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Planning Department
Kildare County Council
Áras Chill Dara
Devoy Park
Naas
Co. Kildare

21st October 2016

Re: - Michael Ennis intends to apply for permission for development at site at Boherkill, Rathangan
The development will consist of Restoration of the existing excavated gravel pit (previously granted planning permission (01/1270, 07/188 & 15/515) to the original ground levels & use as agricultural land, in order to comply with condition 2(a) of planning permission 07/188, by importing c1,500,000 tonnes (i) of imported inert natural materials, principally excess soil, stones and/or broken rock excavated on construction sites, (ii) Recovery of imported inert construction materials, including stones, granular fill, concrete, blocks, bricks and ceramic tile & (iii) reinstating existing overburden contained on site & all other associated site works for a period of 10years.
The planning application is accompanied by an Environmental Impact Statement (EIS).
The application relates to a restoration development for the purpose of an activity requiring a waste licence to be issued by the Environmental Protection Agency.
Planning Ref: 16/526

To whom it may concern

With reference to your request for further information in relation to above planning application, please find the following:

1. Landscape & Visual Impacts
   (a) Enclosed please find 6no copies of Landscape & Visual Impact Assessment
   (b) Enclosed please find 6no. copies of dwg no. 151324-P-08, comprehensive & dedicated landscaping plan for the site.
   (c) Enclosed please find 6no copies of dwg no. 151324-P-07 showing East-west sections at an appropriate scale (1:500).

2. Plans & Particulars
   (a) The existing & intended use of the mobile home on site has been & will be used as a staff facility incorporating staff tea station, store, changing room & wc. The mobile home was shown on drawing no 061063-AI-04 which was granted planning permission ref. 07/188.

(b) Enclosed please find 6no copies of dwg no. 151324-P-05-FI & 151324-P-10 showing exact location, area & design of proposed hard standing - Temporary hard standing/ waste inspection10m x 10m.
150mm tk. reinforced concrete slab on 225mm min blinded hardcore
(c) Enclosed please find 6no copies of dwg no. 151324-P-05-FI & 151324-P-10 showing exact location, area & design of proposed temporary waste inspection area
(d) The existing weighbridge & wheelwash currently on site were granted planning permission under planning file 07/188 (15/515 Extension of Duration). Enclosed please find 6no copies of dwg no. 151324-P-07-FI showing Weighbridge & wheelwash location & specification.
(e) Enclosed please find 6no copies of dwg no. 151324-P-06-FI showing (1) Existing office/weighbridge Building & (2) Existing Temporary Staff facility building (mobile home)
(f) Enclosed please find 6no copies of dwg no. 151324-P-09 showing location of temporary stockpiling of topsoil & subsoil pending re-use as cover material for restoration
(g) Enclosed please find 6no copies of dwg no. 151324-P-05-FI showing location of proposed security fencing for the overall site.

Proposed Security Fencing

3. (a) Enclosed please find 6no copies of dwg no. 151324-P-05-FI showing boundaries of extracted areas & areas currently being extracted which are located within boundary of site granted planning permission 07/188 (pl 09.226737) & extension of duration 15/515
(b) Enclosed please find 6no copies of dwg no. 151324-P-05-FI showing an overlay of previously permitted site layout plans in relation to reg. ref. 01/1270 & 07/188 (pl 09.226737)
(c) Enclosed please find 6no copies of dwg no. 151324-P-05-FI showing extraction depths relative to the ground water/water table level. Note: levels have been amended to relate to Ordnance Datum levels

4. <u>Consideration of Alternatives</u>
Refer to RME Environmental report

5. <u>Cumulative Impacts & Interaction of Effects</u>
Refer to RME Environmental report

6. <u>Hydrogeology</u>
Enclosed please find 6no copies of Report as prepared by Aisling Whelan Senior Hydrogeologist, IE Consulting - Water, Environmental and Civil Engineering Consultants

7. As per 6 above

8. Noise
   Enclosed please find 6no copies of Report as prepared by Oliver Fitzsimons MSc. BSc. Fitzsimons Walsh Environmental Limited

9. As per 8 above

10. Duration of Restoration Works
    Refer to RME Environmental report

11. Wastewater Management
    Existing waste water is connected to a holding tank (1.2m dia x 2.3m deep). This tank is emptied as necessary by licenced contractor Michael Kelly t/a KDS, Rahan, Edenderry, Co. Offaly reg. No. NWCPO/11/10646/02

12. Further to discussion with Ciara Corrigan, KCC Environmental Section, & due to the fact that there are only 2 permanent staff members, it was agreed that existing wastewater holding tank will be suitable for the duration of the proposed development subject to same been emptied regularly by a licenced contractor Michael Kelly t/a KDS, Rahan, Edenderry, Co. Offaly reg. No. NWCPO/11/10646/02

13. Staff
    Enclosed please find 6no copies of dwg no. 151324-P-06-FI showing existing staff facilities: These include;
    1. Temporary Staff Office building comprising of 2no offices, store room & WC &
    2. Temporary Staff building (mobile home) comprising of Staff room, Changing Room, Store Room & Shower Room/WC.
    The proposed restoration works will have no impact as regards existing employment levels. It is envisaged that the number of staff permanently employed at the facility will remain at 2, with a further 1 temporary staff member if necessary.

Staff Building

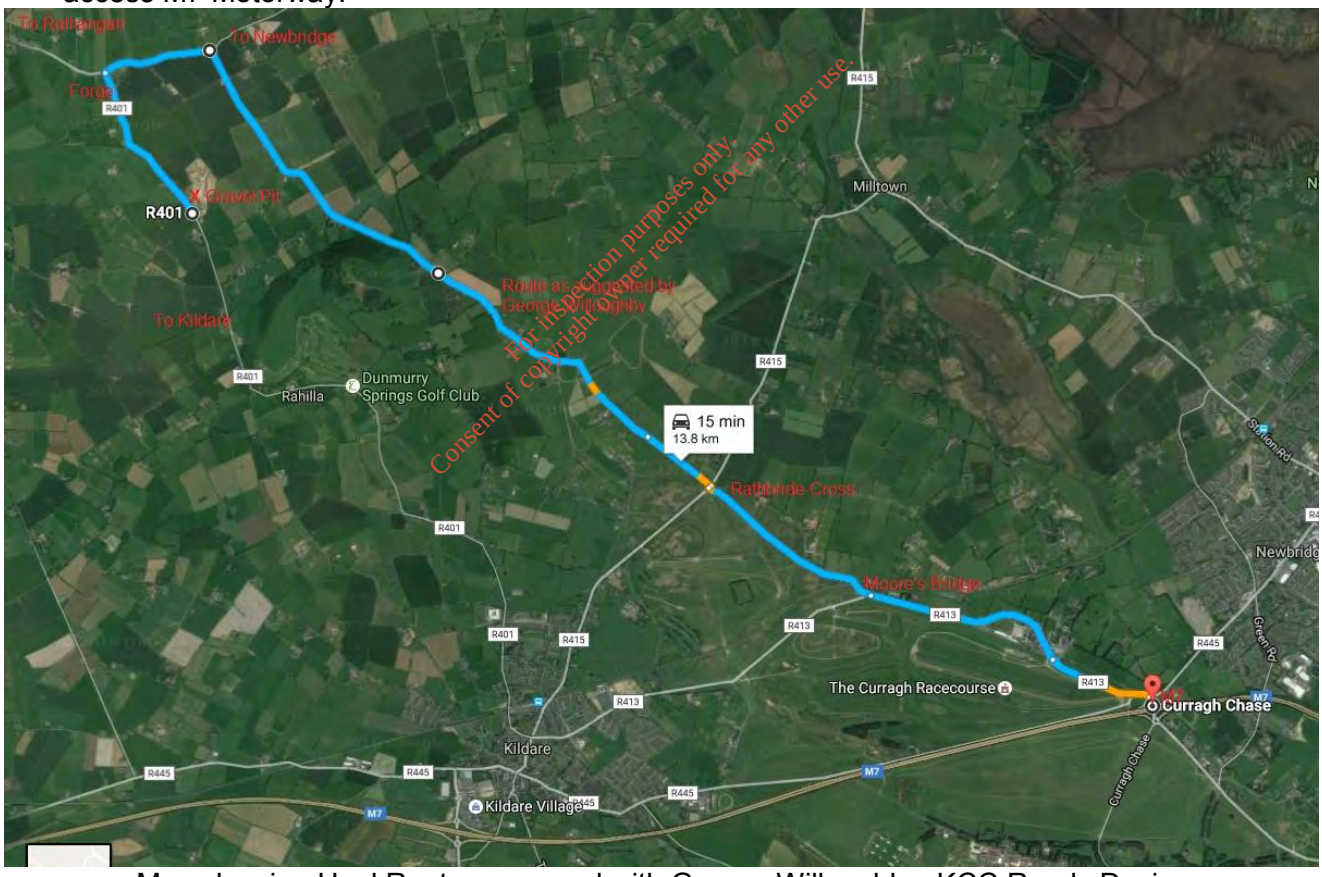
Weighbridge

Office

Wheel-wash

14. Natural Heritage
    Enclosed please find report as prepared by Roger Goodwillie, M.Sc., MCIEEM, Applications Ecologist.

15. Transportation
    Further to discussions with George Willoughby & Siobhan O'Dwyer, who in turn discussed haulage route with Brigette Rea, please see below agreed haulage route from proposed site to access M7 Motorway.



Map showing Haul Route as agreed with George Willoughby, KCC Roads Design

16. Enclosed please find 6no copies of dwg no. 151324-P-05-FI & 151324-P-08 showing extent of hedging to be removed & new hedging to be planted to achieve compliance with required site lines.

17. Enclosed please find 6no copies of dwg no. 151324-P-05-FI detailing the proposed site traffic management layout, no. of car parking spaces & location of same. Provision for employee and visitor car parking is currently provided adjacent to the temporary site office.

18. Enclosed please find 6no copies of dwg no. 151324-P-05-FI detailing adequate turning movements within the curtilage of the site.

19. Preventative Measures:
(i) water from a tractor drawn bowser will be sprayed on dry exposed soil surfaces (including unpaved road surfaces) as and when required
(ii) the site shall be restored in a phased manner and each phase shall be grassed as soon as practicable after placement of cover soils in order to minimise soil erosion and potential dust emissions
(iii) The area of bare or exposed soils will, insofar as practicable, be kept to a minimum. Consideration will be given to establishing temporary vegetation cover over temporary slopes pending final backfilling and restoration to original ground level.
(iv) all HGV's exiting the site shall be routed through a wheel wash facility. This measure will prevent transport of fines on the public road network by HGVs exiting the site.
(v) Stockpiling of imported soils will be minimized. Soils will ideally be placed and compacted in-situ immediately after being unloaded. If and when temporary stockpiling of soils is required, they will be placed as close as practicable to the centre of the application site, away from nearby residences. The amount of dust or fines carried onto the public road network will be further reduced by periodic sweeping of the paved internal access road and the existing local road in front of the application site.

20. <u>Third Party Submission</u>
Submission from An Taisce:
We have spoken to Mr. Ian Lumley, of An Taisce on 12th October 2016. He has confirmed that An Taisce are in favour of the restoration works proposed within the current application to comply with condition 2a of planning permission 07/188, requiring the lands to be restored to agricultural use.
We have previously commented on this submission and further assert that the submission from Environmental Action Alliance-Ireland on behalf of Ms. Dominique Plant, submitted by an Taisce, should be dismissed as vexatious, frivolous and an abuse of process

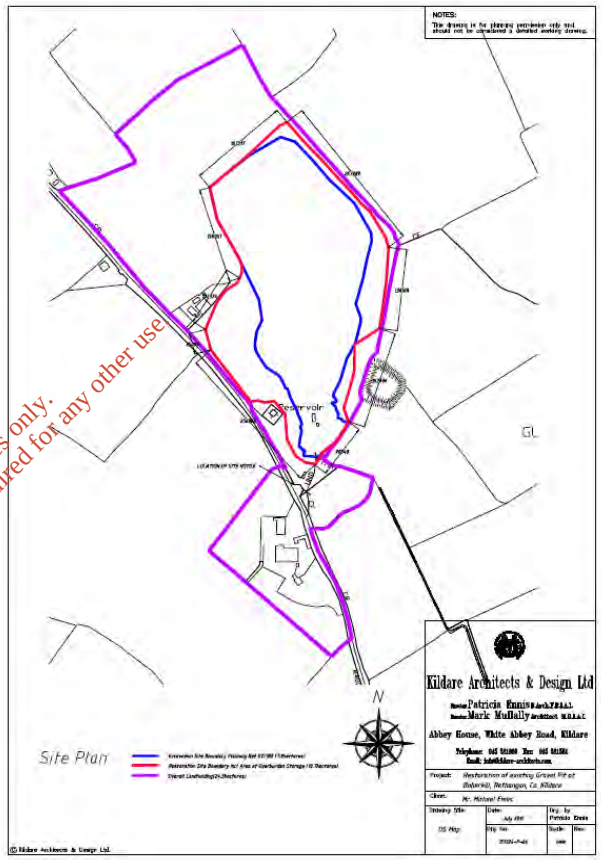
Submission from Environmental Action Alliance-Ireland (Mr. David Malone) 22nd June 2016:
The basis of the submission is entirely misconceived, as this planning application is a result of a planning condition 2a from granted planning permission 07/188 (pl 09.226737) requiring the lands to be restored to agricultural use.
It has been the applicant's contention that planning permission was not required to comply with the condition & therefore no EIS would be required, & this application is a continuation of planning permission 07/188 (pl 09.226737)
However, the current application has been made in the form that it has, out an abundance of caution to comply with condition 2a of planning permission 07/188, requiring the lands to be restored to agricultural use, and all requirements of EIS directive & other relevant directives have been complied with.
In those circumstances it is unnecessary to deal with the vague & erroneous submission made by Mr. Malone about noncompliance with directives & it is noteworthy that he has not particularized in any way the assertions made, and amount to nothing more than vague & unsubstantiated submissions.

The application site is that which was granted planning permission 07/188 (pl 09.226737) with an additional area to include location of temporarily stored overburden (refer to dwg no151324-P-04), and that is the appropriate basis for this application in circumstances which it seeks to comply with a condition of that planning (condition 2a of planning permission 07/188). Terms of that permission have been complied with & the submission is fundamentally incorrect, mistaken & contains incorrect & misleading information.

The submission states that:

a) *Continued extraction of sand & gravel has not been included in the application*
Planning permission 15/515 was granted for the extension of duration of planning permission 07/188 until August 2020 which permits the extraction of sand and gravel.

b) *The proposed restoration area extends to 10.7hectraes and the excavated site area is 7.8hectares. It appears from this that 2.9hectares requires retention*
The area of 10.7hectares incudes additional area to the 7.8hectare extraction area for the purpose of storage of temporary overburden stockpiles which will be reinstated into the lands as part of the restoration process.



c) *The quarry is in the ownership of the applicant Mr. Michael Ennis and has been operational for the past 13 years under the operational stewardship of Kildare Sand and Gravel Ltd - The following will show that this is totally incorrect as it is well documented that there have been significant unauthorized development taking place on the Boherkill site since 2001.*
The above statement only shows that the site has been operated by Kildare Sand and Gravel for 13years and does not mention previous operators of the site. All aspects of the development prior to this period were dealt with in planning permission 01/1270 & 07/188

d) *Mr. O'Brien……. effectively forced to sell his house to Michael Ennis*

No evidence was provided in the submission indicating that Mr. O'Brien was forced to sell his home. The current occupiers & previous residents of this dwelling have forwarded letters stating that they have no objections to the porposed development & have not experienced any disruption in the past.

Consultation with neighbours, the results of which were shown in the EIS, show that they are in favour of restoring the lands to agricultural use.

	Landowner	Visit By	Date	Comments
1				
2				
3	Simon & Catherine Holohan	Michael Ennis	Week of 23 March 15	Would be in favour of restoring to agricultural lands
4				
5	Paul & Cathy Ennis	Michael Ennis	Week of 23 March 15	Would be in favour of restoring to agricultural lands
6				
7	Edmund & Elizabeth Burrell	Michael Ennis	Week of 23 March 15	Would be in favour of restoring to agricultural lands
8				
9	Robert Pearson	Michael Ennis	Week of 23 March 15	Would be in favour of restoring to agricultural lands
10				
11	Mark Holohan	Michael Ennis	Week of 23 March 15	Would be in favour of restoring to agricultural lands
12				
13	Brendan & Mary Plant	Patricia Ennis	Week of 10 January 16	No comments except that applicant deal with Environmental Consultant, Mr David Malone
14				
15	Sean & Geraldine Wade	Patricia Ennis	Week of 10 January 16	Would be in favour of restoring to agricultural lands
16				
17	Frank & Siobhan Gunning	Patricia Ennis	Week of 10 January 16	Would be in favour of restoring to agricultural lands
18				
19	Jeremy Harley	Michael Ennis	Week of 25 January 16	Would be in favour of restoring to agricultural lands

e) *…Kildare County Council issued a Warning Letter (Ref No. UD3455)…*

This case is now closed

f) *Condition 2 (c) of PL 07/188 were never complied with by the Applicant, resulting in continuous unauthorized developments taking place…..*
As previously stated, it has always been the applicant's contention that planning permission was not required to comply with the condition, & the current application is a continuation of planning permission 07/188 (pl 09.226737). It therefore appears that Mr. Malone is in agreement that restoration works should be carried out, however, he is objecting to the application which seeks to carry out these works.

g) *Anua Environmental report…*
The photographs contained within the submission reflect particular conditions on site & have no particular relevance to matters which KCC have to deal with now. Please see below current photographs taken on site.


Photo 3 from EAA-I Submission


Current on site (12th October 2016)

The Audits which were carried out, reflect the extent the applicant has gone to in order to ensure compliance with planning & proper running of operations on site.

h) *EAA-I carried out an on-site investigation on 25th March 2016…*
This investigation was carried out by illegal trespassing onto the site, ignoring all warning signs.

Site Safety Notices

i) *Excavation below water table…These photos show that Michael Ennis gave false information to Kildare County Council….*
Photos show occasional surface water ponding due to the rainfall over the previous months which was substantially greater than previous years. Refer to Met Eireann rainfall reports taken from Oakpark Carlow & Baldonnell – Casement Aerodrome. As can be seen, the rainfall during the months leading to the surface water ponding was substantially greater than previous years

Photo 4 from EAA-I Submission

Current on site (12th October 2016)

Monthly values for Oak_Park up to 23-jun-2016

Total rainfall in millimetres for Oak_Park

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2016	110.9	95.7	40.6	64.3	61.6	47.5							420.6
2015	66.0	36.3	53.5	26.3	89.4	29.7	79.4	83.0	27.6	56.8	110.0	270.9	928.9
2014	147.2	176.7	65.0	52.6	78.6	61.9	214.8	122.1	18.2	138.2	165.6	47.7	1098.4
2013	76.2	35.8	57.6	44.4	35.6	37.5	32.3	85.6	24.4	170.0	27.7	136.6	763.7
mean	80.4	57.3	63.4	55.9	59.8	49.8	58.7	71.9	69.6	92.9	85.9	83.6	840.2

Monthly values for Casement up to 23-jun-2016

Total rainfall in millimetres for Casement

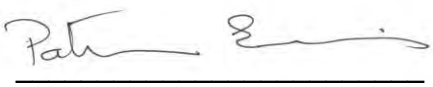
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2016	83.2	68.3	38.7	59.[illegible]	62.6	72.4							384.9
2015	63.4	30.5	56.4	[illegible].2	96.4	17.4	62.5	67.5	26.2	39.4	114.3	206.3	836.5
2014	110.7	122.0	56.7	39.3	98.4	31.8	42.3	142.0	12.9	87.8	138.9	64.1	946.9
2013	69.5	45.2	63.3	47.5	52.8	43.2	42.7	62.9	35.1	100.4	21.2	104.7	688.5
mean	63.8	48.5	50.7	51.9	59.1	62.5	54.2	72.3	60.3	81.6	73.7	75.7	754.3

Current On-site Photo (12th October 2016) – no surface water ponding

j) *Ms. Dominique Plant….*
3rd party rights – It is the right of any 3rd party to make a submission in respect of proper planning & sustainable development of the area. However, it is difficult to conceive how Ms. Plant & Mr. Malone can object to a proposal which seeks to comply with a condition imposed on a planning permission to restore lands to their original use. It is incredible that they are objecting to a formal planning application prepared to reinstate & restore the land in circumstances where this was required by virtue of a condition of planning & the entire basis of Mr. Malone's submission should be dismissed as vexatious, frivolous and an abuse of process.

Do not hesitate to contact us if you require further information.

Yours sincerely



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LANDSCAPE & VISUAL IMPACT ASSESSMENT

for

RESTORATION OF EXISTING GRAVEL PIT

at

BOHERKILL
RATHANGAN
CO. KILDARE

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1.0 INTRODUCTION

1.1 BACKGROUND

This section assesses the landscape & visual impacts arising from the proposed restoration of existing gravel pit at Boherkill, Rathangan, Co. Kildare including assessment of the following:
Landscape Impacts, including: direct impacts upon specific landscape elements within and adjacent to the site; effects on the overall pattern of the landscape elements which give rise to the landscape character of the site and its surroundings; and impacts upon any special interests in and around the site.
Visual Impacts: direct impacts of the development upon views in the landscape; and overall impact on visual amenity.

The site is located entirely within the townland of Boherkill, Rathangan, Co. Kildare, approximately 3km south-east of Rathangan Co Kildare on the R401 National Secondary route way and 5.5km north west of Kildare Town. Irish National Grid Coordinates (E269919, N217476).

The application site and existing sand and gravel quarry is located largely in an agricultural area. There are a number of isolated residences in the area immediately surrounding the existing facility. The surrounding land use activities are largely agricultural with a mix of tillage and grazing activities predominant.

Landscape effects assessment: *deals with changes to landscape as a resource. Society as a whole has an interest in this and it is recognised as one of the key dimensions of environmental interest, alongside matters such as biodiversity, or cultural heritage. It is concerned with issues like protected landscapes, the contribution of landscape character to sense of place and quality of life for all, and the way that change may affect individual components of the landscape;*

Visual effects assessment: *is concerned with how the surroundings of individuals or groups of people may be specifically affected by change in the landscape. This means assessing changes in specific views and in the general visual amenity experienced by particular people in particular places. Guidelines for Landscape and Visual Impact Assessment Third Edition*

1.2 SCOPE OF WORK

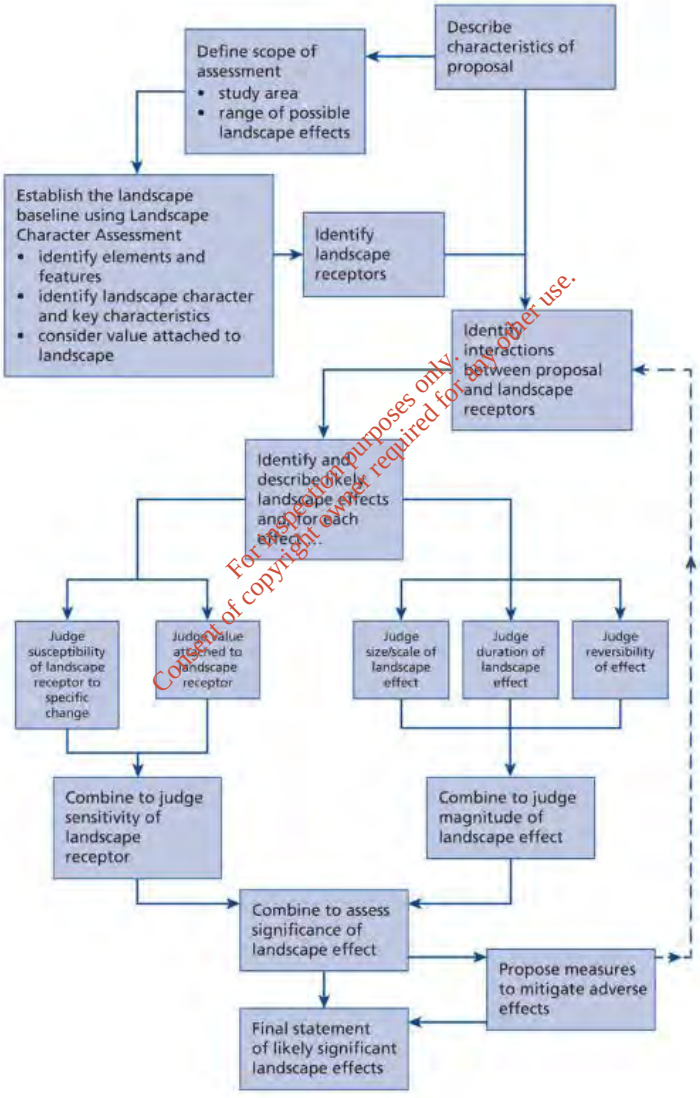
The landscape and visual impact assessment was carried out in accordance with the Guidelines for Landscape and Visual Impact Assessment Third Edition 2013 (GLVIA3)

Introduction – brief description of the development, relevant planning context

Receiving Environment – description of the landscape & visual baseline

Impact Assessment – description of the proposed development in relation to landscape and visual effects

Mitigation Measures – description of the measures which will be incorporated to mitigate any landscape and visual effects of the development



Steps in assessing landscape effects

1.3 PLANNING POLICY

Kildare County Council Development plan 2011-2017 is the statutory plan detailing the development objectives/policies relating to the proposed development. The relevant policies objectives are outlined below;

10.7.7 Landscape Impacts

In terms of location, Chapter 14 of this Plan in relation to landscape, identifies protected views, scenic routes and amenity areas in the county. In the assessment of planning applications related to the extractive industry, including restoration / rehabilitation of existing pits, the planning authority will have regard to the policies / objectives for the specific landscape character of the area within which the application site is located.

10.7.7.1 Archaeological Assessment

The Archaeological Code of Practice (Code of Practice between the Department of the Environment, Heritage and Local Government and the Irish Concrete Federation, June 2009) shall be among the guidelines used in the archaeological assessment of all extractive development applications, with best practice adopted in all cases.

10.8 Extractive Industry Policy

It is the policy of the Council:

EI 12: To ensure that all existing workings are rehabilitated to suitable land uses and that extraction activities allow for future rehabilitation and proper land use management.

Appendix 3 Landscape Character Areas in County Kildare

4 The Central Uplands or the Chair of Kildare

4.1 Description

The Central Uplands or the Chair of Kildare as the area is locally known consists of a number of hills that interrupt the continuity of the Kildare plains. This landscape character unit is located immediately north of Kildare town. The land rises to a maximum of 233m O.D. at Dunmurry Hill. The ridgeline of Dunmurry together with the ridgelines of Grange Hill (223m O.D.), Red Hill (197m O.D.), Boston Hill (159m O.D.) and Hill of Allen (219m O.D.) define the skyline of central Kildare and represent significant features on the landscape. The elevated nature of this area provides highly scenic views over the central plains and boglands of Kildare. Soils in the area are dominated by Grey Brown Podzolics combined with small pockets of mineral soils as well as raised bogs and reclaimed peats. The area is generally suitable for tillage, pasture and forestry, the suitability of boglands areas being unclassified.

Cultural Significance

The Hill of Allen is of mythological significance, with the legendary Fionn MacCumhaill and the Fianna. It is supposed to have been the site of their camp, with the surrounding area as their training ground.

4.2 Land Uses

The Chair of Kildare comprises a number of landuses. Large fields within this area are generally used as pasture lands, however a significant amount of non-irrigated agricultural lands, mainly containing tillage, can also be found. Coniferous forestry represents another significant landuse in the area, with some patches of naturally occurring vegetation, mainly at Allen and Dunmurry Hills. Allen Hill is characterised by the mineral extraction and quarrying activities on its north-western part. Similarly, Boston Hill has a large area of gravel extraction activities. A visually dominant feature of Red Hill is the telecommunication mast located on the hilltop.

Land parcels within this unit are of medium to large size, with generally well-maintained low hedgerows. Small villages such as Allen, Killeagh and Guidenstown, together with a dispersed pattern of rural houses and farm structures are indicative of a relatively high rural population density.

4.3 Boundary Determinants

The boundaries of this unit are directly derived from the geology, subsoils (i.e. quaternary geology) and topography of the area, which largely coincide with the soils and landform and are further confirmed by the existing land uses.

4.4 Critical Landscape Factors

• Elevated Vistas

A number of regional and local roads run through this landscape character unit. The roads cross the upper and lower slopes of the hills and provide access to established residences as well as to Kildare town. As a result of the elevated road level and the generally low vegetation, there are long distance and extensive views towards the surrounding lowlands and boglands.

• Slopes

The slopes of the hills that form the Chair of Kildare define the visual boundary of the adjacent lowland areas. Sloping land intensifies the visual prominence of any feature over greater distances, as in the case of the Hill of Allen, Red Hills, Dunmurry and Grange Hills. Slope also provides an increased potential for development to penetrate primary and secondary ridgelines when viewed from lower areas of the public realm such as the roads and population centres in this area.

