

I.5 Ground and/or groundwater 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.

A detailed hydrogeological risk assessment was commissioned in support of this application. A copy of the hydrogeological risk assessment prepared by IE Consulting/GES Ltd is attached (Refer to Attachment I.2.1 above). This report addresses both surface and groundwater issues pertaining to the site.

Dr. Robert T. Meehan, Consultant Geologist was also commissioned to undertake a detailed ground investigation study of both the lands restored and currently under restoration. 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. In general the imported material was found to comprise clean brown and black boulder clays with very little detritus material. A copy of this report is included as Attachment I.5.1. Trial pit locations are highlighted in the Attached N, Figure I 5.1 - Soil Investigation Plan.

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Attachment I.5.1

ASSESSMENT OF FILLED SUBSOILS FOR WASTE LICENCE APPLICATION AT NAUL, COUNTY MEATH

Dr. Robert T. Meehan, Consultant Geologist

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**ASSESSMENT OF FILLED SUBSOILS FOR WASTE LICENCE APPLICATION
AT
NAUL, COUNTY MEATH**

FINAL REPORT

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Prepared for:
**JOHN SHEILS PLANNING AND ENVIRONMENTAL LIMITED,
31 ATHLUMNEY CASTLE,
NAVAN,
COUNTY MEATH.**

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Project No.: 16046

Report Title: Assessment of filled subsoils for Waste Licence Application at Naul, County Meath

Report Status: FINAL

Date: 10/02/2009

Prepared by:

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 Clashford Recovery Facility Limited 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 Naul Townland, Naul, Co. Meath (*NGR 313350-261380*). The site is located approximately 0.3 km north of the village of Naul at an elevation of approximately 60-80mAOD and is approached by the regional R108 road (Figure 1). The site includes an area of reclaimed grassland, an area of reclaimed (but failed) forestry, and an area currently being filled. The closest surface watercourse as seen on the Discovery Series Map is the Delvin River, which flanks the site to the south, and an unnamed stream, which flanks the northern boundary of the site. A full set of site location maps and drawings of the layout of the development are contained in the accompanying planning application.

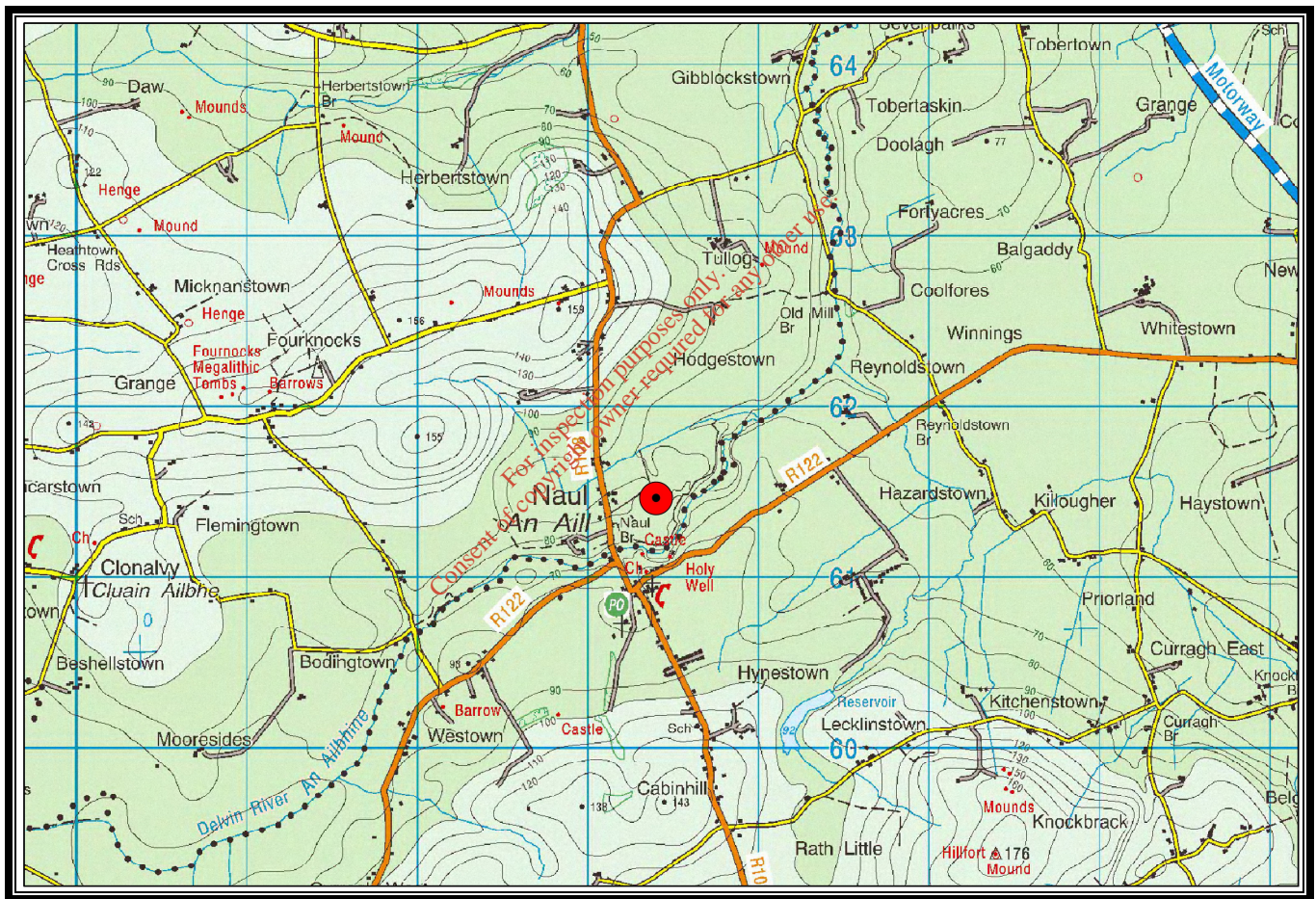


Figure 1 Location of site at Clashford, Naul, illustrating surrounding topography and surface water stream nad river features (OS Licence EN 0057908).

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.

As well as this, research was conducted into the reasons why the forestry in the northeast portion of the site may have failed, as well as relevant best practice guidelines for reclamation of land, in order to arrive at a scheme to further remediate the site to best standards.

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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. From this, sites were selected for excavation and 13 no. trenches were excavated:

- 5 no. in the northwestern, 'reclaimed' agricultural field;
- 5 no. in the area of 'failed' forestry at the northeast and;
- 3 no. in the recently-filled, eastern portion of the site.

As well as this, 5 no. sections from the face around the edge of the filled area 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 Shiels Planning and Environmental Ltd. at the subject site on 6th and 21st January 2009. Trenches were dug using a JCB 3X Backhoe Excavator. Based on the materials logged from the 13 no. trial pits dug within the site, the imported subsoil material across the site is relatively consistent.

The trial pits were excavated to depths ranging from 2.12m to 2.8m below ground level. The trial pits in the northwestern and northeastern land parcels their 4 no. corners, with 1 no. excavated in the centre of each area. Those dug in the eastern area were dug along the central axis of this locality. 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: northwestern field.

5 no. trial pits were excavated in the northwestern field, which has been reclaimed for agricultural pasture. This forms part of a high ridge feature.

The topsoil encountered in these pits was dark yellowish brown to dark brown to dark greyish brown, silty clay loam or SILT/CLAY material which was at least 0.3m deep in 4 no. of the 5 no. pits, and was up to 0.6m deep. This was uncompact to very soft and was generally of crumb to subangular blocky structure, with abundant roots and rootlets. This material is of relatively good quality and promotes adequate grass growth.

Within all trial pits, the subsoil was recorded as being dominated by unmottled SILT/CLAY, and was soft to very stiff in bulk density (as per BS5930, 1999). Beds and pods of SILT and SAND also occur within this material. The majority of imported material in the pit has come from north Dublin (Mr. Larry Kiernan, pers. comm.) and the appearance of the subsoils under this field is similar to the brown and black boulder clays of north Dublin.

Small fragments of plastic ties, brick, wood and steel was seen in pit nos. 1-4, with large pieces of concrete in pit no. 5. Overall the amount of waste material was small (<5%) and subsoil completely dominated the face profiles.

Bedrock was not met in any of the pits. Groundwater seeped into trial pit no. 2 only.

2.2. Cluster 2: northeastern 'failed' forestry area.

5 no. trial pits were excavated in the northeastern field, which has been reclaimed for forestry which has failed on the majority of the site. This forms a low, flat area topographically and rushes are common across it.

The topsoil encountered in these pits was dark brown to dark greyish brown, silty clay loam, sandy clay loam or clay loam material which was generally shallow, being no more than 0.4m deep throughout the site, but in the western area particularly, where the trees completely failed, being in the order of only 0.2m deep in general. The topsoil in this western area was also firm to stiff and poorly aerated. Further west it becomes more soft and has a better structure.

Within these trial pits, the subsoil often showed 2 no. layers, but was generally recorded in all cases as being dominated by unmottled gravelly SILT/CLAY. The uppermost subsoil unit had been imported; the lowermost unit comprised *in situ* material, forming the subsoil unit that lay under the sands and gravels which were extracted from the original gravel pit on-site. The presence of shell fragments in this lowermost subsoil unit was notable: this suggests the material is of 'Irish Sea' till, which is found below the surface over much of the area close to the north Dublin coastline. This material has much more CLAY than the brown and black boulder clays of inland Dublin, and is also more stiff and of poorer structure.

Some pockets of mottled areas did occur in the subsoil of this zone, and groundwater was met in 1 no. of the pits, with significant seeps in another.

