

NOVEMBER 2017 | Project No. 33.1.13.39.2015.10

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR)

APPENDICES

For further extraction of a quarry & and all related ancillary site works over an application site area of 21.9 ha. with excavation over an area of 13.6 ha.

To accompany an application for permission for a quarry under S.37L of the Planning & Development Act, 200 (as amended)

Powerstown,
Nurney,
Co. Carlow

On behalf of
Dan Morrissey Ireland Ltd. (In Receivership)

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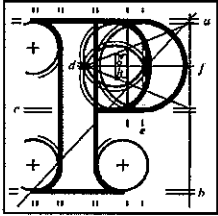
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APPENDIX 1.1 RECEIPTS OF CONCURRENT APPLICATIONS FOR SUBSTITUTE CONSENT

ABP-300034-17 Quarry area receipt of substitute consent application and acknowledgement letter

ABP-300037-17 Plant area receipt of substitute consent application and acknowledgement letter



An
Bord
Pleanála

Admháil ar an bhFáil
Acknowledgement of Receipt
Uimh. Aitheantais Lóisteála:
Lodgement ID: LDG-100023-17

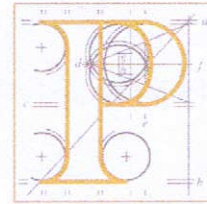
| | |
|---|-------------------------------|
| Ainm an chustaiméara: Name of Customer: | Paul McCann & Stephen Tennant |
| Gníomhaire: Agent: | Planex |
| Cineál Lóisteála: Lodgement type: | Application |
| Modh Lóisteála: Lodgement method: | In Person |
| Íocaíocht Faighte: Payment received: | €38,000.00 |
| Uimhir Thagartha Íocaíochta: Payment Reference Number: | PD-000021-17 |
| Modh Íocaíochta: Payment Method: | Cheque |
| Lóisteáil Faighte: Lodgement Received: | 24/10/2017 16:52 |
| Faighte ag: Received by: | Susan Moloney |

AN BORD PLEANÁLA
TIME _____ BY _____
24 OCT 2017
RECEIVED BY _____
PL _____

Our Ref: ABP-300034-17

PA Reg Ref:

Your Ref:



An
Bord
Pleanála

Property Resource Planning Management & Development Limited
70 Glengarrif Parade
Phibsborough

Dublin
Dublin 7
Ireland

Date: 06/11/2017

Re: Quarry

Clonmesh and Garyhundon, Nurney, Co. Carlow

Dear Sir / Madam

An Bord Pleanála has received your substitute consent application in respect of the above mentioned development.

Please be aware that section 177M of the Planning and Development Act 2000, as amended (as inserted by section 57 of the Planning and Development (Amendment) Act 2010) provides that where the Board grants an application for substitute consent under section 177K in a case where it granted leave to apply for substitute consent on the grounds that exceptional circumstances exist, or in a case where the application is made in compliance with a direction to apply for substitute consent under section 261A of the Planning and Development Act, 2000 as amended, it may determine that a sum or sums is or are required to be paid in order to defray some or all of the costs incurred by the Board or the planning authority during the course of consideration of the application and may direct the applicant to pay the sum or sums to the Board or the planning authority or both, as the case may be.

In circumstances where the Board makes a provisional decision to direct an applicant for substitute consent to pay an additional sum or sums (beyond the application fee already paid) to it and/or the planning authority under this section it is required to notify the applicant of this provisional decision at the same time as notifying it of the Board's decision on the substitute consent application. Section 177M furthermore provides that an applicant who receives a notification in relation to such a provisional costs decision can at that stage and within 2 weeks of the date of such notice make submissions or observations to the Board in relation to the sum or sums so notified. The Board shall consider any such submissions made to it and shall then decide to confirm, vary or withdraw the original costs notice and give notice to the applicant of the Board's final decision and the reasons therefore.

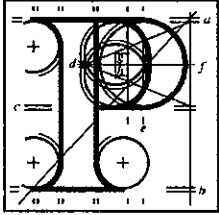
The Board will now consider the validity of the application by reference to the requirements of section 177E (2) of the Planning and Development Acts 2000 to 2014 and articles 223, 224, 225, and 227 of the Planning and Development (Amendment) (No.3) Regulations.

Teil
Glao Áitiúil
Facs
Láithreán Gréasáin
Riomphost

Tel (01) 858 8100
LoCall 1890 275 175
Fax (01) 872 2684
Website www.pleanala.ie
Email bord@pleanala.ie

64 Sráid Maolbhríde
Baile Átha Cliath 1
D01 V902

64 Marlborough Street
Dublin 1
D01 V902



An
Bord
Pleanála

Admháil ar an bhFáil
Acknowledgement of Receipt
Uimh. Aitheantais Lóisteála:
Lodgement ID: LDG-100024-17

| | |
|---|-------------------------------|
| Ainm an chustaiméara: Name of Customer: | Paul McCann & Stephen Tennant |
| Gníomhaire: Agent: | Planex |
| Cineál Lóisteála: Lodgement type: | Application |
| Modh Lóisteála: Lodgement method: | In Person |
| Íocaíocht Faighte: Payment received: | €9,783.20 |
| Uimhir Thagartha Íocaíochta: Payment Reference Number: | PD-000022-17 |
| Modh Íocaíochta: Payment Method: | Cheque |
| Lóisteáil Faighte: Lodgement Received: | 24/10/2017 16:53 |
| Faighte ag: Received by: | Ian Conroy |

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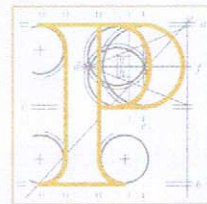
64 Marlborough Street
Dublin 1
D01 V902

H.
RECEIVED

Our Ref:

PA Reg Ref:

Your Ref:



An
Bord
Pleanála

Property Resource Planning Management & Development Limited
70 Glengarriff Parade
Phibsborough
Dublin
Dublin 7
Ireland

Date: 08/11/2017

Re:

Dear Sir / Madam

An Bord Pleanála has received your substitute consent application in respect of the above mentioned development.

Please be aware that section 177M of the Planning and Development Act 2000, as amended (as inserted by section 57 of the Planning and Development (Amendment) Act 2010) provides that where the Board grants an application for substitute consent under section 177K in a case where it granted leave to apply for substitute consent on the grounds that exceptional circumstances exist, or in a case where the application is made in compliance with a direction to apply for substitute consent under section 261A of the Planning and Development Act, 2000 as amended, it may determine that a sum or sums is or are required to be paid in order to defray some or all of the costs incurred by the Board or the planning authority during the course of consideration of the application and may direct the applicant to pay the sum or sums to the Board or the planning authority or both, as the case may be.

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APPENDIX 1.2 REVIEW OF INFORMATION CONTAINED IN EIAR AS REQUIRED UNDER ANNEX IV 'INFORMATION REFERRED TO IN ARTICLE 5(1)' OF 2014 EIA DIRECTIVE.

| Annex IV Information Requirements |
|--|
| 1. Description of the project, including in particular: |
| a) a description of the location of the project; |
| b) a description of the physical characteristics of the whole project, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases; |
| c) a description of the main characteristics of the operational phase of the project (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used; |
| d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operation phases. |
| 2. A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects. |
| 3. A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge. |
| 4. A description of the factors specified in Article 3(1) likely to be significantly affected by the project: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape. |
| 5. A description of the likely significant effects of the project on the environment resulting from, inter alia: |
| (a) the construction and existence of the project, including, where relevant, demolition works; |
| (b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources; |
| (c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste; |
| (d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters); |
| (e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources; |
| (f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change; |
| (g) the technologies and the substances used. |
| The description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the project. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project. |
| 6. A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved. |
| 7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases. |
| 8. A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies. |
| 9. A non-technical summary of the information provided under points 1 to 8. |
| 10. A reference list detailing the sources used for the descriptions and assessments included in the report. |

APPENDIX 1.3 REVIEW OF INFORMATION CONTAINED IN AN EIS AS REQUIRED UNDER SCHEDULE 6 OF THE P&D REGULATIONS.

| Schedule 6 Information Requirements |
|---|
| 1. (a) A description of the proposed development comprising information on the site, design and size of the proposed development. |
| (b) A description of the measures envisaged in order to avoid, reduce and, if possible, remedy significant adverse effects. |
| (c) The data required to identify and assess the main effects which the proposed development is likely to have on the environment. |
| (d) An outline of the main alternatives studied by the developer and an indication of the main reasons for his or her choice, taking into account the effects on the environment. |
| 2. Further information, by way of explanation or amplification of the information referred to in paragraph 1, on the following matters:- |
| (a)(i) a description of the physical characteristics of the whole proposed development and the land-use requirements during the construction and operational phases; |
| (a)(ii) a description of the main characteristics of the production processes, for instance, nature and quantity of the materials used; |
| (a)(iii) an estimate, by type and quantity, of expected residues and emissions (including water, air and soil pollution, noise, vibration, light, heat and radiation) resulting from the operation of the proposed development; |
| (b) a description of the aspects of the environment likely to be significantly affected by the proposed development, including in particular: |
| - human beings, fauna and flora, |
| - soil, water, air, climatic factors and the landscape, |
| - material assets, including the architectural and archaeological heritage, and the cultural heritage, |
| - the inter-relationship between the above factors; |
| (c) a description of the likely significant effects (including direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative) of the proposed development on the environment resulting from: |
| - the existence of the proposed development, |
| - the use of natural resources, |
| - the emission of pollutants, the creation of nuisances and the elimination of waste, |
| and a description of the forecasting methods used to assess the effects on the environment; |
| (d) an indication of any difficulties (technical deficiencies or lack of know-how) encountered by the developer in compiling the required information. |

APPENDIX 2.1 SUMMARY OF PLANNING & LICENSING HISTORY OF CLONMELSH & GARYHUNDON DMIL LANDS

| Reference ¹ CCC Carlow County Council ABP An Bord Pleanála | Development | Submission Date | Decision Date |
|--|--|-----------------|--|
| CCC Reg. Ref. 1509 | Install portable plant for washing chippings at Clonmelsh | 02 January 1970 | 09 March 1970 (grant) |
| CCC Reg. Ref. 2981 | Erection of 60 tonne weighbridge at Clonmelsh | 21 January 1974 | 13 February 1974 (grant) |
| CCC Reg. Ref. 2979 | Erection of gate entrance at Garyhundred | 21 January 1974 | 13 February 1974 (grant) |
| CCC Reg. Ref. 3842 | Extension of Plant at Clonmelsh | 12 April 1976 | 02 June 1976 (grant order) |
| CCC Reg. Ref. 92/137 | Construction of asphalt plant at Clonmelsh | 21 April 1992 | 17 July 1992 (grant) |
| CCC QY/25 | Section 261 Registration of 323 ha. site area and extraction area of 85 ha. | 27 April 2005 | 26 April 2006 (planning application & EIS required) |
| CCC DL7/233 & ABP 01.WW.0371 | Discharge License | 04 October 2007 | 25 June 2008 (grant) & 05 June 2009 (amend condition no. 4.8) |
| CCC APL 10/01 & ABP 01.LA.0085 | Air Pollution License | 29 January 2010 | 13 July 2010 (grant) & 25 February 2011 (amend conditions) |
| CCC Reg. Ref. 10/130 & ABP PL01.238679 | "...continued use and development of the quarry (extraction area 123.8 hectares) within an application area of 167.2 hectares. The proposed quarry floor level will be at -75 mOD. This application is submitted in accordance with the requirements of Section 261 of the Planning & Development Act, 2000 (Quarry Ref. No. 25)." | 28 April 2010 | 23 February 2011 (notification of grant) 27 May 2013 (appeal refusal) |
| CCC QY12/25 | Section 261A review of S.261 map noted a boundary of 316.29 ha. | n/a | 23 August 2012 (no further action) |
| CCC Reg. Ref. 12/240 & ABP PL01.242648 | Retention of certain processing plant and buildings and permission for replacement for new offices and wastewater treatment system. | 22 October 2012 | 14 October 2013 (notification of grant) 17 November 2014 (appeal refusal) |
| CCC SEC5/13/13 | the quarry and quarrying use of lands comprising registry folios CW2075F (part) in the townlands of Clonmelsh, Powerstown, and CW6086F in the townland of Garyhundred, Powerstown is exempted development. Sought by DMIL | 05 July 2013 | 01 August 2013 |
| CCC SEC5/13/16 & ABP RL01.3149 | related to quarrying activity taking place on land comprising folio CW2075F in the townlands of Clonmelsh, Powerstown, County Carlow (the "CW2075F lands"). This declaration raised eight specific questions which Garyhundred Residents Association requested the Council to determine. | 09 August 2013 | 04 September 2013 & 15 th January 2015 |
| CCC SEC5/13/17 & ABP RL01.3148 | related 8 queries in relation to quarrying activity taking place on land comprising land registry folio CW6086F in the townland of Garyhundred, Powerstown, County Carlow (the "CW6086F lands"). Also by Garyhundred Residents Association. | 09 August 2013 | 04 September 2013 & 15 th January 2015 |
| ABP LS01.LS0019 | Application for leave for substitute consent in respect of a quarry of 81 hectares (ha.) in extent over two benches to a depth of 25aOD located on lands at Clonmelsh and Garyhundred, Co. Carlow. Leave to apply for substitute consent is also sought for the associated plant located within the 81ha quarry site. | 06 July 2015 | 07 April 2017 (grant of leave for plant area 01.LS.0019 & grant of leave for quarry area 01.LQ.001) |
| ABP-300034-17 (Quarry) | Application for substitute consent for a quarry over two areas; 51 ha. in Clonmelsh to an average depth of approximately 25 AOD and 27 ha. in Garyhundred to an average depth of approximately 57 AOD granted leave under 01.SH0.235 | 24 October 2017 | |
| ABP-300037-17 (Plant Area) | Application for substitute consent for a plant area over 3.22 ha. at Clonmelsh granted leave under ref. 01.SH.0236 | 24 October 2017 | |

NOTE 1: Reg. Ref. = Planning Application Register Reference Number under Planning & Development Acts
 SEC = Section 5 Declaration under Planning and Development Act, 2000 as amended
 LS = Leave for substitute consent application under Planning & Development Act, 2000 as amended
 DL = Discharge License under Water Pollution Acts, 1977 - 2007
 APL = Air Pollution License under Air Pollution Act 1987







APPENDIX 6.1 TRIAL PIT LOGS SUBMITTED UNDER REG. REF. 10/130 EIS

NOTES

1. Refer to Figure 5.5 for Trial Pit Locations
2. Depths of contacts below surface in meters are written on the left of the column

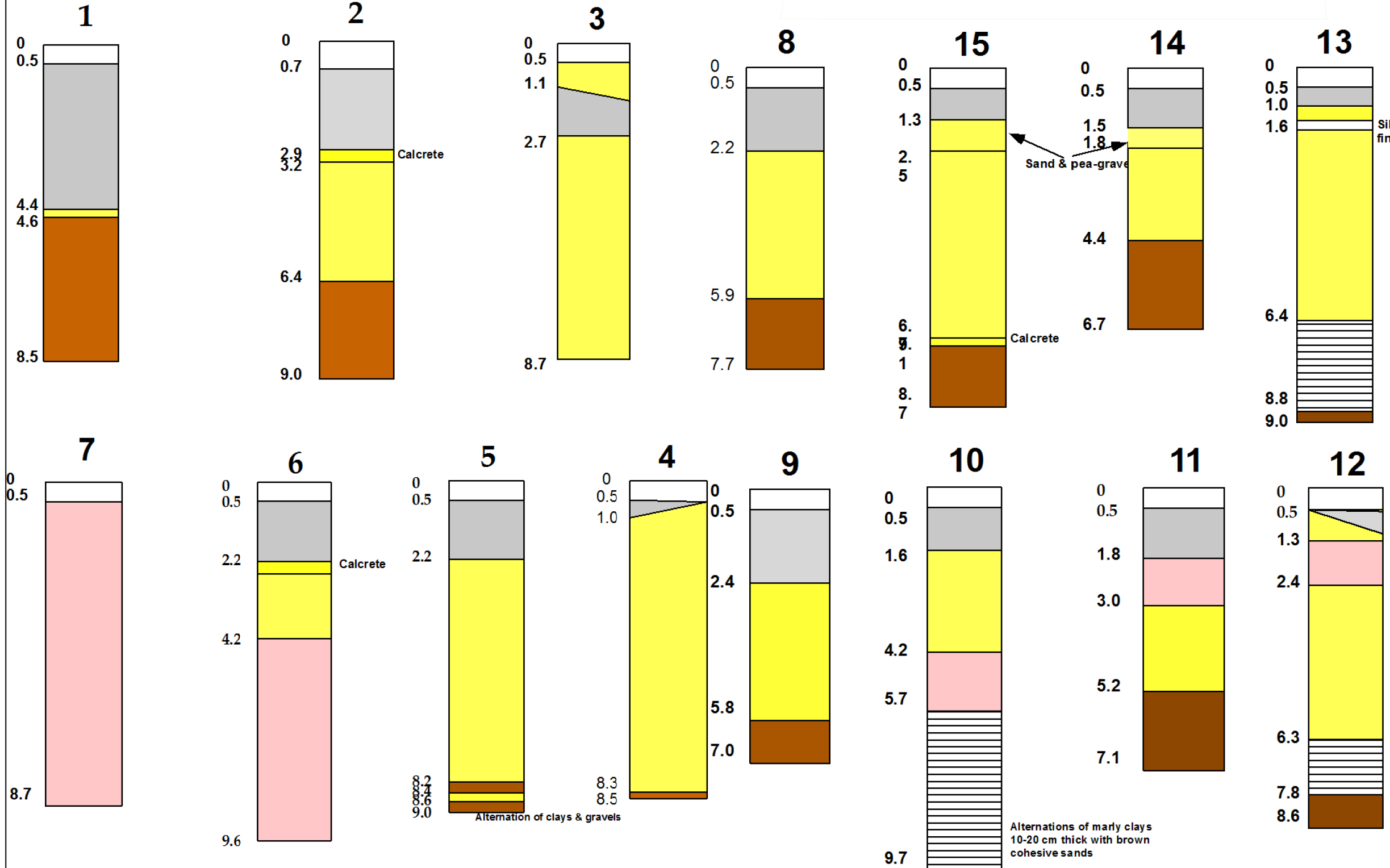
LEGEND

Key to colour coding of overburden

-  Soil.
-  Sandy & poorly cohesive till
Greyish-brown colour.
Predominantly limestone clasts.
-  Coarse limestone gravel with rare sand lenses
-  Dark brown clay-rich small stone till.
Bluish grey at depth.
-  Yellow, clay-rich gravels
and sands. Sticky & cohesive.
-  Clean, well-bedded
medium yellow sand.