• Prominent Ridge Lines

These occur as either primary ridgelines (visible only against the sky from any prospect) or secondary ridgelines (visible at least from some prospects below a distant primary ridge line). In this upland environment of the Chair of Kildare, nearly all ridgelines are primary when viewed from the surrounding lowland areas. Ridge lines perform the important roles of providing adjacent areas with visual identity, acting as dominant landscape focal points, and defining the extent of visual catchments.

• Undulating topography

Gently undulating topography is presented within the upland area of this character unit, particularly to the south (i.e. between Red, Dunmurry and Grange Hills). The physical shielding within the lee of hills can conceal relatively large new features, where it does not break the skyline. The dynamic and complex nature of undulating land has the potential for locally enclosed vistas.

• Low Vegetation

Low vegetation, represented in this unit by grassland, moorland and generally low hedgerows, is generally uniform in appearance, failing to break up vistas and allowing long distance visibility, thereby, providing an inability to visually absorb development.

• Shelter Vegetation

Shelter vegetation, represented in certain areas of this unit by coniferous plantations, provides visual screening, enclosing vistas and helping to provide a visual containment.

• Localised Canal Views

Canal corridors are generally visually enclosed and highly localised areas of very distinctive character with a high degree of visual consistency. The area has localised vistas to the Milltown Feeder of the Grand Canal that runs south of Hill of Allen and north of Grange Hill.

and suitable for forestry.

1.4 AUTHOR

The assessment, including site work and completion of drawings, was carried out by Mark Mullally, Architect MRIAI of Kildare Architects & Design Ltd

2.0 RECEIVING ENVIRONMENT

2.1 BASELINE STUDY METHODOLOGY

The aim of the visual baseline is to 'establish the area in which the development may be visible, the different groups of people who may experience views of the development, the places where they will be affected and the nature of the views and visual amenity at those points' (GLVIA 3rd Edition, P32 Paragraph 3.15). Also, where possible the approximate or relative number of different groups of people who will be affected.

Refer to Photographs 1-9 showing views to & from Redhills, Grange Hill & Dunmurry Hill.

All photographs were taken in October 2015 & August 2016 using a Canon EOS 450 digital SLR Camera.

'Two-dimensional photographic images and photomontages alone cannot capture or reflect the complexity underlying the visual experience, and should therefore be considered an approximation of the three-dimensional visual experiences that an observer would receive in the field'

Map showing location of hills

DUNMURRY HILL

Photo 1

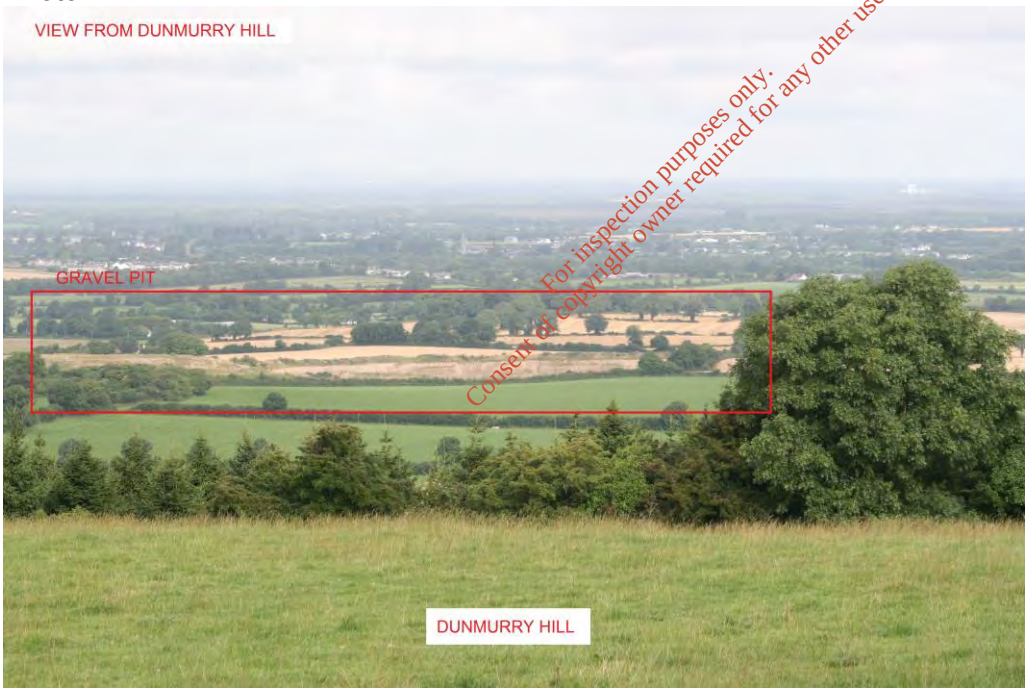


Photo 2

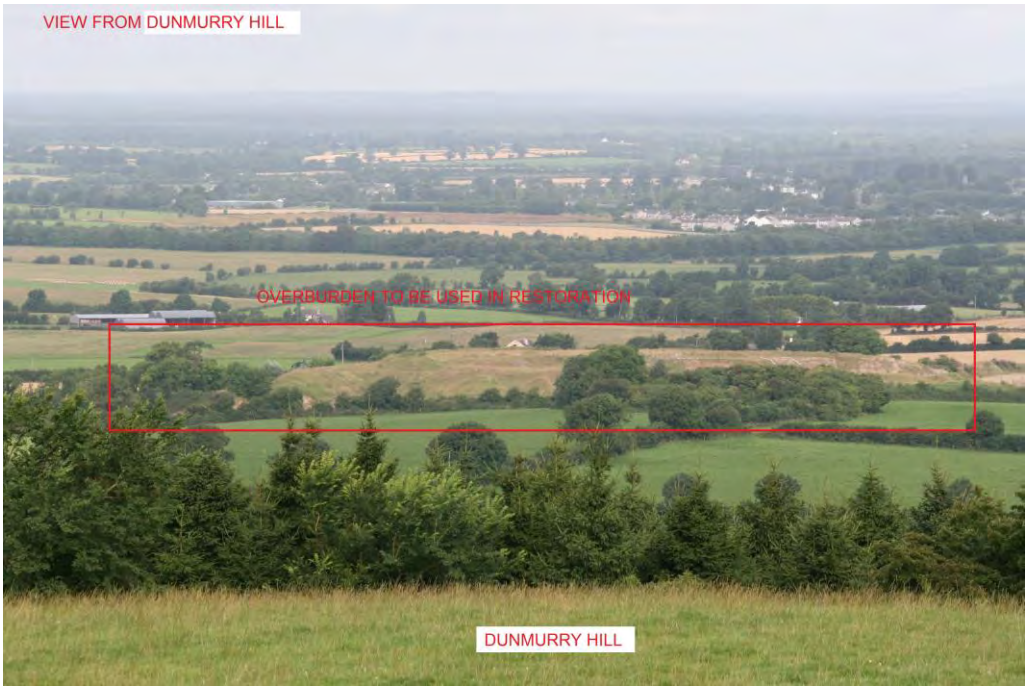


Photo 3

Photo 4

GRANGE HILL

Photo 5

Photo 6

REDHILLS

Photo 7

Photo 8

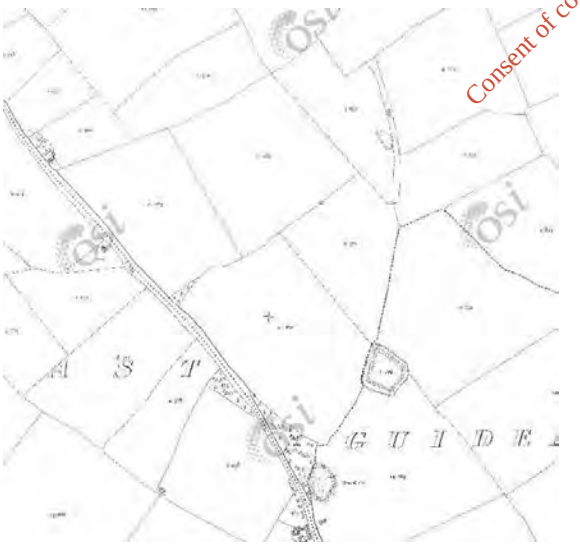
Photo 9

2.11 STUDY AREA

A study area from Dunmurry Hill, Grange Hill and Redhills was taken for the Landscape & Visual assessment.

2.12 SOURCES OF INFORMATION

- Kildare County Development Plan 2011-2017
- Ordnance Survey mapping
- Topographical survey
- Site/Field Inspection


Extract from OS Map 6" Historic Map

2.13 FIELD MONITORING/INSPECTION

A detailed site survey was undertaken on October 2015 & August 2016 with views from Redhills recorded in October and views from Dunmurry Hill & Grange Hill recorded in August. The visibility assessment was recorded from public road R401.

Photo 10

Photo 11

Photo 12

Photo 13

2.2 LANDSCAPE BASELINE

Chapter 14 of County Development Plan provides a landscape character assessment. This divides the county into 4 landscape character types with the planning applications site located in *High Sensitivity Landscapes "Major Uplands Type – Uplands - Chair of Kildare – Red Hill, Dunmurry Hill, Allen Hill"*

Table 14.1 Major Landscape Character Types

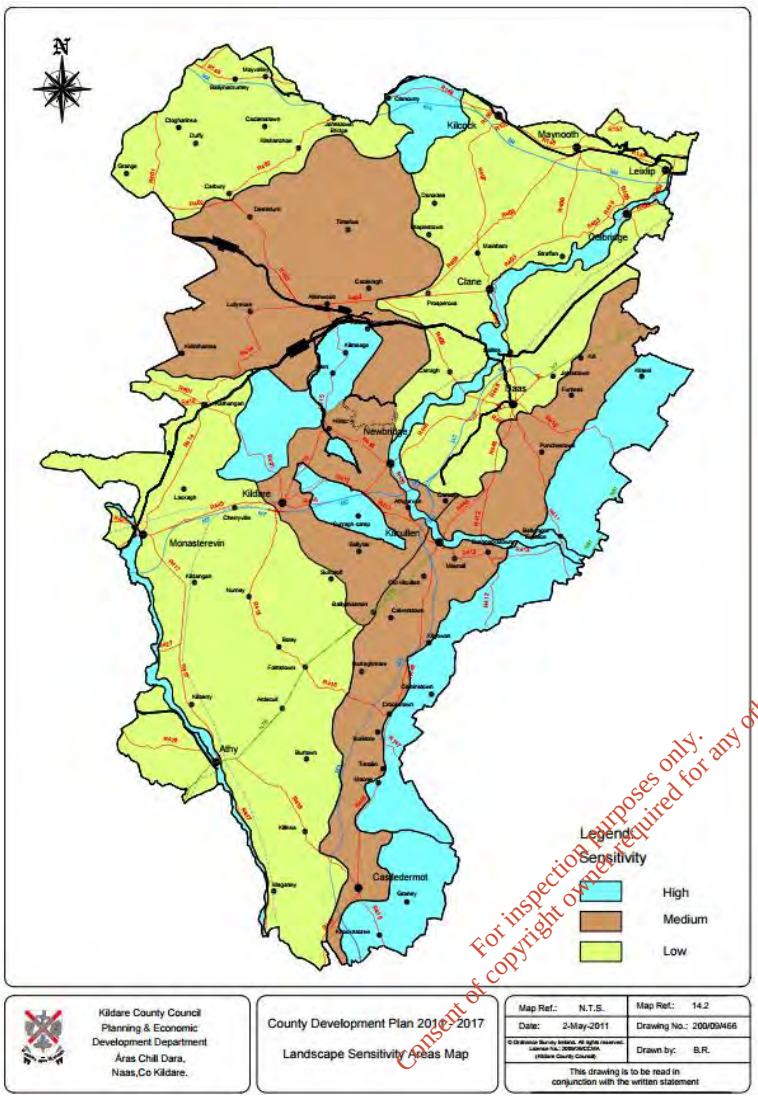
Major Landscape Type	Landscape Character Area	Description
Uplands	Eastern Uplands – Oughterard South-eastern Uplands – Corballis Hills Northern Hills – Newtown Hills Chair of Kildare – Red Hill, Dunmurry Hill, Allen Hill	The uplands of Kildare are characterised by low intensity agriculture, coniferous forestry plantations and some areas of transitional vegetation (e.g heath, gorse, scrub, woodland). Within the upland areas the ridge lines are prominent. These hilltop areas are characterised by poor drainage and high wind/rainfall, with a limited range of vegetation and landuse. Some areas within these landscape areas have concentrations of quarries.

14.4 Landscape Character Assessment

Map 14.1 Landscape Character Areas

In 2004, a Landscape Character Assessment of the county was undertaken and is contained in Appendix 3. This focuses on characterisation i.e. the discernment of the character of the landscape based on its land cover and landform but also on its values such as historical, cultural, religious and other understandings of the landscape. It concentrates on the distinctiveness of different landscapes and on the sensitivity of that landscape to development. Map 14.1 outlines the indicative landscape character areas of the county. These character areas have been amalgamated into a set of four generic landscape types based on similarities evident within the various areas (Table 14.1 Refers).

Map 14.2 Landscape Sensitivity Areas



Kildare County Council
Planning & Economic
Development Department
Áras Chill Dara,
Naas,Co Kildare.

County Development Plan 2011 - 2017

Landscape Sensitivity Areas Map

Map Ref.:	N.T.S.	Map Ref.:	14.2
Date:	2-May-2011	Drawing No.:	200/09/466
		Drawn by:	B.R.

This drawing is to be read in conjunction with the written statement

14.4.1
Landscape Sensitivity
High Sensitivity Landscapes

High sensitivity landscapes are vulnerable landscapes with the ability to accommodate limited development pressure. In this rank of sensitivity, landscape quality is at a high level and landscape elements are highly sensitive to certain types of change. If pressure for development exceeds the landscape's limitations the character of the landscape may change.

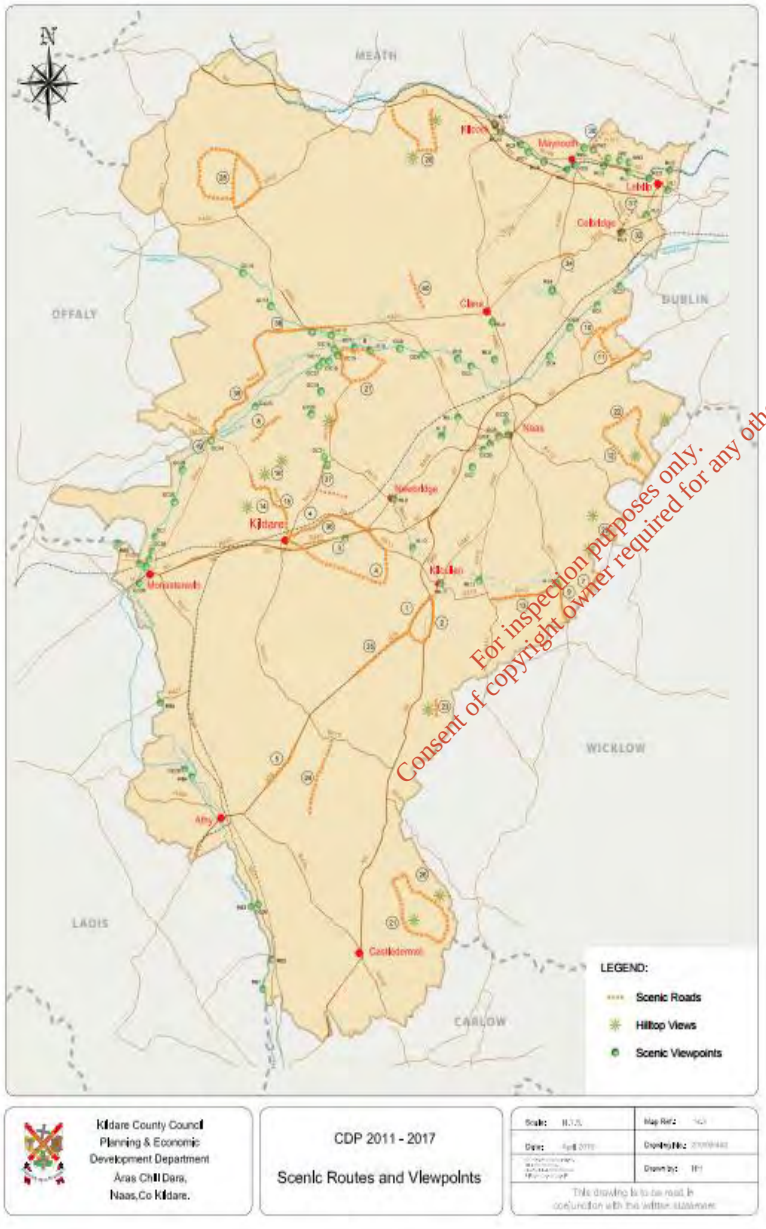
These landscapes comprise:

- *Eastern Uplands – Oughterard.*
- *South-eastern Uplands – Corballis Hills.*
- *Northern Hills – Newtown Hills.*
- ***Chair of Kildare – Red Hill, Dunmurry Hill, Allen Hill.***
- *River Valleys and Canal Corridors (River Liffey Valley, River Barrow Valley,*

14.6 Scenic Routes and Protected Views
14.6.2 Views to and from Hills

14	Views to and from Red Hill and Views of Central Kildare Plains and Boglands on the R401 and adjoining Roads	Redhill, Loughandys, Water Grange, Knocknagalliagh, Rathwalkin
15	Views to and from Dunmurray and Views of Central Kildare Plains and Boglands on the R401 and adjoining roads	Kilmoney South, Carrickanearla, Guidenstown, Dunmurray

Map 14.3 Senice Routes and Viewpoints



As the landform of the county is generally flat, with very little variation in topography, and predominantly low vegetation, extensive views can be obtained from hilltops, allowing vistas over long distances, and similarly from the lowland areas, the eyes are drawn to the primary and secondary ridgelines that define the skyline throughout the county. Ridgelines are conspicuous features of the natural landscape as they perform an important role as dominant landscape focal points. It is important that development does not interrupt the integrity of ridgelines. Development on steeply sloping land can be viewed over greater distances.

14.9.3 Hill Views
It is the policy of the Council: HV 1: To protect the upland Landscape Character Areas as identified in the Landscape Character Assessment and to ensure that development on or in the vicinity of the upland areas does not disproportionately affect views to and from the hills, or impact on the landscape character of the area as a whole.

2.21 OUTDOOR RECREATIONAL FACILITIES WITHIN THE STUDY AREA

Dunmurry Springs Golf Club is located within the 2km study area. However, it is located on the opposite side of Dunmurry Hill.

Map

2.22 SITE SPECIFIC LANDSCAPE APPRAISAL

The application site and existing Sand and Gravel quarry are located within an undulating rural landscape. The predominant land use in the surrounding area is agricultural, principally pasture and tillage with limited forestry. In the immediate vicinity of the application site however, mineral extraction activities constitute a locally significant land use. Although sand and gravel extraction activities have been significantly reduced at the site, there are few large scale operations in the immediate vicinity.

There are a number of isolated residences in the area immediately surrounding the existing facility. There is a residence immediately west of the application site, another at the north-west corner of the site, three around the north-east corner of the site and one to the south of the site.

The site is located in an area of rich pastoral landscape at the foothills of Dunmurry Hill. Kildare County Development Plan identifies the surrounding area as an area of specific landscape and visual interest. The area itself is referred to as “The Central Uplands or the Chair of Kildare”. The Central Uplands or the Chair of Kildare as the area is locally known consists of a number of hills that interrupt the continuity of the Kildare plains. This landscape character unit is located immediately north of Kildare town. The land rises to a maximum of 233m O.D. at Dunmurry Hill. The ridgeline of Dunmurry together with the ridgelines of Grange Hill (223m O.D.), Red Hill (197m O.D.), Boston Hill (159m O.D.) and Hill of Allen (219m O.D.) define the skyline of central Kildare and represent significant features on

the landscape. The elevated nature of this area provides highly scenic views over the central plains and boglands of Kildare.
The gravel pit site is bounded to the west by the R401 which functions as an 80kph regional road within Kildare County Council's road hierarchy. Along the length of the R401 vehicular access is provided to individual residential properties, farm holdings and agricultural farmlands with all of these access points taking the form of simple gated agricultural access points or simple priority 'T' junction arrangements.
The sloping topography, in conjunction with the tree lined hedgerows has the potential to accommodate the proposed development

2.3 VISUAL BASELINE

2.31 GENERAL VISIBILITY

The visibility of the application site was assessed by a desktop study of OSI Maps, available aerial photography & detailed site survey

Views of the site from locations to the north, south, east & west are limited due to the topography of the land and dense vegetation to the boundaries.

The application site is visible from centre locations on Dunmurry Hill, Grange Hill & Redhills as shown in photographs 1-9. However, these viewpoints are within agricultural fields which are not publicly accessible. Views from public road R401 are also restricted due to dense vegetation to the site boundaries.

2.32 VISUAL RECEPTORS

Paragraph 6.13 of GLVIA3 defines visual receptors as people living in the area, people who work there, people passing through on road, rail or other forms of transport, people visiting promoted landscapes or attractions, and people engaged in recreation of different types.

Visual receptors include users of the R401 who get a glimpse of the site entrance as they pass it & view the temporary overburden stockpile which will be reinstated as part of the restoration process. Private residents adjacent to gravel pit with view of temporary overburden stockpile.

The views of the road users along the R401 are grouped into one visual Receptor Area, as the views from all locations within this area are similar.

Visual Receptor Area - Map

Visual Receptor Area No.	Approximate Location/Extent	Types of Receptor	Nature of Views/Visual Amenity
1	Approximately 800m along the R401 to the north & south of the entrance	Road users	Short distance views towards the site entrance and access road. Medium visual amenity.
2	Private Dwelling	People living in the area	Views of temporary overburden stockpile Medium visual amenity.

Visual Receptor Area - Table

Photography and fieldwork analysis of views of the site were carried out from the surrounding landscape. The object was to determine which locations offer the clearest views of the application site and/or are most accessible to the public and to identify representative viewpoints for detailed viewpoint analysis. The existing views from each of these points are briefly described with the aid of photographs.




Visual Receptor Area 1 – Photographs


Visual Receptor Area 2 – Photographs

2.4 DIFFICULTIES ENCOUNTERED

No difficulties were encountered during the desktop study or field survey.

3.0 IMPACT ASSESSMENT

3.1 EVALUATION METHODOLOGY

As described in paragraph 3.26 of GLVIA3, assessment of sensitivity will incorporate judgements about the:

- Susceptibility of the receptor to the type of change arising from the specific proposal; and
- The value attached to the receptor.

Each of the visual effects identified needs to be evaluated in terms of its

- size or scale,
- the geographical extent of the area influenced, and
- its duration and reversibility.

The judgements about the sensitivity and magnitude are supported by a number of pre-defined parameters as described below. Word scales, with ideally three or four categories, are preferred as the means of summarising judgements for each of the contributing criteria.

3.11 LANDSCAPE SENSITIVITY

Landscape receptors need to be assessed firstly in terms of their sensitivity, combining judgements of their susceptibility to the type of change or development proposed and the value attached to the landscape. In LVIA sensitivity is similar to the concept of landscape sensitivity used in the wider arena of landscape planning, but it is not the same as it is specific to the particular project or development that is being proposed and to the location in question.

Judgements about the susceptibility of landscape receptors to change should be recorded on a verbal scale (for example high, medium or low), but the basis for this must be clear, and linked back to evidence from the baseline study.

Landscape sensitivity is used to establish the capacity of the landscape to accommodate the type of development proposed and is defined as follows:

Landscape Sensitivity	Definition
High	Highest/Very Attractive landscape quality with highly valued or unique characteristics susceptible to relatively small changes.
Medium	Good landscape quality with moderately valued characteristics reasonably tolerant of changes
Low	Ordinary/Poor landscape quality with common characteristics capable of absorbing substantial change.

3.12 SUSCEPTIBILITY TO CHANGE

This means the ability of the landscape receptor (whether it be the overall character or quality/condition of a particular landscape type or area, or an individual element and/ or feature, or a particular aesthetic and perceptual aspect) to accommodate the proposed development without undue consequences for the maintenance of the baseline situation and/ or the achievement of landscape planning policies and strategies.

3.13 VIEWPOINT SENSITIVITY

Judgements about the susceptibility of visual receptors to change should be recorded on a verbal scale (high, medium or low) linked back to evidence from the baseline study.

Susceptibility	Visual Receptor Types
High	residents at home; people, whether residents or visitors, who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focused on the landscape and on particular views; visitors to heritage assets, or to other attractions, where views of the surroundings are an important contributor to the experience; communities where views contribute to the landscape
Medium	Travellers on road, rail or other transport
Low	people engaged in outdoor sport or recreation which does not involve or depend upon appreciation of views of the landscape; people at their place of work whose attention may be focused on their work or activity, not on their surroundings, and where the setting is not important to the quality of working life (although there may on occasion be cases where views are an important contributor to the setting and to the quality of working life).

3.14 MAGNITUDE OF LANDSCAPE RESOURCE CHANGE

The magnitude of effects, made up of judgements about:

- the size and scale of the effect — for example, whether there is complete loss of a particular element of the landscape or a minor change;
- the geographical extent of the area that will be affected
- the duration of the effect and its reversibility.

Judging the magnitude of the visual effects identified needs to take account of:

- the scale of the change in the view with respect to the loss or addition of features in the view and changes in its composition, including the proportion of the view occupied by the proposed development;
- the degree of contrast or integration of any new features or changes in the landscape with the existing or remaining landscape elements and characteristics in terms of form, scale and mass, line, height, colour and texture;
- the nature of the view of the proposed development, in terms of the relative amount of time over which it will be experienced and whether views will be full, partial or glimpses.

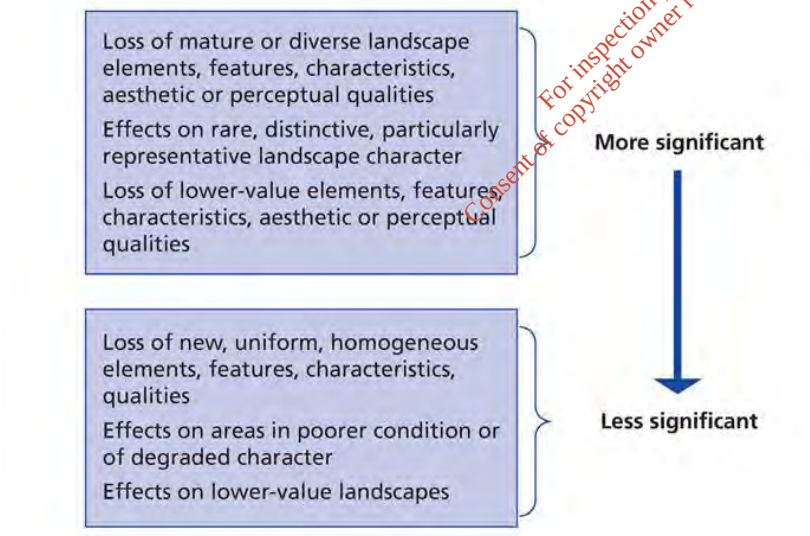
The geographical extent of a visual effect will vary with different viewpoints and is likely to reflect:

- the angle of view in relation to the main activity of the receptor;
- the distance of the viewpoint from the proposed development; the extent of the area over which the changes would be visible.

The overall magnitude of the landscape/visual effects is summarised on a scale of 'high negative', 'medium negative', 'low negative', 'negligible', 'high positive', 'medium positive' or 'low positive', based on professional interpretation of the findings.