Waste material was effectively absent from all the trial pits in this portion of the site. This would potentially mean less cavities in the subsurface material, which would retard water movement through them as well as aeration, and would mean that the compacted SILT/CLAY material was denser as a whole than further west on-site.

Bedrock was not met in any of the pits. Groundwater seeped into trial pit nos. 7 and 8 only.

2.3. Cluster 3: eastern fill area.

3 no. trial pits were excavated in the eastern fill area, which has only recently been filled. This forms a flat area topographically with bare ground cover.

No topsoil was encountered in these pits.

The subsoil here was dark brown unmottled sandy SILT/CLAY, with abundant gravels, cobbles and boulders. All holes were dry. Some fragments of waste were only met in trial pit no.13, and the material overall is clean (<5% waste material).

2.4. Profiles around the edge of the pit.

5 no. profiles were logged from around the edge of the existing pit, and the edge of the high fill area.

Topsoil was only seen in the eastern area and was absent from the northern portion where a road tops the material. The subsoil was in generally very dark greyish brown unmottled SILT/CLAY, with common gravels which are particularly abundant at depth along the northern area of the existing pit. Fragments of waste material were effectively absent from these profiles (<5% waste).

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3.0 ASSESSMENT OF AREA OF FAILED FORESTRY.

Within the failed forestry area to the northeast of the facility, trees planted comprise ash in the majority, with some birch and alder. It was noted that the forestry failed to a much greater degree in the westernmost portion of the field, but did take along the easternmost boundary of the field. Rushes are common across the site, as are other weeds and rough grasses. The ground is generally flat to gently sloping, and is hard and compact underfoot, with patches of ponding following recent rains showing that infiltration rates are low on the site.



Plate 1 View across the failed forestry area, from its southwestern corner. The trees have failed completely in this western area, but did take along the easternmost boundary, as seen in the distance.

3.1. Subsurface stratigraphy

The stratigraphy of the subsurface materials encountered within the area of failed forestry are described in detail in Section 2.2, with trial pit logs detailed in Appendix A.

The topsoil encountered in the pits was can be summarised as dark brown to dark greyish brown, silty clay loam, sandy clay loam or clay loam material which was generally shallow, being no more than 0.4m deep throughout the site. In the western area particularly, where the trees completely failed, topsoil in the order of only 0.2m deep is present. The topsoil in this western area was also firm to stiff and poorly aerated. Further west it becomes more soft and has a better structure.

Within these trial pits, the subsoil often showed 2 no. layers, but was was generally recorded in all cases as being dominated by unmottled gravelly SILT/CLAY. The uppermost subsoil unit had been imported; the lowermost unit comprised *in situ* material, forming the subsoil unit that lay under the sands and gravels which were extracted from the original gravel pit on-site. This material is very stiff, or poor structure, and very CLAY-rich.

3.2. Discussion of optimal conditions for broadleaf forestry and associated aspects

The material within the failed forestry area contains a relatively thin topsoil cover, with heavily consolidated subsoil, which is either naturally stiff in the case of the *in situ* Irish Sea Till, or has been compacted by machinery in the western area. As well as this, the pH of this subsoil material is likely to be high (>8.0, see soil descriptions of Soil Association 40 derived from Irish Sea Till, in Gardiner and Radford, 1980).

In general, ash trees prefer well drained, fertile sites, which are more alkaline than acid and with a pH range of 6.0-8.0. Ash is however a selective tree, and is very site specific; failing in patches over scales of tens of metres and yet flourishing in others. Particularly noteworthy, however, is their dislike of compacted ground. From this, the conditions across the northeastern field at Naul would probably be considered unsuitable for ash.

The fact that the topsoil is unevenly and thinly spread across the site itself is the foremost reason for the poor quality of the land in the northeastern extreme of the site at Naul: this factor alone would probably prohibit grass productivity on the site and would mean that more vigorous weeds would flourish in the area (it is notable that this has already occurred in the forestry area). From this, further reclamation of the site is recommended, in order to improve drainage across the site, to maintain a deeper and more consistent topsoil cover, and to better merge the relatively low area into the landscape with the higher, ridge area infilled and reclaimed to the immediate west of the forestry parcel.

3.3. Procedure for reclamation

The optimal option for remediation of the site is to import well drained subsoil and topsoil across the site. The land should be graded and built up to a similar height as the ground in the reclaimed field to the west, in order to merge with existing ground contours. The subsoil and topsoil material should be well aerated and well drained and should tend towards the sandy loam/sandy clay loam/silt loam grade to avoid structure and poor drainage characteristics. The material should be laid in 1m lifts and the final topsoil cap should be at least 0.3m deep.

As the ultimate goal is a gently sloping surface, large debris, such as tree trunks, pieces of concrete and steel/plastic, should be removed prior to regarding. The surface of the final slope should be moderately roughened to help in establishing vegetation: use of tracking machines is therefore optimal. The gentle slope will promote runoff and prohibit ponding.

The optimum time for final regarding is in summer, simply for ease of reclamation. Wet topsoil is not conducive to heavy equipment traffic and leads to compaction and eventual ponding at the surface.

Fertiliser should be applied to enhance the soil. This can be inorganic (*e.g.* N-P-K blend) or organic (slurry). The topsoil should be tested before application to ensure the maintenance of an appropriate nutrient balance in the ground.

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4.0 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 Naul Townland, Naul, Co. Meath, 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. As well as this, research was conducted into the reasons why the forestry in the northeast portion of the site may have failed, as well as relevant best practice guidelines for reclamation of land, in order to arrive at a scheme to further remediate the site to best standards.

Trial pits were excavated to depths ranging from 2.12m to 2.8m below ground level. The imported subsoil material across the site is relatively consistent.

In the northwestern field, which has been reclaimed for agricultural pasture and forms part of a high ridge feature, the topsoil encountered was well aerated and was up to 0.6m deep. The material is of relatively good quality and promotes adequate grass growth. Within all trial pits here, the subsoil was recorded as being dominated by unmottled SILT/CLAY, and was soft to very stiff in bulk density. Beds and pods of SILT and SAND also occur within this material, and small fragments of plastic ties, brick, wood and steel, as well as some concrete, was seen in places. Overall the amount of waste material was small and subsoil completely dominated the face profiles. Groundwater was seen in 1 no. pit only.

The northeastern field has also been reclaimed, in this case for forestry which has failed on the majority of the site. This forms a low, flat area topographically and rushes are common across it. The topsoil encountered was generally shallow, being no more than 0.4m deep throughout the site, but in the western area particularly, where the trees failed, the soil was in the order of only 0.2m deep. The topsoil in this western area was also firm to stiff and poorly aerated. Within the trial pits within the forestry, the subsoil often showed 2 no. layers, but was generally recorded in all cases as being dominated by unmottled gravelly SILT/CLAY. The uppermost subsoil unit had been imported; the lowermost unit comprised *in situ* material, forming the subsoil unit that lay under the sands and gravels which were extracted from the original gravel pit on-site. Some pockets of mottled areas did occur in the subsoil of this zone, and groundwater was met in 1 no. of the pits, with significant seeps in another. Waste material was effectively absent from all the trial pits in this portion of the site.

The eastern fill area, which forms a flat area topographically with bare ground cover, has only recently been filled. No topsoil was encountered in these pits and the subsoil here was unmottled sandy SILT/CLAY, with abundant clasts. All holes were dry and fragments of waste were only met in 1 no. trial pit; the material overall is clean.

The material within the failed forestry area contains a relatively thin topsoil cover, with heavily consolidated subsoil, which is either naturally stiff or has been over-compacted by machinery. As well as this, the pH of this subsoil material is likely to be high (>8.0); ash trees prefer well drained, fertile sites, which are more alkaline than acid and with a pH range of 6.0-8.0. From this, the conditions across the northeastern field at Naul would probably be considered unsuitable for ash, and further

reclamation of the site is recommended in order to improve drainage across the site, to maintain a deeper and more consistent topsoil cover, and to better merge the relatively low area into the landscape with the higher, ridge area infilled and reclaimed to the immediate west of the forestry parcel.

It is therefore recommended that further well drained subsoil and topsoil be imported across the site. The land should be graded and built up to a similar height as the ground in the reclaimed field to the west, in order to merge with existing ground contours. The subsoil and topsoil material should be well aerated and well drained and the final topsoil cap should be at least 0.3m deep. Fertiliser should be applied to enhance the soil. This can be inorganic (*e.g.* N-P-K blend) or organic (slurry), and the topsoil should also be tested before application to ensure the maintenance of an appropriate nutrient balance in the ground.

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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 Counties Meath and Dublin. 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 Naul

Site: Naul
 Client: John Sheils Planning/Env. Ltd.
 Project No.: 16/046

Method and Equipment: JCB 3X Backhoe Excavator

Logged by: R. Meehan

Date: 06/12/2009

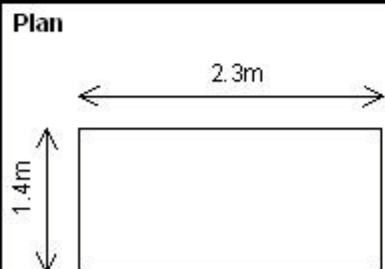
Easting: 313158

Northing: 261561

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

Grid level IOD: 75.5m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.24-0.3							TOPSOIL/A horizon: soft to firm, crumb to subangular blocky, dark greyish brown (4/2, 10 YR) silty clay loam with occasional grass rootlets. TOPSOIL/SUBSOIL 'B' horizon: firm to stiff, massive, dark yellowish brown (4/4, 10 YR) CLAY with occasional gravel and occasional rootlets.	
0.5 0.47-0.52								
1.0							'C' horizon (SUBSOIL): firm to stiff, massive (yet fissile owing to layering from 'lifts'), dark greyish brown (4/2, 10 YR) SILT/CLAY with common gravels and occasional cobbles and boulders. Subsoil is unmottled. Some brown (4/3, 10 YR) pods up to 0.4m across. Occasional fragments of plastic and steel, but rare overall.	
1.5								
2.0							Trial pit completed at 2.22m on dark greyish brown, massive, stn boulder clay 'fill'.	
2.22								
2.5								
3.0								
3.5								
4.0								
4.5								
5.0								



Bearing : 84° (W-E)

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

General remarks :
 Dug in western portion of the site, into a dry, grass-covered 'reclaimed' field. Dug on a 2° slope, falling northwestwards.