East - west profiles along Trial Pits 1 to 3 and 7 to 4

East - west profiles along Trial Pits 8 to 15-14-13 and 9 to 12



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F: +353-1-2964676
www.slrconsulting.com

DAN MORRISSEY (IRL) LTD.
CLONMELSH, GARRYHUNDON &
POWERSTOWN, CO. CARLOW
SECTION 261 QUARRY REF. NO. 25
EAST - WEST PROFILES ALONG
TRIAL PITS 1 TO 15

FIGURE 5.6

Scale NTS @ A3 Date APRIL 2010

| | | | |
|---------------------------------|-------------------------------|----------------------------|-----------------------------|
| Project Name: Clonmelsh Quarry | Project No. 501.0051.00013 | Co-ords: 271472E - 170155N | Hole Type Rotary |
| Location: Clonmelsh, Co. Carlow | | Level: 50.00 m AOD | Scale 1:100 |
| Client: Dan Morrissey (IRL) LTD | | Dates: 01/07/2007 | Logged By Dr. P. Stroger |

| Piezo | Core Geotechnical Data | | | | Depth (m) | Level (m OD) | Litho | Stratum Description |
|-------|------------------------|------|---------|--|-----------|--------------|-------|--|
| | Drill Tag | Type | Results | | | | | |
| | | | | | 1 | | | SAND and GRAVEL (GLACIAL SAND & GRAVEL) |
| | | | | | 2 | | | |
| | | | | | 3 | | | |
| | | | | | 3.80 | 46.20 | | |
| | | | | | 4 | | | Gravelly CLAY (BOULDER CLAY) |
| | | | | | 4.20 | 45.80 | | |
| | | | | | 5 | | | SAND and GRAVEL (GLACIAL SAND & GRAVEL) |
| | | | | | 6 | | | |
| | | | | | 7 | | | |
| | | | | | 7.70 | 43.00 | | |
| | | | | | 8 | | | Gravelly CLAY (BOULDER CLAY) |
| | | | | | 9 | | | |
| | | | | | 9.10 | 40.90 | | |
| | | | | | 10 | | | SAND and GRAVEL (GLACIAL SAND & GRAVEL) |
| | | | | | 11 | | | |
| | | | | | 11.90 | 38.10 | | |
| | | | | | 12 | | | LIMESTONE (OPEN HOLE) |
| | | | | | 12.50 | 37.50 | | |
| | | | | | 13 | | | Weakly laminated dark argillaceous LIMESTONE. Laminae very irregular and clearly disturbed in places. Thicker paler grey bands up to 1cm thick with darker, finer black argillaceous laminae - very wispy and intricate (LIMESTONE BEDROCK) |
| | | | | | 14 | | | Shell hash |
| | | | | | 15 | | | Shell hash |
| | | | | | 15.50 | 34.50 | | Shell hash |
| | | | | | 16 | | | End of Borehole at 15.50 m |
| | | | | | 17 | | | |
| | | | | | 18 | | | |
| | | | | | 19 | | | |

Remarks: Rock Condition: Good, breaks along pressure solution seams 20-40cm apart. Possibly some cave-in. Recovery 80% no vugs, vein breccias. The limestones are locally dolomitized. The fabric of the limestones is almost fully preserved and the log descriptions focus on the limestone fabrics as such in order to correlate the individual boreholes as accurately as possible.

| | | | |
|---------------------------------|-------------------------------|----------------------------|-----------------------------|
| Project Name: Clonmelsh Quarry | Project No. 501.0051.00013 | Co-ords: 271718E - 169722N | Hole Type Rotary |
| Location: Clonmelsh, Co. Carlow | | Level: 54.34 m AOD | Scale 1:100 |
| Client: Dan Morrissey (IRL) LTD | | Dates: 01/07/2007 | Logged By Dr. P. Strogon |

| Piezo | Core Geotechnical Data | | | | Depth (m) | Level (m OD) | Litho | Stratum Description |
|-------|------------------------|------|---------|--|-----------|--------------|-------|--|
| | Drill Tag | Type | Results | | | | | |
| | | | | | 11.00 | 53.34 | | Sandy gravelly CLAY (BOULDER CLAY) |
| | | | | | 2 | | | SAND and GRAVEL (GLACIAL SAND & GRAVEL) |
| | | | | | 2.70 | 51.64 | | Sandy gravelly CLAY (BOULDER CLAY) |
| | | | | | 3 | | | |
| | | | | | 4 | | | |
| | | | | | 5 | | | |
| | | | | | 5.10 | 49.24 | | SAND and GRAVEL (GLACIAL SAND & GRAVEL) |
| | | | | | 6 | | | |
| | | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 10.80 | 43.54 | | Limestone (OPEN HOLE) |
| | | | | | 11 | | | |
| | | | | | 11.50 | 42.84 | | Clean well-sorted GRAINSTONE which coarsen up in an erratic manner. Some beds are very coarse sand grain size and have preserved a very mature, well-sorted, well rounded fabric (oolitic?). Most beds are internally laminated - laminae are irregular and up to a few mm thick Rock Condition(11.5-18.75): Good, no clay coatings. Rocks break along pressure solution seams 20-30cm apart, very little clay bound parting surfaces (LIMESTONE BEDROCK) |
| | | | | | 12 | | | |
| | | | | | 13 | | | |
| | | | | | 14 | | | |
| | | | | | 15 | | | |
| | | | | | 16 | | | |
| | | | | | 17.00 | 37.34 | | Intraclastic with 3-5mm rounded clasts of darker limestone Layers of shell hash |
| | | | | | 18 | | | Unit of darker muddy looking LIMESTONE. These are laminated with irregular disturbed laminae, predominantly pale with lesser muddy layers with signs of bioturbation (LIMESTONE BEDROCK) |
| | | | | | 18.75 | 35.59 | | Layers of shell hash Vein breccia |
| | | | | | 19 | | | Unit of fine, weakly laminated GRAINSTONE (fine to medium sand) |

Continued next sheet

Remarks: Recovery 99.4%. Bedding Dips @ 10 degrees from 11.5-18.75 and 25.0-34.75. The limestones are locally dolomitized. The fabric of the limestones is almost fully preserved and the log descriptions focus on the limestone fabrics as such in order to correlate the individual boreholes as accurately as possible.

| | | | |
|---------------------------------|----------------------------|----------------------------|--------------------------|
| Project Name: Clonmelsh Quarry | Project No. 501.0051.00013 | Co-ords: 271718E - 169722N | Hole Type Rotary |
| Location: Clonmelsh, Co. Carlow | | Level: 54.34 m AOD | Scale 1:100 |
| Client: Dan Morrissey (IRL) LTD | | Dates: 01/07/2007 | Logged By Dr. P. Strogon |

| Piezo | Core Geotechnical Data | | | | Depth (m) | Level (m OD) | Litho | Stratum Description |
|-------|------------------------|------|---------|--|-----------|--------------|-------|---|
| | Drill Tag | Type | Results | | | | | |
| | | | | | 21 | | | with thin black shale bands. Grainstones still clean but finer and less well sorted. Occasional layers still display clean well-sorted texture (LIMESTONE BEDROCK) |
| | | | | | 21.85 | 32.49 | | Shale |
| | | | | | 22 | | | Shale |
| | | | | | 22 | | | Shale |
| | | | | | 22 | | | Synsedimentary breccia with darker grainstone as angular fragments in paler slightly coarser grainstone |
| | | | | | 23 | | | Fine uniform GRAINSTONE, darker in colour than above beds. Very weakly laminated, almost massive in appearance. Though darker they are not muddier but cleaner. |
| | | | | | 24 | | | Rock Condition (18.75-34.75): Excellent, many runs up to almost 1m without fractures. Pressure solution seams scarce, 40-70cm apart. Rare true stylolites. (LIMESTONE BEDROCK) |
| | | | | | 25.00 | 29.34 | | Vein breccia |
| | | | | | 25.00 | | | Vein breccia |
| | | | | | 26 | | | Pale grey thickly bedded clean LIMESTONES. Medium to coarse sand grain size. Some runs are massive but the majority is well, if irregularly laminated. Laminae are defined by subtle changes in grain size, generally in medium to coarse sand range, occasionally very coarse sand. A few horizons stand out with alternating laminae of coarse to very coarse sand. (LIMESTONE BEDROCK) |
| | | | | | 27 | | | Vein breccia |
| | | | | | 28 | | | |
| | | | | | 29 | | | Vein breccia |
| | | | | | 30 | | | Vein breccia |
| | | | | | 31 | | | Intervals of very coarse sand with shell hash |
| | | | | | 32 | | | |
| | | | | | 33 | | | |
| | | | | | 34 | | | |
| | | | | | 34.75 | 19.59 | | Darker finer (fine to medium) GRAINSTONES. More uniform in appearance than the unit above and a distinctly darker grey colour, but still free of argillaceous matter and shale horizons. Lacks any coarse sand and has few coarse sand intervals. |
| | | | | | 35 | | | Rock Condition: Good. Pressure solution seams 20-50cm apart, little clay on surfaces. Scarce clean fractures, 50cm or more apart. (LIMESTONE BEDROCK) |
| | | | | | 36 | | | |
| | | | | | 37 | | | |
| | | | | | 38 | | | |
| | | | | | 39 | | | Vein breccia |

Continued next sheet

Remarks: Recovery 99.4%. Bedding Dips @ 10 degrees from 11.5-18.75 and 25.0-34.75. The limestones are locally dolomitized. The fabric of the limestones is almost fully preserved and the log descriptions focus on the limestone fabrics as such in order to correlate the individual boreholes as accurately as possible.

| | | | |
|---------------------------------|-------------------------------|----------------------------|-----------------------------|
| Project Name: Clonmelsh Quarry | Project No. 501.0051.00013 | Co-ords: 271718E - 169722N | Hole Type Rotary |
| Location: Clonmelsh, Co. Carlow | | Level: 54.34 m AOD | Scale 1:100 |
| Client: Dan Morrissey (IRL) LTD | | Dates: 01/07/2007 | Logged By Dr. P. Strogon |

| Piezo | Core Geotechnical Data | | | | Depth (m) | Level (m OD) | Litho | Stratum Description |
|-------|------------------------|------|---------|-------|-----------|--------------|-------|--|
| | Drill Tag | Type | Results | | | | | |
| | | | | | | | | Darker finer (fine to medium) GRAINSTONES. More uniform in appearance than the unit above and a distinctly darker grey colour, but still free of argillaceous matter and shale horizons. Lacks any coarse sand and has few coarse sand intervals. Rock Condition: Good. Pressure solution seams 20-50cm apart, little clay on surfaces. Scarce clean fractures, 50cm or more apart. (LIMESTONE BEDROCK) |
| | | | | 41 | | | | |
| | | | | 42 | | | | |
| | | | | 43 | | | | |
| | | | | 44 | | | | |
| | | | | 45 | | | | |
| | | | | 46 | | | | |
| | | | | 47 | | | | |
| | | | | 48 | | | | |
| | | | | 48.50 | 5.84 | | | |
| | | | | 48.62 | 5.72 | | | |
| | | | | 49 | | | | Thick vein of white LIMESTONE with scattered small angular clasts of darker limestone. The rock beneath contains the most amount of crinoid debris (BEDROCK) |
| | | | | 50 | | | | Finer grained darker more crinoidal LIMESTONE. Distinctly more crinoidal. Crinoids are small 1-2mm, scattered throughout the rock (not stringers), making up to 10% in places, in intervals 5 to 20cm thick. Finer overall than the unit above and has distinct wisps of dark mudstone and in places is distinctly bioturbated. Rock Condition: Sound. Broken up where large vugs occur, but pressure solution seams 40-60cm apart, with thin shale films. (LIMESTONE BEDROCK) |
| | | | | 51 | | | | Large vug |
| | | | | 52 | | | | Large vug |
| | | | | 53 | | | | Vug |
| | | | | 53 | | | | Large vug |
| | | | | 54 | | | | Large vug |
| | | | | 55 | | | | Large vug |
| | | | | 55 | | | | Large vug |
| | | | | 56 | | | | Large vug |
| | | | | 57 | | | | Large vug |
| | | | | 57 | | | | Large vug |
| | | | | 58 | | | | |
| | | | | 59 | | | | |

Continued next sheet

Remarks: Recovery 99.4%. Bedding Dips @ 10 degrees from 11.5-18.75 and 25.0-34.75. The limestones are locally dolomitized. The fabric of the limestones is almost fully preserved and the log descriptions focus on the limestone fabrics as such in order to correlate the individual boreholes as accurately as possible.



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Borehole No

BH02

Sheet 4 of 4

Project Name: Clonmelsh Quarry

Project No.
501.0051.00013

Co-ords: 271718E - 169722N

Hole Type
Rotary

Location: Clonmelsh, Co. Carlow

Level: 54.34 m AOD

Scale
1:100

Client: Dan Morrissey (IRL) LTD

Dates: 01/07/2007

Logged By
Dr. P. Strogon

| Piezo | Core Geotechnical Data | | | | Depth (m) | Level (m OD) | Litho | Stratum Description |
|-------|------------------------|------|---------|--|-----------|--------------|-------|--|
| | Drill Tag | Type | Results | | | | | |
| | | | | | 61 | | | <p>Finer grained darker more crinoidal LIMESTONE. Distinctly more crinoidal. Crinoids are small 1-2mm, scattered throughout the rock (not stringers), making up to 10% in places, in intervals 5 to 20cm thick. Finer overall than the unit above and has distinct wisps of dark mudstone and in places is distinctly bioturbated.</p> <p>Rock Condition: Sound. Broken up where large vugs occur, but pressure solution seams 40-60cm apart, with thin shale films. (LIMESTONE BEDROCK)</p> <p>Nodular crinoidal LIMESTONE. Mottled heterogeneous with dark muddy horizons, margins quite irregular in shape and paler crinoidal layers. No chert. Some larger crinoids (3-4cm) and scattered brachiopod debris here and there throughout.</p> <p>Shales (pressure solution seams) @ 65.7 (2cm), 67.3 (1cm), 67.7 (1.5cm), 74.75 (1-2cm), 75.69 (0.5cm), 79.0 (1cm). Undoubted pressure solution seams present also.</p> <p>Vugs: very few and small @ 67.2 (2cm), 69.0 (irregular 2cm), 69.5-69.6 (vertical), 70.68 & 70.88 (2cm), 73.0 (4cm), 73.25 (2cm), 73.8 & 74.12 (both small), 75.75, 75.9 & 76.0 (all small), 79.12 & 79.7 (both small) & 79.8 (4cm, irregular)</p> <p>Rock Condition: Good despite more muddy nature. Pressure solution seams 30-60cm apart. (LIMESTONE BEDROCK)</p> |
| | | | | | 61.90 | -7.57 | | |
| | | | | | 62 | | | |
| | | | | | 63 | | | |
| | | | | | 64 | | | |
| | | | | | 65 | | | |
| | | | | | 66 | | | |
| | | | | | 67 | | | |
| | | | | | 68 | | | |
| | | | | | 69 | | | |
| | | | | | 70 | | | |
| | | | | | 71 | | | |
| | | | | | 72 | | | |
| | | | | | 73 | | | |
| | | | | | 74 | | | |
| | | | | | 75 | | | |
| | | | | | 76 | | | |
| | | | | | 77 | | | |
| | | | | | 78 | | | |
| | | | | | 79 | | | |

End of Borehole at 80.00 m

Remarks: Recovery 99.4%. Bedding Dips @ 10 degrees from 11.5-18.75 and 25.0-34.75. The limestones are locally dolomitized. The fabric of the limestones is almost fully preserved and the log descriptions focus on the limestone fabrics as such in order to correlate the individual boreholes as accurately as possible.



Project Name: Clonmelsh Quarry

Project No.
501.0051.00013

Co-ords: 271786E - 169243N

Hole Type
Rotary

Location: Clonmelsh, Co. Carlow

Level: 63.42 m AOD

Scale
1:100

Client: Dan Morrissey (IRL) LTD

Dates: 01/07/2007

Logged By
Dr. P. Strogon

| Piezo | Core Geotechnical Data | | | | Depth (m) | Level (m OD) | Litho | Stratum Description |
|-------|------------------------|------|---------|-------|-----------|--------------|-------|--|
| | Drill Tag | Type | Results | | | | | |
| | | | | | | | | SAND and GRAVEL (GLACIAL SAND & GRAVEL) |
| | | | | 1 | | | | |
| | | | | 2 | | | | |
| | | | | 3 | | | | |
| | | | | 4 | | | | |
| | | | | 5 | | | | |
| | | | | 6 | | | | |
| | | | | 7 | | | | |
| | | | | 8 | | | | |
| | | | | 9 | | | | |
| | | | | 10 | | | | |
| | | | | 10.60 | 52.82 | | | |
| | | | | 11 | | | | Gravelly CLAY (BOULDER CLAY) |
| | | | | 12 | | | | |
| | | | | 13.00 | 50.42 | | | |
| | | | | 14 | | | | SAND and GRAVEL (GLACIAL SAND & GRAVEL) |
| | | | | 14.50 | 48.92 | | | |
| | | | | 15 | | | | GRAVEL (GLACIAL SAND & GRAVEL) |
| | | | | 15.80 | 47.62 | | | |
| | | | | 16 | | | | Uniform fine grained GRAINSTONES (Limestone). Shale free. Slight variation in grain size but no overt banding or sharp contacts (LIMESTONE BEDROCK) |
| | | | | 17 | | | | |
| | | | | 18 | | | | |
| | | | | 19 | | | | |

Continued next sheet

Remarks: Excellent rock condition. Pressure solution seam 40-60cm apart, several sticks 60cm long. Recovery 100%. The limestones are locally dolomitized. The fabric of the limestones is almost fully preserved and the log descriptions focus on the limestone fabrics as such in order to correlate the individual boreholes as accurately as possible.