Magnitude	Definition
High Negative	Total loss or large scale damage to existing character or distinctive features and elements, and/or the addition of new but uncharacteristic conspicuous features and elements
Medium Negative	Partial loss or noticeable damage to existing character or distinctive features and elements, and/or the addition of new but uncharacteristic conspicuous features and elements
Low Negative	Slight loss or noticeable damage to existing character or distinctive features and elements, and/or the addition of new but uncharacteristic conspicuous features and elements
Negligible	No noticeable loss, damage or alteration to character or features or elements
Low Positive	Slight improvement of character by the restoration of existing features and elements, and/or the removal of uncharacteristic features and elements, or by the addition of new characteristic elements
Medium Positive	Partial or noticeable improvement of character by the restoration of existing features and elements, and/or the removal of uncharacteristic and noticeable features and elements, or by the addition of new characteristic features.
High Positive	Large scale improvement of character by the restoration of features and elements, and/or the removal of uncharacteristic and conspicuous features and elements, or by the addition of new distinctive feature

The magnitude of change effecting visual receptors



Scale of Significance

3.15 SIGNIFICANCE OF LANDSCAPE IMPACT

Significance	Definition
Major (Negative)	Be at considerable variance with the character of the landscape. Degrade or diminish the integrity of a range of characteristic features and elements. Damage the sense of place or local distinctiveness of an area.
Moderate/Major (Negative)	Are likely to cause effects that meet some of the criteria from the above and below categories
Moderate (Negative)	Conflict with the character of the landscape. Have an adverse impact on characteristic features or elements. Diminish the sense of place or local distinctiveness of an area.
Minor/Moderate (Negative)	Likely to cause effects that meet the criteria from some of the above and below categories
Minor (Negative)	Not quite fit the character of the landscape. Be at variance with characteristic features and elements. Detract from the sense of place or local distinctiveness of an area.
Neutral	Maintain the character (including quality and value) of the landscape. Blend in with characteristic features and elements. Enable a sense of place or local distinctiveness to be retained. Change which has balanced positive and negative effects
Minor (Positive)	Complement the character (including quality and value) of the landscape. Maintain or enhance characteristic features and elements. Enable some sense of place or local distinctiveness to be restored. Enable some restoration of established characteristic features partially lost through other land uses.
Minor/Moderate (Positive)	Likely to cause effects that meet the criteria from some of the above and below categories
Moderate (Positive)	Improve the character of the landscape. Enable the creation, repair, conservation or restoration of characteristic features and elements partially lost or diminished as a result of changes from inappropriate management or development. Enable a sense of place or local distinctiveness to be restored. Enable good creation, repair, conservation or restoration of valued characteristic features partially lost through other land uses.
Moderate/Major (Positive)	Are likely to cause effects that meet some of the criteria from the above and below categories
Major (Positive)	Enhance the character of the landscape. Enable the restoration of characteristic features and elements lost as a result of changes from inappropriate management or development. Enable a sense of place or local distinctiveness to be enhanced. Enable significant creation, repair, conservation or restoration of valued characteristic features partially lost through other land uses.

The level of significance of impact on landscape character is a product of landscape sensitivity and the magnitude of change in landscape resource as indicated below

Magnitude of landscape resource change	**Landscape Sensitivity**		
	Low	**Medium**	**High**
High Negative	Neutral	Minor (Negative)	Minor/Moderate (Negative)
Medium Negative	Minor (Positive)	Neutral	Minor (Negative)
Low Negative	Minor/Moderate (Positive)	Minor (Positive)	Neutral
Negligible	Moderate (Positive)	Minor/Moderate (Positive)	Minor (Positive)
Low Positive	Moderate/Major (Positive)	Moderate (Positive)	Minor/Moderate (Positive)
Medium Positive	Major (Positive)	Moderate/Major (Positive)	Moderate (Positive)
High Positive	Major (Positive)	Major (Positive)	Moderate/Major (Positive)

Principles of Assessing Significance of Landscape and Visual Impacts

3.2 LANDSCAPE IMPACTS

3.21 LANDSCAPE EFFECTS

The main landscape effects that will take place due to the proposed development will be the changes to the landform within the fill area, removal of the temporary stockpiles of overburden & additional hedgerow/trees.

3.22 LANDSCAPE SENSITIVITY

The site is located in an area of *High Sensitivity - Landscapes "Major Uplands Type - Uplands - Chair of Kildare – Red Hill, Dunmurry Hill, Allen Hill",* as part of the Kildare Landscape Character Assessment.

The application site is made up from extracted ground, with the exception of stockpiling to the perimeter of the extracted area. No major landscape elements will be affected by the proposed development, with the development, in fact, having a positive effect on the surrounding landscape.

There are number of scenic routes listed in the vicinity of the area, but, resulting from existing mature tree lined hedgerows & the surrounding landscape topography, the views of the proposed site are minimal from these routes.

On balance, the assessment made in the Kildare Landscape Character Assessment, and the location of the site within a previously extracted sand and gravel pit, the sensitivity of *Chair of Kildare* to the proposed development is assessed as MEDIUM. The sensitivity of individual landscape elements of the works is assessed as MEDIUM, as the proposed development will restore the lands to their original form & topography.

3.23 MAGNITUDE OF CHANGE TO LANDSCAPE

See table below describing size & scale, geographical extent & duration/reversibility of the identified landscape effects, and resulting judgement of their overall magnitude:

Parameter	Description
Size & Scale	An area of approximately 10.7hectares will be restored to its original landform & agricultural use, using imported inert material & existing overburden stored on site. The overall scale of the landscape will not be affected by the proposed development, as all works are contained within an existing sand & gravel pit The key characteristics of the landscape surrounding the site will be positively affected by the proposal as the lands will be restored to sloping agricultural lands.
Geographical Extent	The effects will be experienced at site level only (within the development itself)
Duration/Reversibility	The duration is considered long term as the impact on the landform will be permanent. The proposed development will reverse the impact of the previous extraction of the lands which has taken place, by reinstating the lands to the original landform.
Overall Magnitude	The changes due to the proposed development will have a positive effect on overall landscape character. The overall magnitude of the landscape effect, due to the proposed development is assessed as **MEDIUM POSITIVE**

3.24 SIGNIFICANCE OF LANDSCAPE IMPACT

The sensitivity of the *Chair of Kildare* affected by the proposed development is assessed as MEDIUM. Combining this with the MEDIUM POSITIVE magnitude of the landscape effects results in a **MODERATE/MAJOR (POSITIVE)** level of landscape impact

The sensitivity of the individual landscape elements affected by the proposed development is assessed as MEDIUM. Combining this with the MEDIUM POSITIVE magnitude of the landscape effects results in a **MODERATE/MAJOR (POSITIVE)** level of landscape impact

3.3 VISUAL IMPACTS

3.31 VISUAL EFFECTS

The visual effects that will take place due to the proposed development will be the visibility of lorries accessing the entrance from the R401. Due to the dense vegetation to the R401 boundary, no on site activities will be visible form publicly accessible areas.

3.32 VISUAL RECEPTOR SENSITIVITY

The effect in terms of sensitivity is made up of judgements on

- the susceptibility of the receptor to the type of change arising from the specific proposal;
- and the value attached to the receptor;

Visual Receptor Area No.	Susceptibility	Value	Overall Sensitivity
1	Medium - Travellers on road, rail or other transport	• Views to and from Red Hill and Views of Central Kildare Plains and Boglands on the R401 and adjoining Roads • Views to and from Dunmurry and Views of Central Kildare Plains and Boglands on the R401 and adjoining roads	MEDIUM
2	Medium – Private dwelling	• No protected view	MEDIUM

3.33 MAGNITUDE OF CHANGE TO VIEWPOINTS

The magnitude is made up of judgements about:

- the size and scale of the effect;
- the geographical extent of the area that will be affected;
- and the duration of the effect and its reversibility.

Visual Receptor Area No.	Description of Magnitude of Change	Overall Magnitude
1	• **Size and scale of the effect** Elements of the proposed development visible in views from the visual receptor area will only be lorries accessing the site from R401. Due to the dense vegetation to the R401 boundary, no on site activities will be visible form publicly accessible areas. Views by road users are limited to the time it takes to pass the site entrance. • **Geographical extent of the area that will be affected** Users of the R401 who get a glimpse of the site entrance as they pass it & view the temporary overburden stockpile which will be reinstated as part of the restoration process. Views of the road users along the R401 from all locations within this area are similar. • **Duration of the effect and its reversibility** It is expected to take c10 years to complete the restoration process, which means the visual effects will be temporary & there will be no lasting visual effects on completion	MEDIUM POSITIVE

3.34 SIGNIFICANCE OF VISUAL IMPACT

Based on the sensitivity of the visual receptors (medium) combined with the magnitude of the visual effects (medium positive), the significance of visual effects is assessed as Moderate/Major (Positive).

3.4 IMPACTS ON LANDSCAPE/PLANNING DESIGNATIONS

3.41 EXTRACTIVE INDUSTRY POLICY

The proposed development will result in the restoration of a sand & gravel pit to agricultural use which is in line with 10.8 Extractive Industry Policy EI 12 of Kildare County Development Plan 2011-2017 & Condition 2 (a) of granted planning permission 07/188 *"the lands shall be restored to agricultural use and landscaped as per drawing 061063-AI-01 submitted to the Planning Authority on the 14th September 2007"*

3.42 SCENIC ROUTES AND PROTECTED VIEWS

The proposed development will not be visible from any of the described views along scenic routes due to existing mature vegetation & the topography of the lands, and will therefore not have any visual impact on this designation.

3.5 DO-NOTHING SCENARIO

If the proposed development were not to be carried out, the planning application site would be slowly re-colonised with locally occurring grass and scrub species but would not take the land form of the surrounding areas.

4.0 MITIGATION MEASURES

Measures taken to further minimise the potential visual impacts associated with the existing and proposed development can be classified as;

- Avoidance
- Mitigation

The primary measure taken to minimise visual impacts is through their avoidance. It is considered that the existing hedgerows along the site boundary and the surrounding topography, will ensure that the visual impact of the development is not significant.

The following landscape mitigation measures should be put in place to further eliminate and/or minimise any potential visual impact associated with the proposed restoration scheme:
i) Retain all hedgerows along the site boundary and reinforce with additional planting where necessary.
ii) Provide for off-site removal, re-use and/or recovery of all buildings, plant, infrastructure and paved surfaces on completion of restoration activities;
iii) Ensure the final restored landform is graded at a shallow angle so as to merge in with the surrounding agricultural landscape.

These mitigation measures are in accordance with the recommendations provided in the DoEHLG (2004) publication. Quarries and Ancillary Activities: Guidelines for Planning Authorities.

5.0 RESIDUAL IMPACT ASSESSMENT

The assessment has found that overall the proposed development will have a positive impact on the general landscape character within the study area.

6.0 REFERENCES

Guidelines for Landscape and Visual Impact Assessment Third Edition Landscape Institute and Institute of Environmental Management & Assessment, Routledge

Kildare County Development Plan 2011 - 2017

DoEHLG (2004) publication. Quarries and Ancillary Activities: Guidelines for Planning Authorities.

Restoration of Sand and Gravel Quarry at Boherkill, Rathangan, Co Kildare.

Response to Sections 4, 5, 10, 11 &12 of a Further Information Request from Kildare County Council PL Ref: 16/526 dated 15/07/2016

Response prepared by Raphael Mc Evoy of RME Environmental

Rev.	Status	Author	Reviewed By	Approved By	Issue Date
D01	Draft	Raphael Mc Evoy	Deirdre Smith	RME	19/10/2016
D02	Draft	Raphael Mc Evoy	Deirdre Smith	D Smith	21/10/2016

RME Environmental were requested by the applicant Mr Michael Ennis to assess the contents of the Further Information Request issued by Kildare County Council in respect of Planning Application Reference 16/526. Other consultants from the design team have been requested to address sections relevant to their expertise and RME Environmental in this submission will address sections 4, 5, 10, 11 & 12 of said FI request.

SECTION 4: CONSIDERATION OF ALTERNATIVES

The EIS Submitted does not outline alternatives to the proposed development and therefore provides no reasons as to why the proposed development as an option was chosen. Section 5.2 of the DECLG "Guidelines for Planning Authorities and An Bord Pleanala on carrying out Environmental Impact Assessment (2013) states that: The applicant/developer must also submit an outline of the main alternatives studied…

You are therefore requested to submit further information comprising a robust assessment of the alternatives considered to the proposed development as part of the preparation of the EIS

INTRODUCTION

In relation to section 4 of the further information request the local authority has suggested that the EIS does not outline alternatives to the proposed development and therefore provides no reason as to why the proposed development as an option was chosen. The council has pointed out that the submission in this regard is required so as to comply with Section 5.2 of the DECLG "Guidelines for Planning Authorities and An Bord Pleanala on carrying out Environmental Impact Assessment. It has therefore been requested to submit this further information comprising a robust assessment of the alternatives considered to the proposed development as part of this further information request response.

Section 1.8 of the EIS dealt with the issue of "Alternatives" and for the purposes of completeness the following was stated in this section:

1.8 ALTERNATIVES

Given that site restoration / recovery activities (such as those envisaged at the applications site) can only be undertaken where previous land-use activities have created a disturbed ground surface, degraded landscape and/or derelict, non-productive land, it is not appropriate to identify and appraise the merits of alternative candidate sites for the proposed waste recovery activities.

The available soil and groundwater data indicates that the inert soil recovery / site restoration works undertaken at the application site to date have not had any detrimental impact on the local water environment. Assuming that activities at the site continues to be managed as heretofore, it is considered reasonable to assume that established operations can continue without any significant adverse impact on groundwater quality.

The European (EIA) Directive 97/11/EC has raised the importance of a consideration of alternatives

within the EIA Directive as a whole. The consideration of alternatives is mandatory under the

following range of alternatives should normally be studied:

- Do Nothing
- locations or alignments;
- site layout and project design;
- size and scale;
- working or management arrangements;
- timescale for construction and operation.

The following is a description of the above main alternatives studied by the developer and an indication of the reasons for his choice, taking into account the interconnections between the economic, social and environmental issues.

Do Nothing

The consequences of not reinstating the gravel pit at Boherkill, County Kildare would include:

- the loss of economic benefits to the applicant;
- the loss of valuable needed jobs in the area;
- the loss of an opportunity to provide a location for development sites to transfer inert or inactive materials *Typically: Largely water insoluble and non or very slowly biodegradable: e.g. sand, subsoil, concrete, bricks, mineral*
- The loss of potential to increase the food, agricultural or bio-energy crop production in the area which would contribute to the National need.
- The loss of an opportunity to restore the former sand and gravel quarry pit to its former status as an agricultural field and the consequential knock on to the visual amenity of the area.
- The loss of potential to further protect the groundwater resource by building back up the site and reducing the potential for groundwater contamination.

There are what are considered to be temporary negatives to the carrying on of the development like potential noise, dust, air traffic issues etc. but these are temporary and with this proposal on this site and the willingness of the developer to make this commitment to the site the “Do Nothing” alternative could only be viewed as a wasted opportunity for the facility.

Location

The site is well placed to serve local markets and the needs of local construction markets and those of neighbouring authorities. In particular those of the regional waste authority in which it stands. The site is currently in use as an operational gravel pit (planning ref: 07/188) which was due to expire in August 2015. Planning Permission 15/515 permits the continued extraction at the site until 2020. An additional 5 years extraction. No alternative is applicable to the location as the proposed development in this case is very much site specific. No alternative locations have been assessed in this instance.

Site Layout and Project Design

The site layout continues on from the existing extraction area and it is intended to restore the entire area of extraction to the original levels and land use. Therefore the site layout itself in reality will remain

the same and stay exactly as it lies following the resource extraction. There are no possible alternatives to this. In respect of the project design, there are alternatives, for example, regarding the phasing as per section 2.3.1 below a very specific and considered restoration programme has been designed firstly to facilitate the additional extraction phases which will continue for a period of 2 / 3 years. It has been decided to phase the restoration in a North to South direction which would mean effectively that the project moves further from the most sensitive receptors quicker thus mitigating the cumulative nuisance potentially generated.

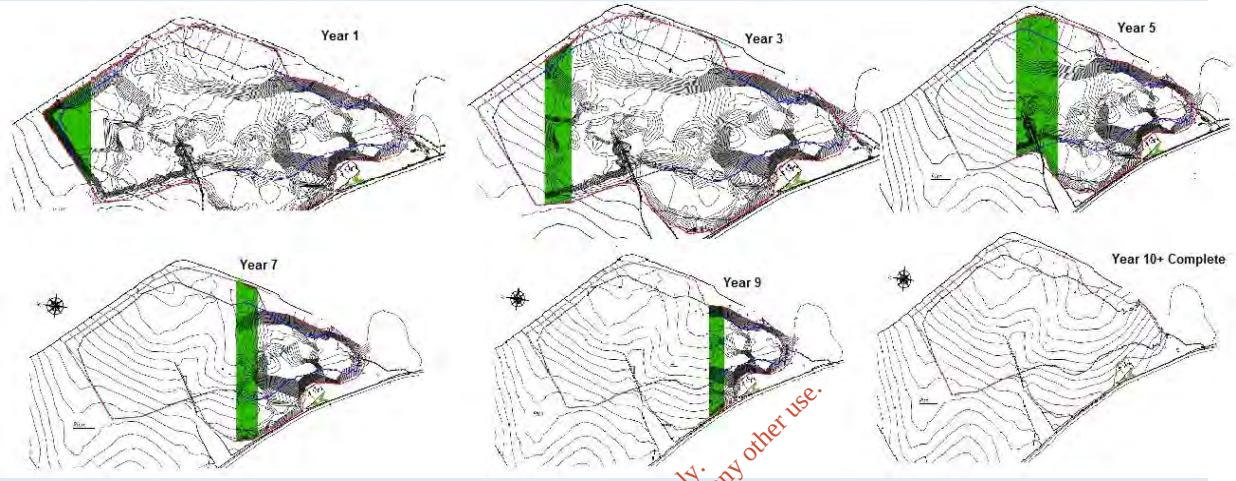


Fig: 1.5 Yearly Planned Restoration Profile

Alternative phased approaches have been considered but consultation with the environmental team the project developer and the site operators have concluded that this methodology would provide the best solution in the most environmentally efficient manner.

Size and Scale

The size and scale of the restoration project are predetermined but the design team has addressed alternatives in respect of both. Some key considerations in the decision making process were around:

1: The volume of materials acceptable at the site

2: whether to completely fill the pit back to a level consistent with the surroundings

3: deciding on the level of importation in consideration with the licensing requirements

4: assessing the volume for importation in line with all potential environmental aspects

5: assessing the scale in line with the previous planning permissions

6: qualitatively assessing the project in terms of overall economic deliveries

7: qualitatively assessing the residual value in bring the plot back to an agricultural field

8. qualitatively assessing the visual impact / improvement on the surrounding landscape

9: qualitatively assessing the impact on biodiversity and agricultural productivity

In general it was felt that there would be an economic incentive to fill the void completely if there was available material for the re-filling. A review of the Dublin market and the general trend locally around the construction and commercial climate meant that that decision was made. Also the general belief among the design team is that a figure of 150,000T per annum is attainable. It was felt that given the scale of the project it would demand an EPA waste licence and this was carefully considered and deemed to be a welcome route for the project given that the licensing criteria expected will not be vastly different from the current management criteria if maybe a little more frequent.

When all of the above considerations and alternatives were addressed it was felt that to fully restore the quarry was the most sustainable, visually pleasing, environmentally sound and economically justifiable methodology with which to proceed. Meeting with the statutory stakeholders namely Kildare County Council also led to the understanding that resource recovery facilities like that proposed are a scarce resource in Kildare at present. Whilst a lot of alternatives were considered. The proposed methodology was deemed the most appropriate

ASSESSMENT OF ALTERNATIVES:

In order to comply with the requirements of the further information request it is thought that a more robust account of the possible alternatives is required which will result in some repetition regarding the initial submission.

(i) Alternative locations:

This proposed development which is the backfilling of an existing void space is not like a factory development for example that can be located at many locations. In this instance the location of the proposed development is unique to the existing site from which the material has been excavated and the void space is existing. No alternative location is therefore applicable in the instance of the proposed development. The void space can only be filled where it exists and only were the environmental effects of backfilling can be demonstrated to be minimal in the context of the development.

This however is not the only pre-requisite which determines whether the location is suitable for backfilling. The proximity to a willing market is key to the assessment of the location or alternative locations as it would be counterproductive economically and environmentally to propose the project in a location where there was no feasible route to acquire the material required for the restoration of the quarry. In the case of this particular project, given the knowledge around the current waste management shortfall in available recovery facilities of this nature in Kildare and the Dublin hinterland and given the pre-planning meeting with the environmental representatives from Kildare County Council present confirming that situation to be the case, it was very clear to the developer that there was a severe shortage of facilities for recovery of inert soil and stone and inert construction and demolition waste material in the county and the relative proximity of this development to the local market and also to the Dublin market by extension would address the existing relative shortage of facilities existing at present. Therefore again the location was deemed suitable and no alternative location was deemed applicable in this instance.

Internally within the development alternative locations have been assessed by the project team in respect of all engineering decisions made for the project for example:

A: Alternative location for the weighbridge and offices: The location of the offices and weighbridge for the facility are located at the entrance to the site. Given that the main thrust of the development will shift from an outward momentum for material to and inward one it and also given that there would be specific EPA requirements under the waste licence for the facility alternative locations were addressed for the weighbridge in conjunction with the proposed phasing of the site. Deliberations were made around whether the weighbridge could be moved closer to the active backfilling areas and be moved as the phases moved from North to South in accordance with the proposed phasing plan for the site. There was no commercial or environmental benefit deemed to accrue from the moving the weighbridge to an alternative location as the location of the weighbridge had been shown to a sufficient in respect of the previous, current and proposed requirements.

B: Alternative location for the materials inspection and quarantine areas: Discussion has been made in relation to alternative locations to the quarantine and inspection area locations within the site in order to ensure that only material permitted in the restoration of the proposed development be allowed access the site initially and secondly that if material is observed to be non-compliant that it is readily quarantined and removed off-site immediately to a fully licensed permitted facility. The discussion in this instance focussed primarily on which location would provide the best environmental protection to ensure that only permitted material could access the site. The existing location as proposed is to locate the materials inspection and quarantine area proximate to the weighbridge and site initial access point. The suggested alterative locations was to locate the area proximate to the tipping area of the materials. Given that there are limited a limited number of employees at the site it was decided that the primary qualitative assessment was made proximate to the weighbridge to avoid alit of extra handling of material should it get to the tipping stage and then be discovered to be non-compliant. Therefore whilst alternative locations have been considered the chosen option has been deemed to be the most secure way to manage the intake of material and to ensure the utmost levels of environmental protection and health and safety are observed.

(ii) Alternative Site layout and Project Design

Alternative layouts and designs within the site were considered with particular attention being paid to the direction of the phased working. Consideration was given to the screening of the operations in respect of any potential nuisance mitigation that may be required. The design chosen is considered to be the best layout to minimise potential impacts.

In respect of the layout of the project and the design of the project internally there were a number of alternatives studied and addressed however the proposed layout and design have again been deemed to the environmentally and commercially most sustainable option to the developer. When discussing the site layout it was decided that the proposed phasing of the project would run from north to south with phasing and design given for each of the 10 years of operation commensurate with the target input of materials to the site.

(a) Phasing: Consideration was given to the commencement of the backfilling of the site at the southern end of the site and working back towards the Northern end of the site. This would have involved the tipping of the material proximate to the intake and weighbridge side of the facility. This would most likely have involved the construction of additional haul roads within the site and meant that the backfilling operation would have to take place in a south to north direction backfilling the western side initially and then coming back from a north to south direction to backfill the eastern side of the facility. This was not considered best practice from an engineering point of view.

(b) Environmental issues related to operational plant: In respect of the proposed operation of plant and equipment at the facility and any potential direct impact locally from their operation or the cumulative impacts of extraction plant and restorative plant alternative phasing was considered. This was to establish whether by employing alternative phasing that any potential mitigation effects would arise that would benefit the proposal. Given the fact that the noise and dust arising predictions do not indicate any significant environmental issues the assessment of the alternative phasing proposals were not deemed to demonstrate any environmental gain. Therefore the proposed phasing is deemed the most suitable environmentally for the development.

(C) Site Layout and Boundary Considerations: In respect of the requirement for the proposed development to have a waste licence issued by the Environmental Protection Agency an alternative consideration has been made regarding the physical owned site versus the proposed licensed site. In short the design team have assessed the full boundary of the "owned" site versus the void space location. The void space is obviously smaller than the site boundary and therefore an alternative specification for the licenced entity has been considered.

The alternative was assessed to determine whether shrinking the licensed boundary versus the owned boundary would provide any additional environmental buffering to the local area by effectively reducing potential environmental exposures. The design team decided to match the licensed boundary to the owned boundary for the site because this would allow for the seamless integration and development of the final agricultural field which is the target outcome for the development. Altering the licensed site boundary may have created anomalies that would create licensing and backfilling issues as the project enters the final stages of completion. The ultimate arbiter in this decision will be the Environmental protection Agency themselves when presented with the options in the waste licence application.

(d) Alternative Final Layout Design: As with all projects of this nature the consideration of the final layout was subjected to a number of alternative suggestions. Alternative suggestions for the finished layout were discussed regarding whether to bring the level of the proposed development back to the pre-extraction agricultural field or whether to simply backfill to a particular datum, below pre-existing levels and develop an area of specific biodiversity or a flooded area or

wetland etc. The design decisions were based primarily on information arising from the project EIS and hierarchically decided upon in the following order:

1: Ecology: the assessment of the ecology of the site showed that no significant biodiversity had established at the site and therefore no special considerations would be required in the design for accommodation of such.

2: Landscape Assessment: An assessment of the alternative of partially backfilling the site was deemed not to have any significant effect on the surrounding landscape. Therefore the difference in fully restoring to agricultural land or partially backfilling whilst it would have very significant on-site outcomes from a visual impact perspective would not have any significant external impact. Either option was deemed to be applicable from a landscape and visual impact perspective.

3: Benefit of restoration to agricultural land: The fact that the proposal aims to bring the extracted void back into operation as a productive swathe of agricultural land in itself was considered when discussing the alternative final design outcomes for the site. There would be future material benefits, future biodiversity benefits and local visual benefits derived from the reactivation of the site as productive farmland. Productive farmland is a finite and limiting resource particularly on an island like Ireland and the ability to reactivate exploited land to a resource was a factor key in selecting the existing design over the alternatives as stated above.

4: Health and Safety: A key design alternative in relation to design alternatives were the health and safety considerations for the site if left as is. It is felt that whilst most quarries once depleted provide an alternative ecological platform for biodiversity etc. they also provide health and safety hazards if left unsecured. This option again was considered in the context of partially filling or no filling at all. Experience nationally has demonstrated that it is more preferentially to remove the steep cliff faces and backfill ponded waters etc. on disused quarries to prevent potential for steep falls or drowning. The proposal recognises those potential hazards and whilst the alternatives may be attractive to some disciplines the health and safety considerations take precedence in this regard.

4: The Economic Benefit: Commercially given the current market situation regarding the availability of facilities like the proposed facility and also given the fact that the overall economy is slowly recovering there is a greater economic potential for the developers to fully restore the site garnering a gate fee to do and secondly for the site owners to, as discussed above, re-activate the site for agricultural use thereby realising future income potential from the use of the reconstituted resource.

(iii) Alternative Processes

An assessment of alternative processes was carried out in relation to the proposed development at the outset of the project. It was assessed as to whether it would be viable to employ onsite screening, separation and reconstitution of the waste materials as they arrive onsite with a view toward creating alternative products for resale and redistribution back to the construction industry. Discussions were held with industry experts around the viability and market for such recovered products and is was deemed that given the relatively small annual volumes required for the backfill operation that the further processing would add layers of complex operational and licensing complexity to the project which would lead to delays in delivering the ultimate objective of a fully restored and operational agricultural field.

The consideration of alternative processes is therefore confined to choices of machinery to carry out the defined backfilling restoration works. The selection of bulldozers and excavators is current best practice and the process that is most used nationally.

(iv) The "Do Nothing" Alternative:

Planning permission exists at the site for the continued extraction of material at the site for the next five years. This timeline would be limited by the amount of resource available however it would be permissible under existing consents for the developer to close the gates at the site and effect no restoration or post-development closure plan. Doing this would constitute the "Do Nothing" alternative. In respect of activity, traffic, noise and dust generation, groundwater protection, surface water protection and ecology this alternative would ensure minimal effect on the local area. However the substantive issue as addressed by the design team was whether or not there would be significant benefits or losses accruing from doing nothing versus restore the quarry.

The consequences of not reinstating the gravel pit at Boherkill, County Kildare would include:

- the loss of economic benefits to the applicant;
- the loss of valuable needed jobs in the area;
- the loss of an opportunity to provide a location for development sites to transfer inert or inactive materials *Typically: Largely water insoluble and non or very slowly biodegradable: e.g. sand, subsoil, concrete, bricks, mineral*
- The loss of potential to increase the food, agricultural or bio-energy crop production in the area which would contribute to the National need.
- The loss of an opportunity to restore the former sand and gravel quarry pit to its former status as an agricultural field and the consequential knock on to the visual amenity of the area.

Effects of the proposed The loss of potential to further protect the groundwater resource by building back up the site and reducing the potential for groundwater contamination.

- The Health and safety implications for leaving the void space as is.

There are what are considered to be temporary negatives to the carrying on of the development like potential noise, dust, air traffic issues etc. but these are temporary and with this proposal on this site and the willingness of the developer to make this commitment to the site the "Do Nothing" alternative could only be viewed as a wasted opportunity for the facility.

Having assessed alternative locations, designs, layouts and processes for the facility and this coupled with a robust assessment of the Do Nothing alternative the design team involved iin the production of the EIS are happy that all relevant alternatives have been considered and that the proposed development constitutes the optimal design for the site at Boherkill Rathangan Co Kildare.