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 topsoil overlying subsoil in trial hole no. 1. See the absence of waste material from the profile and the well aerated nature of the material, with no groundwater seepages throughout the profile.

TRIAL PIT RECORD TP2



Project: Waste Licence Application at Naul

Site: Naul
 Client: John Sheils Planning/Env. Ltd.
 Project No.: 16/046

Method and Equipment: JCB 3X Backhoe Excavator
 Logged by: R. Meehan Date: 06/01/2009
 Easting: 313256 Northing: 261562

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

Ground level O.D.: 75.5m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.14-0.16					75.35			TOPSOIL 'A' horizon: compact, crumb, dark brown (3/3, 10YR) loam with abundant grass roots and rootlets.
0.5								TOPSOIL/SUBSOIL 'B' horizon: soft to firm, subangular blocky to massive, dark yellowish brown (3/4, 10YR) SILT/CLAY with occasional gravels and occasional rootlets.
0.58-0.6					74.9			'C' horizon (SUBSOIL): firm to very stiff, massive (yet very fissile owing to layering from 'lifts'), very dark greyish brown (3/2, 10YR) SILT/CLAY with abundant gravels and occasional cobbles and boulders. Subsoil is unmottled.
1.0								
1.5								
2.0								
2.12					73.4			
2.5								Trial pit completed at 2.12m on very dark greyish brown, massive, very stiff boulder clay 'fill'.
3.0								
3.5								
4.0								
4.5								
5.0								

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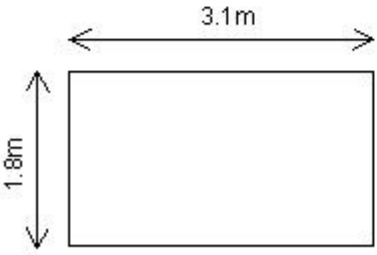
<p>Plan</p>  <p style="text-align: center;">Bearing : 92° (W-E)</p>	<p>Stability :</p> <p>Trial pit walls very consolidated, and material very competent.</p> <hr/> <p>General remarks :</p> <p>Dug in central portion of the northwestern, grass-covered 'reclaimed' field. Dug on a 2° slope, falling northwards.</p> <hr/> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>Groundwater :</p> <p>Dry initially, but small seepage at 1.05m depth.</p> </td> <td style="width: 50%; vertical-align: top;"> <p>Sequence summary:</p> <p>Well drained, deep, 'filled' topsoil over filled boulder clay, 'lifted' on-site.</p> </td> </tr> </table>	<p>Groundwater :</p> <p>Dry initially, but small seepage at 1.05m depth.</p>	<p>Sequence summary:</p> <p>Well drained, deep, 'filled' topsoil over filled boulder clay, 'lifted' on-site.</p>
<p>Groundwater :</p> <p>Dry initially, but small seepage at 1.05m depth.</p>	<p>Sequence summary:</p> <p>Well drained, deep, 'filled' topsoil over filled boulder clay, 'lifted' on-site.</p>		



Plate A2: Profile of topsoil overlying subsoil in trial hole no. 2. See the general absence of waste material from the profile and the well aerated nature of the material, with one slight groundwater seepage at 1.05m depth.

TRIAL PIT RECORD TP3







Project: Waste Licence Application at Naul

Site: Naul
 Client: John Sheils Planning/Env. Ltd.
 Project No.: 16/046

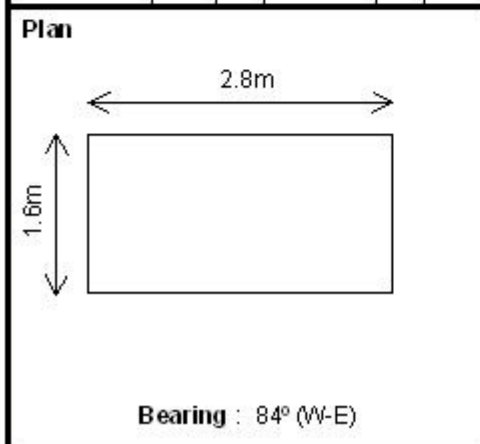
Method and Equipment: JCB 3X Backhoe Excavator
 Logged by: R. Meehan Date: 06/01/2009
 Easting: 313348 Northing: 261554

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

Ground level O.D.: 76.5m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.15-0.16					76.35			TOPSOIL: A horizon: compact loam, crumb to subangular blocky, very dark greyish brown (3/2, 10YR) silt/clay loam with common grass roots and roots.
0.5								
1.0								'B/C' horizon (SUBSOIL): firm to stiff, massive (yet fissile owing to layering from 'lifts'), very dark greyish brown (3/2, 10YR) SILT/CLAY with abundant gravels, cobbles and boulders. Subsoil is unmottled.
1.5								Occasional pieces of concrete and occasional plastic ties.
2.0								
2.5					74.0			Trial pit completed at 2.5m on very dark greyish brown, massive, stiff boulder clay 'fill'.
3.0								
3.5								
4.0								
4.5								
5.0								

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

General remarks :
 Dug in eastern portion of the northwestern dry, grass-covered, 'reclaimed' field. Dug on a 3° slope, falling north-northeastwards.

Groundwater :
 Dry.

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



Plate A3: Profile of shallow soil overlying subsoil in trial hole no. 3. See the occasional pieces of concrete in the basal area of the profile and the well aerated nature of the material, with no groundwater seepages recorded to 2.5m depth.

TRIAL PIT RECORD TP4




Project: Waste Licence Application at Naul

Site: Naul
 Client: John Sheils Planning/Env. Ltd.
 Project No.: 16/046

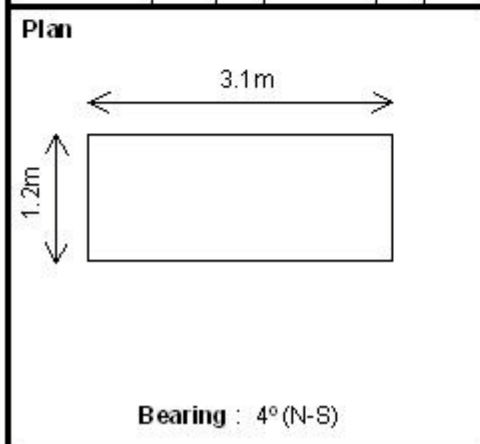
Method and Equipment: JCB 3X Backhoe Excavator
 Logged by: R. Meehan Date: 06/01/2009
 Easting: 313312 Northing: 261724

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

Ground level O.D.: 69.5m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.1-0.13				69.4			TOPSOIL 'A' horizon: soft, crumb to subangular blocky, dark brown (3/3, 10YR) silty clay loam with common grass roots and rootlets.	
0.45-0.47				69.0			TOPSOIL/SUBSOIL 'B' horizon: very soft to firm, massive, very dark greyish brown (3/2, 10YR) CLAY with occasional gravel and occasional rootlets.	
1.0							'C' horizon (SUBSOIL): firm to stiff, massive (yet very fissile owing to layering from 'lifts'), very dark greyish brown (3/2, 10YR) slightly sandy SILT/CLAY with common gravels, cobbles and boulders. Subsoil is unmottled.	
1.5							Some pods of SILT and fine SAND up to 0.2m across.	
2.0							Occasional fragments of plastic, wood and steel, but rare overall.	
2.5				67.0			Trial pit completed at 2.5m on very dark greyish brown, massive, stiff boulder clay 'fill'.	
3.0								
3.5								
4.0								
4.5								
5.0								

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

General remarks :
 Dug in northeastern portion of the dry, grass-covered 'reclaimed' field. Dug on a 3° slope, falling north-northeastwards, in a low area.

Groundwater :
 Dry.