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Borehole No

BH03

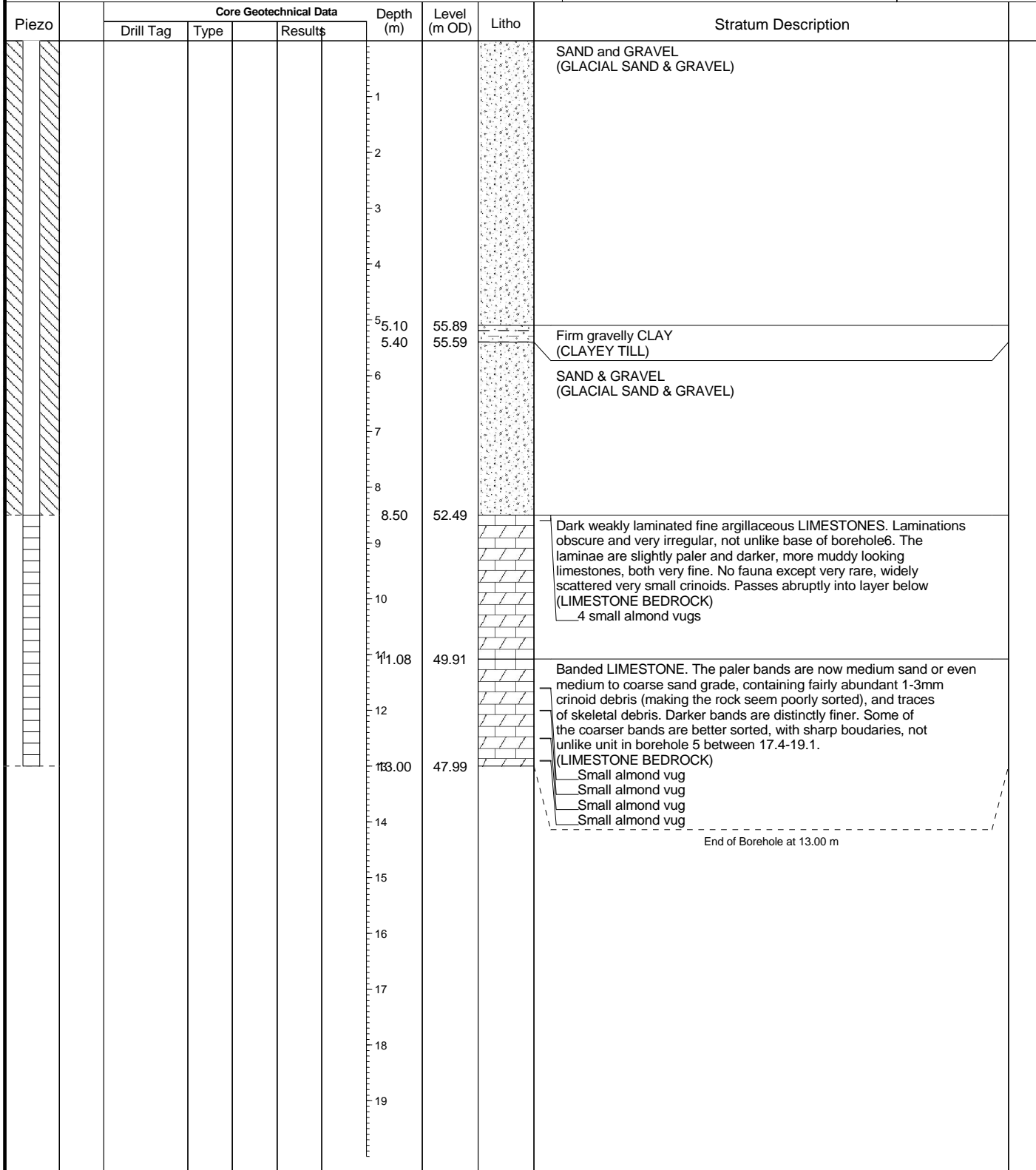
Sheet 2 of 2

| | | | |
|---------------------------------|-------------------------------|----------------------------|-----------------------------|
| Project Name: Clonmelsh Quarry | Project No. 501.0051.00013 | Co-ords: 271786E - 169243N | Hole Type Rotary |
| Location: Clonmelsh, Co. Carlow | | Level: 63.42 m AOD | Scale 1:100 |
| Client: Dan Morrissey (IRL) LTD | | Dates: 01/07/2007 | Logged By Dr. P. Strogon |

| Piezo | Core Geotechnical Data | | | | Depth (m) | Level (m OD) | Litho | Stratum Description |
|-------|------------------------|------|---------|--|-----------|--------------|-------|--|
| | Drill Tag | Type | Results | | | | | |
| | | | | | 20.50 | 42.92 | | Remaining Detail : 19.58m - 20.50m : Distinctly coarser (medium sand grade) and streaky rather than laminated. Coarse brachiopod debris from at 20.08m |
| | | | | | 21 | | | End of Borehole at 20.50 m |
| | | | | | 22 | | | |
| | | | | | 23 | | | |
| | | | | | 24 | | | |
| | | | | | 25 | | | |
| | | | | | 26 | | | |
| | | | | | 27 | | | |
| | | | | | 28 | | | |
| | | | | | 29 | | | |
| | | | | | 30 | | | |
| | | | | | 31 | | | |
| | | | | | 32 | | | |
| | | | | | 33 | | | |
| | | | | | 34 | | | |
| | | | | | 35 | | | |
| | | | | | 36 | | | |
| | | | | | 37 | | | |
| | | | | | 38 | | | |
| | | | | | 39 | | | |

Remarks: Excellent rock condition. Pressure solution seam 40-60cm apart, several sticks 60cm long. Recovery 100%. The limestones are locally dolomitized. The fabric of the limestones is almost fully preserved and the log descriptions focus on the limestone fabrics as such in order to correlate the individual boreholes as accurately as possible.

| | | | |
|---------------------------------|-------------------------------|----------------------------|-----------------------------|
| Project Name: Clonmelsh Quarry | Project No. 501.0051.00013 | Co-ords: 272149E - 169521N | Hole Type Rotary |
| Location: Clonmelsh, Co. Carlow | | Level: 60.99 m AOD | Scale 1:100 |
| Client: Dan Morrissey (IRL) LTD | | Dates: 01/07/2007 | Logged By Dr. P. Strogon |



Remarks: Rock condition: very broken to 9.5m, better quality after that with pressure solution seams 25-40cm apart. Recovery 96.2%. Bedding dip <10 degrees. The limestones are locally dolomitized. The fabric of the limestones is almost fully preserved and the log descriptions focus on the limestone fabrics as such in order to correlate the individual boreholes as accurately as possible.

| | | | |
|---------------------------------|-------------------------------|----------------------------|-----------------------------|
| Project Name: Clonmelsh Quarry | Project No. 501.0051.00013 | Co-ords: 271964E - 169015N | Hole Type Rotary |
| Location: Clonmelsh, Co. Carlow | | Level: 63.44 m AOD | Scale 1:100 |
| Client: Dan Morrissey (IRL) LTD | | Dates: 01/07/2007 | Logged By Dr. P. Strogon |

| Piezo | Core Geotechnical Data | | | | Depth (m) | Level (m OD) | Litho | Stratum Description |
|-------|------------------------|------|---------|--|-----------|--------------|-------|---|
| | Drill Tag | Type | Results | | | | | |
| | | | | | 1 | | | SAND and GRAVEL (GLACIAL SAND & GRAVEL) |
| | | | | | 2 | | | |
| | | | | | 3 | | | |
| | | | | | 4 | | | |
| | | | | | 5 | | | |
| | | | | | 6 | | | |
| | | | | | 7 | 56.34 | | |
| | | | | | 7.10 | | | Gravelly CLAY (BOULDER CLAY) |
| | | | | | 8 | | | |
| | | | | | 9 | 54.24 | | |
| | | | | | 9.20 | | | SAND and GRAVEL (GLACIAL SAND & GRAVEL) |
| | | | | | 10 | | | |
| | | | | | 11 | | | |
| | | | | | 12 | | | |
| | | | | | 13 | | | |
| | | | | | 13.90 | 49.54 | | |
| | | | | | | | | Bouldery GRAVEL (BOULDER CLAY) |
| | | | | | 15.05 | 48.39 | | |
| | | | | | | | | Blank - Open Hole drilling (OPEN HOLE) |
| | | | | | 16.00 | 47.44 | | |
| | | | | | | | | Very fine grained argillaceous LIMESTONE. Very feintly laminated as in borehole1 but less contrast. No fauna except very sparse small crinoids in disuse concentrations between 16.6-17.4 (LIMESTONE BEDROCK) |
| | | | | | 17 | | | |
| | | | | | 17.40 | 46.04 | | |
| | | | | | | | | Laminated pale LIMESTONE. Strongly laminated with pale medium sand grade straight edged but lensoid layers from a few mm to c.2cm. Strong contrast between these and darker finer & muddier limestones. Roughly subequal amounts of each overall, (LIMESTONE BEDROCK) |
| | | | | | 18 | | | |
| | | | | | 18.01 | 44.43 | | |
| | | | | | | | | Small vug |
| | | | | | | | | Very fine grained argillaceous LIMESTONE. Very feintly |

Continued next sheet

Remarks: Rock condition: fairly good. Thin clay films on joints and pressure solution seams down to base of hole. Cross fractures are mainly pressure solution seams 10-20cm apart. Probably very nodular, thin bedded in outcrop. Recovery 90.6%. The limestones are locally dolomitized. The fabric of the limestones is almost fully preserved and the log descriptions focus on the limestone fabrics as such in order to correlate the individual boreholes as accurately as possible.



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Borehole No
BH05
 Sheet 2 of 2

| | | | |
|---------------------------------|-------------------------------|----------------------------|-----------------------------|
| Project Name: Clonmelsh Quarry | Project No. 501.0051.00013 | Co-ords: 271964E - 169015N | Hole Type Rotary |
| Location: Clonmelsh, Co. Carlow | Level: 63.44 m AOD | | Scale 1:100 |
| Client: Dan Morrissey (IRL) LTD | Dates: 01/07/2007 | | Logged By Dr. P. Strogon |

| Piezo | Core Geotechnical Data | | | | Depth (m) | Level (m OD) | Litho | Stratum Description |
|-------|------------------------|------|---------|--|-----------|--------------|-------|---|
| | Drill Tag | Type | Results | | | | | |
| | | | | | 21 | | | laminated. No fauna except very sparse small crinoids in disuse concentrations. No sharp boundary to the sequence below. (LIMESTONE BEDROCK) |
| | | | | | 22.01 | 41.43 | | Very fine grained argillaceous LIMESTONE with diffuse bands with scattered crinoid and brachiopod debris. Like at the base of borehole 2. (LIMESTONE BEDROCK) Small almond vug Small almond vug |
| | | | | | 23 | | | |
| | | | | | 24 | | | |
| | | | | | 24.50 | 38.94 | | End of Borehole at 24.50 m |
| | | | | | 25 | | | |
| | | | | | 26 | | | |
| | | | | | 27 | | | |
| | | | | | 28 | | | |
| | | | | | 29 | | | |
| | | | | | 30 | | | |
| | | | | | 31 | | | |
| | | | | | 32 | | | |
| | | | | | 33 | | | |
| | | | | | 34 | | | |
| | | | | | 35 | | | |
| | | | | | 36 | | | |
| | | | | | 37 | | | |
| | | | | | 38 | | | |
| | | | | | 39 | | | |

Remarks: Rock condition: fairly good. Thin clay films on joints and pressure solution seams down to base of hole. Cross fractures are mainly pressure solution seams 10-20cm apart. Probably very nodular, thin bedded in outcrop. Recovery 90.6%. The limestones are locally dolomitized. The fabric of the limestones is almost fully preserved and the log descriptions focus on the limestone fabrics as such in order to correlate the individual boreholes as accurately as possible.

Project Name: Clonmelsh Quarry

Project No.
501.0051.00013

Co-ords: 272478E - 169928N

Hole Type
Rotary

Location: Clonmelsh, Co. Carlow

Level: 67.30 m AOD

Scale
1:100

Client: Dan Morrissey (IRL) LTD

Dates: 01/07/2007

Logged By
Dr. P. Strogon

| Piezo | Core Geotechnical Data | | | | Depth (m) | Level (m OD) | Litho | Stratum Description |
|-------|------------------------|------|---------|----|-----------|--------------|-------|--|
| | Drill Tag | Type | Results | | | | | |
| | | | | | 0.30 | 67.00 | | Gravelly CLAY (BOULDER CLAY) |
| | | | | 1 | | | | SAND and GRAVEL (GLACIAL SAND & GRAVEL) |
| | | | | 2 | | | | |
| | | | | 3 | 2.90 | 64.40 | | Gravelly CLAY (BOULDER CLAY) |
| | | | | 4 | | | | |
| | | | | 5 | 4.50 | 62.80 | | SAND and GRAVEL (GLACIAL SAND & GRAVEL) |
| | | | | 6 | | | | |
| | | | | 7 | | | | |
| | | | | 8 | 7.65 | 59.65 | | BOULDERS (BOULDER CLAY) |
| | | | | 9 | 8.10 | 59.20 | | CLAY (BOULDER CLAY) |
| | | | | 10 | 8.50 | 58.80 | | SAND and GRAVEL (GLACIAL SAND & GRAVEL) |
| | | | | 11 | | | | |
| | | | | 12 | 11.20 | 56.10 | | Blank - Open Hole drilling (OPEN HOLE) |
| | | | | 13 | 11.50 | 55.80 | | Banded grainstone LIMESTONE. Medium to coarse grainstone layers with crinoid debris up to several cm thick and alternate with darker, finer grainstones at the top of interval. Nearer the base the darker layers become even finer and muddy. Passes abruptly into layer below. (LIMESTONE BEDROCK) |
| | | | | 14 | | | | |
| | | | | 15 | 13.60 | 53.70 | | Dark argillaceous LIMESTONE. Weakly laminated dark argillaceous limestone not unlike the base of BH07/02. Little fauna except rare small crinoids. Lithostrotron colony 5cm thick at 14.8m. Vugs - generally scarce, a few small ones towards the base of the hole (LIMESTONE BEDROCK) |
| | | | | 16 | 16.00 | 51.30 | | End of Borehole at 16.00 m |
| | | | | 17 | | | | |
| | | | | 18 | | | | |
| | | | | 19 | | | | |

Remarks: Rock very broken 11.9-12.4, 16.1-16.7. Clay films down to 16.4. Strong cross fractures at 30-50 degrees to SAOC, and pressure solution seams 20-40cm apart. Despite this the recovery was 98%. Dip 10 degrees. The limestones are locally dolomitized. The fabric of the limestones is almost fully preserved and the log descriptions focus on the limestone fabrics as such in order to correlate the individual boreholes as accurately as possible.



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Borehole No

BH08

Sheet 1 of 1

| | | | |
|---------------------------------|-------------------------------|----------------------------|-----------------------------|
| Project Name: Clonmelsh Quarry | Project No. 501.0051.00013 | Co-ords: 272306E - 168793N | Hole Type Rotary |
| Location: Clonmelsh, Co. Carlow | | Level: 57.98 m AOD | Scale 1:100 |
| Client: Dan Morrissey (IRL) LTD | | Dates: 01/07/2007 | Logged By Dr. P. Strogon |

| Piezo | Core Geotechnical Data | | | | Depth (m) | Level (m OD) | Litho | Stratum Description |
|-------|------------------------|------|---------|-------|-----------|--------------|-------|--|
| | Drill Tag | Type | Results | | | | | |
| | | | | | | | | SAND and GRAVEL (GLACIAL SAND & GRAVEL) |
| | | | | 1 | | | | |
| | | | | 2 | | | | |
| | | | | 2.50 | 55.48 | | | Sandy CLAY (BOULDER CLAY) |
| | | | | 3 | | | | |
| | | | | 3.90 | 54.08 | | | SAND (GLACIAL SAND & GRAVEL) |
| | | | | 4 | | | | |
| | | | | 5 | | | | |
| | | | | 6 | | | | |
| | | | | 7 | | | | |
| | | | | 7.90 | 50.08 | | | SAND and GRAVEL (GLACIAL SAND & GRAVEL) |
| | | | | 8 | | | | |
| | | | | 9 | | | | |
| | | | | 9.20 | 48.78 | | | Sandy gravelly CLAY (BOULDER CLAY) |
| | | | | 10 | | | | |
| | | | | 10.00 | 47.98 | | | End of Borehole at 10.00 m |
| | | | | 11 | | | | |
| | | | | 12 | | | | |
| | | | | 13 | | | | |
| | | | | 14 | | | | |
| | | | | 15 | | | | |
| | | | | 16 | | | | |
| | | | | 17 | | | | |
| | | | | 18 | | | | |
| | | | | 19 | | | | |

Remarks: Bedrock not encountered



| | | | |
|---------------------------------|-------------------------------|----------------------------|---------------------|
| Project Name: Clonmelsh Quarry | Project No. 501.0051.00013 | Co-ords: 272343E - 168204N | Hole Type Rotary |
| Location: Clonmelsh, Co. Carlow | | Level: 59.75 m AOD | Scale 1:100 |
| Client: Dan Morrissey (IRL) LTD | | Dates: 01/07/2007 | Logged By IGSL |

| Piezo | Core Geotechnical Data | | | | Depth (m) | Level (m OD) | Litho | Stratum Description |
|-------|------------------------|------|---------|--|-----------|--------------|-------|--|
| | Drill Tag | Type | Results | | | | | |
| | | | | | 1 | | | SAND and GRAVEL (GLACIAL SAND & GRAVEL) |
| | | | | | 2 | | | |
| | | | | | 3 | | | |
| | | | | | 4 | | | |
| | | | | | 5 | | | |
| | | | | | 6 | | | |
| | | | | | 7 | | | |
| | | | | | 8 | | | |
| | | | | | 9 | | | |
| | | | | | 10 | | | |
| | | | | | 11 | | | |
| | | | | | 12 | | | |
| | | | | | 13.00 | 46.75 | | |
| | | | | | 14 | | | |
| | | | | | 15 | | | |
| | | | | | 16 | | | |
| | | | | | 17 | | | |
| | | | | | 18 | | | |
| | | | | | 19 | | | |

Continued next sheet

Remarks: The borehole was drilled and logged by IGSL as part of a groundwater well monitoring plan for the site. The limestones are locally dolomitized. The fabric of the limestones is almost fully preserved and the log descriptions focus on the limestone fabrics as such in order to correlate the individual boreholes as accurately as possible.