SECTION 5: Cumulative Impacts & Interaction of Effects

The submitted EIS does not provide a specific chapter or section dealing with cumulative impacts and interaction of effects. In addition, from the planning authority's assessment of the content of the EIS there appears to be an absence of robust and tangible assessment of the combined effects. Apart from the matter of traffic impacts, the main focus of the EIS appears to be in relation to the effects of the restoration works to be carried out. You are therefore requested to submit further information comprising an assessment of cumulative impacts and interaction of effects. This assessment should consider:

- *The combined effects of the proposed development with existing quarrying activities taking place on the site. The importation of material to raise ground levels will be taking place alongside quarrying / extraction activities.*
- *The combined effects of the proposed development with other similar developments (quarries and or restoration works) being undertaken in the wider area.*
- *The combined effects of the proposed development with other significant developments in the area whether existing / already operational, or existing extant planning permission yet to be implemented.*

Schedule 6 of the Planning and Development Regulations 2001 (S.I. 600/2001) sets out the requirement to consider the interrelationships of certain aspects of the environment as part of the EIA process. The requirement arises from the recognition that all environmental factors are inter-related to some extent. Interactions are usually highly complex, and a change in any one factor, such as land-use or water quality, could affect all of the other interrelated factors. Although almost all environmental aspects are inter-related to some degree only the significant interactions are usually considered in an assessment. The interactions of the impacts and mitigation measures between one topic and another, where applicable, are discussed under the respective sub-sections within Section 3, rather than in a specific "Interactions" section. Because an EIS is typically prepared by a number of specialist consultants it is important that the interactions between the various disciplines are also considered. This section draws attention to significant interaction and interdependencies in the existing environment.

In terms of protecting the environment, the impacts of the proposed development of a Waste Recovery Facility at Boherkill, Rathangan have been assessed and where required, appropriate mitigation measures provided to remedy any significant adverse effects on the environment. The following matrix has been generated to show where possible interactions may result between the

various environmental impacts. For details of any interactions refer to the relevant sections of the EIS.

Section	Human Beings	Flora and fauna	Soils and Geology	Water	Climate	Air Quality	Noise	Landscape	Cultural Heritage	Material Assets	Traffic
Human Beings											
Flora and Fauna											
Soils and Geology											
Water	•	•	•								
Climate											
Air Quality	•	•			•						
Noise	•	•									
Landscape	•	•				•					
Cultural Heritage								•			
Material Assets	•			•		•	•	•	•		
Traffic	•	•				•	•			•	

Taking each of the potential interactions and cumulative effects of each potential environmental component the following are representative of the main potential areas for interaction or cumulative effect:

1: Human Beings:

As per the matrix above human beings in the development as proposed have the potential to interact and create cumulative effects in respect of water, air quality, noise, landscape, material assets and traffic. The development can predominantly exert an effect in respect of human beings through the modicum of noise and air quality but interaction can pervade through traffic and vehicular interactions. In this particular proposal the change in relation to the operations is such that noise and air pollution predictions show that no cumulative effects will accrue via the interactions of human beings and those environmental elements. Given that the proposed development is essentially a back filling operation with the continuation for a limited period of the extraction of sand and gravel and associated processes again there is not predicted to be any cumulative effect on human beings.

It may be argued that human beings will invariably be effected by a prolonging of the operational period of the development and this may be the case from the point of view of time however the overall substantive environmental good would ultimately be served by filling in the void and returning it to productive agricultural land.

A positive interaction from the human beings perspective would invariably also be the development or re-manufacturing of productive agricultural land. If left as a void space there would be a biodiversity element to the site as nature would take over and the void pace would be colonised by a rich diversity of species, as is seen in many redundant quarries throughout the count and country alike. That would represent the do nothing scenario and would not really be the product of a cumulative outcome from the interaction of the foregoing. However the cumulative social impact of the proposed development would be the short term continuation of the existing employment at the site, followed by a further number of years of productive employment during the restorative period and consequentially there would be a long term cumulative impact whereby the land will become a

productive piece of agricultural ground which will serve the human employment and food chain requirement for many years to come.

It may also be argued that another positive interaction of the forgoing resulting from the cumulative impact of the back filling and restoration plan would be that the landscape and visual impact will be restored to be consistent with the surrounding hinterland again a cumulative impact that could be argued would benefit human beings from a visual perspective.

It would be fair to ask about the cumulative impact of the continuation of the existing development, namely the extraction of sand and gravel and the proposed restorative actions on human beings from a traffic point of view. In short the proposal will result in less traffic movements being generated than are currently being permitted at the site including interactions from residential traffic and other commercial and civilian road users. The traffic impact of such developments are recognised as short term and once, as is the case for this proposal that all relevant road traffic safety precautions and road health and safety deign considerations are upheld there will again be no significant cumulative impact.

The cumulative impacts as predicted on human beings from the interactions of the fore goings will culminate in the production of a new material asset. The extraction of the sand and gravel will have been a demonstration of the utilisation of a material asset to benefit our general human population by providing the raw natural material which facilitates the construction of our homes and commercial and industrial infrastructure. Again the fact that the interactions and cumulative effects have been demonstrated to be relatively low in the development of the very positive material asset which will be a newly restored agricultural entity benefitting human beings for generations to come.

2: Flora and Fauna:

The ecological section of the EIS stated concluded *"the impact of inert waste disposal on this site will be considerable in local terms but will resemble the extraction process in the habitats it creates. It will not result in any loss of heritage values in the locality or, more widely, in the Natura 2000 network of protected sites. The simultaneous small scale extraction will have no significant ecological effect except that it may give temporary nesting sites for sand martins."*. The report by Roger Goodwillie identified invariably that there would be impacts associated with the physical extraction of the remaining areas of the site and also the physical backfilling of the site and the various ecological systems within the confines of the quarry. Mr Goodwillie identified dust arisings as a potential interaction between the proposal and the surrounding ecology but again this was viewed as a minor and not extremely significant effect. No significant cumulative effects were predicted either via the interactions with eth exception of the possible impacts on sand martin nesting grounds which typically would be in the terrain of disused redundant quarries. However it was noted that this would be a direct effect of the proposal and not a cumulative effect of interactions between any other environmental effects.

3: Soils and Geology

In cases where industrial activities interact with soils and geology there are always the possibilities of accidental pollutions or introduced contamination and the generation of cumulative effects of the interaction of the foregoing. An example would be the introduction of contaminated restorative material which would ultimately lead to leachate contamination to the groundwater and the cumulative effect being a bigger more disperse contamination issue than which would have arisen were the

material to have been left in its pre-waste state. In the case of this proposed development all materials would be screened via WAC (Waste Acceptance Criteria)analysis and material characterisation procedures or similar prior to being accepted to the site and would be also screened on site in accordance with globally accepted waste acceptance criteria for facilities of this nature. All material more importantly will be inert and non-leaching therefore it is difficult to predict any significant cumulative effect which could arise from the intake of the target material.

There are no predicted cumulative effects on soil and stone from any interaction with any other environmental element.

4: Water

Potentially there are cumulative impacts which could occur in a proposal of this nature between water, flora and fauna and soils and geology. As per the previous sections 2 and 3 above no cumulative impacts have been identified primarily due to the fact that the proposal again will be a dry back filling process using uncontaminated inert materials to fill the void. This couple with the fact that there are no significant interactions between critical species of flora and fauna and soil and geology and water there are no predicted cumulative impacts for water. It is also notable that the fact that there have been no transgressions below the water table decreases the potential hazards that could result in impacts on the water element and also the fact that there are no significantly sensitive surface water elements proximate to the site also reduce the risk of significant cumulative impacts for the proposed development.

5: Climate:

No significant impacts on climate have been predicted to result from the proposed development. Potentially any interactions around air quality will also potentially effect climate on a local or global scale or be seen to cumulatively add to global climatological issues. There are no predicted air emissions issues from traffic volumes associated with the development and given that the volumes of traffic emissions from the proposed development are less than those permitted for the extraction phase of the development, it can be concluded that traffic emissions will not significantly interact with existing on site or other nearby developments to create significant climatological issues.

Management of dust on site to the acceptable environmental norms will also not result is any significant cumulative climatological impact.

6: Air Quality

The matrix above identifies the fact that interactions between air quality impacts can potentially cumulatively impact on humans, Flora and fauna and climate. Section 5 above deals with the cumulative impacts that will arise from the interaction of climate and air quality and as described there are no significant impacts predicted for this development.

Obviously there would be a potential for human interaction to cumulatively impact on air quality relative to this proposal via increased traffic volumes and increased dust generation in particular however with the suggested mitigation measures and best practice through the predicted EPA waste

licence conditions and operating parameters, no cumulative effects are predicted in relation to this proposed development.

In the event that air quality was poor and impacts became significant, one of the first direct effects of this would be evident in the local ecology either by the dying off of certain species of flora or by the evacuation of the site by certain fauna. This would represent a potential cumulative impact however as described in section 2 above, no cumulative effects are predicted given the relatively low impact nature of the proposed development.

7: Noise

Noise impacts could invariable generate direct impacts on predominantly human beings but also certain fauna for example bats, rabbits hares or foxes local to the proposed development. The first issues regarding the cumulative impacts of the development is whether the combination of the extraction process and the backfilling process will result in a cumulative impact greater than the noise impacts currently experienced from the extraction activities alone. The noise experts drafted in to the site predict no significant noise impact at the nearest sensitive areas to the site. The study takes into account the predicted manufactures noise ratings for all plant to be used on site and the cumulative effects of running these plant simultaneously. Again no significant cumulative effect is predicted.

It must also be stressed that a mitigating factor in relation to this discussion must also be that there is not predicted to be any different machinery on site than that which is currently operational there. Therefore no cumulative impact is to be anticipated from the proposed development in respect of on-site processes.

The EIS must also reflect on the cumulative impact from any potential increase in traffic noise on human beings proximate to the site. Again the traffic section of the report reflects a reduction in the traffic volumes and therefore again no cumulative environmental impacts ae predicted in relation to this proposed development.

8: Landscape

The Landscape Impact Assessment as carried out in response to the further information request from Kildare County Council in respect of this development (Section 1 in particular) concludes the following *"overall the proposed development will have a positive impact on the general landscape character within the study area".* Materialistically this conclusion is drawn from the fact that the current extraction process and the proposed backfilling process are both invisible external to the site and that the final outcome from the proposed development will be the creation of a 10.7 hectare tract of newly constituted agricultural land that will blend visually with the surrounding hinterland.

The interactions of humans and human activity and those of flora and fauna in relation to landscape are recognised in this proposal as being able to cumulatively interact to generate an impact greater than the sum of the individual parts. The cumulative impact in this instance is generally seen as one of a positive nature via the replenishing of the void space to a space which is exactly similar to what it was prior to the extractive process commencing thereby replenishing the local flora and fauna and secondly by restoring the visual amenity for human beings where should they be able to view the

landscape from the air the landscape visual amenity as is would be effected to what is regarded as a more visually pleasing aspect.

9: Cultural Heritage:

Due to the extraction process ongoing and with respect to the archaeological insignificance of the existing site as evidenced in chapter 9 of the Environmental Impact Statement it is found that the only cumulative impact from the proposal is that the landscape itself when reconstituted will reflect a continuation of our agricultural and social cultural heritage and permit for a continuance of same. It may then also be argued that the removal of a quarried out landscape serves to deny future generations of the physical evidence of our commercial / industrial cultural heritage and therefore the cumulative impact may be seen as a negative one. The nature of the impact is therefore not deemed to be a tangible impact rather one of perception, very much dependent on that off the human being observing. It can be concluded therefore that no tangible cumulative impact is evident in respect of the proposed development.

10: Material Assets:

Section 12 of the EIS and the baseline study of the area with regard to material assets involved a general assessment of the local road network around the application site, economic activities, commercial properties and housing in the area. An assessment of the potential cumulative effects of any interaction of any or all of the environmental elements of the proposed developments suggests that there may be impacts where human beings, water, noise, air quality and cultural heritage cumulatively interact to form greater impacts.

It is clear from the EIS that there are impacts from the proposal in relation to the material assets that are the road network, local economic activity, property and local housing. When assessing the potential cumulative impacts however we must assess whether the elements above will interact positively or negatively together in the context of the proposed development. Whilst there is no methodology for calculating the cumulative impact as opposed to the direct impacts it must be stated that where the development has been demonstrated to have negligible direct impacts in respect of the interactions of the foregoing it is therefore hard to conclude how cumulative impacts either negative or positive would arise in respect of the material assets local to the site.

11: Traffic

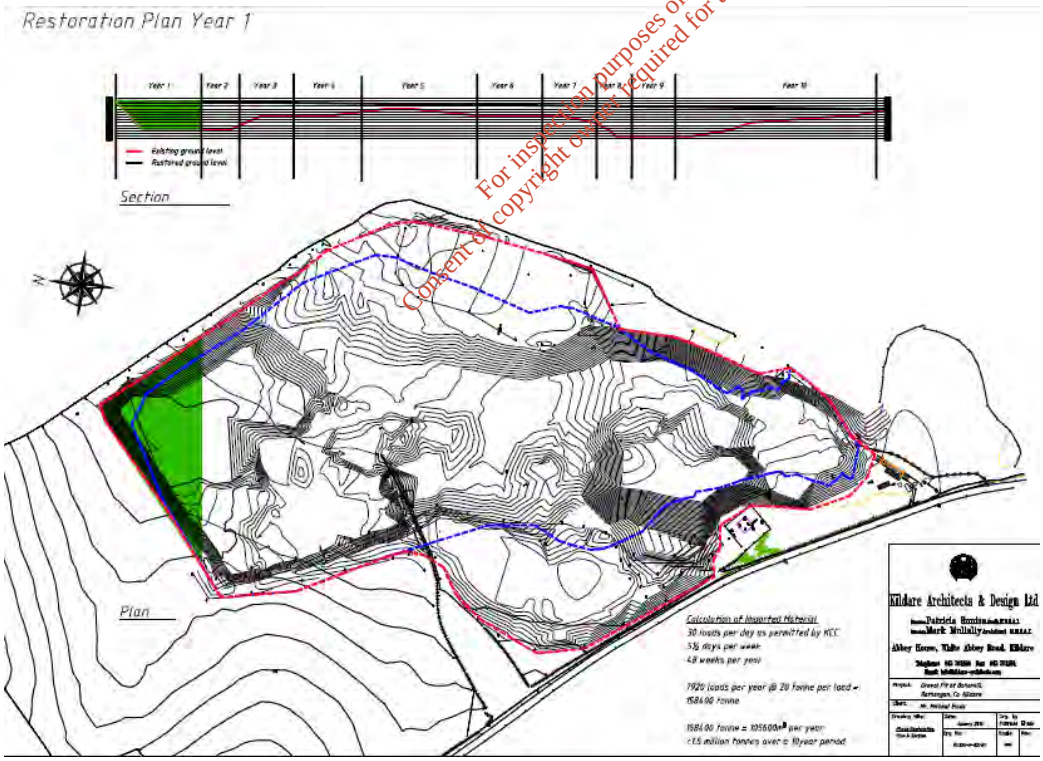
Traffic Impacts as per sections 1 – 10 preceding will potentially interact with other environmental elements to cumulatively create an impact greater than the sum of the combined parts. In the context of the proposed development these elements have been identified as human beings, flora and fauna, air quality, noise and material assets. Given the fact that the proposed development will result in less traffic than had been permitted for in respect of the original extractive development it is not considered that the impact of the traffic will impact cumulatively on the surrounding environment.

Section 10 Duration of the Restoration Works

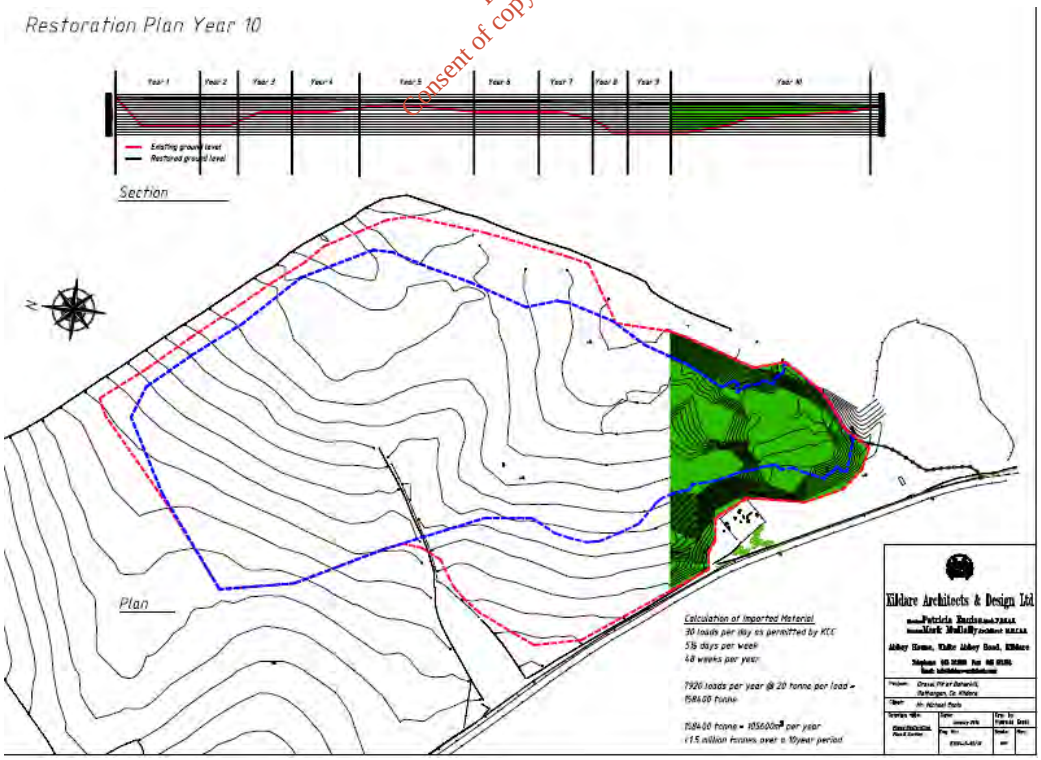
In Section 3.4 of the EIS it is proposed that the duration of restoration activities in the immediate vicinity of residences will be kept to a minimum. However no details are provided on how it is intended to minimise the restoration works. You are therefore requested to submit further information to clarify and address this matter.

The proposals in section 3.4 referred to the concept of the duration of the works at a particular point on the site being kept to a minimum as opposed to the actual restoration activities themselves being minimised.

In the appraisal of the proposal for the phasing of the works and the general west to east phased proposal, the point that was being made was that the proposed phasing would commence at a point closest to the most sensitive residential receptors and would progressively move further away over the course of the phased restoration thereby minimising the proximity of the potential impacts as time progressed.



If we look at the proposed phase for year 1 above and the greatest concentration of nearby residences it is obvious that by phase 10 below the development has been progressively moving further away from the bulk of the closest sensitive residences.



This was simply the point being made in section 3.4 of the original EIS.

Section 11 Wastewater Management

Section 6.4 of the EIS states that wastewater from a toilet on the site is discharged into an existing septic tank, and refers to a drawing in appendix A in relation to the location of same. However, there is no Appendix A for the EIS, the submitted plans do not identify an existing toilet or septic tank and elsewhere in the application, including Section 2.2.9 of the EIS, reference is made to the use of a portaloo system. Please submit further information to address, correct and clarify these discrepancies.

We wish to clarify that the existing wastewater treatment system operational on site during the extraction phase was simply a portaloo arrangement located as per attached drawing X.XX.XX attached. Reference to septic tanks etc and indeed Appendix A were typographical errors made in respect of the submitted EIS.

Section 12 Wastewater Management

Following consideration of the 10 year duration of the proposed development, the council's Environment Section have queried whether effluent disposal should be catered for by a wastewater treatment system. Please submit further information to address this issue. You are advised to liaise with Ciara Corrigan in the council's Environment Section prior to the submission of a formal response to this request.

On Tuesday 18th October 2016 Raphael Mc Evoy of RME Environmental, in response to the advice laid out in this section of the Further information request liaised with Ms Ciara Corrigan of the Environment Section of Kildare County Council by phone. The discussion centred around the proposals, consistent with many other developments of this nature, to have the wastewater diverted to a holding tank and have it removed to a licenced treatment facility for treatment. Ms Corrigan was in agreement with the proposal in principal.

It is proposed therefore to divert the wastewater to a holding tank with the dimensions:

1.2 m diameter and 2.3 metres deep

This gives a capacity of the holding tank of: $\prod r^2h$ = 3.14(0.6m X 0.6m)2.3m

= 2.60 m^3

In respect of the proposed volumes generated on the site The Irish Code of Practice (EPA, 2009) uses a daily hydraulic load of 150 Litres per capita per day in order to calculate the design load for on-site wastewater treatment systems. This figure is a house hold figure on a 24 hr basis. The Water Research Centre (WRc) UK conducted a large-scale survey to investigate water consumption trends in different parts of the UK (Liu et al., 2010), which noted that the 32% tap usage statistic was

broken down in comparison to international data as follows: 14% in the bathroom, 14% in the kitchen and 4% for irrigation, cleaning and other outdoor purposes.

Given that 14% of the total figure for water usage is for bathroom purposes it is concluded that 14% of 150 L per day would be that which is applicable to wastewater generation per capita for a 24 hour period on site. (14% of 150 L = 21 L per person per 24 hour period) Given the proposed opening hours of the site a maximum design figure of 12 hour per day is used therefore 10L per person per day. Given that there will be a maximum of 5 employees on site and 35 inbound loads per day allowing for a maximum of 3 litres per load driver per day that implies the following:

5 employees @ 10 L per 12 hour day = 50 Litres per day

35 inbound truck drivers at 2 litres per day (Max) = 70 Litres per day

Total wastewater volume generated per day = 125L per day.

Given that the holding capacity is 2600 Litres and allowing for a 5% freeboard the effective capacity of the holding tank will be 2470 L

2470 L capacity / 125 L per day = 20 days

Therefore the holding tank as proposed using maximum loading rates will require emptying every 20 working days which based on a 5.5 day working week is every 3.6 weeks.

It is proposed to enter into a disposal agreement with the following company or similarly approved for the collection and disposal of the wastewater from the site:

Michael Kelly t/a KDS, Rahan, Edenderry, Co. Offaly reg. No. NWCPO/11/10646/02

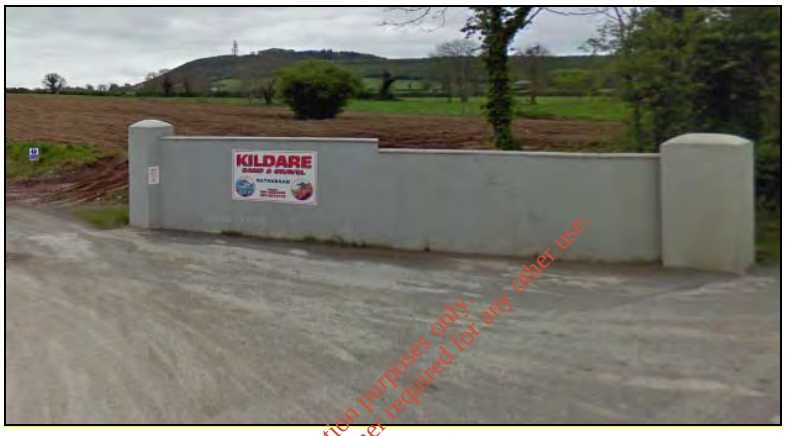
And Mr Kelly has intimated that the material will be brought to Osberstown Treatment Plant.

PROPOSED RESTORATION & INFILLING OF SAND AND GRAVEL PIT,

BOHERKILL, RATHANGAN, CO. KILDARE

PLANNING REFERENCE 16/526

HYDROGEOLOGICAL ASSESSMENT



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PROPOSED RESTORATION & INFILLING OF SAND AND GRAVEL PIT,

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Appendix A	*Drawing No. IE1105-002-B*
	Drawing No. IE1105-006-B
	Drawing No. IE1105-007-A
Appendix B	*GSI Mapping*
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Appendix E	*Safety Data Sheet – Flocculating Agent*

1 Introduction

IE Consulting was engaged by Kildare Architects and Design Ltd., to respond to Item 6 and 7 of a Request for Further Information (RFI) for a planning application for the proposed infilling and restoration of a sand and gravel pit at Boherkill, Rathangan, Co Kildare (Pl. Ref. No. 16/526). It is proposed to infill the pit using inert Construction and Demolition (C&D) waste, mainly soil and stone.

The proposal to restore the quarry in this fashion is technically classified as recovery of waste through deposition on land. The large volume of imported inert soil and stone required to complete this task will require a Waste Licence Application to be submitted to the Environmental Protection Agency, together with a supporting Environmental impact Statement.

Item 6 and 7 of the RFI issued by the Council on 15/7/2016 stated:

Item 6

"The applicant is requested to submit a detailed Hydrogeological Report, prepared by a suitably qualified Hydrologist who is registered with a relevant professional body. The report shall set out details recommendations on the proposed restoration of the site, including:

a) Groundwater flow direction(s);

(b) Water table levels;

(c) Impacts on local wells;

(d) Impacts on public groundwater supply i.e. Monasterevin/Rathangan Well Field;

(e) Impacts on watercourses in the area; and;

(f) How open ponds on the site will be reinstated.

Point 7

Section 12.2.6 of the EIS details that it is not likely that many of the local houses in the vicinity of the application site source drinking water from the local aquifer as they are predominantly on a mains supply. However no figures or other survey data has been provided to substantiate this contention. You are therefore requested to submit accurate survey data of well water and public mains water supplies in the area.

2 Scope of Works

IE Consulting was engaged to undertake the following works to respond to the above Items 6 and 7:

- Review of report *"Aggregate Resource Assessment – Boherkill Quarry, Rathangan, Co. Kildare"* prepared by John Barnett & Associates in January 2002;
- Well survey within 1.5 km radius of the quarry;
- Preparation of groundwater contour map based on groundwater levels obtained during the well survey;
- Measurement of groundwater level in existing well within the quarry site;
- Overseeing of drilling of 3 No. monitoring wells - 1 No. upgradient and 2 No. downgradient of the quarry. (However, as described in *Section 8.1* below, drilling conditions proved difficult and it was not possible to install monitoring boreholes at the site);
- Preparation of a hydrogeological report using the above information.

The information obtained during the above works was used in conjunction with the information already presented in the original EIS to prepare this hydrogeological assessment. The primary objective of this hydrogeological assessment is to assess the impact posed to surface water and groundwater by the on-going extraction at the quarry pit and the proposed waste recovery of inert material and by the infilling and restoration of the existing quarry void using inert waste. Where appropriate, mitigation measures are recommended.

3 Site Location & Land Use

The Kildare Sand & Gravel pit is located at Boherkill on the R4011 Kildare/Rathangan road c. 3 km southwest of Rathangan (*Drawing No. IE1105-007-A, Appendix A*).

The site is surrounded by lands which are primarily used for agricultural activities. According to the EPA Corine Land use Map 2012, land use in the area has been classified as 'Pastures and non-irrigated land`.

There are a number of residences in the vicinity of the site located along the public roads; as one-off rural dwellings and also associated with farm holdings. The closest residential property is located along the public road immediately northwest of the pit.

4 Proposed Development

4.1 Overview

Operations at the facility involve the extraction of sand and gravel for supply to the construction market. It is proposed to continue extraction of sand and gravel. The extraction scenario is that there are sufficient reserves to allow approximately two years workings of about 100 tonnes per day (approximately five loads) from the site. The excavated area is currently 7.8 hectares. It is proposed that the worked out sand and gravel pit will be restored on a phased basis, from north to south over 10 years, using imported inert construction and demolition (C&D) waste, mainly soil and stone. The proposed restoration area extends to 10.7 hectares.

4.2 Extraction Process & Site Infrastructure

Currently the process at the pit involves the extraction of material from the western boundary of the facility. The material is then transported to the screeners, south of the facility, close to the entrance gate. All materials washed and segregated are stored within and around the processing area (See *Drawing No. IE1105-002-B, Appendix A*).

Coagulants used in the washing process are supplied by Abbeywater. The product name is Polygold Anionic/Non-Ionic Powders. It is used as a flocculating agent. According to the Safety Data Sheet supplied by Abbeywater (*Appendix E*) the product is not classified as hazardous to health or the environment in accordance with the classification according to EC Regulation (EC) NO. 1272/2008 (classification, labelling and packaging of substances and mixtures).

Washwater from the processing area is discharged to an on-site settlement lagoon. The water in the lagoon is discharges to ground. The lagoon is cleaned periodically and the settled silt is used as part of the site restoration. This lagoon required dredging at the time of a site visit by IE Consulting on 18th November 2015.

The site infrastructure includes a disused office, a toilet, a wheel wash, and a 2,000L bunded fuel tank. It is understood wastewater from the toilet is currently discharged to a holding tank which is emptied periodically by a licenced waste contractor. The washwater from the wheel wash facility percolates to ground.