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

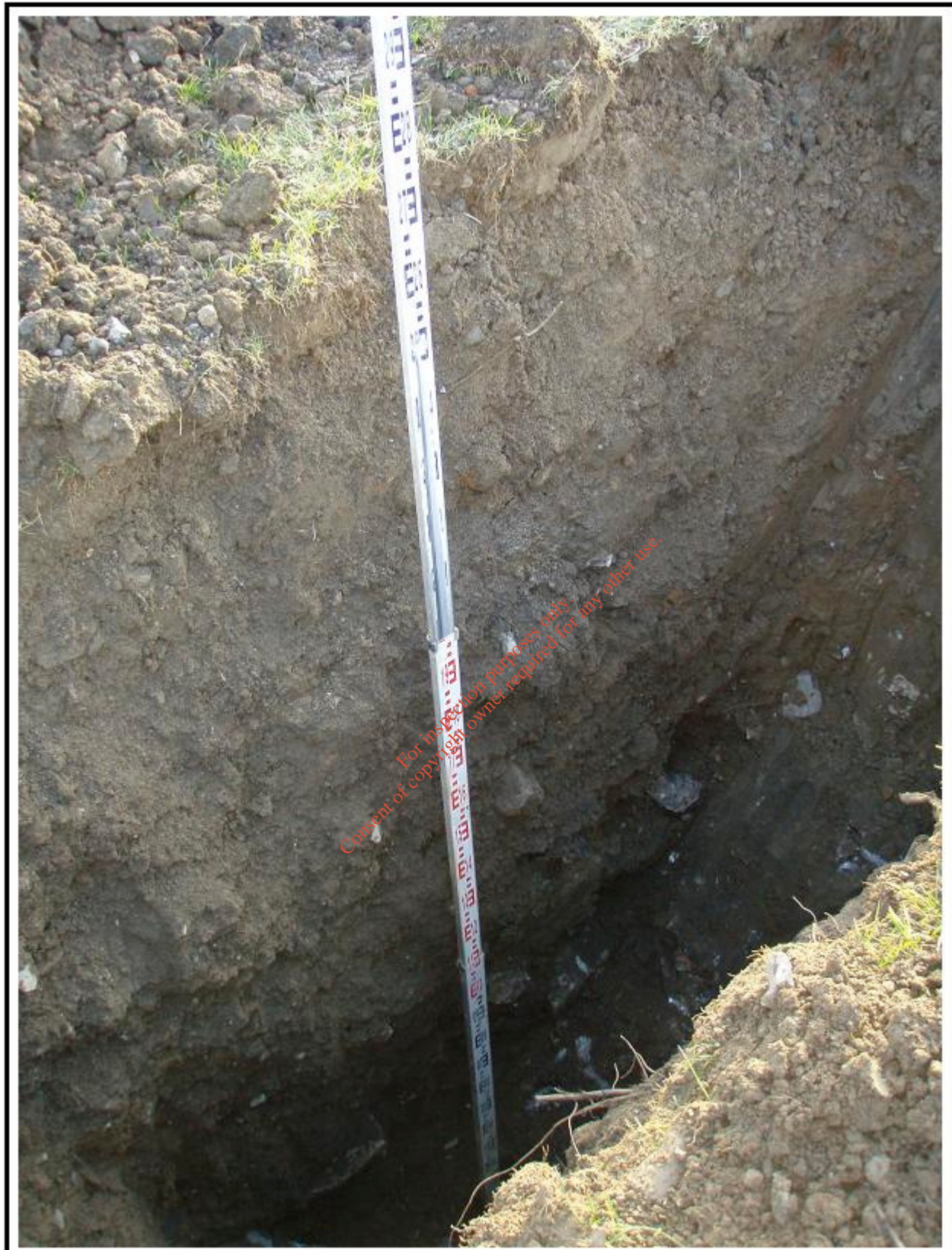


Plate A4: Profile of deep topsoil overlying subsoil in trial hole no. 4. See the concrete piece in the basal area of the profile and the well aerated nature of the material, with no groundwater seepages recorded to 2.5m depth.

TRIAL PIT RECORD TP5

Project: Waste Licence Application at Naul

Site: Naul
 Client: John Sheils Planning/Env. Ltd.
 Project No.: 16/046

Method and Equipment: JCB 3X Backhoe Excavator

Logged by: R. Meehan

Date: 06/01/2009

Easting: 313254

Northing: 261476

All dimensions on this sheet are in metric unless otherwise stated

Ground level O.D.: 79.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.12-0.14							TOPSOIL 'A' horizon: compact to very soft, crumbly massive, dark yellowish brown (3/4, 10 YR) silty clay loam with abundant grass roots and rootlets.	
0.3-0.34							TOPSOIL 'SUBSOIL' 'B' horizon: firm to stiff, massive, dark brown (3G, 10 YR) silty clay loam.	
0.5								
1.0							'C' horizon (SUBSOIL): firm to stiff, massive (yet fissile owing to layering from 'lifts'), very dark greyish brown (3/2, 10 YR) SILT/CLAY with abundant gravels and occasional cobbles and boulders. Subsoil is unmottled.	
1.5								
2.0							Occasional pieces and blocks of concrete and fragments of plastic, wood and steel.	
2.47								
2.5					76.5		Trial pit completed at 2.47m on very dark greyish brown, massive, stiff boulder clay 'fill'.	
3.0								
3.5								
4.0								
4.5								
5.0								

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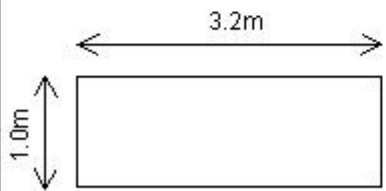
<p>Plan</p>  <p>Bearing : 30° (SW-NE)</p>	<p>Stability :</p> <p>Trial pit walls very consolidated, and material very competent.</p>	
	<p>General remarks :</p> <p>Dug in southwestern portion of the dry, grass-covered 'reclaimed' field. Dug on a 1° slope, falling northwards.</p>	
	<table border="1"> <tr> <td> <p>Groundwater :</p> <p>Dry.</p> </td> <td> <p>Sequence summary:</p> <p>Well drained, shallow, 'filled' topsoil over filled boulder clay, 'lifted' on-site.</p> </td> </tr> </table>	<p>Groundwater :</p> <p>Dry.</p>
<p>Groundwater :</p> <p>Dry.</p>	<p>Sequence summary:</p> <p>Well drained, shallow, 'filled' topsoil over filled boulder clay, 'lifted' on-site.</p>	



Plate A5: Profile of shallow topsoil overlying subsoil in trial hole no. 5. See the occasional concrete pieces and fragments of steel within the profile and the well aerated nature of the material, with no groundwater seepages recorded to 2.47m depth.

TRIAL PIT RECORD TP6

Project: Waste Licence Application at Naul

Site: Naul
 Client: John Sheils Planning/Env. Ltd.
 Project No.: 16/046

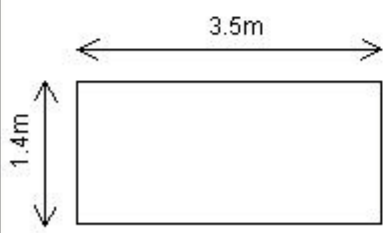
Method and Equipment: JCB 3X Backhoe Excavator
 Logged by: R. Meehan Date: 06/01/2009
 Easting: 313379 Northing: 261695

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

Ground level O.D.: 66.5m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.25-0.29							TOPSOIL/A horizon: firm to stiff, massive, dark brown (3/3, 10YR) silty clay loam with occasional grass rootlets.	
0.5							'B/C' horizon (SUBSOIL): very soft to firm, massive (yet slightly fissile in patches, owing to layering from 'lifts'), very dark greyish brown (3/2, 10YR) slightly sandy SILT/CLAY with abundant gravels and occasional cobbles. Subsoil is unmottled, with occasional shell fragments within. No waste material. Trial pit completed at 2.8m on very dark greyish brown, massive, stiff boulder clay.	
1.0								
1.5								
2.0								
2.5								
2.8								
3.0								
3.5								
4.0								
4.5								
5.0								

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<p>Plan</p>  <p style="text-align: center;">3.5m</p> <p style="text-align: center;">1.4m</p> <p style="text-align: center;">Bearing : 152° (NW-SE)</p>	<p>Stability :</p> <p>Trial pit walls very consolidated, and material very competent.</p>	
	<p>General remarks :</p> <p>Dug in northwestern portion of the low, 'failed' forestry area. Dug on a 1° slope, falling northwards.</p>	
	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;"> <p>Groundwater :</p> <p>Dry.</p> </td> <td style="width: 50%;"> <p>Sequence summary:</p> <p>Well drained, shallow, imported topsoil over <i>in situ</i> boulder clay.</p> </td> </tr> </table>	<p>Groundwater :</p> <p>Dry.</p>
<p>Groundwater :</p> <p>Dry.</p>	<p>Sequence summary:</p> <p>Well drained, shallow, imported topsoil over <i>in situ</i> boulder clay.</p>	



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Plate A6: Profile of shallow topsoil overlying subsoil in trial hole no. 6. Surprisingly, given the low elevation, this hole was dry. See the complete absence of waste material in the clean *in situ* subsoil, with no groundwater seepages recorded to 2.8m depth.

TRIAL PIT RECORD TP7







Project: Waste Licence Application at Naul

Site: Naul
 Client: John Sheils Planning/Env. Ltd.
 Project No.: 16/046

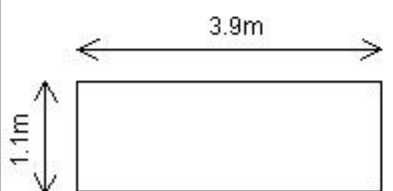
Method and Equipment: JCB 3X Backhoe Excavator
 Logged by: R. Meehan Date: 06/01/2009
 Easting: 313433 Northing: 261574

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

Ground level O.D.: 70.5m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.12-0.15					70.35			'TOPSOIL' horizon: very soft to firm, crumbly pods to brit generally massive, very dark greyish brown (3/2, 10YR) clay loam with common grass roots and roots.
0.5								'B/C' horizon (SUBSOIL): very soft to firm, massive (but fissile below 1.5m depth owing to layering from 'lifts'), very dark greyish brown (3/2, 10YR) SILT/CLAY with common gravels and occasional cobbles and boulders. Subsoil is unmottled. Some sandy SILT/CLAY pods up to 0.5m across.
1.0								
1.5								
2.0								
2.3					68.2			
2.5								Trial pit completed at 2.3m on very dark greyish brown, massive, stiff boulder clay 'fill'.
3.0								
3.5								
4.0								
4.5								
5.0								