Project Name: Clonmelsh Quarry

Project No.
501.0051.00013

Co-ords: 272343E - 168204N

Hole Type
Rotary

Location: Clonmelsh, Co. Carlow

Level: 59.75 m AOD

Scale
1:100

Client: Dan Morrissey (IRL) LTD

Dates: 01/07/2007

Logged By
IGSL

| Piezo | Core Geotechnical Data | | | | Depth (m) | Level (m OD) | Litho | Stratum Description |
|-------|------------------------|------|---------|-------|-----------|--------------|----------------------------|---------------------|
| | Drill Tag | Type | Results | | | | | |
| | | | | | | | LIMESTONE (BEDROCK) | |
| | | | | 21 | | | | |
| | | | | 22 | | | | |
| | | | | 23 | | | | |
| | | | | 24 | | | | |
| | | | | 25 | | | | |
| | | | | 26.00 | 33.75 | | | |
| | | | | | | | End of Borehole at 26.00 m | |
| | | | | 27 | | | | |
| | | | | 28 | | | | |
| | | | | 29 | | | | |
| | | | | 30 | | | | |
| | | | | 31 | | | | |
| | | | | 32 | | | | |
| | | | | 33 | | | | |
| | | | | 34 | | | | |
| | | | | 35 | | | | |
| | | | | 36 | | | | |
| | | | | 37 | | | | |
| | | | | 38 | | | | |
| | | | | 39 | | | | |

Remarks: The borehole was drilled and logged by IGSL as part of a groundwater well monitoring plan for the site. The limestones are locally dolomitized. The fabric of the limestones is almost fully preserved and the log descriptions focus on the limestone fabrics as such in order to correlate the individual boreholes as accurately as possible.

APPENDIX 7.1A **CARLOW COUNTY COUNCIL DISCHARGE LICENCE CLONMELSH QUARRY REF. DL7-233**



Carlow County Council

Local Government (Water Pollution) Acts, 1977-1990

Section 4

Licence to Discharge Domestic Effluent to Waters

Per Registered Post

To: Dan Morrissey (IRL) Ltd., Bennekerry, Co. Carlow

Ref: DL7/233

The Carlow County Council in exercise of the powers conferred on it by the Local Government (Water Pollution) Acts, 1977-1990, hereby grants a licence to discharge domestic effluent to waters.

From: Quarry Development
Located at: Clonmelsh, Milford, Co. Carlow

To: A watercourse

Subject to the conditions specified hereunder.

Dated:

25-6-08

Signed:

Robt Connolly

Senior Executive Engineer.

Note: The decision of the Local Authority may be appealed within one month beginning on the date of the grant of the licence. Appeals should be addressed to The Secretary, An Bord Pleanála, Floor 3, Block 7, Irish Life Centre, Lower Abbey Street, Dublin 1 and must be forwarded by prepaid post or by leaving the appeal with an employee of the Board at the office of the Board during office hours.

An appeal to the Board will be invalid unless at the outset it

- **Is made in writing**
- **States the name and address of the appealant**
- **State the subject matter of the appeal,**
- **States in full the grounds of appeal and the reasons, considerations and arguments on which they are based**
- **Is accompanied by the fee of €127 euros, or in the case of bodies prescribed under Article 14 of the Local Government (Water Pollution) Regulations, 1992.**

A person other than a party to an appeal may make submissions or observations in writing to the Board. Any such submissions or observations must be made within the appeal period and be accompanied by a fee of €38.10 euros otherwise they will not be considered by the Board.

Any request for an oral hearing must be made in writing before the expiration of the appeal period and must be accompanied by a fee of €63.50 euros (in addition to the appeal fee).

Condition 1: Scope

- 1.1 The activity (quarry development) shall be controlled, operated and maintained such that the conditions attached to this licence are complied with.
- 1.2 No alterations shall be made to, or reconstruction in respect of the activity or any part thereof which would or is likely to result in material change or increase in:-
 - 1.2.1 The nature or quantity of the effluent.
 - 1.2.2 The effluent treatment system or any changes in.
- 1.3 This licence is for the purpose of licensing discharges to Waters as defined in the Local Government (Water Pollution) Act, 1977 and Local Government (Water Pollution) (Amendment) Act, 1990 and nothing in this licence shall be construed as negating the licences statutory obligations or requirements under any other enactments or regulations.

| |
|--|
| Reason: To clarify the scope of this licence |
|--|

Condition 2: Notification and Record Keeping of Incidents

- 2.1 The licensee shall notify Carlow County Council by both telephone and facsimile immediately after the occurrence of any of the following.
 - 2.1.1 Any unscheduled emissions or any emission which does not comply with terms of this licence.
 - 2.1.2 Any incident with the potential for environmental contamination of surface or groundwater or requiring an emergency response from Carlow County Council.
- 2.2 The licensee shall include as part of the notification, date and time of the incident, details of the occurrence and the steps taken to minimise the emissions and avoid recurrence. The licence shall make a record of any incident as set out in condition 2.1 above.
- 2.3 The licensee shall ensure that an Emergency Response Procedure can and will be implemented at any time to respond to any emergency situation which may arise on site as referred to in 2.1.1 and 2.1.2 above. This procedure shall include an emergency testing regime and shall be capable of minimising the effects of any emergency on the environment.
- 2.4 The licensee shall prepare and implement an environmental management system in regard to the treatment and management of effluent, in accordance with the EPA publication on Environmental Management in the Extractive Industry (Non-Scheduled Minerals) within 12 months of the date of this licence. A copy of this system and subsequent annual reviews shall be submitted to Carlow County Council by 28th February each year.
- 2.5 The licensee shall submit an Annual Environmental Report (AER) to the Director of Services, Infrastructure and the Environment, Carlow County Council for the preceding calendar year by no later than February 28th of each year. The first AER shall be submitted by 28th February 2009 in respect of the period from the date of grant this licence to 31st December 2008. The AER shall include details of:
 - (a) any changes or alteration to the facility which may impact on the emissions from the facility;

- (b) monitoring and analysis undertaken in accordance with Schedule 1 and 2 of this licence;
- (c) details of any unscheduled emissions, non-compliant emissions or trigger level exceedance events;
- (d) reportable incidents
- (e) include total annual load discharged for all parameters
- (f) contain the monthly pollutant load
- (g) outline the intentions of the licensee with regard to the upgrading of and/or alterations to works or operations should these results not fully comply with the terms of this licence.

In addition, the licensee shall include in the report, a written summary of compliance with all of the conditions attached to this licence.

Reason: To provide for the notification and record keeping of incidents and to provide for the requirements of the local authority in accordance with Section 14 of the Local Government (Water Pollution) Act, 1977-1990.

Condition 3: Site Design and Management

- 3.1 There shall be a single discharge outlet from the drainage channel into the watercourse (Powerstown Stream).
- 3.2 The effluent treatment system under the control of the licensee shall be inspected daily, and properly maintained at all times. The volume of water in the settlement lagoons shall normally be maintained at a volume not in excess of 65% of the capacity of the lagoons.
- 3.3 The drainage system shall be designed and maintained to minimise surface water run-off into the quarry workings.
- 3.4 Ensure all surface run-off from hardstanding areas used for refuelling is directed to an appropriately sized hydrocarbon interceptor prior to discharge
- 3.5 Provide bunding to all fuel/chemical storage tank areas: 110% of the capacity of the largest tank within the area or 25% of the total volume of the substance which could be stored within the area, whichever is greater. Conduct regular checks of the bunds to ensure integrity is maintained.
- 3.6 Provide spill pallets to store drums of all chemicals and oils (including waste oils) stored on site.
- 3.7 Provide spillage control equipment on site (booms and suitable absorbent materials, etc.) to contain any accidental spillage.
- 3.8 Ensure blasting practice minimises the risk of occurrence of nitrate/ammonia residues by proper blast design and implementation, appropriate disposal of any excess explosives, and selection of the appropriate type of explosives.
- 3.9

Reason: To make provisions for management of the activity and maintenance of effluent treatment equipment.

Condition 4: Emissions to Waters of Treated Effluent

- 4.1 There shall be a single discharge outlet from the central pump-sump into the watercourse.
- 4.2 No film shall be visible on the effluent being discharged from the oil interceptor or on the receiving water and no odour (hydrocarbon) present.

- 4.3 Provision shall be made at the outfall from the discharge point for an inspection and sampling chamber, prior to discharge to waters. The chamber shall be accessible at all times to authorised persons appointed under and in accordance with the provisions of Section 28 of the Local Government (Water Pollution) Act, 1977, and as amended by Section 19 of the Local Government (Water Pollution) (Amendment) Act, 1990. The licensee shall ensure that this chamber is safely accessible in all weathers and is suitable for the taking of a check sample of effluent. It is the responsibility of the licensee to ensure that all monitoring points are fitted with monitoring chambers to enable collection of a check sample of the discharge. After their installation, samples taken for check monitoring by the licensing authority are deemed to be representative of the discharge based on the provisions of this condition.
- 4.4 A flow meter shall be installed at the final discharge outlet to waters in the facility and cumulative daily readings shall be recorded and available for inspection on request by the licensing authority.
- 4.5 A flow proportional composite sampler shall be located at the discharge point to waters.
- 4.6 A penstock shall be located before the discharge point to prevent discharges from the facility in the event that monitoring and/or a visual inspection should indicate that -
- (a) treated process water is not within its discharge licence limits or is liable to give rise to a breach in licence limits,
 - (b) contamination of water has taken place on site which could adversely affect the quality of the water to be discharged. The outlet penstock shall be closed and the contaminated water if higher than the licence limits shall be treated until such time as it is within its licence limit. If the water is so contaminated that it cannot be treated, it shall be tankered off-site for treatment until such time as the source of contamination has been identified and appropriate measures are introduced to prevent further risk to surface waters in the area.
- 4.7 The sampling inspection point, flow meter, composite sampler and penstock specified in conditions 4.3, 4.4, 4.5, and 4.6, shall be operational within 3 months of the date of issue of this licence.
- 4.8 No specified emissions to the waters shall exceed the emission limit values set out in Schedule 1 - Emissions to Waters. Where flow proportionate samples are used, the results of analysis of this sample shall not exceed the licence limits applied in Schedule 1. Where a grab sample is taken, the results of analysis of this sample shall not exceed 1.2 times the licence limits.
- 4.9 The licensee will install the best available technology (BAT) to ensure that the effluent meets the emission limit values set out in Schedule 1 - Emissions to Waters.
- 4.10 Sampling and analysis of emissions to the Waters shall be carried out as specified in Schedule 1 - Emissions to Waters. The results of all effluent analysis shall be submitted to Carlow County Council in accordance with Schedule 1 - Emissions to Waters.
- 4.11 All sampling and analysis specified in Schedule 1 - Emissions to Waters shall be carried out for the licensee by a laboratory approved by Carlow County Council. The name and address of this laboratory shall be provided by the licensee to Carlow County Council within one month of the date of grant of licence.

- 4.12 The licensee shall maintain historic records of all effluent analysis for a minimum period of three years. These shall be available for inspection upon request by authorised officers of Carlow County Council or its agents, and persons authorised under Section 28 of the Local Government (Water Pollution) Act, 1977-1990.
- 4.13 The licensee shall permit authorised officers of Carlow County Council or its agents, and persons authorised under Section 28 of the Local Government (Water Pollution) Act, 1977-1990 to inspect, examine and test at all reasonable times, any plant and equipment installed in connection with effluent treatment and to take samples as required.
- 4.14 The licensee, at the request of the licensing authority, shall analyse the effluent being discharged for the substances listed in the schedule of the Water Quality (Dangerous Substances) Regulations, 2000.

Reason: By way of control, limitation and monitoring of emissions to provide for the protection of the environment.

Condition 5: Fees/Contribution

- 5.1 All costs incurred in specified sampling and analysis shall be borne by the licensee, as shall all regulatory sampling and analysis carried out by or on behalf of Carlow County Council. The cost of periodic audits carried out by Carlow County Council to ensure compliance with licence conditions shall be borne by the licensee.
- 5.2 The licensee shall pay an annual fee to Carlow County Council, towards the costs of license administration. The amount will be calculated annually and the licensee shall be charged accordingly. (Annual fee in 2008 = €1,500)
- 5.3 Authorised officers of Carlow County Council and persons authorised under Section 28 of the Local Government (Water Pollution) Act, 1977-1990 reserves the right to take whatever additional samples for analysis considered appropriate. The licensee shall reimburse Carlow County Council or its agents, and persons authorised under Section 28 of the Local Government (Water Pollution) Act, 1977 – 1990 on demand for the costs of such sampling and analysis.
- 5.4 Extraordinary site inspections and additional laboratory tests or otherwise as a result of any incident referred to in standard licence conditions 2.1. and 2.2. shall be subject to extra charges.

Reason: In the interests of environmental protection

Schedule 1 - Emissions to Waters

Emission to: Powerstown Stream

| Parameter | Emission Limit Value (mg/l) | Monitoring Frequency | Sampling Method | Analysis Technique | **Submission of Results |
|--------------------------|--|----------------------|---|------------------------|-------------------------|
| Colour | No abnormal change | Daily | Grab | Visual inspection | Monthly |
| Visual inspection | Check for the presence of oils/excess solids | Daily | Grab | Visual inspection | Monthly |
| pH | 6-9 | Weekly | Composite | *Standard Method | Monthly |
| Ammonia | 0.3 | Weekly | Composite | *Standard Method | Monthly |
| Total Suspended Solids | 10 | Weekly*** | Composite | *Standard Method | Monthly |
| B.O.D. ₅ | 5 | Monthly | Composite | *Standard Method | Monthly |
| C.O.D. | 5 | Monthly | Composite | *Standard Method | Monthly |
| Total Phosphorous (as P) | 0.1 | Monthly | Composite | *Standard Method | Monthly |
| Ortho-phosphate | 0.03 | Monthly | Composite | *Standard Method | Monthly |
| Nitrates | 25 | Monthly | Composite | *Standard Method | Monthly |
| Temperature | 25°C | Monthly | Composite | *Standard Method | Monthly |
| Total hydrocarbons | 1 | Quarterly | Composite | *Standard Method | Quarterly |
| Parameter | Emission Limit Value | Monitoring Frequency | Sampling Method | *Submission of Results | |
| Flow | 2000m ³ per day and 85m ³ per hour | Continuous | On-line flow meter with recorder. Hourly and Daily flows. | Monthly | |
| Turbidity | 10 NTU and trigger level**** | Continuous | On-line turbidity meter with recorder | Monthly | |

*Standard Methods: As detailed in "Standard Methods for the Examination of Water and Wastewater", 21st Edition.

** Results shall be submitted to Carlow County Council within one month of samples being taken. **Any non-compliance with the terms of the licence shall be highlighted and the reason why this occurred shall be stated.**

*** Unless otherwise required by condition for investigation of condition number 2.2.

**** Trigger level to be agreed with Carlow County Council in writing within one month of date of this licence.

Schedule 2 - Surface Water Monitoring**Location:** Upstream

| Parameter | Monitoring Frequency | Sampling Method | Analysis Technique | Submission of Results |
|---------------------------------|-----------------------------|------------------------|---------------------------|------------------------------|
| pH | Quarterly | Grab | *Standard Method | Quarterly |
| B.O.D.₅ | Quarterly | Grab | *Standard Method | Quarterly |
| C.O.D. | Quarterly | Grab | *Standard Method | Quarterly |
| Ammonia | Quarterly | Grab | *Standard Method | Quarterly |
| Total Suspended Solids | Quarterly | Grab | *Standard Method | Quarterly |
| Total Phosphorous (as P) | Quarterly | Grab | *Standard Method | Quarterly |
| Ortho-phosphate | Quarterly | Grab | *Standard Method | Quarterly |
| Nitrates | Quarterly | Grab | *Standard Method | Quarterly |
| Temperature | Quarterly | Grab | *Standard Method | Quarterly |

*Standard Methods: As detailed in "Standard Methods for the Examination of Water and Wastewater", 21st Edition.

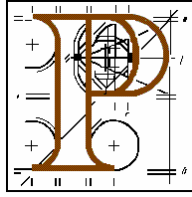
Location: Downstream

| Parameter | Monitoring Frequency | Sampling Method | Analysis Technique | Submission of Results |
|---------------------------------|-----------------------------|------------------------|---------------------------|------------------------------|
| pH | Quarterly | Grab | *Standard Method | Quarterly |
| B.O.D.₅ | Quarterly | Grab | *Standard Method | Quarterly |
| C.O.D. | Quarterly | Grab | *Standard Method | Quarterly |
| Ammonia | Quarterly | Grab | *Standard Method | Quarterly |
| Total Suspended Solids | Quarterly | Grab | *Standard Method | Quarterly |
| Total Phosphorous (as P) | Quarterly | Grab | *Standard Method | Quarterly |
| Ortho-phosphate | Quarterly | Grab | *Standard Method | Quarterly |
| Nitrates | Quarterly | Grab | *Standard Method | Quarterly |
| Temperature | Quarterly | Grab | *Standard Method | Quarterly |

*Standard Methods: As detailed in "Standard Methods for the Examination of Water and Wastewater", 21st Edition.

**APPENDIX 7.1B CARLOW COUNTY COUNCIL DISCHARGE LICENCE CLONMELSH QUARRY REF. DL7-233 APPEAL
OUTCOME REF. 01.WW.0371**

An Bord Pleanála



LOCAL GOVERNMENT (WATER POLLUTION) ACTS 1977 TO 2007

Carlow County

Register Reference Number: DL7/233

APPEAL by Dan Morrissey (Ireland) Limited care of John Barnett and Associates of CSA House, 7 Dundrum Business Park, Windy Arbour, Dublin in relation to the granting, on the 25th day of June, 2008, by Carlow County Council, of a licence under section 4 of the Local Government (Water Pollution) Acts 1977 to 2007 for the discharge of trade effluent from a quarry development to a discharge channel entering Powerstown Stream at Clonmelsh, Milford, County Carlow:

DECISION: In exercise of the powers conferred on it by section 8 of the Local Government (Water Pollution) Act, 1977, as substituted by section 6 of the Local Government (Water Pollution) (Amendment) Act, 1990, and based on the Reasons and Considerations set out below, An Bord Pleanála hereby allows the said appeal and directs the said licensing authority to amend condition number 4.8 so that it shall be as follows and to attach a further condition so that it shall be as follows:

4.8 No specified emissions to the waters shall exceed the emission limit values set out below in Schedule 1 – Emissions to Waters. Where flow proportionate samples are used, the results of analysis of this sample shall not exceed the licence limits applied in Schedule 1. Where a grab sample is taken, the results of analysis of this sample shall not exceed 1.2 times the licence limits.

New Condition

Within three months from the date of this licence, the licensee shall conduct a monitoring programme and assessment report to be agreed with the local authority which shall demonstrate that the system for treating and discharging waters to the Powerstown Stream is capable of complying with the Suspended Solids limit of 25 mg/l SS as set out in Schedule 1 below.