4.3 Site Water Management

The layout of the site water management components are presented in *Drawing IE1105-002-B, Appendix A*.

Water used on the site is sourced from an on-site well (referred to in this report as Well 5). It is utilised as process water for washing of the excavated material, for dust suppression on the site and for the wheel wash.

The screener used on-site includes, a process water treatment plant which treats all silt laden water from the screening process. The use of coagulants and settlement tanks ensure that clean recycled water is put back into the process so as to maximise efficiencies and reduce the water demand of the site. Processed waters, that are not recycled, are pumped to a settlement pond located in the eastern area of the site. Following silt settlement the clean water percolates to ground. The use of both the process water treatment plant and settlement pond ensures mitigation measures are taken to protect ground and surface waters. Currently the settlement pond is undredged and water pumped to it flows over the top of the accumulated silt and flows by gravity to the natural sump in the northern area of the site. This sump allows the silt to collect and settle. The water then percolates to ground.

All wheel washwater either evaporates from the surface or percolates to ground.

Foul water from the on-site toilet facilities is stored in a holding tank and collected periodically by a licenced waste contractor.

5 Topography

The site is located on lands sloping northwestwards towards Rathangan. To land rises to the south, southeast, and east towards Red Hill, Dunmurry Hill and Grange Hill respectively. The nearest topographical high is Dunmurry Hill located approximately 1.5 km to the southeast at an elevation of 233 mAOD. Red Hill is located approximately 2.6 km to the south at an elevation of 197 mAOD and Grange Hill is located c. 2.5 km to the east at an elevation of 223 mOD (see *Drawing IE1105-007-A, Appendix A*).

The site itself is set on land slightly elevated above Rathangan and the flat lands to the west. Rathangan is positioned at an elevation of c. 70 mOD. The original ground level of the pit (before extraction) would have been at an elevation of between 100 and 120 mOD. The elevation of the proposed restoration area currently ranges from 122.5 mOD along the eastern boundary to 86.0 m OD at the lowest point of the pit in the south central area.

6 Hydrology

In a regional context, the site is situated in the South Eastern River Basin District (SERBD) within the Barrow River catchment. The main surface water feature in the vicinity of the site is the River Slate, located approximately 3 km north of the site where it flows in a westerly direction discharging into the Figile River at a location approximately 9 km west of the site.

Aside from the River Slate there is one small unnamed stream approximately 2.3 km to the west of the site, which flows northwards discharging to the River Slate. There are no mapped surface water features or drainage channels with the site itself or in the vicinity. Generally there is marked absence of drainage features in the area.

For the purposes of the Water Framework Directive (WFD) the River Slate was categorised as being at 'moderate' status upstream of Rathangan and at "good" status downstream of Rathangan (2010-2012 assessment).

7 Effective Rainfall & Recharge

The GSI's National Recharge Map indicates effective rainfall for the site and surrounding area is 491 mm/yr.

The sand and gravel deposits will have a high recharge acceptance capacity due to the high permeability of the deposits and the significant depth of unsaturated zone (see *Section 9.4* below). Where high permeability sand and gravel subsoils exist, the majority (80-90%) of effective rainfall is expected to recharge the permeable subsoils. Therefore the majority effective precipitation falling within the quarry area is expected to recharge into the ground. During extreme storm events some ponding may occur but it is expected to be lost by combined seepage to ground and from open water evaporation.

The underlying bedrock aquifer is classified as a locally important (Ll) aquifer, and there will be an upper limit to the amount of recharge it can accept. The GSI advise that a recharge cap of 200 mm/year be applied to locally important aquifers.

8 Geological Setting

8.1 Soils and Subsoils

Teagasc mapping indicates soils at the site and surrounding area are shallow well drained soils derived from calcareous parent material (BminSW). However, the majority of these soils within the pit have now been stripped away as part of the extraction process. The dominant soil type in the area surrounding the pit is deep well drained soils derived from calcareous parent material (BminDW).

Soils are mapped as being absent in the on Red Hill, Dunmurry Hill and Grange Hill hills to the south, southeast and east of the site.

8.2 Subsoils

Teagasc subsoil mapping indicates the subsoils at the site comprise **Limestone Sands and Gravels** (**GLs**) (*Figure 2, Appendix B*). The majority of this subsoil cover has been excavated at the site to date. Outside the area of mapped sands and gravels, the dominant subsoil type in the area between the site and Rathangan is till derived chiefly from limestone (TLs). Subsoils are absent on the hills to the south,

southeast and east where bedrock is at or close to surface (Rck). A strip of alluvium (A) is mapped c. 440 m to the south east of the site.

Five shell and auger percussion boreholes (BH2, BH2A, BH3, BH4 and BHX) were previously drilled on the site during 2001 as part of an aggregate resource investigation (JBA, 2002). The boreholes were drilled to total depths ranging from 11.5 m to 19.7 m. The locations of the boreholes are shown in *shown in Appendix C.* The deposits encountered comprised an average of 4 m of generally sandy, gravelly CLAY followed by an average of 12 m of SAND/GRAVEL (see borehole logs included in *Appendix D*). A sixth borehole was drilled by reverse circulation to a total depth of 32 m. The deposits encountered in this borehole comprised mainly SAND/GRAVEL and bedrock was not encountered (the borehole log is also included in *Appendix D*).

There is an existing well on the site (referred to in this report as Well 5). However, no borehole log or drilling records were available for this.

As part of this hydrogeological assessment it was proposed to install 3 No. monitoring boreholes in the sand and gravels beneath the site. The purpose of the monitoring boreholes was to obtain information on the subsoil deposits, in addition to information on depth to bedrock, groundwater levels and to facilitate groundwater sampling. The proposed borehole locations are shown in *Drawing No. IE1105-006-B (Appendix A).* Drilling of BH1 commenced on 17/10/2016 with an ODEX drilling system. However, drilling conditions proved difficult and despite attempts at two locations (BH1A and BH1B) drilling could not progress beyond 23.5 m and temporary steel casing could not be retrieved to facilitate installation of a pvc screen and casing.

The following information on subsoils was obtained during drilling of BH1A and BH1B:

BH1A

0-3 m Gravelly CLAY

3.0 – 4.0 m Silty GRAVELS

4.5 - 5.2 m Gravelly SAND

5.2 - 5.6 m BOULDER

5.6 - 7.0 m Sandy GRAVEL

7.0 - 9.0 m BOULDERS

9.0 - 11.2 Coarse GRAVELS

11.2 –14.0 m Slightly gravelly SAND

14.0 – 17 m Sandy coarse GRAVELS with silt

17.0 – 17.5 m SAND

17.5 – 20.0 m Slightly sandy GRAVELS

20.0 - 20.5 m BOULDER

20.5 - 21.5 Slightly sandy GRAVELS

BH1B

0-3.8 m Gravelly CLAY

3.8 – 6.0 m GRAVELS

6.0 – 12.0 m Sandy GRAVELS

12.0 – 12.5 m Slightly gravelly SAND

12.5 – 15.5 m Sandy/silty GRAVELS

15.5 – 17.5 – Very sandy GRAVEL

17.5 – 19.5 m Coarse GRAVELS

19.5 – 21.7 Sandy GRAVELS

21.7 – 22.0 m BOULDER ?

22.0 – 23.5 m Sandy GRAVELS (damp from 22.5 m)

BH1A was decommissioned and capped (although it was not possible to retrieve the steel casing). BH1B has been capped.

8.3 Bedrock Geology

Reference to the 1:100,000 scale map of the Geology of Kildare/Wicklow (Sheet 16) (Geological Survey of Ireland, 1994) indicates that the bedrock beneath the sand and gravel is **Carboniferous age Limestones** of the Boston Hill Formation. This limestone formation is described as mainly nodular and irregularly bedded, muddy limestone which is commonly dolomotised and has subordinate calcareous shale (*Figure 1, Appendix B*). No site specific information on bedrock was available.

8.4 Depth to Bedrock

None of the six boreholes drilled during the site investigations undertaken by JBA in 2002 encountered bedrock. The deepest borehole (BH5) was drilled to 32 m below ground level in the central area of the pit and did not encounter rock. The two unsuccessful boreholes drilled as part of this assessment (BH1A and BH1B) were advanced to depths of 21.5 m and 23.5 m respectively, but did not encounter bedrock.

9 Hydrogeological Setting

9.1 Aquifer Classification

Limestone Bedrock

The GSI classify the limestone bedrock underlying the site as a **Locally Important (Ll) aquifer** i.e. bedrock which is moderately productive only in local zones (see *Figure 3, Appendix B*). The limestone aquifer forms part of the Kildare Groundwater Body (a management unit for the purposes of the Water Framework Directive (WFD). The key characteristics of this GWB as identified by the GSI are follows:

- The aquifers in this GWB are considered to be local or poor aquifers. Nevertheless, the lithologies are limestone and therefore groundwater flow may be karstic to some degree and more so in local zones where purer limestones exist. This implies the groundwater flow may be fast if concentrated in conduits along openings in the rock e.g. fractures and faults.
- In general it is likely groundwater flow will be through a poorly developed karstic system over most of the area. The extent of the karstic development will depend partly on the nature and thickness of the overlying strata.
- No information is available on the hydrogeological properties of this groundwater body. Estimated transmissivities can be considered to range 1 – 10 m^2/day.
- The majority of groundwater flow in this area is considered to take place in the upper weathered zone of the aquifer.
- Effective thickness is not expected to be large but may be around 25 m in some areas.
- Recharge can enter this groundwater body from areas exposed to the surface where subsoil is thin and also from surrounding groundwater bodies.
- The interaction between surface water and groundwater will differ throughout the area depending largely on the overlying strata type. In areas of outcrop the surface water and groundwater will be very closely linked at streams etc. Where there are areas of till covering the bedrock the interactions may be more subdued depending on the thickness of the over burden. In areas where there are deposits of peat this may completely seal off the surface water from the groundwater. Where the gravel aquifers occur there will be little or no interaction between the bedrock groundwater and the surface water bodies.
- Discharge from this groundwater body will be to the associated surface water bodies and also, in local zones, to adjacent groundwater bodies.
- Where the gravel aquifers occur there will be little or no interaction between the bedrock groundwater and the surface water bodies.

<u>Sand & Gravel Deposits</u>

While the sand and gravels deposits beneath, and surrounding, the site are substantial, they are not sufficiently extensive or of sufficient saturated thickness to be classified as an aquifer by the GSI. However, the sands and gravels will allow a high level of recharge and provide additional storage to the underlying bedrock aquifer. Reports from private well owners surveyed as part this assessment (see *Section 9.3* below) suggest that some of the wells in the area either wholly, or partially, abstract from the sand and gravel deposits. Additionally, it is reported that the site well (Well 5) was drilled into the sands/gravels only and not bedrock. Therefore, there is some evidence that the sands and gravel in the vicinity of the site area can support, or partially support small, local supplies. However, no borehole logs

or drilling records for any of the nearby private wells or the site well (Well 5) were available to confirm this.

Based on information for the sand and gravel deposits for the nearby Rathangan GWB, the sand and gravels are expected to have a moderately high storage and transmissivity. The deposits will have intergranular porosity and groundwater flow will be diffuse. The velocity may be in the region of 1 m/d. The original depth of the sand and gravel deposits at the site was extensive (> 32 m from JBA site investigation data). The groundwater level in the on-site well (well 5) is 14.16 m below ground suggesting the depth of the saturated sand/gravels beneath the site is c. 15 m. The mapped extent of the sands and gravels in the vicinity of the site is limited however (as shown in *Figure 2, Appendix B)* and GSI mapping indicates the sands and gravels give way to till subsoils c. 550 m north of the site. It is assumed the till has low permeability with limited capacity to transmit groundwater which is likely to mean the sands and gravels beneath the site are not in direct hydraulic connection with the downgradient River Slate. If the sands and gravels beneath the site recharge the underlying limestone bedrock aquifer then there is unlikely to be hydraulic connection between the groundwater beneath the site and the River Slate. However, where high permeability zones exist within the till to the north of the site, there may be potential for migration of contaminants within permeable subsoils depending on depth to water table, saturated thickness etc. and therefore potential for a hydraulic connection between the groundwater in the sands and gravels beneath the site and the River Slate

9.2 Karst Features

Reference to the Geological Survey of Ireland karst database indicates that there are no karst landforms located within the vicinity of the site. No karst features have been mapped within the site perimeter. Nevertheless the bedrock underlying the site is limestone and therefore groundwater flow may be karstic to some degree and more so in local zones where purer limestones exist.

9.3 Groundwater Abstractions & Well Survey

GSI Well Database

The Geological Survey of Ireland (GSI) well database was consulted and records of wells within a 1.5 km radius of the site are shown in *Table 1* below. The GSI's database indicates the Monasterevin/Rathangan public water supply well field is located approximately 2.6 km to the west/northwest of the site. No information was available on whether these wells abstract from any permeable sand and gravels present or the underlying limestone bedrock or both. Source protection areas were delineated by KT Cullen & Company for the Monasterevin/Rathangan well field. The sand and gravel pit is not within the Zone of Contribution (ZOC) to the well field. The eastern boundary of the ZOC is located c. 1.3 km to the east of it.

Well Survey 7th September 2016

A survey of accessible wells within a 1.5 km radius of the site was carried out by IE Consulting on 7th September 2016, the results of which are shown in *Table 2* below. The locations of the well surveyed are shown in *Drawing No. IE1105-006-B, Appendix A.* The well survey identified two private wells to the northwest and directly downgradient of the site. Well 1 and Well 7 are located approximately 770 m and 780 m respectively from the northern boundary of the site.

Map Location Ref	GSI Reference	Easting Northing	Location Accuracy	Location Relative to Study Area	Well Type	Drill Date	Owner	Depth (m)	Depth to Rock (m)	Well Use	Yield (m^3/d)	Abstraction (m^3/d)
1	2621SWW224	270320 218830	to 50m	1.37 km NE	Dug well	-	-	15.3	-	Agri & domestic use	-	-
2	2621SWW106	270260 219090	to 1km	1.61 km NE	Borehole	20/12/1978	-	42.7	24.4	-	21.8 Poor	-
3	2621SWW220	269080 218540	to 50m	1.33 km NW	Dug well	-	-	25.2	-	Unknown	-	-
4	2621SWW109	268740 217500	to 2km	1.18 km W	Dug well	06/11/1970	-	11.6	-	-	28 Poor	-
5	2621SWW221	269060 217400	to 50m	0.87 km W	Spring	-	-	2.4	-	Domestic use only	-	-
6	2621SWW260	268710 216940	to 50m	1.34 km SW	Dug well	-	-	11	-	Unknown	-	-
7	2621SWW212	269690 216740	to 100m	0.80 km SW	Borehole	18/08/1998	Original Name: 35 Owner Name: KILDARE COUNTY COUNCIL	24	-	Other	-	-
8	2621SWW210	269270 215500	to 2km	2.11 km SW	Unknown	-	Original Name: ILC WELL NO 1509	30.5	-	Unknown	39.6 Poor	-
9	2621SWW170	270020 215740	to 2km	1.77 km S	Borehole	01/01/1971	KILDARE COUNTY COUNCIL	18.3	-	Unknown	-	-
10	2621SWW204	269950 216760	to 20m	0.75 km S	Borehole	19/06/1998	Original Name: 27 OR 27A Owner Name: KILDARE COUNTY COUNCIL	14.7	-	Other	-	-
11	2621SWW227	269910 217240	to 50m	0.27 km S	Dug well	-	-	21.3	-	Agri & domestic use	-	-
12	2621SWW229	269980 217080	to 50m	0.43 km S	Dug well	-	Kildare Co. Co. Decommissioned	23.7	-	Public supply (Co Co)	-	-

Map Location Ref	GSI Reference	Easting Northing	Location Accuracy	Location Relative to Study Area	Well Type	Drill Date	Owner	Depth (m)	Depth to Rock (m)	Well Use	Yield (m^3/d)	Abstraction (m^3/d)
13	2621SWW273	270000 216970	to 50m	0.54 km S	Dug well	-	Kildare Co. Co. Decommissioned	24.1	-	Public supply (Co Co)	-	-
14	2621SWW274	270260 216860	to 50m	0.73 km SE	Dug well	-	-	36.6	-	Unknown	-	-
15	2621SWW275	270560 216780	to 50m	0.96 km SE	Spring	-	-	-	-	Unknown	-	-
16	2621SWW228	271150 217360	to 50m	1.23 km E	Borehole	-	-	16.5	-	Agri & domestic use	-	-
17	2621SWW226	270720 217780	to 50m	0.83 km NE	Borehole	-	-	23.4	-	Agri & domestic use	-	-
18	2621SWW103	270490 217440	to 2km	0.56 km E	Borehole	03/03/1969	Original Name: WTB/KLD	16.5	-	-	27.28 Poor	-

Table 1. GSI Database records within 1.5 km radius of Site

Well ID	Well Owner	ITM Coordinates		Well Type	Total depth (m)	Water Level (m below ground)	Reduced Water Level (m OD)	Usage	Construction Details	Reported Yield m^3/day
Well 1	Sammy Houlihan	669157	718361	Hand dug stone lined well	Not known	12.430	79.790	Disused	Stone lined	-
Well 2	Patricia Ennis	669861	717232	Hand dug stone lined well	Not known	20.330	84.316	Disused	Stone lined	-
Well 3	Paul Ennis	670223	716884	Borehole	Not known	Well not accessible for water level measurements		Farm & domestic	160 mm dia steel casing. No further info.	Use c. 25
Well 4	Robert Pearson	669957	717007	Hand dug stone lined well	?	22.270	83.234	Disused	Stone lined	-
Well 5	Kildare Sand & Gravel	669864	717446	Borehole	Reported by site personnel to be abstracting from sands/gravels only Measured at 27 m	14.595	84.156	Quarry process water but not currently in use	190 mm dia steel casing with 100 mm dia plastic casing. Top plastic casing is 588 mm below top steel casing	-
Well 6	Desmond Lawlor & Niamh Finlay	669018	717449	Borehole	80 ft (reported by owner)	5.000	80.463	Domestic (serves 2 houses - father & daughter)	160 mm dia steel casing to 15-20 ft. Gravel down to < 15 ft. (according to well owner).	-
Well 7	Lar Murphy	669034	718137	Borehole	21.5 ? (measured on site)	3.890	80.062	Only used for cattle at the moment - plan to connected to house soon	160 mm dia steel casing. Driled into gravel - steel casing all the way to bottom? (slotted steel??)	655 (6,0000 gph)

Well ID	Well Owner	ITM Coordinates		Well Type	Total depth (m)	Water Level (m below ground)	Reduced Water Level (m OD)	Usage	Construction Details	Reported Yield m^3/day
Well 8	Paddy & Dermot O' Loughlin	670240	718751	Borehole	-	Well not accessible for water level measurements	-	Domestic (serves 2 houses - brothers)	160 mm dia steel casing. No further info.	-
Well 9	Colm Ruffley	670648	718645	Borehole	56.4	23.650	84.753	Domestic & landmower centre	160 mm dia steel casing	-

Table 2. Well Survey Details

9.4 Groundwater Levels and Flow Direction

Groundwater levels were obtained from accessible wells within the area identified as part of the well survey on 7th September 2016. The levels were levelled in to Ordnance Datum (see reduced levels in *Table 1* above). The water level data obtained during the well survey was used to prepare a groundwater contour map for the area (*see Drawing No. IE1105-006-B, Appendix A*. The data indicates flow direction is to the northwest towards Rathangan which is what would be expected given the topography and position of surface water features in the area.

Additionally, a water level measurement was obtained from the existing well (Well 5) at the pit. The water level is relatively deep at 14.595 m below ground level (equivalent to 84.156 mOD). It is reported that this well is installed in the sands and gravels only, so this measurement is thought to represent water levels in the sands and gravels. The measurement indicates the water table in c. 2m below the lowest point of the pit (at 860.29 mOD in the western central area of the pit). The measurement from the pit well was taken during September when groundwater levels tend to be at their lowest. Groundwater levels in Irish aquifers tend to fluctuate by about 5-10m annually, but this tends to be lower in high transmissivity sand and gravel deposits. A review of water levels in gravel monitoring boreholes in the South Eastern River Basin District (SERBD) by the EPA indicated annual fluctuations of <2.1 m (EPA, 2011). Assuming an annual fluctuation of about 2 m, the base of the pit appears to be at, or close, to the seasonally high winter water table. It is understood that water has been observed in the lowest points of the pit at times during past winter periods. This may be groundwater or ponding of surface water after rainfall events. However, no site specific winter groundwater levels are available to confirm this or not.

As indicated previously it was proposed to install 3 No. monitoring boreholes in the sand and gravels beneath the site as part of this hydrogeological assessment. One of the objectives of drilling was to obtain information on groundwater levels. No groundwater was encountered in BH1A which was drilled to a depth of 21.5 m. BH1B was drilled to a total depth of 23.5 m and subsoils were observed to be damp from c. 22.5 m. Immediately after drilling on 19/9/16 water rose in the borehole to 19.29 m below ground level. However, when the borehole was subsequently dipped again on 20/10/16 the well was dry. The groundwater in the well initially is thought to represent perched conditions that drained after drilling.

9.5 Groundwater Vulnerability

Groundwater vulnerability is a term used to represent the intrinsic geological and hydrogeological characteristics that determine the ease with which groundwater may be contaminated by human activities. Where the subsoil thickness is <3 m, the vulnerability is rated as Extreme (the highest risk situation). Where the subsoil thickness is >3 m, the vulnerability is rated as High, Moderate or Low (depending on the nature and thickness of the subsoil).

Water level data from the pit well (Well 5) indicates the water table is c. 2m below the base of the pit. Based on the GSI vulnerability mapping methodology for sand and gravel aquifers this corresponds to **Extreme** vulnerability as the unsaturated zone is less than 3 m deep.

9.6 Groundwater Quality

No site specific information on groundwater quality beneath or in the vicinity of the site was available. Under the Water Framework Directive (Directive 2000/60/EC) the Kildare Groundwater Body is classified as "Good" status. It is proposed to install boreholes at the site to monitor groundwater quality upgradient and downgradient of the site during the restoration works and a short aftercare period.

9.7 Groundwater Protection

The DoELG / EPA / GSI have developed a scheme (Groundwater Protection Response Matrix for Landfills) to assessing potential landfill sites on the basis of groundwater vulnerability and aquifer status. However, it should be noted that this scheme has largely been developed for new non-hazardous landfills (i.e. receiving a 'traditional' waste stream of municipal solid wastes, and commercial and industrial wastes). It is therefore not a directly applicable tool for assessment of inert soil recovery facilities such as proposed at Boherkill.

Notwithstanding this, a review of aquifer classification and the interpreted vulnerability in accordance with the DoELG / EPA / GSI methodology indicates that the Boherkill site is located within an area of High to Extreme vulnerability and a Locally Important Bedrock Aquifer. However, it is reported that the sand and gravel deposits support some small local groundwater supplies in the area. Therefore, to be conservative the sand and gravel deposits have been assessed on a similar basis to a Locally Important Sand/Gravel aquifer (Lg).

Based on an Extreme vulnerability classification and a Locally Important Sand/Gravel aquifer the matrix for non-hazardous landfills indicates that the site setting falls within a response category of $R3^2$, which is described as being 'not generally acceptable (for non-hazardous landfill) unless it can be shown that:

- The groundwater in the aquifer is confined;
- There will no significant impact on the groundwater;
- It is not practicable to find a site in a lower risk area'.

The proposed backfilling of the existing quarry with inert C & D including predominantly cohesive inert glacial till can provide an enhanced degree of protection, over and above that which exists at present. Given the limited risk to groundwater associated with the placement and compaction of inert soil compared to those presented by non-hazardous landfills, it is considered that the site setting is appropriate for an inert soil recovery facility.

The GSI response matrix for non-hazardous landfills also covers responses for proposed developments source protection areas (SPA's) to groundwater supplies. However, the pit is located outside the delineated zone of contribution to the Monasterevin /Rathangan well field and therefore this was not assessed.

10 Impact Assessment

10.1 Methodology

The IGI's and EPA's recommended methodology for assessing impacts was used. Each potential impact was described in terms of its Quality, Significance, Duration and Type. In addition the criteria for rating significance used (a combination of magnitude of impact and site importance) was that as outlined in *'Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.'* National Roads Authority, 2008.

The qualitative impact assessment presented in *Tables 3.4.5-8* below is based on the hydrogeological and hydrological information collected to date in relation to the site, and described in previous sections of this report.

The continued operation of the quarry site and the proposed recovery facility has the potential to impact on groundwater in terms of both the groundwater quality and the groundwater flow regime and these are evaluated below.

10.2 Potential Impacts On Groundwater Quality

- **Hydrocarbon Leakage/Spillage** - possible contamination of groundwater, by leakage or spillage of fuels and lubricants from machinery and associated equipment, may occur during excavation and restoration works. Any accidental hydrocarbon spillage would have a *negative short-medium term moderate impact* on groundwater quality beneath and downgradient of the site. Any leakage/spillage also has the potential to impact on groundwater quality in groundwater abstractions downgradient of the site (i.e. Well 7 and Well 8). Any accidental hydrocarbon spillage would have a *negative short-medium term moderate impact* on groundwater quality in these wells. The site is not located within the delineated ZOC for the Monasterevin/Rathangan well field. Therefore, there is no potential for impact on the public supply wells.

- **Soil/Subsoil Excavation** - any removal of soils will temporarily increase the groundwater vulnerability during excavation works and prior to restoration. This would have a *negative short-term moderate impact* on the groundwater quality.

- **Rogue Loads of Contaminated Material**– where adequate controls and checks on the material accepted at the site aren't in place there is potential for rogue loads of contaminated material to be infilled. This is assessed to be a *negative short-term moderate impact* on groundwater quality and downgradient wells.

- **Foul Water Leakage/Spillage –** any leakages or spillages from with the on-site holding tank for foul water would have a *negative short-term moderate impact* on groundwater quality. Any leakages or spillages from with the on-site holding tank for foul water would have a *negative short-term moderate impact* on groundwater quality beneath the site and in downgradient wells.

- **Chemical Composition of Imported of Soil/Subsoils** - the importation of soils and material can influence the chemical composition of underlying groundwater. This is primarily through potential changes to the pH - e.g. by importing base-rich mineral soil to a primarily acidic catchment. Any alteration of the chemical composition as a result of improper placement of soil would result in a direct *negative short-term moderate impact* on the underlying groundwater quality and downgradient wells. This is unlikely to occur however as imported material will be from the Kildare hinterland and is likely to be similar in composition to the existing soil.

10.3 Potential Impacts on Groundwater Flow

- **Low permeability Inert Material** - infilling areas of former high permeability material with low permeability inert fill material could create a low permeability zone altering groundwater recharge. Possible groundwater mounding/flooding could occur if the fill acts as a barrier to normal groundwater flow patterns. However, this is thought unlikely as the groundwater table appears deep in the vicinity of the site. While not confirmed, there is some evidence the winter water table may be slightly above the lowest point of the pit during seasonally high winter groundwater levels. In the event of any mounding, since the permeability of the surrounding subsoil is mapped as high it is anticipated that recharge will flow freely around the restored site and it is unlikely to cause significant mounding/flooding. In addition, the size of the filled area will be significantly less than the overall width of the aquifer in this location therefore the fill does not have the potential to entirely impede the normal groundwater flow patterns of the aquifer as groundwater flow will still be occurring around the site. Immediately downgradient of this potential flow diversion there is a possibility of lowering groundwater levels before the normal groundwater flow patterns converge again. Groundwater flow path diversion is expected to result in a *neutral permanent slight long-term impact* on the groundwater flow.

10.4 Potential Impacts on Surface Water

There are no other surface water features on the site or in the immediate surrounding area. There is potential for a hydraulic connection between groundwater in the sands and gravels beneath the site and the River Slate to the north of the site (as discussed in *Section 9.1*). Given the distance to the river (3 km) and the potential for attenuation and dilution of any contaminations, the potential impact on surface water quality in the River Slate from rogue contaminated infill material or any accidental spillage/leakages of fuels/hydrocarbons is assessed to be a *negative short-medium term low impact*.

11 Mitigation Measures

11.1 Overview

In order to reduce the impact of the existing site activities and proposed restoration works on groundwater and surface water receptors, the following are proposed details of measures/procedures to be implemented.