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<p>Plan</p>  <p style="text-align: center;">Bearing : 152° (NW-SE)</p>	<p>Stability : Trial pit walls very consolidated, and material very competent.</p> <hr/> <p>General remarks : Dug in southwestern portion of the low, 'failed' forestry area. Dug on a 1° slope, falling northwards.</p> <hr/> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>Groundwater : Water table rests at 2.04m bgl.</p> </td> <td style="width: 50%; vertical-align: top;"> <p>Sequence summary: Well drained, shallow, 'filled' topsoil over filled boulder clay, 'lifted' on-site.</p> </td> </tr> </table>	<p>Groundwater : Water table rests at 2.04m bgl.</p>	<p>Sequence summary: Well drained, shallow, 'filled' topsoil over filled boulder clay, 'lifted' on-site.</p>
<p>Groundwater : Water table rests at 2.04m bgl.</p>	<p>Sequence summary: Well drained, shallow, 'filled' topsoil over filled boulder clay, 'lifted' on-site.</p>		

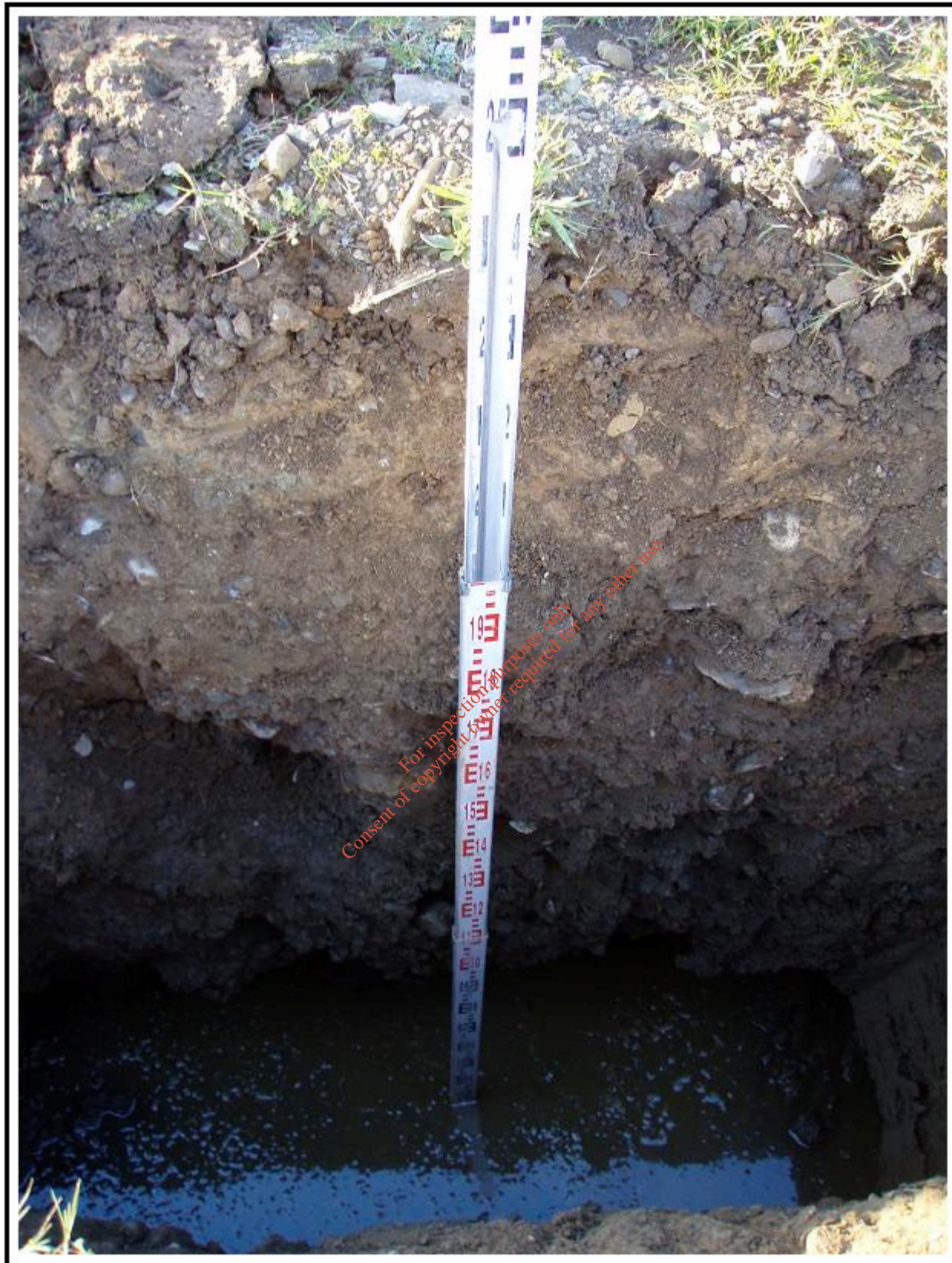


Plate A7: Profile of shallow topsoil overlying subsoil in trial hole no. 7. The water table seeps into this hole and rests at 2.04m depth below surface. See the complete absence of waste material and the preponderance of 'clean' imported subsoil here.

TRIAL PIT RECORD TP8

Project: Waste Licence Application at Naul

Site: Naul
 Client: John Sheils Planning/Env. Ltd.
 Project No.: 16/046

Method and Equipment: JCB 3X Backhoe Excavator

Logged by: R. Meehan




Date: 06/01/2009

Easting: 313488

Northing: 261725

All dimensions on this sheet are in metres unless otherwise stated

Ground level O.D.: 65.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.31-0.42 0.5						64.65	TOPSOIL 'A' horizon: very soft, crumb to subangular blocky, very dark greyish brown (3/2, 10YR) sandy clay loam with abundant glass roots and roots etc.	
1.0							'C ₁ ' horizon (SUBSOIL 1): very soft, massive (yet slightly fissile owing to layering from 'lifts'), very dark greyish brown (3/2, 10YR) and dark yellowish brown (3/4, 10YR) but unmottled SILT/CLAY with abundant gravels (filled material).	
1.2-1.3 1.5						63.75	'C ₂ ' horizon (SUBSOIL 2): stiff to very stiff, massive (yet fissile owing to layering from 'lifts'), very dark greyish brown (3/2, 10YR) gravelly slightly sandy SILT/CLAY with some shell fragments (<i>in situ</i> material).	
2.0						62.8	Trial pit completed at 2.2m on very dark greyish brown, massive, very stiff, <i>in situ</i> boulder clay.	
2.2								
2.5								
3.0								
3.5								
4.0								
4.5								
5.0								

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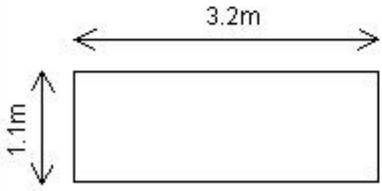
<p>Plan</p>  <p style="text-align: center;">Bearing : 52° (SW-NE)</p>	<p>Stability : Trial pit walls very consolidated, and material very competent.</p> <p>General remarks : Dug in northern portion of the low, 'failed' forestry area. Dug on a 1° slope, falling northwards.</p> <p>Groundwater : Dry initially, but some seeps below 1m depth.</p> <p>Sequence summary: Well drained, deep, 'filled' topsoil and subsoil over <i>in situ</i> boulder clay.</p>
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Plate A8: Profile of deep topsoil overlying 2 no. subsoil units in trial hole no. 8. Though initially dry, some groundwater seeps into this hole at depths below 1.0m below surface. See again the complete absence of waste material in the imported, uppermost subsoil units, and the *in situ* subsoil underneath.

TRIAL PIT RECORD TP9

Project: Waste Licence Application at Naul

Site: Naul
 Client: John Sheils Planning/Erw. Ltd.
 Project No.: 16/046

Method and Equipment: JCB 3X Backhoe Excavator

Logged by: R. Meehan

Date: 06/01/2009

Easting: 313712

Northing: 261819

All dimensions on this sheet are in metric unless otherwise stated

Ground level IOD: 64.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.34-0.4 0.5							TOPSOIL 'A' horizon: compact to very soft, crumb to massive, very dark greyish brown (3/2, 10YR) CLAY with abundant grass roots and rootlets.	
1.0							'C' horizon (SUBSOIL): very stiff to hard, massive, dark greyish brown (4/2, 10YR) gravelly SILT/CLAY, with occasional shell fragments. Subsoil is unmottled. Some pods of gravelly CLAY up to 0.6m across.	
1.5								
2.0								
2.2								
2.5					61.8		Trial pit completed at 2.2m on dark greyish brown, massive, hard, <i>in situ</i> boulder clay.	
3.0								
3.5								
4.0								
4.5								
5.0								

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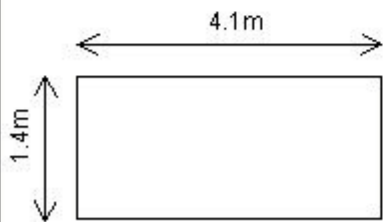
<p>Plan</p>  <p>Bearing : 90° (W-E)</p>	<p>Stability :</p> <p>Trial pit walls very consolidated, and material extremely competent.</p>	
	<p>General remarks :</p> <p>Dug in northeastern portion of the of the low, forestry area. Dug on a 2° slope, falling northwards. Topsoil is very stiff CLAY and is of very poor quality.</p>	
	<table border="0"> <tr> <td> <p>Groundwater :</p> <p>Dry.</p> </td> <td> <p>Sequence summary:</p> <p>Well drained, shallow to deep, 'filled' CLAY 'topsoil' over <i>in situ</i> boulder clay.</p> </td> </tr> </table>	<p>Groundwater :</p> <p>Dry.</p>
<p>Groundwater :</p> <p>Dry.</p>	<p>Sequence summary:</p> <p>Well drained, shallow to deep, 'filled' CLAY 'topsoil' over <i>in situ</i> boulder clay.</p>	



Plate A9: Profile of relatively shallow topsoil overlying overconsolidated, very stiff to hard subsoil in trial hole no. 9. See again the complete absence of waste material in the clean *in situ* subsoil here also. The topsoil is of very poor quality and may actually comprise mostly CLAY subsoil. The hole was dry to 2.2m depth.