Schedule 1 – Emissions to waters
Emission to: Powerstown Stream

| Parameter | Emission Limit Value (mg/l) | Monitoring Frequency | Sampling Method | Analysis Technique | **Submission of Results |
|---------------------------------|--|----------------------|--|-------------------------|-------------------------|
| Colour | No abnormal change | Daily | Grab | Visual Inspection | Monthly |
| Visual Inspection | Check for the presence of oils/excess solids | Daily | Grab | Visual Inspection | Monthly |
| pH | 6-9 | Weekly *** | Composite | *Standard Method | Monthly |
| Ammonia | 0.3 | Weekly *** | Composite | *Standard Method | Monthly |
| Total Suspended Solids | 25 | Weekly *** | Composite | *Standard Method | Monthly |
| B.O.D.₅ | 5 | Monthly | Composite | *Standard Method | Monthly |
| C.O.D. | 5 | Monthly | Composite | *Standard Method | Monthly |
| Total Phosphorous (as P) | 0.1 | Monthly | Composite | *Standard Method | Monthly |
| Ortho-phosphate | 0.03 | Monthly | Composite | *Standard Method | Monthly |
| Nitrates | 25 | Monthly | Composite | *Standard Method | Monthly |
| Temperature | 25 ⁰ C | Monthly | Composite | *Standard Method | Monthly |
| Total Hydrocarbons | 1 | Quarterly | Composite | *Standard Method | Quarterly |
| Parameter | Emission Limit Value | Monitoring Frequency | Sampling Method | **Submission of Results | |
| Flow | 2000m ³ per day and 85m ³ per hour | Continuous | On-line flow metre with recorder. Hourly and Daily flows | Monthly | |
| Turbidity | 10 NTU and trigger level ***** | Continuous | On-line turbidity metre with recorder | Monthly | |

* Standard Method: As detailed in "Standard Methods for the Examination of Water and Wastewater", 21st Edition.

** Results shall be submitted to Carlow County Council within one month of samples being taken. **Any non-compliance with the terms of the licence shall be highlighted and the reason why this occurred shall be stated.**

*** Unless otherwise agreed with Carlow County Council, following a prolonged period (minimum three months) of full compliance with emission limit values.

**** Trigger level shall be agreed with Carlow County Council in writing with three months from the date of this licence.

REASONS AND CONSIDERATIONS

Having regard to the characteristics of the Powerstown Stream into which the discharge is made and the nature and volume of the discharge, it is considered that, subject to compliance with the emission limit values set out in the licence, a suspended solids limit of 25 mg/l is sufficient to protect the water quality of the receiving waters. It is further considered that an assessment to ensure the ability of the current settlement and discharge system of the quarry to meet the revised discharge limit is necessary in order to ensure that long term water quality protection is achieved.

**Member of An Bord Pleanála
duly authorised to authenticate
the seal of the Board.**

Dated this day of 2009.

APPENDIX 7.2 **WATER QUALITY (SURFACE AND GROUND WATERS)**

Appendix 6.B Water Quality Results

| | Unit | BH01 | | BH02 | | BH03 | |
|-------------------------|----------|------------|------------|------------|------------|------------|------------|
| | | 06/07/2007 | 08/05/2008 | 17/01/2008 | 08/05/2008 | 17/01/2008 | 08/05/2008 |
| Temperature | °C | 11.8 | 10.1 | 11.3 | 11 | 10.7 | 11.1 |
| pHmV | | - | -17.3 | - | -21.4 | - | -26.7 |
| ORP | | - | -43 | - | -98 | - | -86 |
| Field Conductivity | µS/cm | 780 | 846 | 779 | 886 | 732 | 804 |
| Conductivity | µS/cm | 756 | 657 | 770 | 807 | 717 | 567 |
| Dissolved Oxygen | % | | 33.7 | 35 | 31.4 | 66 | 89.1 |
| Dissolved Oxygen | mg/l | - | 3.78 | - | 3.44 | - | 9.79 |
| pH | pH Units | - | 7.08 | - | 7.13 | - | 7.23 |
| Lab pH | | 7.69 | 7.48 | 7.3 | 7.71 | 7.41 | 7.72 |
| Calcium | mg/l | 137.9 | 130.6 | 151 | 131.9 | 141 | 64.5 |
| Magnesium | mg/l | 15.09 | 14.44 | 18.9 | 16.33 | 17 | 9.38 |
| Sodium | mg/l | 9 | 9.4 | 16 | 17.3 | 10.4 | 10.7 |
| Potassium | mg/l | 0.8 | 0.9 | 1.3 | 0.5 | 1.56 | 1.9 |
| Alkalinity | mg/l | 250 | 250 | 317 | 230 | 294 | 220 |
| Hardness | mg/l | - | 386 | 455 | 397 | 423 | 200 |
| Chloride | mg/l | 21 | 23 | 28.3 | 24 | 30.6 | 26 |
| Sulphate | mg/l | 55 | 62 | 66 | 64 | 10.4 | 29 |
| Ammonium | mg/l | <0.01 | <0.2 | <0.04 | <0.2 | <0.04 | <0.2 |
| Nitrite (as NO2) | mg/l | <0.05 | - | <0.01 | - | <0.01 | - |
| Nitrate (as NO3) | mg/l | 19.2 | 27.3 | 37.7 | 38.2 | 60.3 | 53 |
| Iron | µg/l | <2 | <2 | <25 | <2 | <25 | 40 |
| Manganese | µg/l | 11 | 2 | 298 | 116 | 4 | 20 |
| Orthophosphate (as PO4) | mg/l | <0.03 | - | <0.03 | - | 0.03 | - |
| Total Organic Carbon | mg/l | 3 | <2 | 1.55 | <2 | 1.3 | <2 |
| Tot. Pet. Hydrocarbons | µg/l | <10 | <10 | - | <10 | - | <10 |
| Mineral Oil | µg/l | <10 | - | - | - | - | - |

| | Unit | BH04 | | | BH05 | | |
|-------------------------|----------|------------|------------|------------|------------|------------|------------|
| | | 06/07/2007 | 17/01/2008 | 08/05/2008 | 06/07/2007 | 17/01/2008 | 08/05/2008 |
| Temperature | °C | 13.4 | 9.7 | 11.9 | 11.8 | 10.7 | 11 |
| pHmV | | - | - | -19 | - | - | -31.5 |
| ORP | | - | - | -48 | - | - | -54 |
| Field Conductivity | µS/cm | 790 | 682 | 873 | 754 | 707 | 778 |
| Conductivity | µS/cm | 787 | 653 | 810 | 759 | 692 | 692 |
| Dissolved Oxygen | % | 120 | 71 | 91.1 | 74.5 | 52.3 | 66.1 |
| Dissolved Oxygen | mg/l | - | - | - | - | - | 7.29 |
| pH | pH Units | - | - | 7.09 | - | - | 7.32 |
| Lab pH | | 7.69 | 7.68 | 7.29 | 7.58 | 7.39 | 7.72 |
| Calcium | mg/l | 130 | 134 | 129.9 | 131 | 136 | 113.8 |
| Magnesium | mg/l | 16.3 | 15.6 | 14.05 | 14.6 | 16.8 | 15.03 |
| Sodium | mg/l | 11.5 | 8.1 | 11.2 | 10.5 | 10.9 | 10 |
| Potassium | mg/l | 4.4 | 7.91 | 10 | 1.7 | 2.2 | 1.5 |
| Alkalinity | mg/l | 160 | 278 | 220 | 200 | 292 | 180 |
| Hardness | mg/l | - | 399 | 382 | 244 | 409 | 346 |
| Chloride | mg/l | 25 | 23 | 27 | 27 | 23.8 | 29 |
| Sulphate | mg/l | 40 | 24.9 | 27 | 27 | 33.1 | 36 |
| Ammonium | mg/l | 0.41 | <0.04 | <0.04 | <0.01 | <0.04 | <0.2 |
| Nitrite (as NO2) | mg/l | 0.11 | 0.03 | - | <0.05 | 0.05 | - |
| Nitrate (as NO3) | mg/l | 101 | 55.4 | 78 | 81.1 | 62.9 | 54.5 |
| Iron | µg/l | 6 | 668 | <2 | 21 | 124 | <2 |
| Manganese | µg/l | 50 | 29 | 4 | 6 | 6 | 3 |
| Orthophosphate (as PO4) | mg/l | 0.11 | 0.06 | - | 0.32 | 0.11 | - |
| Total Organic Carbon | mg/l | 3 | 1.92 | <2 | 3 | 1.9 | <2 |
| Tot. Pet. Hydrocarbons | µg/l | <10 | - | <10 | <10 | - | <10 |
| Mineral Oil | µg/l | <10 | - | - | <10 | - | - |

| | Unit | BH06 | | | BH08 | | | BH09 |
|-------------------------|----------|------------|------------|------------|------------|------------|------------|------------|
| | | 06/07/2007 | 17/01/2008 | 08/05/2008 | 06/07/2007 | 17/01/2008 | 08/05/2008 | 08/05/2008 |
| Temperature | °C | 13 | 11 | - | 13.5 | 10.9 | 12.1 | 10.7 |
| pHmV | | - | - | -19.9 | - | - | -53.2 | -23.2 |
| ORP | | - | - | -54 | - | - | -18 | -71 |
| Field Conductivity | µS/cm | 779 | 740 | 805 | 475 | 448 | 255 | 810 |
| Conductivity | µS/cm | 760 | 726 | 740 | 421 | 453 | 390 | 732 |
| Dissolved Oxygen | % | 90 | 81.7 | 97.9 | 70 | 72 | 83.1 | 92 |
| Dissolved Oxygen | mg/l | - | - | 10.7 | - | - | 8.92 | 10.2 |
| pH | pH Units | - | - | 7.1 | - | - | 7.72 | 7.17 |
| Lab pH | | 7.57 | 7.46 | 7.48 | 8.06 | 7.77 | 7.99 | 7.52 |
| Calcium | mg/l | 112 | 144 | 116.9 | 70.75 | 83.3 | 63.86 | 113 |
| Magnesium | mg/l | 28.1 | 17.9 | 14.1 | 9.81 | 11 | 8.5 | 14.54 |
| Sodium | mg/l | 13 | 13.9 | 13.5 | 7.5 | 6.9 | 6.6 | 10.1 |
| Potassium | mg/l | 2.7 | 2.07 | 2.8 | 1 | 0.74 | 0.7 | 12.7 |
| Alkalinity | mg/l | 190 | 296 | 200 | 167 | 191 | 150 | 200 |
| Hardness | mg/l | - | 434 | 350 | - | 233 | 194 | 342 |
| Chloride | mg/l | 37 | 39.7 | 40 | 7 | 15.5 | 14 | 40 |
| Sulphate | mg/l | 35 | 34.8 | 32 | 38 | 27 | 21 | 15 |
| Ammonium | mg/l | 0.38 | 0.37 | <0.2 | 0.02 | 0.31 | 0.4 | <0.2 |
| Nitrite (as NO2) | mg/l | 0.13 | 0.3 | - | 0.08 | 0.42 | - | - |
| Nitrate (as NO3) | mg/l | 71.3 | 62.9 | 65.3 | 6.7 | 25.6 | 19.6 | 69.2 |
| Iron | µg/l | 9 | 99 | <2 | 12 | 113 | <2 | <2 |
| Manganese | µg/l | 2 | 4 | 2 | <1 | <3 | 3 | 1 |
| Orthophosphate (as PO4) | mg/l | <0.03 | 0.39 | - | 0.26 | 0.5 | - | - |
| Total Organic Carbon | mg/l | 3 | 1.68 | <2 | 3 | 1.03 | <0.2 | <2 |
| Tot. Pet. Hydrocarbons | µg/l | <10 | - | <10 | <10 | - | <10 | <10 |
| Mineral Oil | µg/l | <10 | - | - | <10 | - | - | - |

| Parameter | Licence Limit (from) | Unit | 05/07/2007 | 08/08/2007 | 16/01/2008 | 08/05/2008 | 11/03/2009 | 06/05/2009 | 05/08/2009 | 22/09/2009 |
|------------------------------|----------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Lab pH | 6-9 | pH units | 7.81 | 7.51 | 8.15 | 7.99 | 7.66 | 7.98 | 8.21 | 7.48 |
| Ammoniacal Nitrogen | 0.3 | mg/l NH3 | <0.01 | <0.2 | <0.04 | | <0.2 | <0.2 | <0.2 | <0.2 |
| Total Suspended Solids | 25 | mg/l | 23 | <10 | 39 | 21 | 49 | 2 | 7 | 4 |
| BOD | 5 | mg/l | <2 | <2 | | <2 | 3 | | <1 | 1.53 |
| COD | 5 | mg/l | | | | | <15 | <7 | <7 | <7 |
| Total Phosphorus | 0.1 | mg/l | | | | | <0.05 | <0.018 | <0.018 | <0.018 |
| Orthophosphate | 0.08 | mg/l PO4 | 0.13 | <0.08 | <0.08 | | <0.08 | <0.08 | <0.08 | <0.08 |
| Nitrate | 25 | mg/l NO3 | 25.2 | 25.2 | 30.1 | | 29.1 | 21.1 | 13.3 | 11.5 |
| Temperature | 25 | °C | 14.7 | | 8.5 | 16.62 | 10.47 | 13.12 | 17.45 | 13.93 |
| Total Petroleum Hydrocarbons | 1000 | µg/l | <10 | <10 | | <10 | <10 | <10 | <10 | - |
| Mineral Oil | | µg/l | <10 | <10 | | <10 | | | | |
| Dissolved Oxygen | | % Sat. | 88.8 | | 92.8 | 104 | | | | |
| Conductivity | | µS/cm | 872 | 698 | 859 | 758 | | | | |
| Field Conductivity | | µS/cm | 914 | | 908 | 889 | | | | |
| Calcium | | mg/l | 124.6 | 101 | 149 | | | | | |
| Magnesium | | mg/l | 32.69 | 35.61 | 42.2 | | | | | |
| Potassium | | mg/l | 2.8 | 3.4 | 3.16 | | | | | |
| Sodium | | mg/l | 15.5 | 11 | 12.2 | | | | | |
| Chloride | | mg/l | 27 | 24 | 26 | | | | | |
| Sulphate | | mg/l | 191 | 252 | 255 | | | | | |
| Nitrite | | mg/l NO2 | 0.07 | 0.14 | 0.07 | | | | | |
| Dissolved Iron | | mg/l | | 0.069 | <0.025 | | | | | |
| Manganese | | mg/l | | 0.003 | 0.004 | | | | | |
| Alkalinity | | mg/l CaCO3 | 189 | 220 | 222 | | | | | |
| Hardness | | mg/l | | | 546 | | | | | |
| Total Organic Carbon | | mg/l | | 1 | 1.63 | | | | | |

| Parameter | Licence Limit (from) | Unit | 20/10/2009 | 26/11/2009 | 16/12/2009 | 22/01/2010 | ##### | ##### |
|------------------------------|----------------------|----------|------------|------------|------------|------------|--------|-------|
| Lab pH | 6-9 | pH units | 7.96 | 8.17 | 8.19 | 8.14 | 8.32 | 8.13 |
| Ammoniacal Nitrogen | 0.3 | mg/l NH3 | <0.2 | 0.0811 | 0.0291 | <0.2 | <0.2 | 0.148 |
| Total Suspended Solids | 25 | mg/l | 111 | 28.5 | 9 | 39 | 8.9 | 77 |
| BOD | 5 | mg/l | 1.14 | <1 | | <1 | <1 | <1 |
| COD | 5 | mg/l | 30 | 10 | <7 | 7.71 | <7 | 14 |
| Total Phosphorus | 0.1 | mg/l | 0.0594 | 0.0229 | <0.08 | 0.021 | <0.018 | 0.008 |
| Orthophosphate | 0.08 | mg/l PO4 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 | <0.08 |
| Nitrate | 25 | mg/l NO3 | 16.8 | 24.4 | 26.8 | 24.4 | 27.5 | 25.1 |
| Temperature | 25 | °C | | 9.3 | 8.11 | - | 6.65 | - |
| Total Petroleum Hydrocarbons | 1000 | µg/l | - | - | <10 | - | - | 513 |

| Parameter | Unit | SW03 | SW04 |
|------------------------------|------------|------------|------------|
| Lab pH | pH units | 08/08/2007 | 08/08/2007 |
| Ammoniacal Nitrogen | mg/l NH3 | 7.51 | 7.84 |
| Total Suspended Solids | mg/l | <0.2 | <0.2 |
| BOD | mg/l | <10 | <10 |
| COD | mg/l | <2 | <2 |
| Total Phosphorus | mg/l | | |
| Orthophosphate | mg/l PO4 | | |
| Nitrate | mg/l NO3 | <0.03 | 0.03 |
| Temperature | °C | 81.9 | 32.2 |
| Total Petroleum Hydrocarbons | µg/l | | |
| Conductivity | µg/l | <10 | <10 |
| Field Conductivity | % Sat. | 793 | 639 |
| Calcium | µS/cm | | |
| Magnesium | µS/cm | 89.85 | 97.42 |
| Potassium | mg/l | 10.91 | 9.15 |
| Sodium | mg/l | 4.1 | 1.6 |
| Chloride | mg/l | 11.5 | 11 |
| Sulphate | mg/l | 19 | 14 |
| Nitrite | mg/l | 33 | 19 |
| Dissolved Iron | mg/l | 0.25 | 0.1 |
| Manganese | mg/l NO2 | 0.219 | 0.046 |
| Alkalinity | mg/l | 0.011 | 0.006 |
| Hardness | mg/l | 290 | 310 |
| Total Organic Carbon | mg/l CaCO3 | | |
| Mineral Oil | mg/l | 5 | 5 |
| Dissolved Oxygen | mg/l | <10 | <10 |