- Containment of site fuels and oils, to prevent any accidental spillages which may migrate to the subsoils and underlying groundwater;
- Wherever possible a traffic management system will be put in place to reduce the potential conflicts between vehicles, thereby reducing the risk of a collision;
- A site speed limit would be enforced to further reduce the likelihood and significance of collisions;
- Refuelling of vehicles would either be undertaken in a surfaced compound area from a fuel tank(s) that is bunded or be undertaken off-site to minimise the risk of uncontrolled release of polluting liquids/liquors;
- A double skinned mobile fuel bowser is used to refuel plant and machinery. Spill trays and spill kits will be provided at all times;
- Strict control measures to ensure only suitable material is allowed onto the site, i.e., thorough inspection of waste loads entering the site to confirm inert nature prior to deposition on-site;
- Only granular wastes will be deposited into areas immediately above the groundwater table to prevent the influx of suspended solids into groundwater;
- Maintenance of plant and machinery would be undertaken within a site compound area or offsite, as appropriate, to minimise the risk of uncontrolled release of polluting liquids;
- Regular integrity tests for the foul water holding tank on the site will be undertaken (at least every 5 years).

- The specific mitigation measures could be included in an Environmental Management Plan as part of the conditions for the site waste licence.

11.2 Permeability of Infill Material

Only suitably permeable and inert material will be used in the restoration, thereby reducing the potential to create a low permeability zone which could hinder local/ regional groundwater recharge and/or creating an impermeable barrier to groundwater recharge.

11.3 Settlement Lagoon

The settlement lagoon will be dredged to allow it to operate without overflowing to the natural sump at the northern boundary of the site. Regular dredging will maintain the functional operation of the lagoon during further excavation works.

At the commencement of restoration works the settlement lagoon will be dredged and the silt material will be stockpiled and used for final cover material. The lagoon will be allowed to drain naturally to groundwater and will be infilled with inert material.

11.4 Stockpiling Area

High absorbency mats, pig tails and drums are to be added/ maintained in the stock-piling areas of the site and in quarry vehicles to clean up any leaks from plant or machinery.

11.5 Machinery Maintenance and Repair

No servicing or maintenance of any plant or machinery takes place within the proposed restoration areas. All plant and machinery is driven or tracked to the hardstanding area associated with the site entrance and between the entrance and the wheel wash for service or maintenance works.

High absorbency mats are provided to contain any spills that may occur.

11.6 Storage of Fuel/Chemicals

A double skinned mobile fuel bowser is used to refuel plant and machinery on site. This is due to the fact that the bunded fuel storage tank has been subject to burglary.

Hydrocarbon spill kits and drip trays will be maintained on site. The operator has in place an Emergency Response Procedure for hydrocarbon spills and appropriate training of site staff in its implementation. All waste oils are collected and removed off-site by an approved licensed waste collection contractor in the area.

High absorbency mats are provided to contain any spills that may occur.

11.7 Restoration Area

All material to be used for the restoration will be thoroughly inspected to ensure only suitably permeable, inert material is deposited. Soil importation will be monitored by a competent site operative to monitor soil composition in order to avoid any impact on the underlying groundwater.

11.8 Monitoring of Groundwater Quality

It is proposed to install groundwater monitoring boreholes in the sand and gravel deposits at the site (see proposed locations in *Drawing No. IE1105-006-B (Appendix A*). It is proposed to monitor groundwater quality upgradient and downgradient for the duration of the restoration works and for a short aftercare period on a biannual basis as a minimum. The purpose is to monitor the impact, if any, of the restoration works on groundwater quality beneath the site.

12 Do-Nothing Scenario

The site is currently a large void. To do nothing with the existing site, the worked out quarry would remain a significant visual intrusion, and the range of future land-uses for the site would remain severely restricted. On-going vigilance would also be required to ensure no potential contaminating activities occur on or in the vicinity of the quarry floor.

The proposal involves the recovery of significant quantities of inert soil and stone through backfilling in the quarry void.

To do nothing with the existing site, if the application site is not restored completely to former ground level as proposed, and it remains essentially unchanged from its existing layout; it will have the following implications for soil and geology:

- Failure to recover soil and stone for beneficial use of land improvement, specifically reinstatement of a quarry, could result in unnecessary extraction of natural resources and exhaustion of landfill space;
- the reduced soil cover overlying the sand and gravel aquifer will result in a potential risk to groundwater quality;
- there is the potential for continued degradation of existing slopes, leading to possible slope failures;
- the site may be a target for unauthorised disposal / fly-tipping of waste by unscrupulous operators.

Given that a locally important aquifer underlies the site, and the important role soils and subsoil plays in the protection of aquifers, leaving the quarry void unrestored would cause the increased vulnerability of the aquifers caused by the quarry operations to remain.

13 Conclusions

Any potential and existing risks to groundwater, downgradient wells and surface water from the proposed restoration works will be minimised/ prevented through the adherence to the proposed mitigation measures detailed in *Section 11.*

The site is located outside the delineated ZOC to the Monasterevin/Rathangan well field and therefore no impact is predicted on the public supply wells.

Provided the appropriate mitigation measures are undertaken, it is considered that the proposed backfilling of the quarry void using inert C&D waste will have no significant impact on groundwater or surface water in the area.

Drilling of monitoring boreholes at the site during October 2016 with an ODEX drilling system proved unsuccessful due to difficult drilling conditions. It is planned to undertake further drilling works with a dual rotary system, or similar, at a future date. It is proposed to include the results of further drilling with an updated hydrogeological assessment to be submitted with the waste licence application to the EPA for the proposed development. It is proposed that these monitoring boreholes be used for groundwater quality monitoring purposes for the duration of the restoration works and for a short aftercare period.

14 References

Environmental Protection Agency, 2011. *A Review of Groundwater Levels in the South-East of Ireland.*

European Communities Environmental Objectives (Groundwater) Regulations 2014 (S.I. No.122 of 2014).

European Communities Environmental Objectives (Surface Water) Regulations 2009 (S.I. No. 272 of 2009).

European Communities (Drinking Water) (No. 2) Regulations 2007 (S.I. No. 278 of 2007)

Geological Survey of Ireland Online Mapping Service www.gsi.ie

Geological Survey of Ireland (1994) "*Geology of Kildare-Wicklow, 1:100,000 Series Map*". Sheet 16.

John Barnett & Associates (January 2002). *"Aggregate Resource Assessment – Boherkill Quarry, Rathangan, Co. Kildare"*

Working Group on Groundwater, March (2005) "WFD Pressures and Impacts Assessment Methodology– Guidance on the Assessment of the Impact of Groundwater Abstractions". Guidance Document No. GW5.

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APPENDIX A

Drawing No. IE1105-002-B

Drawing No. IE1105-006-B

Drawing No. IE1105-007-A

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IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

Project Title:	Hydrogeological Assessment
Project Address:	Boherkill, Rathangan, Co. Kildare
Client:	Kildare Architects & Design Ltd
Dwg. Title:	Site Layout

Dwg. Scale:	Date:	Dwg. No.:	Job No.:	Revision:	Dwg. By:
NTS	20/10/16	IE1105-002	IE1105	B	ÁMcE

LEGEND

- Site Outline
- Well/Borehole
- 84.00 mOD — Groundwater Level 7/9/16
- 84 mOD — Groundwater Level Contour
- Groundwater Flow Direction
- Proposed Monitoring Borehole Locations

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WATER-ENVIRONMENTAL-CIVIL

Project Title:	Hydrogeological Assessment
Project Address:	Boherkill Quarry, Rathangan, Co. Kildare
Client:	Kildare Architects & Design Ltd.
Dwg. Title:	Groundwater Contour Map 7/9/16

Dwg. Scale:	Date:	Dwg. No.:	Job No.:	Revision:	Dwg. By:
1:8,000 @ A3	20/10/2016	IE1105-006	IE1105	B	AW

Site Outline

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Project Title:	Hydrogeological Assessment
Project Address:	Boherkill, Rathangan, Co. Kildare
Client:	Kildare Architects & Design Ltd
Dwg. Title:	Site Location Map

Dwg. Scale:	Date:	Dwg. No.:	Job No.:	Revision:	Dwg. By:
1:40,000 @ A4	5/10/16	IE1105-007	IE1105/02	A	AW

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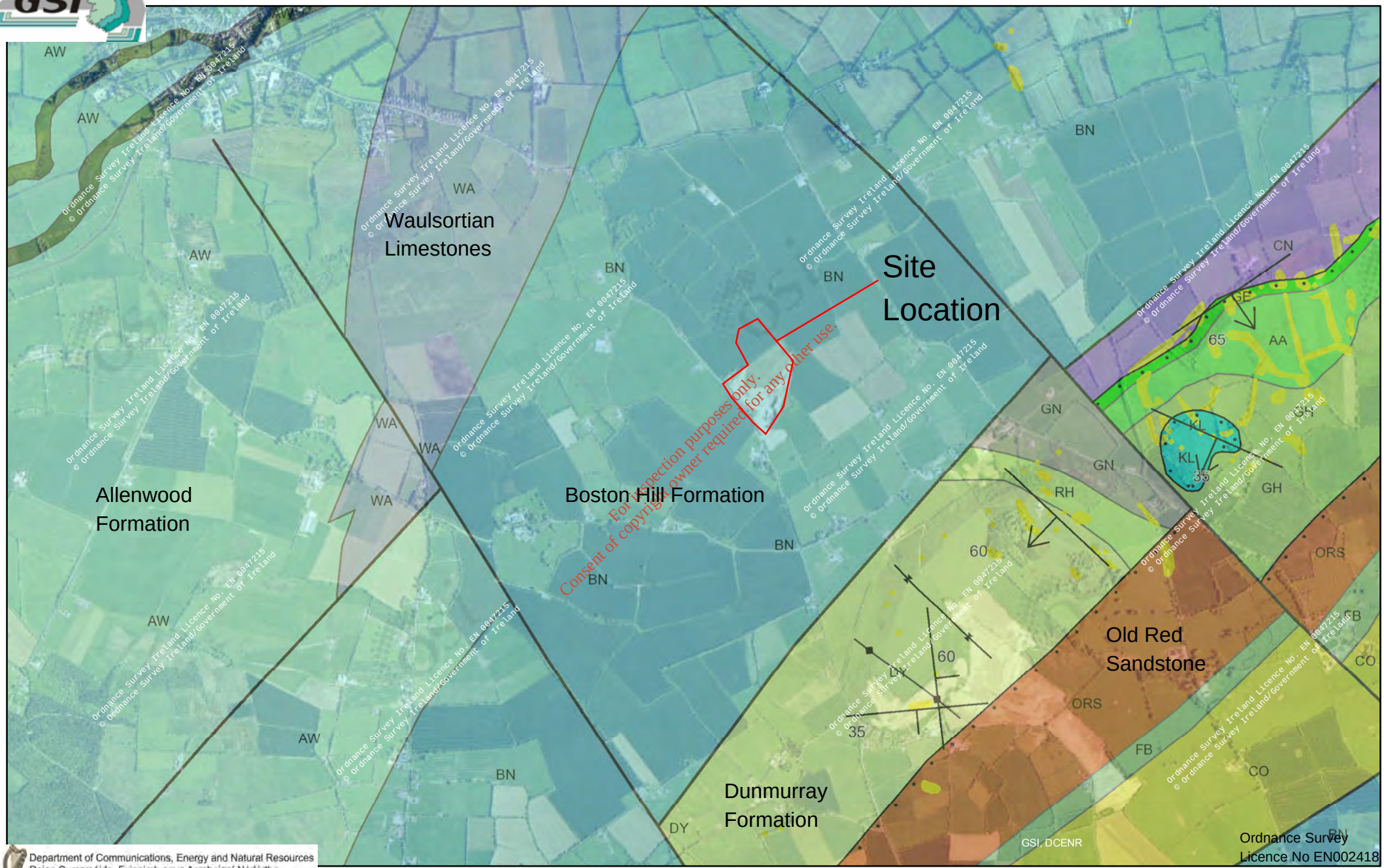
APPENDIX B

GSI Mapping

Figure 1 - Bedrock Geology Map 100k



Department of Communications, Energy and Natural Resources
Roinn Cumarsáide, Fuinnimh agus Acmhainní Nádúrtha

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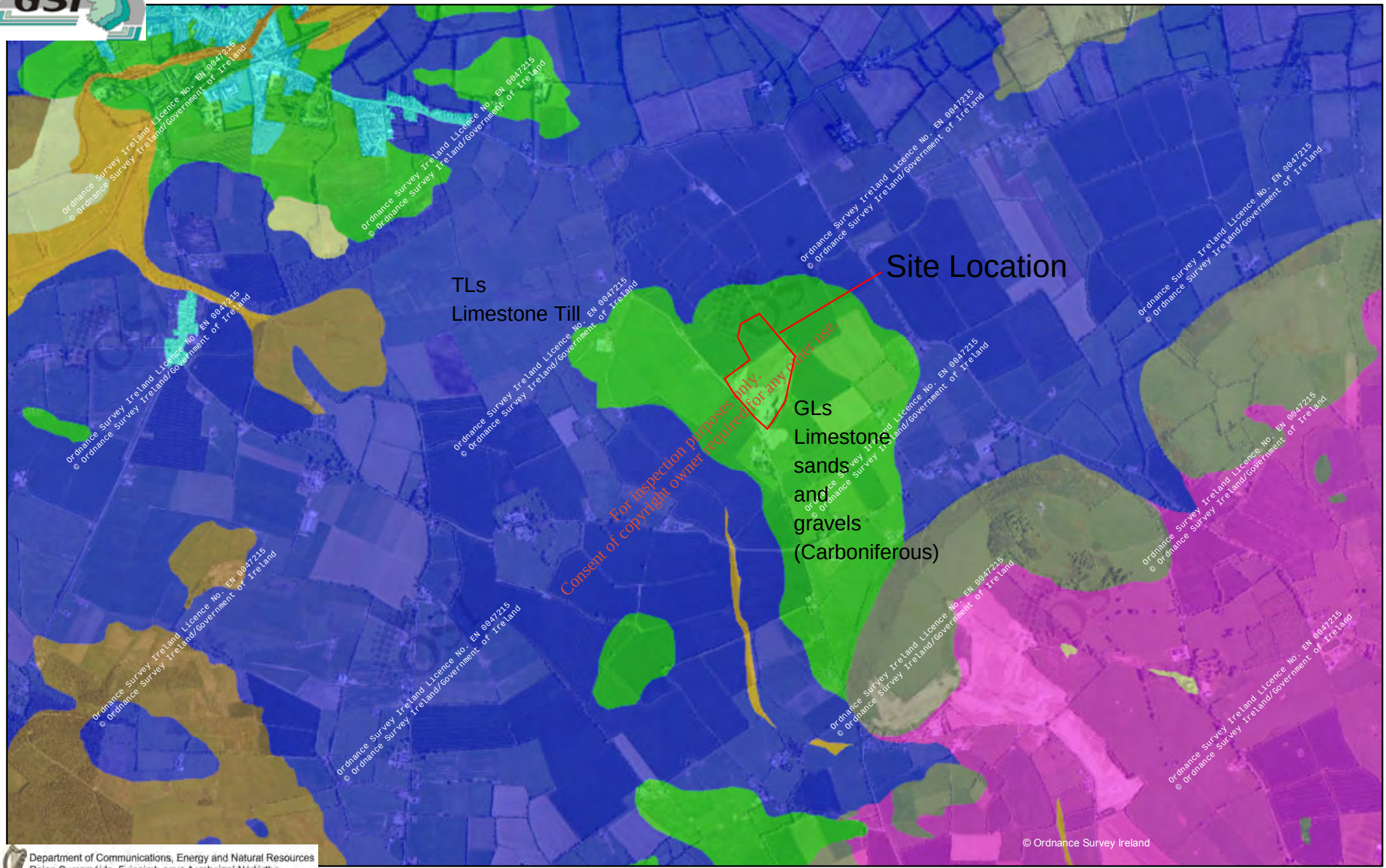
November 13, 2015

0 0.175 0.35 0.7 mi
0 0.275 0.55 1.1 km

Figure 2 - Teagasc Subsoils Map



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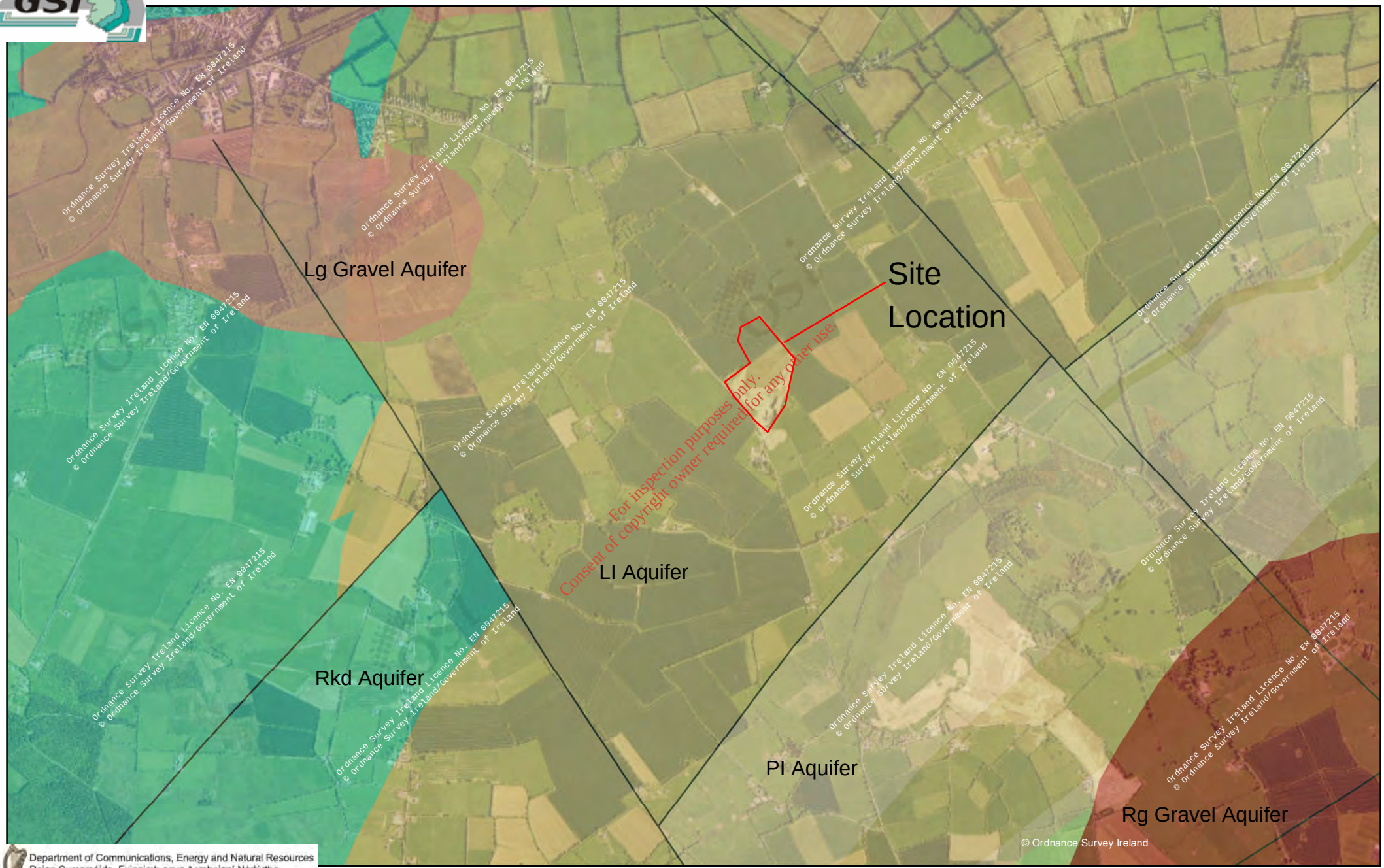
November 13, 2015

0 0.175 0.35 0.7 mi
0 0.275 0.55 1.1 km

Figure 3 - Aquifer Map



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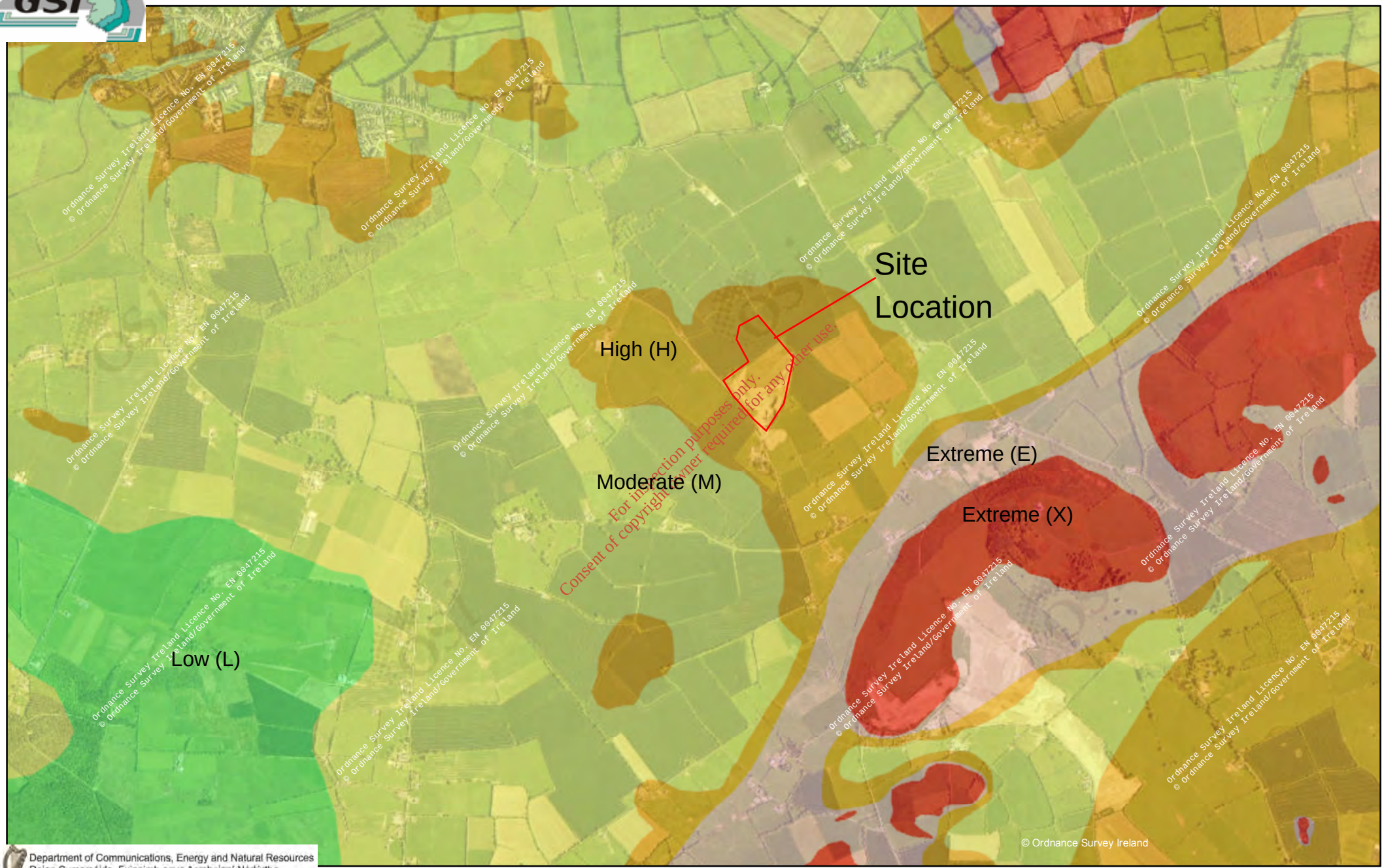
November 13, 2015

0 0.175 0.35 0.7 mi
0 0.275 0.55 1.1 km

Figure 4 - Groundwater Vulnerability Map



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November 13, 2015

0 0.175 0.35 0.7 mi
0 0.275 0.55 1.1 km

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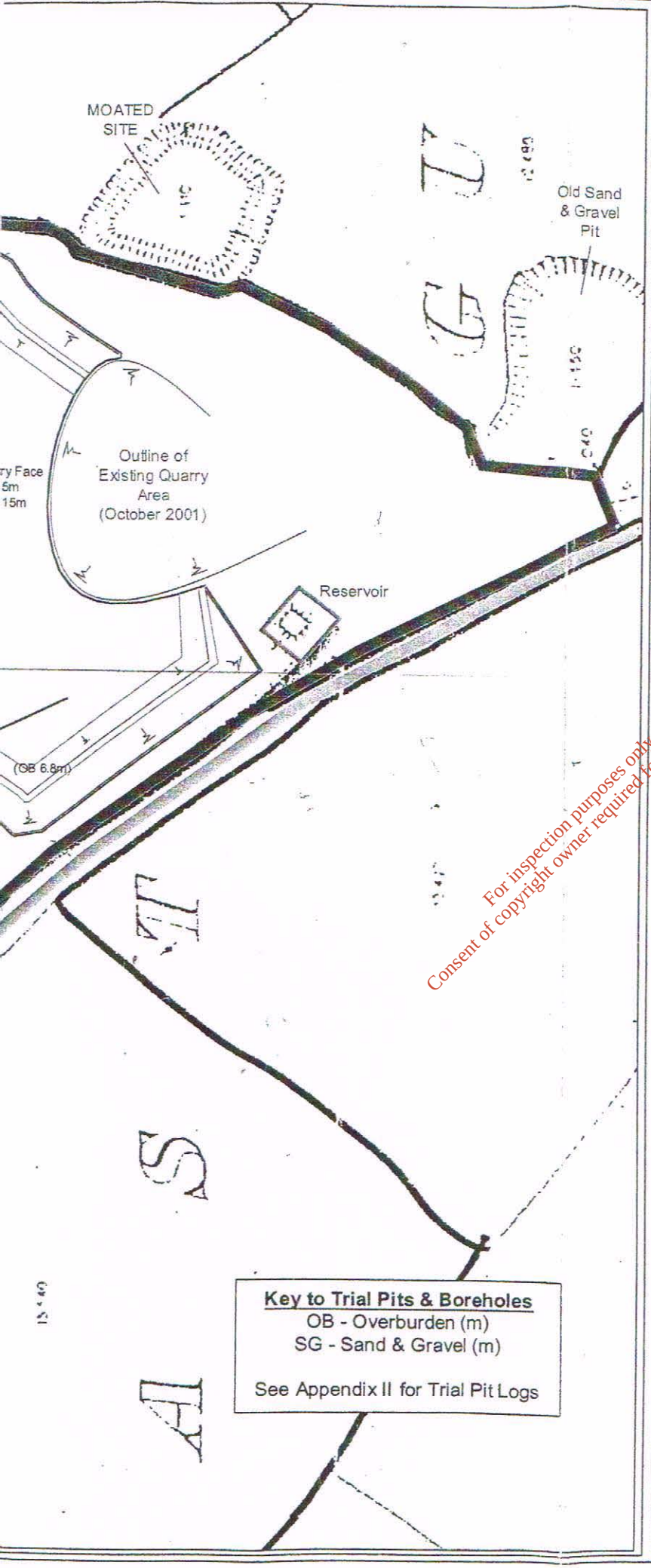
APPENDIX C

Location Map of Boreholes from

2002 JBA Site Investigation



LEGEND

- Land Under Ownership of P. Ennis c.20.6ha
- Resource Area c. 11.5ha
- R401 Regional Road
- Geophysical Line (LINE 2)
- Borehole - Reverse Circulation (BH 4)
- Borehole - Shell and Auger (BH 4)
- Trial Pit - machine excavated trial pits under supervision of JBA (TP 3)
- R Residence

Draft for Review

Scale 1:2500

0m 50m 150m

Figure:	Figure 2.
Client:	P. ENNIS
Project:	Botherkill, Rathangan, Co. Kildare
Title:	SITE PLAN

JBA
John Barnett & Associates
CHARTERED MINERALS SURVEYORS, MINERALS, PLANNING, ENVIRONMENTAL & GEOTECHNICAL CONSULTANTS.
CSA House, 6 & 7 Dundrum Business Park Windy Arbour, Dublin 14, Ireland.
PH: (353) 1 296 46 67
FAX: (353) 1 296 46 76

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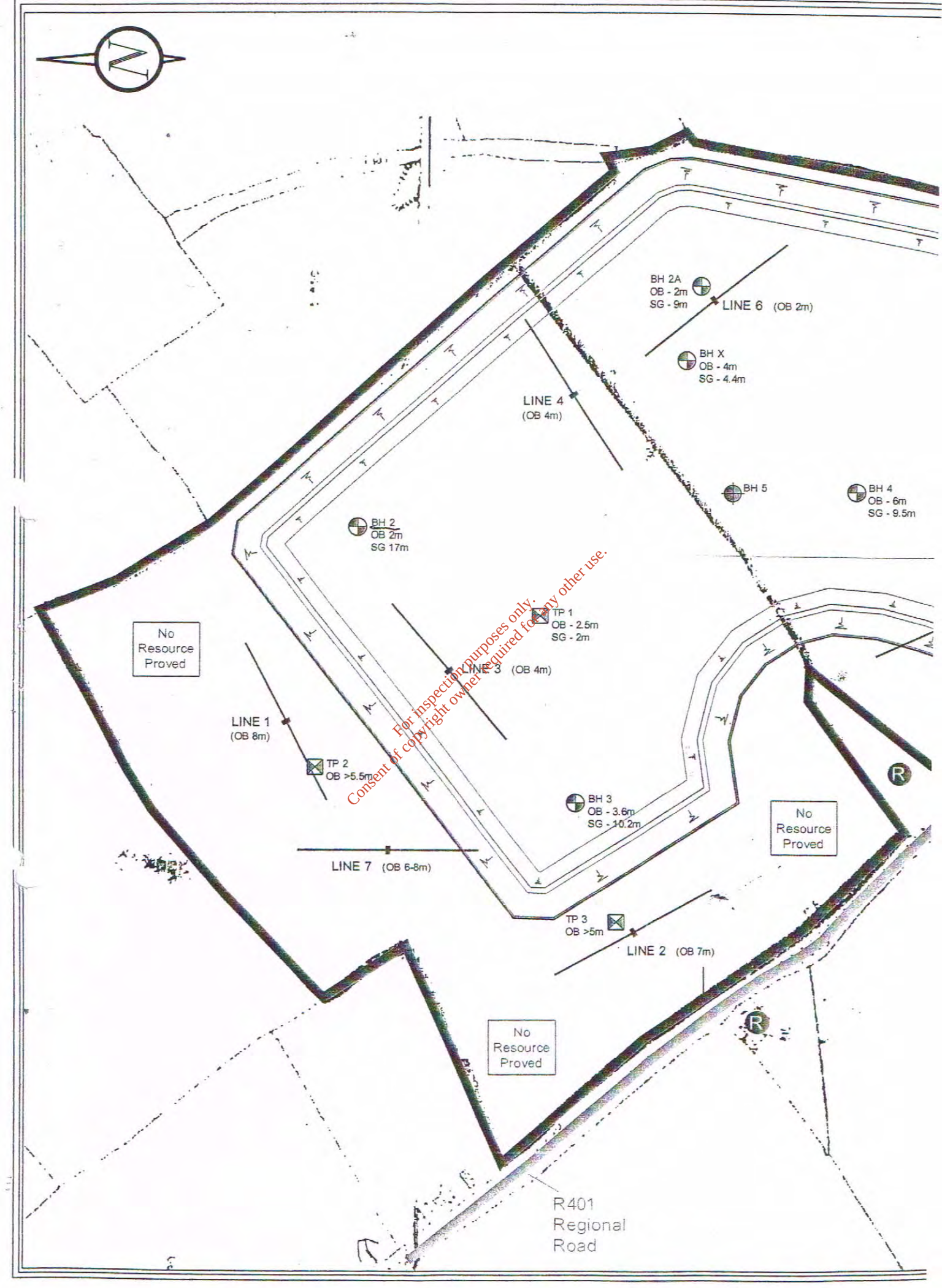
Drawn By:	SMcD	JBA Job No.:	JBA 2865



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APPENDIX D

Boreholes Logs from

2002 JBA Site Investigation

REPORT NO. 7475	GEOTECHNICAL BORING RECORD	IGSL

CONTRACT: Boherkill Quarry, Rathangan

BOREHOLE NO: BH2A
Sheet 2 of 2

CLIENT: Kildare Architects Ltd
ENGINEER: John Burnell & Assoc.