TRIAL PIT RECORD TP10




Project: Waste Licence Application at Naul

Site: Naul
 Client: John Sheils Planning/Env. Ltd.
 Project No.: 16/046

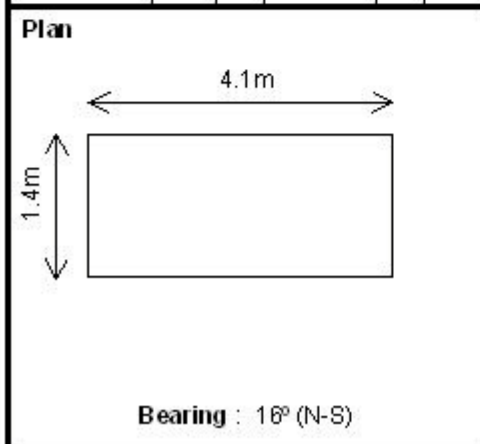
Method and Equipment: JCB 3X Backhoe Excavator
 Logged by: R. Meehan Date: 06/01/2009
 Easting: 313711 Northing: 261705

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

Ground level O.D.: 68.5m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.18-0.2					68.3			TOPSOIL 'A' horizon: compact, crumb, dark brown (3/3, 10YR) silty clay loam with abundant grass roots and rootlets.
0.32-0.4					68.1			TOPSOIL 'B' horizon: firm to stiff, massive, very dark greyish brown (3/2, 10YR) gravelly SILT/CLAY with occasional rootlets.
1.0								'C' horizon (SUBSOIL): very stiff to hard, massive (yet slightly fissile owing to layering from 'lifts'), dark yellowish brown (3/4, 10YR) gravelly sandy SILT/CLAY with common gravels, cobbles and boulders.
1.5								Subsoil is unmottled.
2.0								Some gravelly SILT pods up to 0.4m across.
2.25					66.25			Trial pit completed at 2.25m on dark yellowish brown, massive, hard, <i>in situ</i> boulder clay.
2.5								
3.0								
3.5								
4.0								
4.5								
5.0								

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

General remarks :
 Dug in southeastern portion of the forestry area. Dug in a flat locality, where trees are growing.

Groundwater :
 Dry.

Sequence summary:
 Well drained, deep, 'filled' topsoil over *in situ* boulder clay.



Plate A10: Profile of relatively shallow topsoil overlying overconsolidated, very stiff to hard subsoil in trial hole no. 10. See again the complete absence of waste material in this *in situ* subsoil material. The topsoil is of slightly better quality here and the subsoil is slightly more aerated. The hole was dry to 2.25m depth.

TRIAL PIT RECORD TP11

Project: Waste Licence Application at Naul

Site: Naul
 Client: John Sheils Planning/Env. Ltd.
 Project No.: 16/046

Method and Equipment: JCB 3X Backhoe Excavator

Logged by: R. Meehan

Date: 06/01/2009

Easting: 313449

Northing: 261269

All dimensions on this sheet are in metres unless otherwise stated

Ground level IOD: 75.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5					72.6		No topsoil layer. Uppermost 0.2m is slightly more open with some frost cracks.	
1.0				'C' horizon (SUBSOIL): very soft to stiff (alternating, layer to layer), massive (yet fissile owing to layering from 'lifts'), very dark brown (3/3, 10YR) sandy SILT/CLAY with abundant gravels, cobbles and boulders.				
1.5				Subsoil is unmottled.				
2.0				Occasional pieces of concrete, with some wood and branches also.				
2.4								
2.5				Trial pit completed at 2.4m on very dark brown, massive, stiff boulder clay 'fill'.				
3.0								
3.5								
4.0								
4.5								
5.0								

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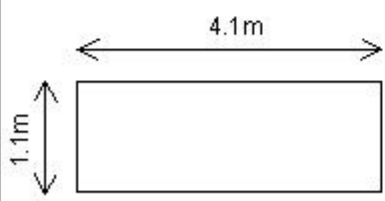
<p>Plan</p>  <p style="text-align: center;">4.1m</p> <p style="text-align: center;">1.1m</p> <p style="text-align: center;">Bearing : 24° (SW-NE)</p>	<p>Stability :</p> <p>Trial pit walls very consolidated, and material very competent.</p> <hr/> <p>General remarks :</p> <p>Dug in southern portion of recently-filled eastern portion of the site, into an area of bare ground. Dug on a flat, low ridge summit.</p> <hr/> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Groundwater :</td> <td style="width: 50%;">Sequence summary:</td> </tr> <tr> <td>Dry.</td> <td>Deep, 'filled' boulder clay, 'lifted' on-site. No topsoil.</td> </tr> </table>	Groundwater :	Sequence summary:	Dry.	Deep, 'filled' boulder clay, 'lifted' on-site. No topsoil.
Groundwater :	Sequence summary:				
Dry.	Deep, 'filled' boulder clay, 'lifted' on-site. No topsoil.				



Plate A11: Profile of overconsolidated subsoil with alternating layers of very soft to stiff material in trial hole no. 11. Here some buried pieces of concrete are seen at depth. No topsoil has been emplaced above this material as of yet, and the ground is bare.

TRIAL PIT RECORD TP12

Project: Waste Licence Application at Naul

Site: Naul
 Client: John Sheils Planning/Env. Ltd.
 Project No.: 16/046

Method and Equipment: JCB 3X Backhoe Excavator

Logged by: R. Meehan

Date: 06/01/2009

Easting: 313451

Northing: 261402

All dimensions on this sheet are in metric unless otherwise stated

Ground level IOD: 75.5m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5							No topsoil layer. Uppermost 0.2m is slightly more open but very clayey, with some frost cracks.	
1.0							'C' horizon (SUBSOIL): very soft to stiff (alternating, layer to layer), massive (yet fissile owing to layering from 'lifts'), very dark brown (3/3, 10YR) sandy SILT/CLAY with abundant gravels, cobbles and boulders.	
1.5							Subsoil is unmottled.	
2.0							Occasional pieces of concrete, with some wood and branches also.	
2.35					73.15		Trial pit completed at 2.35m on very dark brown, massive, stiff boulder clay 'fill'.	
2.5								
3.0								
3.5								
4.0								
4.5								
5.0								

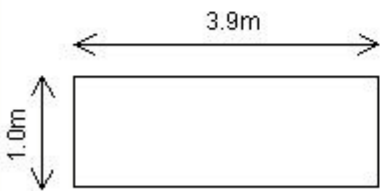
<p>Plan</p>  <p>Bearing : 66° (NW-SE)</p>	<p>Stability :</p> <p>Trial pit walls very consolidated, and material very competent.</p>	
	<p>General remarks :</p> <p>Dug in central portion of recently-filled eastern portion of the site, into an area of bare ground. Dug on a flat, low ridge summit.</p>	
	<table border="1"> <tr> <td> <p>Groundwater :</p> <p>Dry.</p> </td> <td> <p>Sequence summary:</p> <p>Deep, 'filled' boulder clay, 'lifted' on-site. No topsoil.</p> </td> </tr> </table>	<p>Groundwater :</p> <p>Dry.</p>
<p>Groundwater :</p> <p>Dry.</p>	<p>Sequence summary:</p> <p>Deep, 'filled' boulder clay, 'lifted' on-site. No topsoil.</p>	



Plate A12: Profile of overconsolidated subsoil with alternating layers of very soft to stiff material in trial hole no. 12. Here also some buried pieces of concrete are seen at depth. No topsoil has been emplaced above this material as of yet, and the ground is bare.

TRIAL PIT RECORD TP13

Project: Waste Licence Application at Naul

Site: Naul
 Client: John Sheils Planning/Erw. Ltd.
 Project No.: 16/046

Method and Equipment: JCB 3X Backhoe Excavator

Logged by: R. Meehan

Date: 06/01/2009

Easting: 313491

Northing: 261437

All dimensions on this sheet are in metric unless otherwise stated

Ground level (OD): 75.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5							No topsoil layer. Uppermost 0.2m is slightly has some frost cracks.	
1.0							'C' horizon (SUBSOIL): very soft to stiff (alternating, layer to layer), massive (yet fissile owing to layering from 'lifts'), very dark brown (2/2, 10YR) slightly sandy SILT/CLAY with abundant gravels, cobbles and boulders.	
1.5								
2.0							Subsoil is unmottled.	
2.35							Occasional pieces of concrete, with some wood, wire, cloth and branches also.	
2.5					72.65		Trial pit completed at 2.35m on very dark brown, massive, stiff boulder clay 'fill'.	
3.0								
3.5								
4.0								
4.5								
5.0								

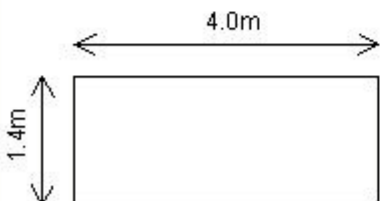
<p>Plan</p>  <p>Bearing : 108° (N-S)</p>	<p>Stability :</p> <p>Trial pit walls very consolidated, and material very competent.</p>	
	<p>General remarks :</p> <p>Dug in northern portion of recently-filled eastern portion of the site, into an area of bare ground. Dug on a 1° slope, falling northwards.</p>	
	<table border="1"> <tr> <td> <p>Groundwater :</p> <p>Dry.</p> </td> <td> <p>Sequence summary:</p> <p>Deep, 'filled' boulder clay, 'lifted' on-site. No topsoil.</p> </td> </tr> </table>	<p>Groundwater :</p> <p>Dry.</p>
<p>Groundwater :</p> <p>Dry.</p>	<p>Sequence summary:</p> <p>Deep, 'filled' boulder clay, 'lifted' on-site. No topsoil.</p>	



Plate A13: Profile of overconsolidated subsoil with alternating layers of very soft to stiff material in trial hole no. 13. Buried pieces of concrete, wire, branches and cloth also occur. No topsoil has been emplaced above this material as of yet either, and the ground is bare.