APPENDIX 7.3 **GSI WELL SEARCH**

Appendix 6.F GSI Well Search Results

| GSIName | OrigName | SrcName | Type | Depth_m | Dpth_Rck_m | DTRConfid | DrillDate | Easting | Northing | Loc_Acc | Townland | County | SkinShitNo | SourceUse | YidClass | ProdClass | Yield_m3d | SC_m3d | casidia_mm | Wtrstrk1_m | Wtrstrk2_m | DrillComms | CasingComs |
|------------|---------------------------|---------------------------|----------|---------|------------|-------------|-----------|---------|----------|---------|--------------|--------|------------|------------------------|----------|-----------|-----------|--------|------------|------------|------------|--------------------------|--|
| 2615NWW152 | BWP.1 | | Borehole | 23 | 12.1 | | 19801101 | 270720 | 168850 | to 10m | POWERSTOWN | Carlow | | Industrial 12 use | | | 0 | 0 | 203 | 0 | 0 | Powerstown Landfill Site | see report |
| 2615NWW153 | BHM.1 | | Borehole | 7 | 7 | Bedrock Met | 19801101 | 270770 | 168970 | to 10m | POWERSTOWN | Carlow | | Industrial 12 use | | | 0 | 0 | 152 | 0 | 0 | Powerstown Landfill Site | No.1 casing |
| 2615NWW154 | BHM 2, ERA report | | Borehole | 9 | 9 | Bedrock Met | 19801101 | 270700 | 168770 | to 10m | POWERSTOWN | Carlow | | Industrial 12 use | | | 0 | 0 | 152 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW155 | BHM 3, ERA report | | Borehole | 8 | 8 | Bedrock Met | 19801101 | 270890 | 168830 | to 10m | POWERSTOWN | Carlow | | Industrial 12 use | | | 0 | 0 | 152 | 0 | 0 | POWERSTOWN LANDFILL SITE | No. 1: casing No. 2: steel |
| 2615NWW156 | BHM 4 | | Borehole | 15.8 | 15.8 | Bedrock Met | 19801101 | 270580 | 168880 | to 10m | POWERSTOWN | Carlow | | Industrial 12 use | | | 0 | 0 | 152 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW420 | Co. Council Pump No.44 | Carlow Drift Survey, 1962 | Borehole | 11 | 0 | Not:Met | 19811112 | 270840 | 170670 | to 10m | CLOGHRISTICK | Carlow | | Public supply (Co Co) | Poor | | 26.2 | 0 | 152 | 0 | 0 | | Runs low in summer, water turns rusty after a couple of buckets have been drawn off. |
| 2615NWW424 | | Carlow Drift Survey, 1962 | Dug well | 11.9 | 0 | DTB Unknown | 272340 | 170040 | 170040 | to 10m | CLOMELSH | Carlow | | Agri & domestic 12 use | | | 0 | 0 | 0 | 0 | 0 | Clonmelsh House | Runs short in dry weather Good Domestic yield |
| 2615NWW172 | Carlow Drift Survey, 1962 | | Borehole | 6.7 | 0 | DTB Unknown | 270970 | 169650 | 170970 | to 20m | CLOGHRISTICK | Carlow | | Domestic 12 use only | | | 0 | 0 | 0 | 0 | 0 | | |
| 2615NWW242 | WG 335 | | Borehole | 36.6 | 8.2 | Bedrock Met | 19800301 | 273040 | 169740 | to 20m | GARRYHUNDON | Carlow | | Agri & domestic 12 use | Poor | II | 32.7 | 109 | 152 | 12.2 | 29 | | |
| 2615NWW256 | M1 | Carlow Co Council | Borehole | 6.2 | 0 | Not:Met | 19801201 | 270710 | 168980 | to 20m | POWERSTOWN | Carlow | | Industrial 12 use | | | 0 | 0 | 0 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW257 | M2 | Carlow Co Council | Borehole | 25 | 21 | Bedrock Met | 19800401 | 270740 | 168730 | to 20m | POWERSTOWN | Carlow | | Industrial 12 use | Good | | 175 | 0 | 114 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW258 | M3 | Carlow co. Council | Borehole | 8.9 | 0 | Not:Met | 19801201 | 270890 | 168840 | to 20m | POWERSTOWN | Carlow | | Industrial 12 use | | | 0 | 0 | 0 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW259 | M 4 | Carlow Co. Council | Borehole | 8.9 | 0 | Not:Met | 19801201 | 270580 | 168900 | to 20m | POWERSTOWN | Carlow | | Industrial 12 use | | | 0 | 0 | 0 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW260 | M 5 | Carlow Co. Council | Borehole | 25 | 16 | Bedrock Met | 19800401 | 270630 | 168820 | to 20m | POWERSTOWN | Carlow | | Industrial 12 use | Poor | | 36 | 0 | 0 | 0 | 0 | | |
| 2615NWW263 | R2 | Carlow Co. Council | Borehole | 0 | 0 | | 19801201 | 270590 | 168730 | to 20m | POWERSTOWN | Carlow | | Industrial 12 use | | | 0 | 0 | 0 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW264 | P 1 | Carlow Co Council | Borehole | 13.1 | 13.1 | Presumed | 19801201 | 270700 | 168870 | to 20m | POWERSTOWN | Carlow | | Industrial 12 use | | | 0 | 0 | 0 | 0 | 0 | Powerstown Landfill Site | Powerstown Date 1/2/1966 |
| 2615NWW265 | M3 A | Carlow Co. Council | Borehole | 25 | 15 | Bedrock Met | 20020101 | 270880 | 168840 | to 20m | POWERSTOWN | Carlow | | Industrial 12 use | Good | | 360 | 0 | 114 | 5 | 0 | Powerstown Landfill Site | |

| GSIName | OrigName | SrcName | Type | Depth_m | Dpth_Rck_m | DTRConf | DrillDate | Eastng | Northng | Loc_Acc | Townland | County | SixInSht No | SourceUse | YidClass | Prod Class | Yield_m3d | SC_m3d | cas.dia_mm | Wtrstrk1_m | Wtrstrk2_m | DrillComms | CasingComs |
|------------|-----------------------------------|-----------------------|----------|---------|------------|---------|-----------|--------|---------|---------|--------------|--------|-------------|---------------------|----------|------------|-----------|--------|------------|------------|------------|--|------------|
| 2615NWW266 | M 8 | Carlow Co. Council | Borehole | 26 | 22 | Met | 20020101 | 270720 | 168630 | to 20m | POWERSTOWN | Carlow | 12 | Industrial use | Good | | 192 | 0 | 0 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW267 | M9 | Carlow Co. Council | Borehole | 28 | 18 | Met | 20020101 | 270670 | 168570 | to 20m | POWERSTOWN | Carlow | 12 | Industrial use | Good | | 288 | 0 | 0 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW268 | TP 13 | Carlow Co. Council | Borehole | 15 | 15 | Met | 20020101 | 270550 | 168980 | to 20m | POWERSTOWN | Carlow | 12 | Industrial use | Good | | 192 | 0 | 0 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW269 | TPM | Carlow Co. Council | Borehole | 17 | 15 | Met | 20020101 | 270620 | 169110 | to 20m | POWERSTOWN | Carlow | 12 | Industrial use | | | 0 | 0 | 0 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW270 | | | Borehole | 0 | 0 | | | 270490 | 169080 | to 20m | POWERSTOWN | Carlow | 12 | Agri & domestic use | | | 0 | 0 | 0 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW271 | RCA 1 | Carlow Co. Council | Borehole | 29 | 22.9 | Met | 20011211 | 271070 | 168870 | to 20m | POWERSTOWN | Carlow | 12 | Industrial use | | | 0 | 0 | 0 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW272 | RCA 2 | Carlow Co. Council | Borehole | 18 | 18 | Met | 20011212 | 271080 | 168860 | to 20m | POWERSTOWN | Carlow | 12 | Industrial use | | | 0 | 0 | 0 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW273 | RCB 1 | Carlow Co. Council | Borehole | 17.2 | 12.9 | | 20011202 | 270930 | 168940 | to 20m | POWERSTOWN | Carlow | 12 | Industrial use | | | 0 | 0 | 0 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW274 | RCB 2 | Carlow Co. Council | Borehole | 12 | 12 | Met | 20011203 | 270930 | 168940 | to 20m | POWERSTOWN | Carlow | 12 | Industrial use | | | 0 | 0 | 0 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW275 | RCC 1 | Carlow Co. Council | Borehole | 8.5 | 3.6 | Met | 20011205 | 270920 | 169050 | to 20m | POWERSTOWN | Carlow | 12 | Industrial use | | | 0 | 0 | 0 | 0 | 0 | Powerstown Landfill Site | |
| 2615NWW428 | ILC.1297 | Bennett Estate | Borehole | 20.7 | 0 | Not Met | 19680118 | 270620 | 170270 | to 20m | CLOGHRISTICK | Carlow | 12 | Agri & domestic use | Poor | III | 25.6 | 41.97 | 152 | 0 | 0 | well abandoned | |
| 2615NWW426 | WG.108 | | Borehole | 25.9 | 0 | Not Met | 19980301 | 270660 | 170020 | to 100m | CLOGHRISTICK | Carlow | 12 | Agri & domestic use | Good | I | 218 | 72.7 | 152 | 12.2 | 0 | Max safe yield=163.7m ³ /day | |
| 2615NWW427 | ILC.1297 A | | Borehole | 20.7 | 0 | Not Met | 19700805 | 270620 | 170120 | to 100m | CLOGHRISTICK | Carlow | 12 | Agri & domestic use | Poor | III | 21.4 | 70.2 | 127 | 0 | 0 | | |
| 2615NWW056 | WTB/CLW 1045 | | Borehole | 17.4 | 17.4 | Met | 19721201 | 270720 | 168610 | to 500m | POWERSTOWN | Carlow | 12 | Agri & domestic use | Poor | | 27.3 | 0 | 0 | 0 | 0 | | |
| 2615NWW057 | Carlow Co. Council Pump No. 141 | Carlow Co. Council | Borehole | 13.7 | 0 | Not Met | | 270720 | 168560 | to 500m | POWERSTOWN | Carlow | 12 | Agri & domestic use | Moderate | | 87.3 | 0 | 152 | 9.1 | 12.2 | strike no.2= water rising to SWL / 1.5m FILLED WITH GRAVEL | |
| 2615NWW117 | Carlow County Council Pump No.206 | Carlow County Council | Borehole | 15.2 | 4.9 | Met | | 272780 | 170130 | to 500m | SESKINRYAN | Carlow | 16 | | Good | | 131 | 0 | 0 | 9.1 | 0 | | |
| 2615NWW118 | WTB/CLW 12 | | Borehole | 31.1 | 0 | Unknown | 19740201 | 272780 | 170090 | to 500m | SESKINRYAN | Carlow | 16 | | Poor | | 27.3 | 0 | 0 | 0 | 0 | | |

| GSIName | OrigName | SrcName | Type | Depth_m | Dpth_Rck_m | DTRConfid | DrillDate | Easting | Northing | Loc_Acc | Townland | County | SkinshtNo | SourceUse | YldClass | ProdClass | Yield_fm3d_m | SC_m3d_m | casidia_mm | Wtrstrk1_m | Wtrstrk2_m | DrillComms | CasingComs |
|------------|--------------|----------------|----------|---------|------------|------------------|-----------|---------|----------|---------|----------------|--------|-----------|---------------------|----------|-----------|--------------|----------|------------|------------|------------|------------|------------|
| 2615NWW250 | ILC 1299 | Bennett Estate | Borehole | 17.4 | | DTB 0 Unknown | 19680130 | 270500 | 169500 | to 500m | CLOGHRISTICK | Carlow | 12 | Agri & domestic use | Poor | ll | 42.5 | 69.67 | 152 | 0 | 0 | | |
| 2617SWW384 | CW 12/9 | | Borehole | 61 | 4.3 | Bedrock Met | | 272950 | 170100 | to 500m | BALLYBAR UPPER | Carlow | 12 | Domestic use only | Good | | 109 | 0 | 0 | 61 | 0 | | |
| 2615NWW053 | WTB/CLW 970 | | Borehole | 13.1 | 13.1 | Bedrock Met | 19720401 | 272510 | 168850 | to 1km | GARRYHUNDON | Carlow | 12 | | Poor | | 32.7 | 0 | 0 | 0 | 0 | | |
| 2615NWW054 | WRB/CLW 964 | | Borehole | 12.5 | 12.5 | Bedrock Met | 19720601 | 272510 | 168810 | to 1km | GARRYHUNDON | Carlow | 12 | | Poor | | 30.5 | 0 | 0 | 0 | 0 | | |
| 2615NWW055 | WTB/CLW 1099 | | Borehole | 36.6 | | DTB 0 Unknown | 19720501 | 272510 | 168770 | to 1km | GARRYHUNDON | Carlow | 12 | | Moderate | | 43.6 | 0 | 0 | 0 | 0 | | |
| 2617SWW343 | | | Borehole | 24.4 | 9.1 | Bedrock Met | 19731010 | 272650 | 170460 | to 1km | CLONMELSH | Carlow | 12 | | Poor | | 38.2 | 0 | 0 | 0 | 0 | | |

THE FOLLOWING ELEMENTS OF THE DATABASE WERE OMITTED BECAUSE THEY RETURNED NULL VALUES:

- Town
- ABSTR_M3D
- OVRELW_M3D
- AbstrDD_m
- Wtrstrk3
- Wtrstrk4
- Wtrloss
- Gencomms

APPENDIX 7.4 **LOCAL WELL SURVEY 2010**

Appendix 6.E Well Survey Results

Well Survey

| | | | |
|---------------|------------|---------------------|----------|
| Client: | DMIL | Well No.: | PW01 |
| Project No.: | 3524_07 | Dist. to Footprint: | |
| Project Name: | | Water Use: | Domestic |
| Surveyed by: | ac/lh | | |
| Date: | 26/07/2007 | | |



EUGENE DALY ASSOCIATES

Groundwater, Hydrological & Environmental Consultants

e-mail: abinchy@csa.ie

7 Dundrum Business Park, Windy Arbour, Dublin 14

WELL OWNER DETAILS:

| | | | |
|----------|----------------------|-------------|--|
| Name: | Noel Farrell | Mobile No.: | |
| Address: | Clonmelsh, Co Carlow | Phone No.: | |

LOCATION:

| | | | |
|------------------|--------------------|-----------------|--|
| Townland: | Clonmelsh | O.S. Map: | |
| County: | Carlow | Design Map: | |
| Nat. Grid. Ref.: | IS 72952 ITM 70102 | Well Head Elev: | |

WELL DETAILS:

| | | | | | |
|------------------|--|--------------------|---------|------------------|--|
| Drilled by: | | Well Head: | | Casing Length: | |
| Drilling Method: | | Well Construction: | | Casing Diameter: | |
| Date completed: | Approx 1987 | Well Depth: | 200ft + | Screen Length: | |
| Well Type: | Borehole <input checked="" type="checkbox"/> Dug Well <input type="checkbox"/> Spring <input type="checkbox"/> | | | Screen Diameter: | |

WATER:

| | | | | | |
|-------------------|--|------------|---|--------------|--|
| Depth to Water: | | Yield: | | W.H. > G.L.: | |
| Water Level: | | Well Test: | <input type="checkbox"/> Yes <input type="checkbox"/> No (if yes, please give details below). | | |
| Water Quality: | N/A | | | | |
| Copy of Analysis: | <input type="checkbox"/> Yes <input type="checkbox"/> No | | Date of Analysis: | | |

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

| | |
|--|-----------|
| Well in pumphouse, not possible to reach | |
| General Land Use: | Drainage: |

GEOLOGICAL LOG:

| | |
|-------------|-------------------|
| Soil Type: | Bedrock: |
| Overburden: | Depth to bedrock: |

POTENTIAL SOURCES OF POLLUTION:

| | |
|---------------------------|----------------|
| Septic Tank Location: | Well Distance: |
| Effluent Disposal System: | |
| Other Sources: | Well Distance: |
| Nat. Grid. Ref.: | |

ROAD CONSTRUCTION DETAILS:

| | | |
|------------------------------------|------------------------|--|
| Road Type: New road improvement in | Distance to Footprint: | |
| | Cut / Fill: | |

OTHER INFORMATION:

| |
|--|
| |
|--|

Not to Scale

Location of well marked with an "x".

Well Survey

| | | | |
|---------------|------------|---------------------|----------|
| Client: | DMIL | Well No.: | PW02 |
| Project No.: | 3524_07 | Dist. to Footprint: | |
| Project Name: | | Water Use: | Domestic |
| Surveyed by: | ac/lh | | |
| Date: | 26/07/2007 | | |



EUGENE DALY ASSOCIATES

Groundwater, Hydrological & Environmental Consultants

e-mail: abinchy@csa.ie

7 Dundrum Business Park, Windy Arbour, Dublin 14

WELL OWNER DETAILS:

| | | | |
|----------|------------------------|-------------|--|
| Name: | O'Neill | Mobile No.: | |
| Address: | Garryhundon, Co Carlow | Phone No.: | |

LOCATION:

| | | | |
|------------------|--------------------|-----------------|--|
| Townland: | Garryhundon | O.S. Map: | |
| County: | Carlow | Design Map: | |
| Nat. Grid. Ref.: | IS 73241 ITM 69710 | Well Head Elev: | |

WELL DETAILS:

| | | | |
|------------------|--|------------------|-------|
| Drilled by: | Well Head: | Casing Length: | |
| Drilling Method: | Well Construction: | Casing Diameter: | |
| Completed: | 2000 | Well Depth: | 200FT |
| Well Type: | Borehole <input checked="" type="checkbox"/> Dug Well <input type="checkbox"/> Spring <input type="checkbox"/> | Screen Length: | |
| | | Screen Diameter: | |

WATER:

| | | | |
|-------------------|--|-------------------|---|
| Depth to Water: | 4.92M | Yield: | |
| Water Level: | | Well Test: | <input type="checkbox"/> Yes <input type="checkbox"/> No (if yes, please give details below). |
| Water Quality: | | | N/A |
| Copy of Analysis: | <input type="checkbox"/> Yes <input type="checkbox"/> No | Date of Analysis: | |

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

| | |
|-------------------|-----------|
| Well in pumphouse | |
| General Land Use: | Drainage: |

GEOLOGICAL LOG:

| | |
|-------------|-------------------|
| Soil Type: | Bedrock: |
| Substratum: | Depth to bedrock: |

POTENTIAL SOURCES OF POLLUTION:

| | |
|---------------------------|----------------|
| Septic Tank Location: | Well Distance: |
| Effluent Disposal System: | |
| Other Sources: | Well Distance: |
| Nat. Grid. Ref.: | |

ROAD CONSTRUCTION DETAILS:

| | | |
|------------------------------------|------------------------|--|
| Road Type: New road improvement in | Distance to Footprint: | <div style="border: 1px solid black; height: 100px; width: 100%;"></div> |
| | Cut / Fill: | |

OTHER INFORMATION:

| |
|-------------------|
| Problem with rust |
|-------------------|

Not to Scale

Location of well marked with an "x".