CO-ORDINATES: E 0.00 N 0.00

GROUND LEVEL (mOD) 0.00
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 11.50
CASING DEPTH (m) 11.50

DATE STARTED: 05/10/2001
DATE COMPLETED: 08/10/2001
BORED BY: D. Harrington

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES REF. NUMBER	SAMPLES SAMPLE TYPE	SAMPLES DEPTH (m)	FIELD TEST RESULTS	STAND PIPE DETAILS
	Dense, grey sandy GRAVEL with cobbles				4917	DB	10.00		
11				11.50					
	End of Borehole at 11.50 m								
12									
13									
14									
15									
16									
17									
18									
19									

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments

Water Strike Details

Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
08/10/2001	11.50	0.00	0.00	Borehole dry at end of boring

Remarks:

REPORT NO. 7475 — GEOTECHNICAL BORING RECORD — IGSL

BOREHOLE NO: BH2A
Sheet 1 of 2

CONTRACT: Boherkill Quarry, Rathangan

CLIENT: Kildare Architects Ltd
ENGINEER: John Barnes & Assoc.
CO-ORDINATES: E 0.00 N 0.00

GROUND LEVEL (mOD) 0.00
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 11.50
CASING DEPTH (m) 11.50

DATE STARTED: 05/10/2001
DATE COMPLETED: 08/10/2001
BORED BY: D. Harrington

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES REF. NUMBER	SAMPLES SAMPLE TYPE	SAMPLES DEPTH (m)	FIELD TEST RESULTS	STAND PIPE DETAILS
0	TOPSOIL			0.30					
1	Firm, grey sandy gravelly CLAY with cobbles								
2				1.80					
3	Dense, grey sandy GRAVEL with cobbles								
4									
5					4316	DB	5.00		
6									
7									
8									
9									
10	Continued next sheet				4317	DB	10.00		

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments
8.00	8.50	1.50	
10.70	11.50	2.00	Hard strata boring

Water Strike Details

Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
08/10/2001	11.50	0.00	0.00	Borehole dry at end of boring

Remarks:

REPORT NO. 7475 — GEOTECHNICAL BORING RECORD — IGSL

CONTRACT: Boherkill Quarry, Rathangan

BOREHOLE NO: BH2
Sheet 1 of 2

CLIENT: Kildare Architects Ltd
ENGINEER: John Barnett & Assoc.

CO-ORDINATES: E 0.00
N 0.00

GROUND LEVEL (mOD): 0.00
BOREHOLE DIAMETER (mm): 200
BOREHOLE DEPTH (m): 20.00
CASING DEPTH (m): 20.00

DATE STARTED: 10/10/2001
DATE COMPLETED: 11/10/2001
BORED BY: D. Harrington

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES REF. NUMBER	SAMPLE TYPE	SAMPLES DEPTH (m)	FIELD TEST RESULTS	STAND PIPE DETAILS
	TOPSOIL			0.30					
	Firm, grey sandy gravelly CLAY				3738	DB	1.00		
				1.90	3739	DB	2.00		
	Medium dense, grey silty SAND			2.50					
	Dense, grey sandy GRAVEL with cobbles				3740	DB	3.00		
					3741	DB	4.00		
					3742	DB	5.00		
					3743	DB	6.00		
					3744	DB	7.00		
					3745	DB	8.00		
					3746	DB	9.00		
	Continued next sheet				3747	DB	10.00		

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments
3.50	4.70	2.00	Hard strata boring
4.70	5.00	1.50	"
8.60	10.20	2.00	"
10.80	12.00	2.50	Hard strata boring
18.80	20.00	2.00	Hard strata boring

Water Strike Details

Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
11/10/2001	20.00	0.00	0.00	Borehole dry at end of boring

Remarks:

REPORT NO. 7475	GEOTECHNICAL BORING RECORD	IGSL

CONTRACT:

BOREHOLE NO: BH2
Extra Sheet

CLIENT:	Kildare Architects Ltd	GROUND LEVEL (mOD)	0.00	DATE STARTED:	10/10/2001
ENGINEER:	John Barnes & Assoc.	BOREHOLE DIAMETER (mm)	200	DATE COMPLETED:	11/10/2001
CO-ORDINATES:	E 0.00 N 0.00	BOREHOLE DEPTH (m)	20.00	BORED BY:	D. Harrington
		CASING DEPTH (m)	20.00		

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES			FIELD TEST RESULTS	STAND PIPE DETAILS
					REF. NUMBER	SAMPLE TYPE	DEPTH (m)		
	Large obstruction/boulders			20.00					
	End of Borehole at 20.00 m								

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments

Water Strike Details

Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
11/10/2001	20.00	0.00	0.00	Borehole dry at end of boring

Remarks:

REPORT NO. 7475 — GEOTECHNICAL BORING RECORD — IGSL

CONTRACT: Boherkill Quarry, Rathangan

BOREHOLE NO: BH3
Sheet 1 of 2

CLIENT: Kildare Architects Ltd
ENGINEER: John Barnett & Assoc.
CO-ORDINATES: E 0.00 N 0.00

GROUND LEVEL (mOD): 0.00
BOREHOLE DIAMETER (mm): 200
BOREHOLE DEPTH (m): 17.50
CASING DEPTH (m): 17.50

DATE STARTED: 15/10/2001
DATE COMPLETED: 16/10/2001
BORED BY: D. Harrington

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES REF. NUMBER	SAMPLES SAMPLE TYPE	SAMPLES DEPTH (m)	FIELD TEST RESULTS	STAND PIPE DETAILS
	TOPSOIL								
				0.50					
	Firm, grey sandy gravelly CLAY								
1					3757	DB	1.00		
2					3758	DB	2.00		
3					3759	DB	3.00		
				3.60					
	Dense, grey sandy GRAVEL with cobbles								
4					3760	DB	4.00		
5					3761	DB	5.00		
6					3762	DB	6.00		
7					3763	DB	7.00		
8					3764	DB	8.00		
				8.40					
	Very dense, grey clayey sandy GRAVEL with cobbles								
9					3765	DB	9.00		
	Continued next sheet				3766	DB	10.00		

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments
3.90	4.60	1.25	Hard strata boring
5.40	6.70	1.50	Hard strata boring
8.40	14.00	3.50	
14.00	17.50	4.50	

Water Strike Details

Water Strike	Casing Depth	Sealed at ..	Rise to ..	Time	Comments

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type
16/10/2001	17.50	2.00	17.50	50mm

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
16/10/2001	17.50	0.00	0.00	Borehole dry at end of boring

Remarks:

REPORT NO. 7475 — GEOTECHNICAL BORING RECORD — IGSL

CONTRACT: Boherkill Quarry, Rathangan

BOREHOLE NO: BH3
Sheet 2 of 2

CLIENT: Kildare Architects Ltd
ENGINEER: John Barnett & Assoc.

CO-ORDINATES: E 0.00 N 0.00

GROUND LEVEL (mOD): 0.00
BOREHOLE DIAMETER (mm): 200
BOREHOLE DEPTH (m): 17.50
CASING DEPTH (m): 17.50

DATE STARTED: 15/10/2001
DATE COMPLETED: 16/10/2001
BORED BY: D. Harrington

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES REF. NUMBER	SAMPLE TYPE	SAMPLES DEPTH (m)	FIELD TEST RESULTS	STAND PIPE DETAILS
	Very dense, grey clayey sandy GRAVEL with cobbles				3766	DB	10.00		
11					3767	DB	11.00		
12					3768	DB	12.00		
13					3769	DB	13.00		
				13.80					
	Very stiff, brown sandy gravelly CLAY with cobbles and boulders				3770	DB	14.00		
15					3771	DB	15.00		
16					3772	DB	16.00		
17					3773	DB	17.00		
				17.40					
	Large obstruction/boulders			17.50					
	End of Borehole at 17.50 m								
18									
10									

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments

Water Strike Details

Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type
16/10/2001	17.50	2.00	17.50	50mm

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
16/10/2001	17.50	0.00	0.00	Borehole dry at end of boring

Remarks:

REPORT NO. 7475	GEOTECHNICAL BORING RECORD	IGSL

CONTRACT: Boherkill Quarry, Rathangan

BOREHOLE NO: BH4
Sheet 1 of 2

CLIENT: Kildare Architects Ltd
ENGINEER: John Barnett & Assoc.

GROUND LEVEL (mOD) 0.00
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 15.60
CASING DEPTH (m) 15.60

DATE STARTED: 17/10/2001
DATE COMPLETED: 18/10/2001

CO-ORDINATES: E 0.00
N 0.00

BORED BY: D. Harrington

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES REF. NUMBER	SAMPLES SAMPLE TYPE	SAMPLES DEPTH (m)	FIELD TEST RESULTS	STAND PIPE DETAILS
1	Firm to stiff, brown sandy gravelly CLAY								
2									
3									
				3.80					
4	Stiff, grey sandy gravelly CLAY with cobbles								
5					3774	DB	5.00		
6				6.00	3775	DB	6.00		
7	Dense, grey sandy GRAVEL with cobbles								
8									
9					3776	DB	9.00		
	Continued next sheet								

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments
0.70	0.90	1.00	
4.60	4.80	1.00	Hard strata boring
10.00	10.40	2.50	
11.60	11.90	0.50	Hard strata boring
12.80	15.60	6.00	

Water Strike Details

Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type
18/10/2001	15.00	1.00	15.00	50mm

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
18/10/2001	15.60	0.00	0.00	Borehole dry at end of boring

Remarks:

REPORT NO. 7475	GEOTECHNICAL BORING RECORD	IGSL

CONTRACT: Boherkill Quarry, Rathangan

BOREHOLE NO: BH4
Sheet 2 of 2

CLIENT: Kildare Architects Ltd
ENGINEER: John Barnett & Assoc.
CO-ORDINATES: E 0.00 N 0.00

GROUND LEVEL (mOD) 0.00
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 15.60
CASING DEPTH (m) 15.60

DATE STARTED: 17/10/2001
DATE COMPLETED: 18/10/2001
BORED BY: D. Harrington

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES REF. NUMBER	SAMPLES SAMPLE TYPE	SAMPLES DEPTH (m)	FIELD TEST RESULTS	STAND PIPE DETAILS
	Dense, grey sandy GRAVEL with cobbles				3777	DB	10.50		
				12.60	3778	DB	12.50		
	Dense, grey clayey sandy GRAVEL with cobbles								
					3779	DB	15.00		
				15.50					
	Large obstruction/boulders			15.60					
	End of Borehole at 15.60 m								

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments

Water Strike Details

Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type
18/10/2001	15.00	1.00	15.00	50mm

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
18/10/2001	15.60	0.00	0.00	Borehole dry at end of boring

Remarks:

REPORT NO. 7475 — GEOTECHNICAL BORING RECORD — IGSL

CONTRACT: Boherkill Quarry, Rathangan

BOREHOLE NO: BHX
Sheet 1 of 1

CLIENT: Kildare Architects Ltd
ENGINEER: John Barnett & Assoc.

CO-ORDINATES: E 0.00 N 0.00

GROUND LEVEL (mOD) 0.00
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 9.00
CASING DEPTH (m) 9.00

DATE STARTED: 09/10/2001
DATE COMPLETED: 09/10/2001
BORED BY: D. Harrington

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES: REF. NUMBER	SAMPLES: SAMPLE TYPE	SAMPLES: DEPTH (m)	FIELD TEST RESULTS	STAND PIPE DETAILS
	TOPSOIL			0.40					
	Firm, grey sandy gravelly CLAY with cobbles								
	Dense, grey sandy GRAVEL with cobbles			4.10	4318	DB	5.00		
	Stiff, grey sandy very gravelly CLAY with cobbles			8.00					
	Dense, grey clayey sandy GRAVEL with cobbles			8.50					
	End of Borehole at 9.00 m			9.00					

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments
7.50	8.00	1.50	

Water Strike Details

Water Strike	Casing Depth	Sealed at	Rise to	Time	Comments

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
09/10/2001	9.00	0.00	0.00	Borehole dry at end of boring

Remarks:

Reverse Circulation – Boherkill Quarry, Rathangan

Borehole 5

Sample Summary Sheet

Sample No.	Depth range	Description
3417	3.00 – 6.00	Grey fine to coarse sandy GRAVEL in a soft clay matrix
3418	6.00 – 9.00	Grey fine coarse sandy GRAVEL
3419	9.00 – 12.00	Grey fine coarse sandy GRAVEL some silt traces
3420	12.0 – 15.0	Light brown sandy SILT with some fine to medium gravel particles
3421	15.0 – 18.0	Reddish brown fine to coarse SAND with some medium gravel throughout
3422	18.0 – 21.0	Grey brown fine to medium very sandy GRAVEL
3423	21.0 – 24.0	Grey fine to medium sandy slightly silty GRAVEL
3424	24.0 – 27.0	Reddish brown fine to coarse very sandy GRAVEL
3425	27.0 – 30.0	Reddish brown fine to coarse SAND with some medium gravel throughout
3426	30.0 – 32.0	Grey silty fine to medium SAND

* Groundwater monitoring installed to the specification of JBA.

IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

APPENDIX E

Safety Data Sheet for Flocculating Agent

Safety Data Sheet

According to Regulation (EU) No. 453/2010

Section 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product Identifier

Product Name: POLYGOLD® ANIONIC/NON-IONIC POWDERS

1.2 Relevant identified uses of the substance or mixture and uses advised against

Use: Flocculation agent for treatment of water

1.3 Details of the supplier of the safety data sheet

Company name: Abbeywater Ltd.
Address: Unit L4A
Smithstown Industrial Estate
Shannon
Co Clare
Web address: www.abbeywater.com
Tel: 061 368787
Fax: 061 368720
E-mail: sales@abbeywater.com

1.4 Emergency telephone number

Tel: 061 368787

Section 2: Hazards identification

2.1 Classification of the substance or mixture

CLASSIFICATION ACCORDING TO REGULATION (EC) NO. 1272/2008

This product is not classified as hazardous to health or to the environment in accordance with this regulation.

CLASSIFICATION ACCORDING TO DIRECTIVE 67/548/EEC OR 1999/45/EC

This product is not classified as hazardous to health or to the environment in accordance with these directives.

2.2 Label elements

LABELLING ACCORDING TO REGULATION (EC) NO. 1272/2008

This product does not require a hazard warning label in accordance with this regulation.

LABELLING ACCORDING TO DIRECTIVE 67/548/EEC OR 1999/45/EC

This product does not require a hazard warning label in accordance with these directives.

2.3 Other hazards

May be dusty if not handled correctly.
As with many organic powders, flammable dust clouds may be formed.
Very slippery when wet.
This product does not meet the criteria for PBT or vPvB in accordance with Annex XIII of Regulation (EC) No. 1907/2006.

Section 3: Composition/Information on ingredients

3.2 Mixtures

Chemical nature: An anionic/non-ionic polyacrylamide.

This product does not contain any ingredients classified as hazardous to health or to the environment in concentrations which should be taken into account according to EC regulations and directives.

Section 4: First aid measures

4.1 Description of first aid measures

Skin contact: Remove all contaminated clothing and wash before wearing again.
Wash affected area with soap and plenty of water.
Seek medical attention if any irritation or symptoms persist.

Eye contact: Remove contact lenses if worn and rinse eye with plenty of water for at least 10 minutes holding eye open.
Seek medical attention if any irritation or symptoms persist.

Ingestion: If confined to mouth, wash out with plenty of water taking care not to swallow, and seek medical advice if there is any ill effect.
If swallowed, DO NOT INDUCE VOMITING, give one or two glasses of water to drink, seek immediate medical attention and show this safety data sheet or label.

Inhalation: Move to fresh air and seek medical attention if any irritation or symptoms persist.

4.2 Most important symptoms and effects, both acute and delayed

Skin contact: There is a possibility of irritation.

Eye contact: There may be temporary irritation.

Ingestion: May cause irritation to digestive system.

Inhalation: May cause irritation to respiratory system.

4.3 Indication of any immediate medical attention and special treatment needed

Treat symptomatically, no specific antidote known.

Section 5: Firefighting measures

5.1 Extinguishing media

Use carbon dioxide, dry powder or foam.
It is preferable not to use water as the floor will become very slippery.

5.2 Special hazards arising from the substance or mixture

Dust may form an explosive mixture with air.
Ammonia and oxides of carbon and nitrogen may be emitted in fire conditions.
Slip hazards will be formed in the presence of water.

5.3 Advice for firefighters

Wear full protective clothing and self contained breathing apparatus.

Section 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedure

Wear suitable equipment for protection of eyes and skin.
Prevent formation of dust if possible.
Respiratory equipment should be worn if a dust has been formed.

6.2 Environmental precautions

Prevent product from entering drains and prevent further spillage if safe to do so.
Advise local authorities if large spills cannot be contained.

6.3 Clean-up procedures

Do not use water to clean up this product as it may cause surfaces to become very slippery.
Use vacuum cleaner or, if only a small amount is involved, sweep up very carefully without raising a dust. Then transfer to suitable, labelled container for disposal.

6.4 Reference to other sections

Suitable equipment for eye/face, skin and respiratory protection is quoted in section 8.
Suitable methods for disposal are quoted in section 13.

Section 7: Handling and storage

7.1 Precautions for safe handling

Avoid contact with eyes and skin.
Avoid formation of dust and ensure adequate ventilation of the working area.
Wear suitable equipment for protection of eyes and skin.
Respiratory equipment should be worn if Workplace Exposure Limit is exceeded.
Do not eat or drink in working area and wash hands after use.

7.2 Conditions for safe storage, including any incompatibilities

Keep packaging well sealed and away from moisture.
Store in cool, dry, well ventilated area.
Avoid using metal containers or equipment, except stainless steel, when mixing.

7.3 Specific end use

There is no specific end use in addition to that shown in section 1.

Section 8: Exposure controls/personal protection

8.1 Control parameters

WORKPLACE EXPOSURE LIMIT EH40

Ingredient name	8 hr TWA		15 min TWA	
	ppm	mg/m³	ppm	mg/m³
Respirable dust	-	4	-	-
Inhalable dust	-	10	-	-

8.2 Exposure controls

Engineering controls: Ensure adequate ventilation of the working area.
Where dust can be generated, local exhaust ventilation should be provided.

Eye/face protection: Safety goggles (EN166).

Skin protection: Chemical resistant gloves (EN374), lightweight protective overalls and protective footwear.

Respiratory protection: Full or half mask respirator with P2 particle filter (European standard EN143) or disposable respirator (EN149 FFP2S).

Section 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance:	Off-white powder
Odour:	Not significant
pH:	6 - 8 (1.0% aqueous solution)
Melting point/freezing point:	n/a
Boiling point or boiling range:	n/a
Flash point:	n/a
Evaporation rate:	n/a
Flammability:	Combustible
Upper/lower flammability or explosive limits:	n/a
Vapour pressure :	n/a
Vapour density:	n/a
Bulk density:	700 -1000 kg/m^3.
Solubility:	Solubility in water limited by viscosity
Partition coefficient: n-octanol/water:	n/a
Auto-ignition temperature:	n/a
Decomposition temperature:	Approx. 200°C
Viscosity:	n/a
Explosive properties:	n/a
Oxidising properties:	n/a

9.2 Other information

None available.

Section 10: Stability and reactivity

10.1 Reactivity

Not likely to react adversely if stored and handled as prescribed.

10.2 Chemical stability

Stable under normal conditions.

10.3 Possibility of hazardous reactions

No hazardous reactions are likely, but contact with water forms a slippery glue-like product.

10.4 Conditions to avoid

Moisture and extreme temperatures.
Dust formation, electrostatic discharges and sources of ignition.

10.5 Incompatible materials

Strong acids, strong bases, strong oxidising agents.

10.6 Hazardous decomposition products

Evolution of ammonia and oxides of carbon and nitrogen is possible when exposed to excessive heat.

Section 11: Toxicological information

11.1 Information on toxicological effects

Information based on a structurally or compositionally similar product.

Acute toxicity:	**LD50 oral mg/kg**	**LD50 dermal mg/kg**	**LC50 inhalation mg/l**
	>2000 (rat)	>2000 (rabbit)	-

Irritation:	Low expectation of irritation to skin, eyes and mucous membranes.
Corrosivity	Not reported.
Sensitisation:	Not reported.
Repeated dose toxicity	Not reported.
Carcinogenity:	Not reported.
Mutagenicity	Not reported.
Toxicity for reproduction	Not reported.

Section 12: Ecological information

12.1 Toxicity

Information based on a structurally or compositionally similar product.

Aquatic toxicity:	**Fish LC50 96hrs mg/l**	**Daphnia EC 50 48 hrs mg/l**	**Aquatic plants EC 50 72 hrs mg/l**
	>100	>100	-

12.2 Persistence and degradability

Readily biodegradable.

12.3 Bioaccumulative potential

Not expected to bioaccumulate.

12.4 Mobility in soil

Solubility in water limited by viscosity.

12.5 Results of PBT and vPvB assessment

Not applicable.

12.6 Other adverse effects

None known.

Section13: Disposal considerations

13.1 Waste treatment methods

Disposal of product: Must be disposed of in accordance with local and national regulations.

Disposal of packaging: Packaging should be emptied as far as possible then sent for recycling or disposed of as for the product.

Section 14: Transport information

This product is not classified as dangerous for carriage by, road, sea or air.

Section 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Council Directive 67/548/EEC (Classification, Packaging and Labelling of Dangerous Substances) and Commission Directive 1999/45/EC (Classification, Packaging and Labelling of Dangerous Preparations) and subsequent amendments.
Regulation (EC) No. 1272/2008 on Classification, Labelling and Packaging of substances and mixtures.
Regulation (EC) No. 1907/2006 on Registration, Evaluation, Authorisation and Restriction of Chemicals.

15.2 Chemical safety Assessment

Not applicable.

Section 16: Other information

This safety data sheet is produced in accordance with Commission Regulation (EU) No. 453/2010 which amends Regulation (EC) No. 1907/2006.

It is revision 02 and replaces revision 01 issued on 01/09/2012.

Changes have been made to sections 2, 9, 11, 12 and 15.

There are no risk phrases or hazard statements not written in full in section 3.

In section 9 the abbreviation n/a = not applicable or not available.

The information given in this document is based on current knowledge and experience and is given in good faith. No warranty expressed or implied is made, and data is only relevant to the use for which the product is supplied.

NOISE IMPACT ASSESSMENT:
Further Information, Planning Reference 16/526

Boherkill gravel pit restoration project

Noise Impact Assessment FI

Report prepared by Oliver Fitzsimons MSc. BSc.

22/09/2016

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Appendix ii Sound Level meter(s) Calibration Certificates 27

1.0 Introduction

Fitzsimons Walsh Environmental Limited has been retained to undertake a noise impact assessment of the proposed restoration project at Boherkill gravel pit, Rathangan, Co. Kildare.

The proposed development is for the restoration of an existing gravel pit at Boherkill, Rathangan, Co. Kildare. Planning permission is sought for the importation of inert materials over a 10-year period (a rate of approximately 150,000 tonnes per annum) to reinstate the lands to the original levels prior to commencement of extraction.

1.1 Planning application further information; Planning Reference 16/526

Kildare County Council requested the following information in relation to the noise impact assessment.

Item 8 *Baseline noise levels have only been taken for two noise sensitive locations, identified as NSL 1 and NSL4. You are therefore requested to carry out baseline noise monitoring at two other locations in order to determine noise emissions north and east of the site.*

Item 9 *Table 8.7 of the EIS and Table 7.0 in the Noise Impact Assessment included in appendix 6 details predicted noise levels for ten NSLs. However, baseline levels have only been provided for two locations.*

Please submit further information to address and clarify this matter.

The further information shall also include predicted operational noise levels for at least four noise sensitive locations north, south and west of the site.

2.0 Existing Noise Environment

Baseline noise monitoring was originally undertaken at:

NSR 1 THOMASTOWN LODGE, THOMASTOWN EAST

And

NSR 4 BOHERKILL, RATHANGAN

At the request of Kildare County Council further monitoring has been undertaken at two additional NSRs:

NSR 7 KILMONEY LODGE, KILMONEY

And

NSR 10 BOHERKILL, RATHANGAN, KILDARE, R51 YA02

The location of all four monitoring points is identified in figure 1 below.