Project: Waste Licence Application at Naul

Site: Naul
 Client: John Sheils Planning/Erw. Ltd.
 Project No.: 16/046

Method and Equipment: Log of soil profile from existing spoil area

Logged by: R. Meehan Date: 21/01/2009

Easting: 313418 Northing: 261332

All dimensions on this sheet are in metres unless otherwise stated

Ground level (O.D. rtp): 75.5m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5							<p>TOPSOIL 'A' horizon: clods of firm, massive, dark yellowish brown (4/4, 10YR) clay loam with occasional gravels and occasional roots and rootlets.</p> <p>Subsoil is unmottled.</p> <p>Some brown (4/3, 10YR) pods up to 0.4m across.</p> <p>Occasional fragments of plastic pipe, but very rare.</p> <p>Section base at 5.0m on very dark grey, massive, very stiff boulder clay 'fill'.</p>	
1.0								
1.5								
2.0								
2.0-2.2				73.3				
2.5								
3.0								
3.5								
4.0								
4.5								
5.0								

<p>Plan</p> <p>Face bearing : 10° (N-S)</p>	<p>Stability :</p> <p>Material very consolidated and competent.</p>	
	<p>General remarks :</p> <p>Dug in southeastern portion of the site, into the main face of imported fill around the existing pit area.</p>	
	<table border="1"> <tr> <td> <p>Groundwater :</p> <p>Dry.</p> </td> <td> <p>Sequence summary:</p> <p>Well drained, deep, 'filled' topsoil over filled boulder clay, 'lifted' on-site.</p> </td> </tr> </table>	<p>Groundwater :</p> <p>Dry.</p>
<p>Groundwater :</p> <p>Dry.</p>	<p>Sequence summary:</p> <p>Well drained, deep, 'filled' topsoil over filled boulder clay, 'lifted' on-site.</p>	



Plate A14: Profile of recently-lain topsoil overlying overconsolidated subsoil at the side of the main eastern fill area. This material is very clean with only one small portion of waste material (plastic pipe) seen.

PROFILE RECORD PF15

Project: Waste Licence Application at Naul

Site: Naul
Client: John Sheils Planning/Erw. Ltd.
Project No.: 16/046



Method and Equipment: Log of hole profile from existing spoil area

Logged by: R. Meehan Date: 21/01/2009

Easting: 313397 Northing: 261395

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

Ground level (OD) (top): 75.0m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details			
Depth taken	Type	No			O.D. Level	Legend	Depth	Description
0.5					74.5		TOPSOIL 'A' horizon: firm, massive, dark yellowish brown (4/4, 10YR) clay loam with occasional gravels and occasional roots and rootlets.	
1.0							'C' horizon (SUBSOIL): firm to very stiff, massive (yet slightly fissile owing to layering from 'lifts'), very dark greyish brown (3/2, 10YR) SILT/CLAY with common gravels and occasional cobbles and boulders.	
1.5							Pockets of CLAY up to 0.8m deep and 2.5m long.	
2.0							Subsoil is unmottled.	
2.5							Some brown (4/3, 10YR) pods up to 2.1m across.	
3.0								
3.5								
4.0								
4.5								
5.0							Section base at 5.0m on very dark greyish brown, massive, very stiff boulder clay 'fill'.	

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Plan Face bearing : 170° (N-S)	Stability : Material very consolidated and competent.	
	General remarks : Dug in northeastern portion of the site, into the main face of imported fill around the existing pit area.	
	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Groundwater : Dry. Some surface water at base in main pit floor.</td> <td style="width: 50%;">Sequence summary: Well drained, deep, 'filled' topsoil over filled boulder clay, 'lifted' on-site.</td> </tr> </table>	Groundwater : Dry. Some surface water at base in main pit floor.
Groundwater : Dry. Some surface water at base in main pit floor.	Sequence summary: Well drained, deep, 'filled' topsoil over filled boulder clay, 'lifted' on-site.	



Plate A15: Profile of relatively shallow, recently-lain topsoil overlying overconsolidated subsoil at the northern side of the main eastern fill area. This material is very clean also.

PROFILE RECORD PF16

Project: Waste Licence Application at Naul

Site: Naul
 Client: John Sheils Planning/Erw. Ltd.
 Project No.: 16/046

Method and Equipment: Log of hole profile from existing spoil area

Logged by: R. Meehan


Date: 21/01/2009

Easting: 313517

Northing: 261447

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

Ground level (OD) (top): 72.5m

Samples & in-situ tests			Result Peak (Residual)	Water	Strata details		
Depth taken	Type	No			O.D. Level	Legend	Depth
0.5							'C' horizon (SUBSOIL): firm to very stiff, massive (yet slightly fissile owing to layering from 'lifts'), very dark greyish brown (3/2, 10YR) SILT/CLAY with common gravels and occasional cobbles and boulders.
1.0							Subsoil is unmottled.
1.5				71.0			Section base at 1.5m on very dark greyish brown, massive, very stiff boulder clay 'fill'.
2.0							
2.5							
3.0							
3.5							
4.0							
4.5							
5.0							

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<p>Plan</p> <p style="text-align: right;">Face bearing : 40° (SW-NE)</p>	<p>Stability :</p> <p>Material very consolidated and competent.</p>	
	<p>General remarks :</p> <p>Dug in eastern extreme of the site, into a low face at the edge of the southeastern circling trackway.</p>	
	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;"> <p>Groundwater :</p> <p>Dry.</p> </td> <td style="width: 50%;"> <p>Sequence summary:</p> <p>Well drained, deep, 'filled' boulder clay, 'lifted' on-site.</p> </td> </tr> </table>	<p>Groundwater :</p> <p>Dry.</p>
<p>Groundwater :</p> <p>Dry.</p>	<p>Sequence summary:</p> <p>Well drained, deep, 'filled' boulder clay, 'lifted' on-site.</p>	



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Plate A16: Profile of relatively shallow exposure into subsoil at the eastern extreme of the fill area. This material is also very clean.

PROFILE RECORD PF17

Project: Waste Licence Application at Naul

Site: Naul
 Client: John Sheils Planning/Erw. Ltd.
 Project No.: 16/046

Method and Equipment: Log of hole profile from existing spoil area

Logged by: R. Meehan


Date: 21/01/2009

Easting: 313359

Northing: 261455

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

Ground level (O.D. (top)): 76.0m

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							'C' horizon (SUBSOIL): firm to very stiff, massive (yet slightly fissile owing to layering from 'lifts'), very dark greyish brown (3/2, 10YR) SILT/CLAY with common gravels and occasional cobbles and boulders.	
2.5							Cobbles and boulders increase with depth and the material becomes gravelly.	
3.0							Subsoil is unmottled.	
3.5								
4.0								
4.5								
5.0				71.0				Section base at 5.0m on very dark greyish brown, massive, very stiff boulder clay 'fill'.

<p>Plan</p> <p>Face bearing : 80° (W-E)</p>	<p>Stability :</p> <p>Material very consolidated and competent.</p>	
	<p>General remarks :</p> <p>Dug in northeastern portion of the site, into the main face of imported fill around the northern edge of the existing pit area.</p>	
	<table border="1"> <tr> <td> <p>Groundwater :</p> <p>Dry. Some surface water at base in main pit floor.</p> </td> <td> <p>Sequence summary:</p> <p>Well drained, deep, 'filled' boulder clay, 'lifted' on-site.</p> </td> </tr> </table>	<p>Groundwater :</p> <p>Dry. Some surface water at base in main pit floor.</p>
<p>Groundwater :</p> <p>Dry. Some surface water at base in main pit floor.</p>	<p>Sequence summary:</p> <p>Well drained, deep, 'filled' boulder clay, 'lifted' on-site.</p>	

