7 Monitoring

The operator will established an environmental monitoring programme to include noise monitoring. Noise levels will continue to be monitored in accordance with ISO 1996/1 – 1982 (E) *“Acoustics – Description and measurement of environmental noise”*.

Two noise monitoring stations which correspond with the dust monitoring locations and include the nearest noise sensitive location are proposed (Refer to Figure F 1.0). It is proposed to carryout noise monitoring on a bi-annual basis.

In accordance with the Environmental Protection Agency Integrated Pollution Control Licensing Guidance note for Noise in relation to Scheduled Activities 2<sup>nd</sup> Edition (2006) *“the noise attributable to on-site activities should not generally exceed a free-field L<sub>A</sub>,T value of 55 dB by daytime (08:00 – 22:00), at any noise sensitive location. During night-time (22:00 – 08:00), the noise attributable to on-site activities should not exceed a free-field L<sub>A</sub>eq, T value of 45 dB”*.

It is therefore considered that the above EPA threshold should be applied for this development as this limit is a recognised standard within the industry and is a limit that is set by most of the Local Authorities. These levels are consistent with guidance issued by the Department of the Environment: *“Quarries and Ancillary Activities – Guidelines for Planning Authorities (2004) DOEHLG”* and the EPA *“Environmental Management in the Extractive Industry (Non-Scheduled Minerals) Environmental Management Guidelines (2006)”*.

The results of monitoring to date shows that the development can comply with the noise level threshold as specified and as a consequence the development will have no significant effects regards noise levels in the area.

This programme will allow on-going monitoring of noise emissions from the site, thereby assisting in ensuring compliance with any future requirements or regulations.

Through implementation of the proposed mitigation measures it is considered the development will continue to have no significant effects with regard to noise levels on the local residences, their property, livestock and amenity.

## I.7 Assessment of Ecological Impacts & Mitigation Measures

The lands are within an essentially rural area, which has a long association with sand and gravel workings. The area under consideration is bounded to the west by a County Road, to the south by Arthurstown Landfill Facility, to the north and east by agricultural land.

The lands are currently being restored to agricultural use by importation and recovery of inert materials in accordance with a phased restoration scheme. The habitats occurring on site may be divided into disturbed soil, exposed sand and gravel and restored grassland. There are no natural habitats within the area under restoration considered worthy of conservation. No significant or likely impacts on the ecology of the area are anticipated. As such it is not considered necessary to provide further description of the existing ecology in this case.

The site is not included within any area of scientific interest, nor has any special amenity order (e.g. Natural Heritage Area, Special Area of Conservation) been made in relation to any site or area within the vicinity.

It is proposed to reclaim the lands to a condition / gradient suitable for agricultural. Good quality imported soil will be conserved wherever possible to provide the subsoil/topsoil capping. These topsoil's/subsoil's will be handled under dry conditions to minimise compaction. For the purpose of restoration to agricultural the restored soil profile (capping) shall comprise 300mm topsoil over 1200-1350mm of subsoil.

Progressive restoration involving grass seeding of restored area's shall be carried out on a staged basis to reduce the effects of soil erosion, windblown dust, to aid ground stabilisation and as an effective means of weed control. On completion of each phase of development final restoration including grading, seeding and landscaping will be carried out. Final restoration is dependent on the availability of good topsoil/subsoil and subject to suitable weather conditions. The final contours and topography for the site is shown by the Final Landform Plan Figure B.2.4 and Cross Sections B.2.5.

Once the topsoil is re-instated it will be seeded with a suitable mix of grasses suitable for pasture in order to quickly stabilise the topsoil. Once the grass sward has become established the restored farmland can be kept either as pasture, hay meadow or arable land. Part of the area has already been restored to pasture.