Well Survey



EUGENE DALY ASSOCIATES

Groundwater, Hydrological & Environmental Consultants

e-mail: abinchy@csa.ie

7 Dundrum Business Park, Windy Arbour, Dublin 14

| | | | |
|---------------|------------|---------------------|----------|
| Client: | DMIL | Well No.: | PW03 |
| Project No.: | 3524_07 | Dist. to Footprint: | |
| Project Name: | | Water Use: | Domestic |
| Surveyed by: | ac/lh | | |
| Date: | 26/07/2007 | | |

WELL OWNER DETAILS:

| | | | |
|----------|--------------------------------|-------------|--|
| Name: | Adrian Walsh owner - rents out | Mobile No.: | |
| Address: | Garryhundon, Co Carlow | Phone No.: | |

LOCATION:

| | | | |
|------------------|-------------------|-----------------|--|
| Townland: | Garryhundon | O.S. Map: | |
| County: | Carlow | Design Map: | |
| Nat. Grid. Ref.: | IS73229 ITM 69684 | Well Head Elev: | |

WELL DETAILS:

| | | | | | |
|------------------|--|--------------------|-------|------------------|--|
| Drilled by: | | Well Head: | | Casing Length: | |
| Drilling Method: | | Well Construction: | | Casing Diameter: | |
| Date completed: | | Well Depth: | 200FT | Screen Length: | |
| Well Type: | Borehole <input checked="" type="checkbox"/> Dug Well <input type="checkbox"/> Spring <input type="checkbox"/> | | | Screen Diameter: | |

WATER:

| | | | | | |
|-------------------|--|------------|---|--------------|--|
| Depth to Water: | 4.68M | Yield: | | W.H. > G.L.: | |
| Water Level: | | Well Test: | <input type="checkbox"/> Yes <input type="checkbox"/> No (if yes, please give details below). | | |
| Water Quality: | N/A | | | | |
| Copy of Analysis: | <input type="checkbox"/> Yes <input type="checkbox"/> No | | Date of Analysis: | | |

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

| | |
|-------------------|-----------|
| Well in pumphouse | |
| General Land Use: | Drainage: |

GEOLOGICAL LOG:

| | |
|-------------|-------------------|
| Soil Type: | Bedrock: |
| Overburden: | Depth to bedrock: |

POTENTIAL SOURCES OF POLLUTION:

| | |
|---------------------------|----------------|
| Septic Tank Location: | Well Distance: |
| Effluent Disposal System: | |
| Other Sources: | Well Distance: |
| Nat. Grid. Ref.: | |

ROAD CONSTRUCTION DETAILS:

| | | |
|------------------------------------|------------------------|--|
| Road Type: New road improvement in | Distance to Footprint: | |
| | Cut / Fill: | |

OTHER INFORMATION:

| |
|--|
| |
|--|

Not to Scale
Location of well marked with an "x".

Well Survey

| | | | |
|---------------|------------|---------------------|----------|
| Client: | DMIL | Well No.: | PW04 |
| Project No.: | 3524_07 | Dist. to Footprint: | |
| Project Name: | | Water Use: | Domestic |
| Surveyed by: | ac/lh | | |
| Date: | 26/07/2007 | | |



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WELL OWNER DETAILS:

| | | | |
|----------|-------------------------------------|-------------|--|
| Name: | Phil Morrissey's house - rented out | Mobile No.: | |
| Address: | Clonmelsh, Co Carlow | Phone No.: | |

LOCATION:

| | | | |
|------------------|-----------|-----------------|--|
| Townland: | Clonmelsh | O.S. Map: | |
| County: | Carlow | Design Map: | |
| Nat. Grid. Ref.: | | Well Head Elev: | |

WELL DETAILS:

| | | | | | |
|------------------|--|--------------------|--|------------------|--|
| Drilled by: | | Well Head: | | Casing Length: | |
| Drilling Method: | | Well Construction: | | Casing Diameter: | |
| Completed: | | Well Depth: | | Screen Length: | |
| Well Type: | Borehole <input checked="" type="checkbox"/> Dug Well <input type="checkbox"/> Spring <input type="checkbox"/> | Screen Diameter: | | | |

WATER:

| | | | | | |
|-------------------|--|-------------------|---|--------------|--|
| Depth to Water: | | Yield: | | W.H. > G.L.: | |
| Water Level: | | Well Test: | <input type="checkbox"/> Yes <input type="checkbox"/> No (if yes, please give details below). | | |
| Water Quality: | | N/A | | | |
| Copy of Analysis: | <input type="checkbox"/> Yes <input type="checkbox"/> No | Date of Analysis: | | | |

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

| | |
|-------------------|-----------|
| | |
| General Land Use: | Drainage: |

GEOLOGICAL LOG:

| | |
|-------------|-------------------|
| Soil Type: | Bedrock: |
| Substratum: | Depth to bedrock: |

POTENTIAL SOURCES OF POLLUTION:

| | | | |
|---------------------------|--------------------|----------------|--|
| Septic Tank Location: | IS 71829 ITM 69600 | Well Distance: | |
| Effluent Disposal System: | | | |
| Other Sources: | | Well Distance: | |
| Nat. Grid. Ref.: | | | |

ROAD CONSTRUCTION DETAILS:

| | | |
|------------|------------------------|--|
| Road Type: | Distance to Footprint: | |
| | Cut / Fill: | |

OTHER INFORMATION:

| |
|--|
| Could not find the well and current occupier was unaware of its location |
|--|

Not to Scale
Location of well marked with an "x".

Well Survey

| | | | |
|---------------|------------|---------------------|----------|
| Client: | DMIL | Well No.: | PW05 |
| Project No.: | 3524 07 | Dist. to Footprint: | |
| Project Name: | | Water Use: | Domestic |
| Surveyed by: | ac/lh | | |
| Date: | 26/07/2007 | | |



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7 Dundrum Business Park, Windy Arbour, Dublin 14

WELL OWNER DETAILS:

| | | | |
|----------|-------------------------|-------------|--|
| Name: | Deacon (mothers house) | Mobile No.: | |
| Address: | Garryhundon, Co. Carlow | Phone No.: | |

LOCATION:

| | | | |
|------------------|--------------------|-----------------|--|
| Townland: | Garryhundon | O.S. Map: | |
| County: | Carlow | Design Map: | |
| Nat. Grid. Ref.: | IS 71807 ITM 68695 | Well Head Elev: | |

WELL DETAILS:

| | | | |
|------------------|--|--------------------|------|
| Drilled by: | | Well Head: | |
| Drilling Method: | | Well Construction: | |
| Date completed: | Approx 1977 | Well Depth: | 40ft |
| Well Type: | Borehole <input checked="" type="checkbox"/> Dug Well <input type="checkbox"/> Spring <input type="checkbox"/> | Casing Length: | |
| | | Casing Diameter: | |
| | | Screen Length: | |
| | | Screen Diameter: | |

WATER:

| | | | |
|-------------------|--|-------------------|---|
| Depth to Water: | | Yield: | |
| Water Level: | | W.H. > G.L.: | |
| Water Quality: | | Well Test: | <input type="checkbox"/> Yes <input type="checkbox"/> No (if yes, please give details below). |
| | | | N/A |
| Copy of Analysis: | <input type="checkbox"/> Yes <input type="checkbox"/> No | Date of Analysis: | |

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

| | |
|--|---------------------------|
| Concrete cover over well, would need tractor to lift | |
| General Land Use: | Domestic and Agricultural |
| Drainage: | |

GEOLOGICAL LOG:

| | |
|-------------|-------------------|
| Soil Type: | Bedrock: |
| Overburden: | Depth to bedrock: |

POTENTIAL SOURCES OF POLLUTION:

| | |
|---------------------------|----------------|
| Septic Tank Location: | Well Distance: |
| Effluent Disposal System: | |
| Other Sources: | Well Distance: |
| Nat. Grid. Ref.: | |

ROAD CONSTRUCTION DETAILS:

| | | |
|------------|------------------------|--|
| Road Type: | Distance to Footprint: | |
| | Cut / Fill: | |

OTHER INFORMATION:

| |
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| |
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| |
|--|
| Not to Scale Location of well marked with an "x". |
|--|

Well Survey



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| | | | |
|---------------|------------|---------------------|----------|
| Client: | DMIL | Well No.: | PW06 |
| Project No.: | 3524_07 | Dist. to Footprint: | |
| Project Name: | | Water Use: | Domestic |
| Surveyed by: | ac/lh | | |
| Date: | 26/07/2007 | | |

WELL OWNER DETAILS:

| | | | |
|----------|-------------------------|-------------|--|
| Name: | Derek Deacon | Mobile No.: | |
| Address: | Garryhondon, Co. Carlow | Phone No.: | |

LOCATION:

| | | | |
|------------------|--------------------|-----------------|--|
| Townland: | Garryhondon | O.S. Map: | |
| County: | Carlow | Design Map: | |
| Nat. Grid. Ref.: | IS 71849 ITM 68823 | Well Head Elev: | |

WELL DETAILS:

| | | | |
|------------------|--|------------------|-----------|
| Drilled by: | Well Head: | Casing Length: | |
| Drilling Method: | Well Construction: | Casing Diameter: | |
| completed: | 1996 | Well Depth: | 160-180ft |
| Well Type: | Borehole <input checked="" type="checkbox"/> Dug Well <input type="checkbox"/> Spring <input type="checkbox"/> | Screen Length: | |
| | | Screen Diameter: | |

WATER:

| | | | |
|-------------------|--|---|--|
| Yield: | | W.H. > G.L. | |
| Depth to Water: | Well Test: | <input type="checkbox"/> Yes <input type="checkbox"/> No (if yes, please give details below). | |
| Water Level: | N/A | | |
| Water Quality: | N/A | | |
| Copy of Analysis: | <input type="checkbox"/> Yes <input type="checkbox"/> No | Date of Analysis: | |

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

| | |
|--|---------------------------|
| Concrete cover over well, would need tractor to lift | |
| General Land Use: | Domestic and Agricultural |
| Drainage: | |

GEOLOGICAL LOG:

| | |
|------------|-------------------|
| Soil Type: | Bedrock: |
| burden: | Depth to bedrock: |

POTENTIAL SOURCES OF POLLUTION:

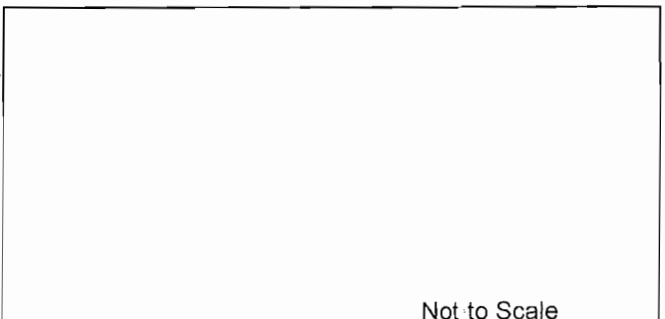
| | |
|---------------------------|----------------|
| Septic Tank Location: | Well Distance: |
| Effluent Disposal System: | |
| Other Sources: | Well Distance: |
| Nat. Grid. Ref.: | |

ROAD CONSTRUCTION DETAILS:

| | | |
|------------|------------------------|--|
| Road Type: | Distance to Footprint: | |
| | Cut / Fill: | |

OTHER INFORMATION:

| |
|--|
| |
|--|



Not to Scale
Location of well marked with an "x".

Well Survey

| | | | |
|---------------|------------|---------------------|----------|
| Client: | DMIL | Well No.: | PW07 |
| Project No.: | 3524_07 | Dist. to Footprint: | |
| Project Name: | | Water Use: | Domestic |
| Surveyed by: | ac/lh | | |
| Date: | 26/07/2007 | | |



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WELL OWNER DETAILS:

| | | | |
|----------|----------------------|-------------|--|
| Name: | Powerstown landfill | Mobile No.: | |
| Address: | Powerstown Co Carlow | Phone No.: | |

LOCATION:

| | | | |
|------------------|--------------------|-----------------|--|
| Townland: | Powerstown | O.S. Map: | |
| County: | Carlow | Design Map: | |
| Nat. Grid. Ref.: | IS 71125 ITM 68630 | Well Head Elev: | |

WELL DETAILS:

| | | | | | |
|------------------|--|--------------------|--------|------------------|--------|
| Drilled by: | | Well Head: | | Casing Length: | |
| Drilling Method: | | Well Construction: | | Casing Diameter: | 8 inch |
| Date completed: | | Well Depth: | 25.30M | Screen Length: | |
| Well Type: | Borehole <input checked="" type="checkbox"/> Dug Well <input type="checkbox"/> Spring <input type="checkbox"/> | | | Screen Diameter: | |

WATER:

| | | | |
|-------------------|--|-------------------|---|
| Yield: | | W.H. > G.L. | |
| Depth to Water: | 11.32M | Well Test: | <input type="checkbox"/> Yes <input type="checkbox"/> No (if yes, please give details below). |
| Water Level: | | | N/A |
| Water Quality: | N/A | | |
| Copy of Analysis: | <input type="checkbox"/> Yes <input type="checkbox"/> No | Date of Analysis: | |

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

| | |
|--|-------------------------|
| Good cover, metal cover over concrete casing | |
| General Land Use: | Landfill, well not used |
| Drainage: | |

GEOLOGICAL LOG:

| | |
|-------------------|--|
| Soil Type: | |
| Overburden: | |
| Bedrock: | |
| Depth to bedrock: | |

POTENTIAL SOURCES OF POLLUTION:

| | |
|---------------------------|--|
| Septic Tank Location: | |
| Well Distance: | |
| Effluent Disposal System: | |
| Other Sources: | |
| Well Distance: | |
| Nat. Grid. Ref.: | |

ROAD CONSTRUCTION DETAILS:

| | | |
|------------------------------------|------------------------|--|
| Road Type: New road improvement in | Distance to Footprint: | |
| | Cut / Fill: | |

OTHER INFORMATION:

| |
|-----------------------------------|
| Water now comes from mains supply |
|-----------------------------------|

Not to Scale

Location of well marked with an "x".

Well Survey

| | | | |
|---------------|------------|---------------------|----------|
| Client: | DMIL | Well No.: | PW08 |
| Project No.: | 3524 07 | Dist. to Footprint: | |
| Project Name: | | Water Use: | Domestic |
| Surveyed by: | ac/lh | | |
| Date: | 26/07/2007 | | |



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7 Dundrum Business Park, Windy Arbour, Dublin 14

WELL OWNER DETAILS:

| | | | |
|----------|--------------------------|-------------|--|
| Name: | Derek Deacon (farmhouse) | Mobile No.: | |
| Address: | Garryhundon, Co. Carlow | Phone No.: | |

LOCATION:

| | | | |
|------------------|--------------------|-----------------|--|
| Townland: | Garryhundon | O.S. Map: | |
| County: | Carlow | Design Map: | |
| Nat. Grid. Ref.: | IS 71723 ITM 68485 | Well Head Elev: | |

WELL DETAILS:

| | | | | | |
|------------------|--|--------------------|------|------------------|--|
| Drilled by: | | Well Head: | | Casing Length: | |
| Drilling Method: | | Well Construction: | | Casing Diameter: | |
| Completed: | 1960'S | Well Depth: | 40FT | Screen Length: | |
| Well Type: | Borehole <input checked="" type="checkbox"/> Dug Well <input type="checkbox"/> Spring <input type="checkbox"/> | | | Screen Diameter: | |

WATER:

| | | | |
|-------------------|--|-------------------|---|
| Yield: | | W.H. > G.L. | |
| Depth to Water: | 9.29 M | Well Test: | <input type="checkbox"/> Yes <input type="checkbox"/> No (if yes, please give details below). |
| Water Level: | | | N/A |
| Water Quality: | N/A | | |
| Copy of Analysis: | <input type="checkbox"/> Yes <input type="checkbox"/> No | Date of Analysis: | |

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

| | | | |
|-------------------|--------------|-----------|--|
| Good well cover | | | |
| General Land Use: | Agricultural | Drainage: | |

GEOLOGICAL LOG:

| | |
|-------------|-------------------|
| Soil Type: | Bedrock: |
| Substratum: | Depth to bedrock: |

POTENTIAL SOURCES OF POLLUTION:

| | | | |
|---------------------------|----------|----------------|--|
| Septic Tank Location: | Not used | Well Distance: | |
| Effluent Disposal System: | | | |
| Other Sources: | | Well Distance: | |
| Nat. Grid. Ref.: | | | |

ROAD CONSTRUCTION DETAILS:

| | | |
|------------|------------------------|--|
| Road Type: | Distance to Footprint: | <div style="border: 1px solid black; height: 100px; width: 100%;"></div> |
| | Cut / Fill: | |

OTHER INFORMATION:

| |
|--|
| |
|--|

Not to Scale

Location of well marked with an "x".

Well Survey



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7 Dundrum Business Park, Windy Arbour, Dublin 14

| | | | |
|---------------|------------|---------------------|----------|
| Client: | DMIL | Well No.: | PW09 |
| Project No.: | 3524 07 | Dist. to Footprint: | |
| Project Name: | | Water Use: | Domestic |
| Surveyed by: | ac/lh | | |
| Date: | 26/07/2007 | | |

WELL OWNER DETAILS:

| | | | |
|----------|--------------------------|-------------|--|
| Name: | William Abbey | Mobile No.: | |
| Address: | Garryhundoon, Co. Carlow | Phone No.: | |

LOCATION:

| | | | |
|------------------|--------------------|------------------|--|
| Townland: | Garryhundoon | O.S. Map: | |
| County: | Carlow | Design Map: | |
| Nat. Grid. Ref.: | IS 71887 ITM 68549 | Well Head Elev.: | |

WELL DETAILS:

| | | | |
|------------------|--|--------------------|--|
| Drilled by: | | Well Head: | |
| Drilling Method: | | Well Construction: | |
| Date completed: | Approx 1967 | Well Depth: | |
| Well Type: | Borehole <input checked="" type="checkbox"/> Dug Well <input type="checkbox"/> Spring <input type="checkbox"/> | Casing Length: | |
| | | Casing Diameter: | |
| | | Screen Length: | |
| | | Screen Diameter: | |

WATER:

| | | | |
|-------------------|--|--------------|---|
| Depth to Water: | | Yield: | |
| Water Level: | | W.H. > G.L.: | |
| Water Quality: | | Well Test: | <input type="checkbox"/> Yes <input type="checkbox"/> No (if yes, please give details below). |
| Copy of Analysis: | <input type="checkbox"/> Yes <input type="checkbox"/> No | | N/A |
| Date of Analysis: | | | N/A |

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

| | |
|--|---------------------------|
| Concrete cover level with the ground, not possible to take depth | |
| General Land Use: | Domestic and Agricultural |
| Drainage: | |

GEOLOGICAL LOG:

| | |
|-------------|-------------------|
| Soil Type: | Bedrock: |
| Overburden: | Depth to bedrock: |

POTENTIAL SOURCES OF POLLUTION:

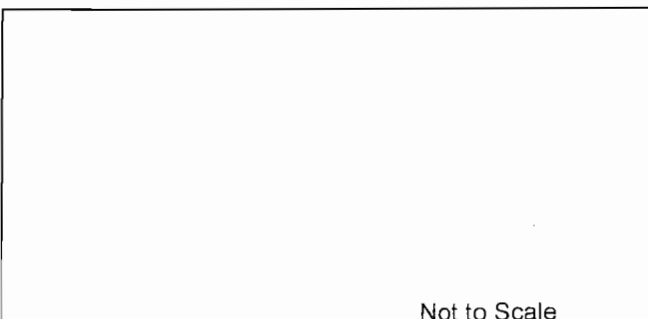
| | |
|---------------------------|---------------------|
| Septic Tank Location: | 100m away in garden |
| Well Distance: | |
| Effluent Disposal System: | |
| Other Sources: | Well Distance: |
| Nat. Grid. Ref.: | |

ROAD CONSTRUCTION DETAILS:

| | |
|------------|------------------------|
| Road Type: | Distance to Footprint: |
| | Cut / Fill: |

OTHER INFORMATION:

| |
|--|
| |
|--|



Location of well marked with an "x".