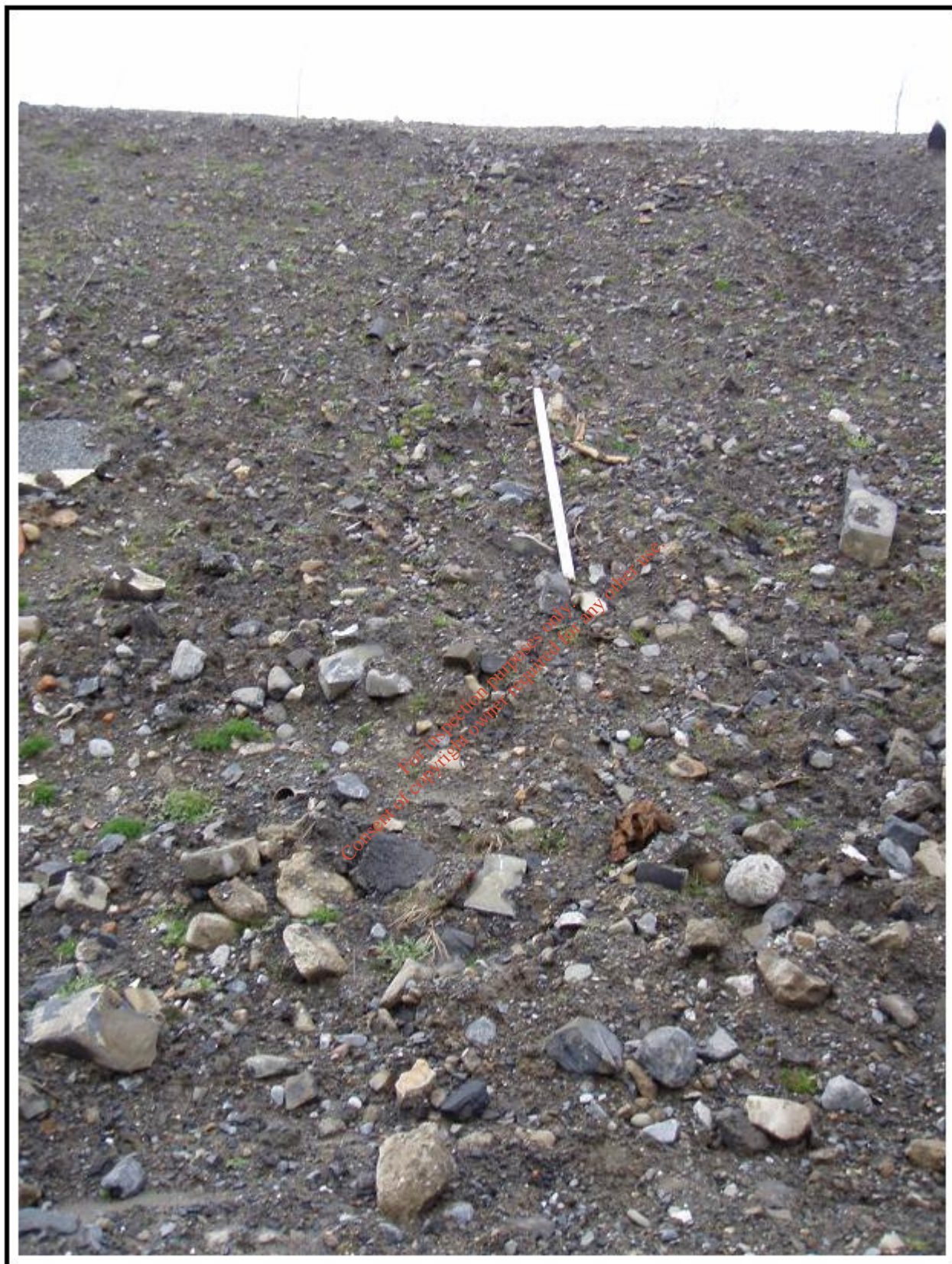


Plate A17: Profile of exposure into subsoil at the northeastern extreme of the main pit area. This material is clean, and gets more gravelly and 'bouldery' at the base.

PROFILE RECORD PF18

Project: Waste Licence Application at Naul


Site: Naul
 Client: John Sheils Planning/Erw. Ltd.
 Project No.: 16/046

Method and Equipment: Log of hole profile from existing spoil area

Logged by: R. Meehan Date: 21/01/2009
 Easting: 313291 Northing: 261436

All dimensions on this sheet are in metric unless otherwise stated

Ground level (O.D. (top)): 77.0m

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								'C' horizon (SUBSOIL): firm to very stiff, massive (yet slightly fissile owing to layering from 'lifts'), very dark greyish brown (3/2, 10YR) SILT/CLAY with common gravels and occasional cobbles and boulders.
2.5								Cobbles and boulders increase with depth and the material becomes 'gravelly'.
3.0								Subsoil is unmottled.
3.5								
4.0								
4.5								
5.0						72.0		Section base at 5.0m on very dark greyish brown, massive, very stiff boulder clay 'fill'.

<p>Plan</p> <p>Face bearing : 80° (W-E)</p>	<p>Stability :</p> <p>Material very consolidated and competent.</p>	
	<p>General remarks :</p> <p>Dug in northwestern portion of the site, into the main face of imported fill around the northern edge of the existing pit area.</p>	
	<table border="1"> <tr> <td> <p>Groundwater :</p> <p>Dry. Some surface water at base in main pit floor.</p> </td> <td> <p>Sequence summary:</p> <p>Well drained, deep, 'filled' boulder clay, 'lifted' on-site.</p> </td> </tr> </table>	<p>Groundwater :</p> <p>Dry. Some surface water at base in main pit floor.</p>
<p>Groundwater :</p> <p>Dry. Some surface water at base in main pit floor.</p>	<p>Sequence summary:</p> <p>Well drained, deep, 'filled' boulder clay, 'lifted' on-site.</p>	



Plate A18: Profile of exposure into subsoil at the northwestern extreme of the main pit area. This material is clean, and again gets more gravelly and 'bouldery' at the base.

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 Naul.

I.6.2 Methodology

The purpose of the baseline study is to assess the existing levels of noise. Routine noise monitoring is carried out at the existing recovery facility in compliance with planning permission P.A Reg. Ref. QY/36 (17.QC.2085) and waste management permit (WMP 2005/25).

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 (Refer to Section I.6.4 below).

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 being 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 along the R108 Regional road to the west of the existing site.

The main noise sources in the area are from the R108 Regional Road and an adjacent concrete batching plant. The area of restored lands completed to date adjoins the north western boundary of the site. In general the future restoration works will be further removed from the nearest noise sensitive residences in the area. 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

Routine noise monitoring is carried out at nearby residences and site boundaries adjoining same (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 (21/04/2008) are included in Table I.6.(i) below.

Table I.6(i) Ambient Noise Assessment

Date: 21/04/08

Station	National Grid Reference (5N, 5E)	Sound Pressure Levels		
		L(A) _{eq}	L(A) ₁₀	L(A) ₉₀
N4:	313217E, 261445N	54.0	55.4	51.0
N5:	313157E, 261649N	52.3	54.2	49.4

- NOTE:** 1. All locations are identified on accompanying Figure F.1.
2. Weather Conditions – dry and overcast with sunny spells, Wind 1.6 – 5 m/s, 8-9°C.

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 planning permission P.A Reg. Ref. QY/36 (17.QC.2085) i.e. Condition No.7 - “the noise levels associated with day to day activity, when measured from any house in the vicinity of the quarry, shall not exceed 55 dB (a) leq over a measured time interval of one hour by day time and shall not exceed 45 dB (A) leq over a measured time of 15 minutes by night time. These levels may be

exceeded to allow temporary but exceptionally noisy phases in the extraction process or for short term construction activity which is required to bring long-term environmental benefits following written consent by Meath County Council”.

I.6.5 Assessment of Impacts

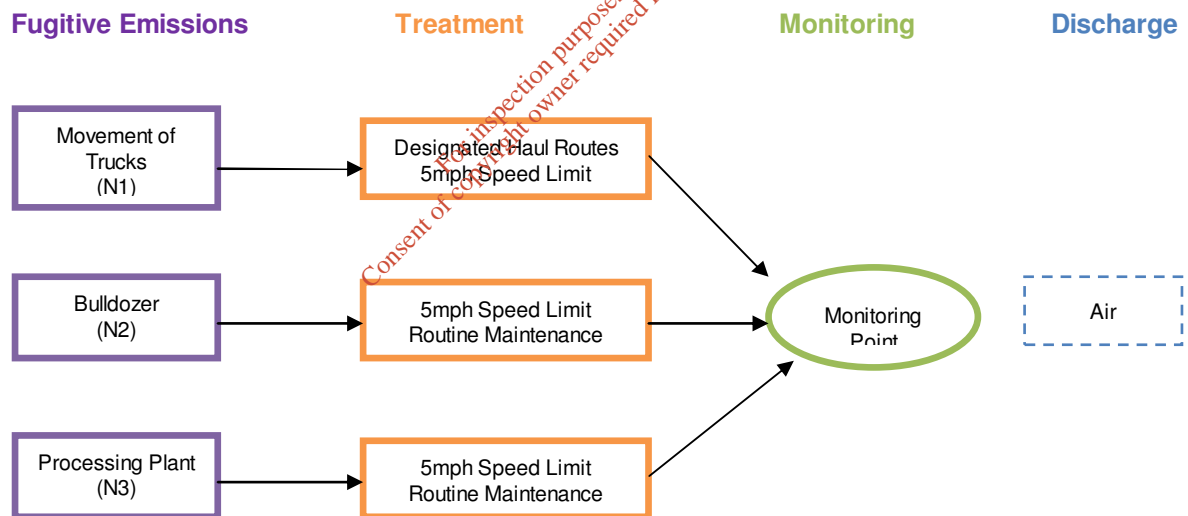
I.6.5.1 Direct Impacts

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. Environmental noise monitoring has been carried out at this location in compliance with both the terms of the Waste Management Permits and various planning permissions pertaining to the site. It should be noted that for most of this time the site activity was concentrated close to the nearest noise sensitive receptors (in particular adjoining environmental monitoring locations N4 and N5). Noise monitoring to date has

shown that noise levels due to site activity are within acceptable thresholds for this type of development. Given that site activity will in general be further removed from the nearest noise sensitive locations the overall impact with respect to noise will be further reduced with respect to the continuance of operations.

I.6.5.2 Indirect Impacts

The main noise sources in the area are from the R108 Regional Road and an adjacent concrete batching plant.

The area of restored lands completed to date adjoins the north eastern boundary of the site. In general the future restoration works will be further removed from the nearest noise sensitive residences in the area. 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 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 has 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”*.

Following discussion with the EPA it has been agreed to include a further two monitoring locations (N6, N7). In total the four noise monitoring stations correspond with the dust monitoring locations and include the nearest noise sensitive locations (Refer to Figure F.1). It is proposed to carry out 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 2nd Edition (2006) *“the noise attributable to on-site activities should not generally exceed a free-field LA_{r,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 LA_{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.

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I.7 Assessment of Ecological Impacts & Mitigation Measures

The site currently forms part of an active sand and gravel pit and as such there are no undisturbed lands that will be affected by the continuation of the progressive restoration of the site using imported inert materials.

The lands are currently being restored to agricultural use by importation and recovery of inert materials in accordance with a phased restoration scheme. 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.