Well Survey



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7 Dundrum Business Park, Windy Arbour, Dublin 14

| | | | |
|---------------|------------|---------------------|----------|
| Client: | DMIL | Well No.: | PW10 |
| Project No.: | 3524 07 | Dist. to Footprint: | |
| Project Name: | | Water Use: | Domestic |
| Surveyed by: | ac/lh | | |
| Date: | 26/07/2007 | | |

WELL OWNER DETAILS:

| | | | |
|----------|-------------------------|-------------|--|
| Name: | Salmon | Mobile No.: | |
| Address: | Garryhondon, Co. Carlow | Phone No.: | |

LOCATION:

| | | | |
|------------------|--------------------|------------------|--|
| Townland: | Garryhondon | O.S. Map: | |
| County: | Carlow | Design Map: | |
| Nat. Grid. Ref.: | IS 72074 ITM 68351 | Well Head Elev.: | |

WELL DETAILS:

| | | | |
|------------------|--|------------------|--|
| Drilled by: | Well Head: | Casing Length: | |
| Drilling Method: | Well Construction: | Casing Diameter: | |
| Completed: | Approx 1947 | Well Depth: | |
| Well Type: | Borehole <input checked="" type="checkbox"/> Dug Well <input type="checkbox"/> Spring <input type="checkbox"/> | Screen Length: | |
| | | Screen Diameter: | |

WATER:

| | | | |
|-------------------|--|-------------------|---|
| Yield: | | W.H. > G.L. | |
| Depth to Water: | 4.63M | Well Test: | <input type="checkbox"/> Yes <input type="checkbox"/> No (if yes, please give details below). |
| Water Level: | | | N/A |
| Water Quality: | | | N/A |
| Copy of Analysis: | <input type="checkbox"/> Yes <input type="checkbox"/> No | Date of Analysis: | |

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

| | |
|--|--------------|
| Well in pumphouse, wasn't possible to reach to dip | |
| General Land Use: | Agricultural |
| Drainage: | |

GEOLOGICAL LOG:

| | |
|-------------|-------------------|
| Soil Type: | Bedrock: |
| Overburden: | Depth to bedrock: |

POTENTIAL SOURCES OF POLLUTION:

| | | | |
|---------------------------|-------------|----------------|--|
| Septic Tank Location: | To be moved | Well Distance: | |
| Effluent Disposal System: | | | |
| Other Sources: | | Well Distance: | |
| Nat. Grid. Ref.: | | | |

ROAD CONSTRUCTION DETAILS:

| | | |
|------------|------------------------|--|
| Road Type: | Distance to Footprint: | |
| | Cut / Fill: | |

OTHER INFORMATION:

| |
|--|
| |
|--|

Not to Scale

Location of well marked with an "x".

Well Survey



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7 Dundrum Business Park, Windy Arbour, Dublin 14

| | | | |
|---------------|------------|---------------------|-------------------------|
| Client: | DMIL | Well No.: | PW11 |
| Project No.: | 3524 07 | Dist. to Footprint: | |
| Project Name: | | Water Use: | Domestic & Agricultural |
| Surveyed by: | ac/lh | | |
| Date: | 26/07/2007 | | |

WELL OWNER DETAILS:

| | | | |
|----------|-------------------------|-------------|--|
| Name: | Arnold Watchorn | Mobile No.: | |
| Address: | Garryhondon, Co. Carlow | Phone No.: | |

LOCATION:

| | | | |
|------------------|--------------------|------------------|--|
| Townland: | Garryhondon | O.S. Map: | |
| County: | Carlow | Design Map: | |
| Nat. Grid. Ref.: | IS 71944 ITM 68045 | Well Head Elev.: | |

WELL DETAILS:

| | | | | | |
|------------------|--|--------------------|--------|------------------|--|
| Drilled by: | Doran Bros | Well Head: | | Casing Length: | |
| Drilling Method: | | Well Construction: | | Casing Diameter: | |
| Date completed: | Jun-05 | Well Depth: | 123 ft | Screen Length: | |
| Well Type: | Borehole <input checked="" type="checkbox"/> Dug Well <input type="checkbox"/> Spring <input type="checkbox"/> | | | Screen Diameter: | |

WATER:

| | | | | | |
|-------------------|--|------------|--|--------------|--|
| Depth to Water: | 4.63M | Yield: | | W.H. > G.L.: | |
| Water Level: | | Well Test: | <input type="checkbox"/> Yes <input type="checkbox"/> No (if yes, please give details below). N/A | | |
| Water Quality: | N/A | | | | |
| Copy of Analysis: | <input type="checkbox"/> Yes <input type="checkbox"/> No | | Date of Analysis: | | |

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

| | | | |
|-------------------|--------------|-----------|--|
| Concrete cover | | | |
| General Land Use: | Agricultural | Drainage: | |

GEOLOGICAL LOG:

| | |
|-------------|-------------------|
| Soil Type: | Bedrock: |
| Overburden: | Depth to bedrock: |

POTENTIAL SOURCES OF POLLUTION:

| | |
|---------------------------|----------------|
| Septic Tank Location: | Well Distance: |
| Effluent Disposal System: | |
| Other Sources: | Well Distance: |
| Nat. Grid. Ref.: | |

ROAD CONSTRUCTION DETAILS:

| | | |
|------------|------------------------|--|
| Road Type: | Distance to Footprint: | |
| | Cut / Fill: | |

OTHER INFORMATION:

| |
|---|
| Farm supplies to Avonmore so well /water quality is regularly checked by avonmore. Have another well on the land but it is not used |
|---|

Not to Scale

Location of well marked with an "x".

Well Survey



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7 Dundrum Business Park, Windy Arbour, Dublin 14

| | | | |
|---------------|------------|---------------------|----------|
| Client: | DMIL | Well No.: | PW12 |
| Project No.: | 3524_07 | Dist. to Footprint: | |
| Project Name: | | Water Use: | Domestic |
| Surveyed by: | ac/lh | | |
| Date: | 26/07/2007 | | |

WELL OWNER DETAILS:

| | | | |
|----------|-----------------------------|-------------|--|
| Name: | Patrick Cody | Mobile No.: | |
| Address: | Oldtown, Nurney, Co. Carlow | Phone No.: | |

LOCATION:

| | | | |
|------------------|--------------------|-----------------|--|
| Townland: | Oltown | O.S. Map: | |
| County: | Carlow | Design Map: | |
| Nat. Grid. Ref.: | IS 71836 ITM 67558 | Well Head Elev: | |

WELL DETAILS:

| | | | | | |
|------------------|--|--------------------|---------------|------------------|--------|
| Drilled by: | Co. Co. | Well Head: | | Casing Length: | |
| Drilling Method: | | Well Construction: | | Casing Diameter: | 8 inch |
| Completed: | Approx 1992 | Well Depth: | Approx 54.50M | Screen Length: | |
| Well Type: | Borehole <input checked="" type="checkbox"/> Dug Well <input type="checkbox"/> Spring <input type="checkbox"/> | | | Screen Diameter: | |

WATER:

| | | | | | |
|-------------------|--|------------|--|--------------|--|
| Depth to Water: | 6.48M | Yield: | | W.H. > G.L.: | |
| Water Level: | | Well Test: | <input type="checkbox"/> Yes <input type="checkbox"/> No (if yes, please give details below). N/A | | |
| Water Quality: | N/A | | | | |
| Copy of Analysis: | <input type="checkbox"/> Yes <input type="checkbox"/> No | | Date of Analysis: | | |

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

| | |
|---|-----------|
| Good protective cover, well on the road side of house boundary wall | |
| General Land Use: | Drainage: |

GEOLOGICAL LOG:

| | |
|-------------|-------------------|
| Soil Type: | Bedrock: |
| Overburden: | Depth to bedrock: |

POTENTIAL SOURCES OF POLLUTION:

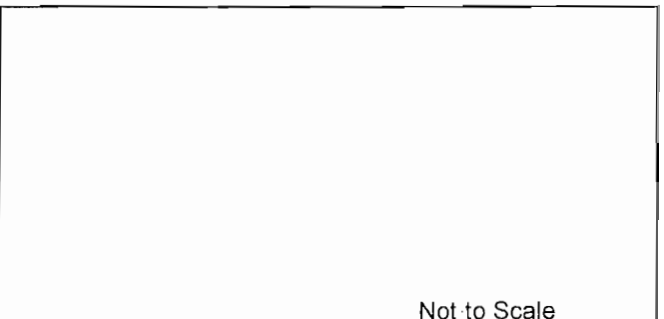
| | | | |
|---------------------------|-------------|----------------|--|
| Septic Tank Location: | back garden | Well Distance: | |
| Effluent Disposal System: | | | |
| Other Sources: | | Well Distance: | |
| Nat. Grid. Ref.: | | | |

ROAD CONSTRUCTION DETAILS:

| | |
|------------|------------------------|
| Road Type: | Distance to Footprint: |
| | Cut / Fill: |

OTHER INFORMATION:

| |
|--|
| Well was build by Co Co for houses along road but then was never I for them. When council built this house they then utilised the well for this house only |
|--|



Location of well marked with an "x".

Well Survey



EUGENE DALY ASSOCIATES

Groundwater, Hydrological &
Environmental Consultants
e-mail: abinchy@csa.ie

7 Dundrum Business Park, Windy Arbour, Dublin 14

| | | | |
|---------------|------------|---------------------|----------|
| Client: | DMIL | Well No.: | PW13 |
| Project No.: | 3524_07 | Dist. to Footprint: | |
| Project Name: | | Water Use: | Domestic |
| Surveyed by: | ac/lh | | |
| Date: | 26/07/2007 | | |

WELL OWNER DETAILS:

| | | | |
|----------|-----------------------------|-------------|--|
| Name: | Cody | Mobile No.: | |
| Address: | Oldtown, Nurney, Co. Carlow | Phone No.: | |

LOCATION:

| | | | |
|------------------|--------------------|------------------|--|
| Townland: | Oldtown | O.S. Map: | |
| County: | Carlow | Design Map: | |
| Nat. Grid. Ref.: | IS 71809 ITM 67497 | Well Head Elev.: | |

WELL DETAILS:

| | | | | | |
|------------------|--|--------------------|-----|------------------|--|
| Drilled by: | Co. Co | Well Head: | | Casing Length: | |
| Drilling Method: | | Well Construction: | | Casing Diameter: | |
| Date completed: | Jan-04 | Well Depth: | 71M | Screen Length: | |
| Well Type: | Borehole <input checked="" type="checkbox"/> Dug Well <input type="checkbox"/> Spring <input type="checkbox"/> | | | Screen Diameter: | |

WATER:

| | | | | | |
|-------------------|--|------------|--|--------------|--|
| Depth to Water: | 7.09M | Yield: | | W.H. > G.L.: | |
| Water Level: | | Well Test: | <input type="checkbox"/> Yes <input type="checkbox"/> No (if yes, please give details below). N/A | | |
| Water Quality: | N/A | | | | |
| Copy of Analysis: | <input type="checkbox"/> Yes <input type="checkbox"/> No | | Date of Analysis: | | |

WELL HEAD COMPLETION, PROTECTION & CONDITION AROUND THE WELL:

| | |
|-------------------|-----------|
| Good well cover | |
| General Land Use: | Drainage: |

GEOLOGICAL LOG:

| | |
|-------------|-------------------|
| Soil Type: | Bedrock: |
| Overburden: | Depth to bedrock: |

POTENTIAL SOURCES OF POLLUTION:

| | |
|---------------------------|----------------|
| Septic Tank Location: | Well Distance: |
| Effluent Disposal System: | |
| Other Sources: | Well Distance: |
| Nat. Grid. Ref.: | |

ROAD CONSTRUCTION DETAILS:

| | | |
|------------|------------------------|--|
| Road Type: | Distance to Footprint: | |
| | Cut / Fill: | |


OTHER INFORMATION:

| |
|----------------------------------|
| Some trouble with lime the water |
|----------------------------------|

Not to Scale

Location of well marked with an "x".

APPENDIX 7.5 **WATER CALCULATIONS**

| | | | | | | |
|---|--|---------|-----------------|------|--------------|--------|
|  | Clonmelsh Quarry, Co. Carlow | | | | | |
| | SUBJECT Water Balance Clonmelsh Quarry - Met Eireann Data | | | | | |
| | Proj. No. | 1784075 | Made by | KMcG | Date | Aug-17 |
| | Ref. | | Checked | BB | Sheet | B-2 |
| | | | Reviewed | BB | | |

Monthly values for Oak_Park up to 08-aug-2017

Total rainfall in millimetres for Oak_Park

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|------|-------|-------|------|------|------|------|------|-------|------|-------|-------|-------|--------|
| 2017 | 36.3 | 57.8 | 66.6 | 15.8 | 81.8 | 91 | 52.7 | 8.9 | | | | | 410.9 |
| 2016 | 110.9 | 95.7 | 40.6 | 64.3 | 61.6 | 61.7 | 29.6 | 46 | 97.4 | 32.3 | 26.3 | 80.2 | 746.6 |
| 2015 | 66 | 36.3 | 53.5 | 26.3 | 89.4 | 29.7 | 79.4 | 83 | 27.6 | 56.8 | 110 | 270.9 | 928.9 |
| 2014 | 147.2 | 176.7 | 65 | 52.6 | 78.6 | 61.9 | 24.6 | 122.1 | 18.2 | 138.2 | 165.6 | 47.7 | 1098.4 |
| mean | 80.4 | 57.3 | 63.4 | 55.9 | 59.8 | 60.8 | 58.7 | 71.9 | 69.6 | 92.9 | 85.9 | 83.6 | 840.2 |

Potential Evapotranspiration (mm) for Oak_Park

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|------|------|------|------|------|------|------|------|------|------|------|------|------|--------|
| 2017 | 11.5 | 17.9 | 35.4 | 50 | 80.7 | 86.5 | 87.7 | 19.8 | | | | | 389.5 |
| 2016 | 10.9 | 16.6 | 33.9 | 52 | 79.4 | 78.4 | 79.7 | 70.5 | 47.3 | 26.7 | 9.9 | 8.3 | 513.6 |
| 2015 | 14.9 | 15.8 | 37.3 | 61.6 | 70.9 | 92.9 | 77.7 | 71.3 | 46.5 | 24.5 | 18.3 | 13.1 | 544.8 |
| 2014 | 12 | 18.4 | 31.6 | 57.9 | 65.8 | 87.5 | 93 | 74.4 | 51.5 | 29.4 | 10.6 | 10.1 | 542.2 |
| av | 12.3 | 17.2 | 34.6 | 55.4 | 74.2 | 86.3 | 84.5 | 59.0 | 48.4 | 26.9 | 12.9 | 10.5 | |
| mean | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a |

Evaporation (mm) for Oak_Park

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|------|------|------|------|------|-------|-------|-------|-------|------|------|------|------|--------|
| 2017 | 15.3 | 25.4 | 51.7 | 71 | 114 | 121.5 | 120.1 | 27.1 | | | | | 546.1 |
| 2016 | 14.8 | 24 | 49.5 | 76 | 111.6 | 108.4 | 110.1 | 96.6 | 65.4 | 36.6 | 13.9 | 10.8 | 717.7 |
| 2015 | 19.3 | 23 | 56.1 | 89.3 | 105.6 | 132.2 | 109 | 98.7 | 63.6 | 33.3 | 23.4 | 17 | 770.5 |
| 2014 | 16.1 | 27.1 | 46.1 | 83.3 | 93.3 | 120 | 124.3 | 102.5 | 69.5 | 40.2 | 14.7 | 12.7 | 749.8 |
| mean | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | # | n/a | n/a | n/a |

Mean temperature in degrees Celsius for Oak_Park

| Year | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Annual |
|------|-----|-----|-----|------|------|------|------|------|------|------|-----|-----|--------|
| 2017 | 6 | 6.5 | 8.3 | 9 | 12.4 | 15 | 15.7 | 15 | | | | | 10.6 |
| 2016 | 5.9 | 4.9 | 6.1 | 7.5 | 12.3 | 15.1 | 16 | 16 | 14.6 | 10.6 | 5.2 | 6.3 | 10.1 |
| 2015 | 5 | 4.3 | 6.2 | 8.7 | 10.2 | 13.4 | 14.6 | 14.6 | 12.4 | 10.2 | 9.2 | 8.6 | 9.8 |
| 2014 | 5.5 | 5.7 | 7 | 10.1 | 11.9 | 14.5 | 16.9 | 14.5 | 14.3 | 11.4 | 7.2 | 5.6 | 10.4 |
| mean | 5.1 | 5.6 | 6.9 | 8.4 | 11 | 13.7 | 15.6 | 15.3 | 13.2 | 10.1 | 7.2 | 5.5 | 9.8 |

APPENDIX 10.1 **TRAFFIC & TRANSPORTATION ASSESSMENT [TTA]**

APPENDIX 11.1 **CULTURAL HERITAGE PHOTOGRAPHIC RECORD**



Plate 11.1 Looking east over the study area



Plate 11.2 Looking east over the study area



Plate 11.3 Looking north over the study area



Plate 11.4 Looking north over the study area



Plate 11.5 Looking south over the study area



Plate 11.6 Looking southeast over the study area