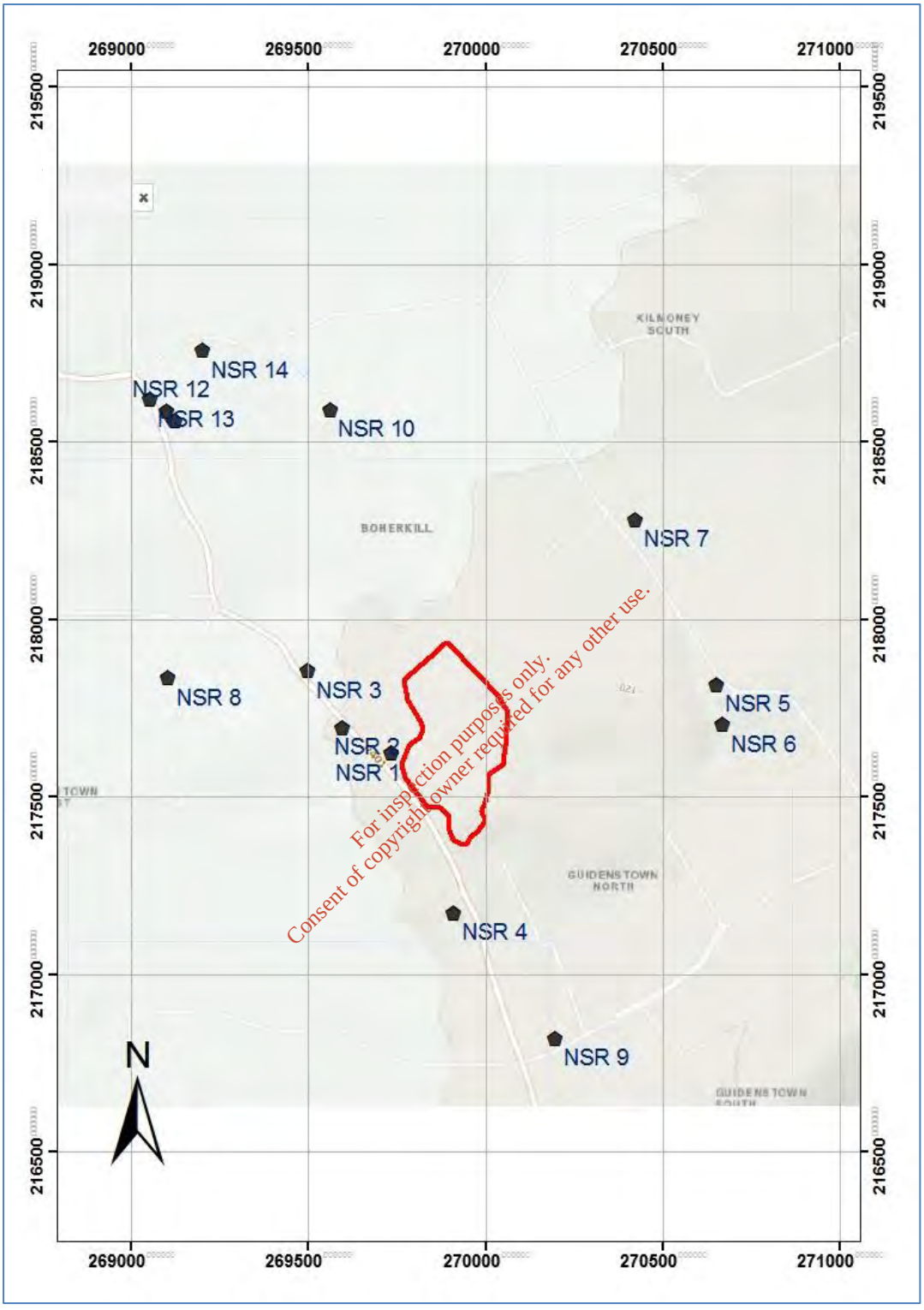

Figure 1 Proposed development at Boherkill and representative NSRs

2.1.3 Results of Noise Survey

The existing ambient and background noise levels in the area of the proposed development were measured at #4 representative noise sensitive receptors.

- After the RFI noise monitoring has been undertaken at two additional locations
- Monitoring period 31/08/2016 – 03/09/2016.
- The complete dataset from the baseline study is presented in the Appendix I.
- A summary of the interval (mean values) measurements is given in Tables 1 and 2 below.

Table 1 NSR7. Residential dwelling east of the site

Baseline noise levels mean values – 15 minute interval data[1]

Monitoring Location id	Day-time Noise levels dB(A)			Evening-time Noise Levels dB(A)			Night-time Noise levels dB(A)		
	Leq	L_{10}	L_{90}	Leq	L_{10}	L_{90}	Leq	L_{10}	L_{90}
NSR7	50	53	41	49	53	40	41	42	33

Table 2 NSR10. Residential dwelling north of the site

Baseline noise levels mean values – 15 minute interval data

Monitoring Location id	Day-time Noise levels dB(A)			Evening-time Noise Levels dB(A)			Night-time Noise levels dB(A)		
	Leq	L_{10}	L_{90}	Leq	L_{10}	L_{90}	Leq	L_{10}	L_{90}
NSR4	51	55	42	51	56	42	43	45	35

- [1] Average noise levels for a specific period are the arithmetic average of the measured LAF noise levels during the relevant period.
- All noise levels derived averages are rounded to the nearest whole integer
- Leq is the equivalent continuous noise level or ambient level.
- L10 is the noise level exceeded or equalled for 10% of the interval.
- L90 (background) is the noise level equalled or exceeded for 90% of a sample interval

3.0 Additional Noise Sensitive Receptors

A further four sensitive receptors have been identified.

Refer to table 3 below for the full set of NSRs potentially affected by the proposed development

Table 3 Noise sensitive receptors (NSRs)

Id	Address	Eastings	Northings	Separation Distance
NSR 1	BOHERKILL, RATHANGAN, KILDARE, R51 VK72	269735	217623	201
NSR 2	AISLING HOUSE, THOMASTOWN EAST, RATHANGAN, KILDARE, R51 K761	269596	217696	335
NSR 3	BOHERKILL, RATHANGAN, KILDARE, R51 CY64	269498	217856	470
NSR 4	THOMASTOWN LODGE, THOMASTOWN EAST, RATHANGAN, KILDARE, R51 CR40	269911	217175	495
NSR 5	HILL VIEW, GUIDENSTOWN NORTH, DUNMURRY, KILDARE, R51 FT98	270649	217817	734
NSR 6	THE PADDOCKS, GUIDENSTOWN NORTH, DUNMURRY, KILDARE, R51 A718	270667	217704	738
NSR 7	KILMONEY LODGE, KILMONEY, RATHANGAN, KILDARE, R51 E290	270423	218281	785
NSR 8	THOMASTOWN EAST,RATHANGAN, KILDARE. R51 HN82	269105	217835	841
NSR 9	SAINT CONLETH'S, GUIDENSTOWN SOUTH, KILDARE. R51 D993	270196	216820	891
NSR 10	BOHERKILL, RATHANGAN, KILDARE, R51 YA02	269562	218590	991
NSR 11	LYNDON HOUSE, BOHERKILL, RATHANGAN, CO. KILDARE. R51 X202	269125	218560	1118
NSR 12	BOHERKILL, RATHANGAN, CO. KILDARE. R51 PW08	269103	218587	1153
NSR 13	BOHERKILL, RATHANGAN, CO. KILDARE. R51 A662	269055	218620	1207
NSR 14	BOHERKILL, RATHANGAN, CO. KILDARE. R51 RX36	269204	218758	1253

Refer to Figure 1 above for locations.

4.0 Potential Noise Impacts

4.1 Predicted noise levels - Operational Phase

Table 4 Predicted operational noise levels

Id	Address	Predicted noise level without mitigation, LAeq, dB[2]
NSR 1	BOHERKILL, RATHANGAN, KILDARE, R51 VK72	52
NSR 2	AISLING HOUSE, THOMASTOWN EAST, RATHANGAN, KILDARE, R51 K761	48
NSR 3	BOHERKILL, RATHANGAN, KILDARE, R51 CY64	45
NSR 4	THOMASTOWN LODGE, THOMASTOWN EAST, RATHANGAN, KILDARE, R51 CR40	44
NSR 5	HILL VIEW, GUIDENSTOWN NORTH, DUNMURRY, KILDARE, R51 FT98	41
NSR 6	THE PADDOCKS, GUIDENSTOWN NORTH, DUNMURRY, KILDARE, R51 A718	41
NSR 7	KILMONEY LODGE, KILMONEY, RATHANGAN, KILDARE, R51 E290	40
NSR 8	THOMASTOWN EAST, RATHANGAN, KILDARE. R51 HN82	40
NSR 9	SAINT CONLETH'S, GUIDENSTOWN SOUTH, KILDARE. R51 D993	39
NSR 10	BOHERKILL, RATHANGAN, KILDARE, R51 YA02	38
NSR 11	LYNDON HOUSE, BOHERKILL, RATHANGAN, CO. KILDARE. R51 X202	37
NSR 12	BOHERKILL, RATHANGAN, CO. KILDARE. R51 PW08	37
NSR 13	BOHERKILL, RATHANGAN, CO. KILDARE. R51 A662	37
NSR 14	BOHERKILL, RATHANGAN, CO. KILDARE. R51 RX36	36
NSR 15	SAINT CONLETH'S, GUIDENSTOWN SOUTH, KILDARE.R51 D993	39

[2] NOT taking account of noise control measures

4.2 Residual noise impact [accounting for mitigation measures]

Table 5 Predicted operational noise levels

Id	Address	Predicted noise level without mitigation, LAeq, dB[3]	Predicted noise level, taking account of mitigation LAeq, dB[4]
NSR 1	BOHERKILL, RATHANGAN, KILDARE, R51 VK72	52	45
NSR 2	AISLING HOUSE, THOMASTOWN EAST, RATHANGAN	48	41
NSR 3	BOHERKILL, RATHANGAN, KILDARE, R51 CY64	45	38
NSR 4	THOMASTOWN LODGE, THOMASTOWN EAST,	44	37
NSR 5	HILL VIEW, GUIDENSTOWN NORTH, DUNMURRY, KILDARE, R51 FT98	41	34
NSR 6	THE PADDOCKS, GUIDENSTOWN NORTH, DUNMURRY	41	34
NSR 7	KILMONEY LODGE, KILMONEY, RATHANGAN, KILDARE, R51 E290	40	33
NSR 8	THOMASTOWN EAST,RATHANGAN, KILDARE. R51 HN82	40	33
NSR 9	SAINT CONLETH'S, GUIDENSTOWN SOUTH, KILDARE. R51 D993	39	32
NSR 10	BOHERKILL, RATHANGAN, KILDARE, R51 YA02	38	31
NSR 11	LYNDON HOUSE, BOHERKILL, RATHANGAN	37	30
NSR 12	BOHERKILL, RATHANGAN, CO. KILDARE. R51 PW08	37	30
NSR 13	BOHERKILL, RATHANGAN, CO. KILDARE. R51 A662	37	30
NSR 14	BOHERKILL, RATHANGAN, CO. KILDARE. R51 RX36	36	29
NSR 15	SAINT CONLETH'S, GUIDENSTOWN SOUTH, KILDARE.R51 D993	39	32

[3] NOT taking account of noise control measures
[4] Taking account of noise control measures

5.0 Conclusions

The further information asked that additional baseline noise monitoring be undertaken. Additional monitoring has been undertaken at two additional locations, one location north and one location east of the site

The results confirm the finding of the original survey.

The additional monitoring data gives an accurate representation of the noise environment in the area. The noise environment is influenced by natural sources including wind interaction with vegetation but also, significantly by anthropogenic sources most notably road traffic and to a lesser extent agricultural activity.

Tables 4 and 5 above present the predicted noise impacts at all of the NSRs that could potentially be affected by the proposed development. A representative selection of properties North, South East and West of the site have been identified.

It is clear that the resulting noise imissions will be within recommended noise limits at all NSRs.

The original impacts assessment and the further information herewith have demonstrated that:

- During normal operation of the facility there should be a negligible noise impact at all nearby residents.
- Noise emissions should contain no clearly audible tones and should not be impulsive in nature.
- Predicted noise imissions should be well within recommended criteria levels if mitigation measures are implemented.

Appendix i Noise Monitoring Data

NSR 7 Baseline noise monitoring data

Date	Time	Leq	L10	L90
31/08/2016	19:00:00	55.8	59.0	43.7
31/08/2016	19:15:00	53.4	57.0	43.5
31/08/2016	19:30:00	52.2	54.7	44.3
31/08/2016	19:45:00	53.3	56.9	43.4
31/08/2016	20:00:00	52.8	57.6	44.2
31/08/2016	20:15:00	51.9	55.2	43.7
31/08/2016	20:30:00	50.6	54.6	42.2
31/08/2016	20:45:00	51.4	55.2	43.5
31/08/2016	21:00:00	51.3	55.4	41.5
31/08/2016	21:15:00	50.3	54.0	41.5
31/08/2016	21:30:00	52.0	55.5	43.3
31/08/2016	21:45:00	52.3	55.7	43.9
31/08/2016	22:00:00	51.0	53.5	42.3
31/08/2016	22:15:00	50.1	53.3	41.1
31/08/2016	22:30:00	47.0	48.0	38.9
31/08/2016	22:45:00	47.6	51.2	38.8
31/08/2016	23:00:00	46.6	47.6	37.5
31/08/2016	23:15:00	46.7	48.8	36.7
31/08/2016	23:30:00	45.4	48.6	37.1
31/08/2016	23:45:00	46.1	45.5	38.1
01/09/2016	00:00:00	45.9	47.7	37.0
01/09/2016	00:15:00	43.3	44.4	34.5
01/09/2016	00:30:00	38.6	40.0	33.2
01/09/2016	00:45:00	42.6	44.6	31.8
01/09/2016	01:00:00	39.6	40.0	33.1
01/09/2016	01:15:00	38.4	37.3	32.1
01/09/2016	01:30:00	33.1	35.0	28.8
01/09/2016	01:45:00	35.5	37.8	30.3
01/09/2016	02:00:00	36.3	38.1	32.4
01/09/2016	02:15:00	41.1	40.3	32.4
01/09/2016	02:30:00	41.1	38.2	31.8
01/09/2016	02:45:00	34.1	36.8	30.4
01/09/2016	03:00:00	35.8	39.4	30.4
01/09/2016	03:15:00	36.6	39.6	31.3
01/09/2016	03:30:00	35.5	38.2	31.5
01/09/2016	03:45:00	38.5	39.4	32.2
01/09/2016	04:00:00	36.0	38.7	31.5
01/09/2016	04:15:00	37.8	40.7	32.3
01/09/2016	04:30:00	38.7	41.7	33.1
01/09/2016	04:45:00	40.1	43.0	33.9
01/09/2016	05:00:00	35.8	39.3	30.1
01/09/2016	05:15:00	37.6	38.9	30.6
01/09/2016	05:30:00	37.0	40.3	31.3

Date	Time	Leq	L10	L90
01/09/2016	05:45:00	39.5	42.8	32.9
01/09/2016	06:00:00	39.9	42.5	31.6
01/09/2016	06:15:00	39.1	42.3	30.8
01/09/2016	06:30:00	38.4	40.8	30.7
01/09/2016	06:45:00	39.8	40.8	31.3
01/09/2016	07:00:00	39.5	42.4	31.2
01/09/2016	07:15:00	44.0	47.8	32.7
01/09/2016	07:30:00	44.4	47.3	35.5
01/09/2016	07:45:00	44.9	47.3	36.6
01/09/2016	08:00:00	46.8	49.5	38.4
01/09/2016	08:15:00	47.0	50.2	39.0
01/09/2016	08:30:00	46.6	49.2	39.6
01/09/2016	08:45:00	47.0	50.2	39.7
01/09/2016	09:00:00	47.6	50.9	40.0
01/09/2016	09:15:00	49.2	53.1	40.8
01/09/2016	09:30:00	53.0	55.5	45.1
01/09/2016	09:45:00	49.8	53.1	42.9
01/09/2016	10:00:00	50.2	52.2	43.9
01/09/2016	10:15:00	52.2	52.8	45.2
01/09/2016	10:30:00	51.1	54.1	45.2
01/09/2016	10:45:00	51.9	55.7	46.2
01/09/2016	11:00:00	52.1	53.9	47.0
01/09/2016	11:15:00	52.5	55.8	46.6
01/09/2016	11:30:00	53.6	54.9	44.7
01/09/2016	11:45:00	53.5	57.2	46.1
01/09/2016	12:00:00	52.5	56.0	45.4
01/09/2016	12:15:00	51.3	53.7	45.0
01/09/2016	12:30:00	53.0	56.8	47.0
01/09/2016	12:45:00	51.5	55.7	46.7
01/09/2016	13:00:00	52.7	55.0	48.3
01/09/2016	13:15:00	52.7	56.1	47.1
01/09/2016	13:30:00	53.2	57.0	48.1
01/09/2016	13:45:00	53.3	56.8	48.6
01/09/2016	14:00:00	53.1	56.8	47.7
01/09/2016	14:15:00	53.6	57.7	48.6
01/09/2016	14:30:00	57.2	60.1	48.6
01/09/2016	14:45:00	52.6	56.3	46.4
01/09/2016	15:00:00	52.7	55.4	47.5
01/09/2016	15:15:00	54.2	57.8	45.8
01/09/2016	15:30:00	52.7	57.1	43.7
01/09/2016	15:45:00	53.6	58.5	44.1
01/09/2016	16:00:00	53.5	56.3	45.2
01/09/2016	16:15:00	52.4	56.4	44.8
01/09/2016	16:30:00	50.6	54.4	42.3
01/09/2016	16:45:00	52.1	56.8	41.2
01/09/2016	17:00:00	53.0	57.2	42.2
01/09/2016	17:15:00	51.5	53.8	42.7
01/09/2016	17:30:00	51.2	53.3	42.1

Date	Time	Leq	L10	L90
01/09/2016	17:45:00	51.7	54.6	42.1
01/09/2016	18:00:00	53.8	57.5	45.6
01/09/2016	18:15:00	52.5	55.4	44.1
01/09/2016	18:30:00	52.8	56.3	43.6
01/09/2016	18:45:00	52.2	56.7	43.4
01/09/2016	19:00:00	52.8	57.0	44.7
01/09/2016	19:15:00	53.9	57.9	45.4
01/09/2016	19:30:00	48.7	53.2	39.5
01/09/2016	19:45:00	48.3	52.6	40.3
01/09/2016	20:00:00	46.6	50.7	38.6
01/09/2016	20:15:00	47.2	51.5	39.7
01/09/2016	20:30:00	47.8	51.8	41.1
01/09/2016	20:45:00	47.6	50.6	40.9
01/09/2016	21:00:00	47.1	50.5	40.9
01/09/2016	21:15:00	46.7	50.2	39.9
01/09/2016	21:30:00	47.7	51.4	40.5
01/09/2016	21:45:00	46.6	50.2	40.6
01/09/2016	22:00:00	45.6	49.0	39.4
01/09/2016	22:15:00	47.2	50.0	40.3
01/09/2016	22:30:00	48.0	51.6	41.3
01/09/2016	22:45:00	47.7	51.1	40.9
01/09/2016	23:00:00	42.8	46.3	35.9
01/09/2016	23:15:00	42.5	46.1	36.1
01/09/2016	23:30:00	40.8	43.9	34.5
01/09/2016	23:45:00	43.3	46.6	36.3
02/09/2016	00:00:00	40.8	44.1	34.3
02/09/2016	00:15:00	40.5	43.5	34.2
02/09/2016	00:30:00	41.0	43.9	36.0
02/09/2016	00:45:00	41.0	44.4	35.3
02/09/2016	01:00:00	42.3	45.1	36.9
02/09/2016	01:15:00	41.4	45.3	34.3
02/09/2016	01:30:00	40.3	43.0	34.5
02/09/2016	01:45:00	44.2	47.1	38.5
02/09/2016	02:00:00	44.2	47.5	38.2
02/09/2016	02:15:00	44.9	48.3	38.5
02/09/2016	02:30:00	44.6	47.5	38.2
02/09/2016	02:45:00	43.5	47.0	37.1
02/09/2016	03:00:00	40.7	43.6	35.3
02/09/2016	03:15:00	42.2	44.0	33.9
02/09/2016	03:30:00	43.7	47.0	37.0
02/09/2016	03:45:00	43.4	46.3	37.3
02/09/2016	04:00:00	41.0	43.0	35.6
02/09/2016	04:15:00	41.8	42.7	34.7
02/09/2016	04:30:00	42.9	43.1	36.4
02/09/2016	04:45:00	41.9	43.2	36.4
02/09/2016	05:00:00	43.0	44.6	37.4
02/09/2016	05:15:00	39.2	42.4	33.3
02/09/2016	05:30:00	41.4	41.6	34.6

Date	Time	Leq	L10	L90
02/09/2016	05:45:00	41.1	42.9	34.8
02/09/2016	06:00:00	42.3	44.8	37.3
02/09/2016	06:15:00	43.6	46.3	38.8
02/09/2016	06:30:00	43.6	45.7	38.3
02/09/2016	06:45:00	42.7	44.7	37.1
02/09/2016	07:00:00	44.6	46.8	37.8
02/09/2016	07:15:00	43.4	45.1	37.1
02/09/2016	07:30:00	44.5	47.2	40.3
02/09/2016	07:45:00	47.0	47.4	40.3
02/09/2016	08:00:00	46.6	47.6	38.0
02/09/2016	08:15:00	49.2	51.2	42.0
02/09/2016	08:30:00	50.8	52.7	43.1
02/09/2016	08:45:00	50.1	51.6	42.6
02/09/2016	09:00:00	47.7	49.8	42.1
02/09/2016	09:15:00	49.5	53.0	42.2
02/09/2016	09:30:00	49.7	52.6	41.2
02/09/2016	09:45:00	50.6	54.6	42.3
02/09/2016	10:00:00	49.3	53.0	40.8
02/09/2016	10:15:00	51.0	55.3	42.2
02/09/2016	10:30:00	49.9	53.3	40.1
02/09/2016	10:45:00	48.8	52.7	40.5
02/09/2016	11:00:00	50.9	55.1	41.8
02/09/2016	11:15:00	50.6	54.8	41.5
02/09/2016	11:30:00	49.9	53.9	39.6
02/09/2016	11:45:00	50.4	54.8	40.2
02/09/2016	12:00:00	48.7	54.1	40.1
02/09/2016	12:15:00	50.5	56.0	40.1
02/09/2016	12:30:00	49.7	55.2	38.3
02/09/2016	12:45:00	50.4	54.7	39.5
02/09/2016	13:00:00	48.9	54.7	38.1
02/09/2016	13:15:00	48.7	54.1	39.0
02/09/2016	13:30:00	48.4	53.2	37.8
02/09/2016	13:45:00	49.8	55.2	39.8
02/09/2016	14:00:00	49.8	53.8	41.0
02/09/2016	14:15:00	50.8	55.7	41.1
02/09/2016	14:30:00	50.1	54.7	40.0
02/09/2016	14:45:00	47.6	51.2	38.1
02/09/2016	15:00:00	47.8	51.0	37.9
02/09/2016	15:15:00	45.6	51.4	35.0
02/09/2016	15:30:00	47.2	52.3	37.2
02/09/2016	15:45:00	47.4	52.5	36.4
02/09/2016	16:00:00	49.0	54.5	39.6
02/09/2016	16:15:00	51.6	56.1	43.7
02/09/2016	16:30:00	51.0	55.8	41.0
02/09/2016	16:45:00	52.1	55.3	43.2
02/09/2016	17:00:00	51.3	56.1	42.3
02/09/2016	17:15:00	50.3	55.0	41.3
02/09/2016	17:30:00	47.3	52.8	39.2

Date	Time	Leq	L10	L90
02/09/2016	17:45:00	48.2	54.0	38.2
02/09/2016	18:00:00	49.0	52.9	39.5
02/09/2016	18:15:00	48.0	50.9	38.9
02/09/2016	18:30:00	49.0	53.0	39.9
02/09/2016	18:45:00	48.5	53.1	39.0
02/09/2016	19:00:00	47.6	49.6	39.5
02/09/2016	19:15:00	49.9	54.3	40.6
02/09/2016	19:30:00	49.5	53.4	39.4
02/09/2016	19:45:00	49.0	53.3	38.7
02/09/2016	20:00:00	48.9	53.5	38.5
02/09/2016	20:15:00	48.3	52.6	37.8
02/09/2016	20:30:00	47.0	50.9	36.9
02/09/2016	20:45:00	49.2	53.0	40.0
02/09/2016	21:00:00	48.7	52.3	37.5
02/09/2016	21:15:00	48.9	52.9	37.5
02/09/2016	21:30:00	47.9	52.7	37.5
02/09/2016	21:45:00	47.4	51.1	36.2
02/09/2016	22:00:00	46.6	50.9	36.4
02/09/2016	22:15:00	45.9	50.5	36.3
02/09/2016	22:30:00	43.6	48.0	31.7
02/09/2016	22:45:00	43.6	47.9	32.4
02/09/2016	23:00:00	43.1	46.9	30.8
02/09/2016	23:15:00	42.7	43.5	30.0
02/09/2016	23:30:00	44.8	48.2	31.3
02/09/2016	23:45:00	43.8	47.0	30.0
03/09/2016	00:00:00	41.6	43.0	29.3
03/09/2016	00:15:00	42.0	41.2	28.1
03/09/2016	00:30:00	41.6	42.3	28.5
03/09/2016	00:45:00	43.4	46.9	30.2
03/09/2016	01:00:00	41.6	40.1	30.6
03/09/2016	01:15:00	41.2	41.2	29.3
03/09/2016	01:30:00	40.0	42.4	31.9
03/09/2016	01:45:00	39.0	40.6	31.7
03/09/2016	02:00:00	41.3	42.0	30.3
03/09/2016	02:15:00	41.0	39.5	28.9
03/09/2016	02:30:00	40.0	38.1	29.9
03/09/2016	02:45:00	39.9	39.4	27.1
03/09/2016	03:00:00	39.2	39.9	25.7
03/09/2016	03:15:00	43.4	42.5	29.6
03/09/2016	03:30:00	41.2	40.2	28.7
03/09/2016	03:45:00	40.7	39.9	30.1
03/09/2016	04:00:00	43.3	43.6	30.8
03/09/2016	04:15:00	41.6	42.5	29.0
03/09/2016	04:30:00	37.5	41.0	30.5
03/09/2016	04:45:00	37.9	38.4	25.7
03/09/2016	05:00:00	40.7	41.7	31.7
03/09/2016	05:15:00	42.7	36.6	32.3
03/09/2016	05:30:00	40.8	37.9	33.9

Date	Time	Leq	L10	L90
03/09/2016	05:45:00	40.1	36.9	33.3
03/09/2016	06:00:00	42.6	39.5	30.7
03/09/2016	06:15:00	43.9	39.4	33.8
03/09/2016	06:30:00	41.0	37.3	31.7
03/09/2016	06:45:00	38.9	37.6	32.9
03/09/2016	07:00:00	43.4	41.9	33.3
03/09/2016	07:15:00	44.5	48.4	31.8
03/09/2016	07:30:00	43.6	44.6	38.4
03/09/2016	07:45:00	44.2	43.6	37.3
03/09/2016	08:00:00	46.4	48.9	39.3
03/09/2016	08:15:00	48.0	50.1	37.6
03/09/2016	08:30:00	44.8	47.0	34.0
03/09/2016	08:45:00	47.3	50.0	38.1
03/09/2016	09:00:00	47.1	50.8	36.6
03/09/2016	09:15:00	48.0	51.8	37.3
03/09/2016	09:30:00	46.4	48.5	36.2
03/09/2016	09:45:00	46.4	48.5	35.5
03/09/2016	10:00:00	49.5	51.0	40.0
03/09/2016	10:15:00	44.9	46.4	36.1
03/09/2016	10:30:00	48.8	51.4	38.7
03/09/2016	10:45:00	47.5	49.9	37.2
03/09/2016	11:00:00	46.1	45.0	37.6
03/09/2016	11:15:00	47.9	51.4	38.5
03/09/2016	11:30:00	47.8	52.3	38.6
03/09/2016	11:45:00	48.6	50.8	38.9
03/09/2016	12:00:00	49.8	50.4	38.4
03/09/2016	12:15:00	50.8	48.6	41.1

NSR 10 Baseline noise monitoring data

Date	Time	Leq	L10	L90
31/08/2016	18:17:00	55.4	59.8	47.0
31/08/2016	18:30:00	53.6	57.7	45.5
31/08/2016	18:45:00	54.4	58.5	44.9
31/08/2016	19:00:00	56.9	61.4	45.0
31/08/2016	19:15:00	55.1	59.2	44.8
31/08/2016	19:30:00	53.2	56.9	45.6
31/08/2016	19:45:00	54.9	59.2	44.7
31/08/2016	20:00:00	53.9	59.9	45.6
31/08/2016	20:15:00	53.5	57.4	45.0
31/08/2016	20:30:00	51.6	56.7	43.5
31/08/2016	20:45:00	52.9	57.4	44.8
31/08/2016	21:00:00	52.4	57.6	42.8
31/08/2016	21:15:00	51.8	56.1	42.8
31/08/2016	21:30:00	53.0	57.7	43.7
31/08/2016	21:45:00	56.9	60.9	48.2
31/08/2016	22:00:00	52.1	55.7	43.5
31/08/2016	22:15:00	51.7	55.5	42.3
31/08/2016	22:30:00	48.0	50.0	40.1
31/08/2016	22:45:00	49.1	53.3	39.9
31/08/2016	23:00:00	47.6	49.5	38.7
31/08/2016	23:15:00	48.1	50.8	37.8
31/08/2016	23:30:00	46.3	50.6	38.2
31/08/2016	23:45:00	47.5	47.3	39.3
01/09/2016	00:00:00	46.8	49.6	38.1
01/09/2016	00:15:00	44.6	46.2	35.5
01/09/2016	00:30:00	41.4	43.6	34.2
01/09/2016	00:45:00	43.8	46.4	32.7
01/09/2016	01:00:00	40.4	41.6	33.4
01/09/2016	01:15:00	39.6	38.8	33.1
01/09/2016	01:30:00	36.7	39.4	32.7
01/09/2016	01:45:00	36.5	39.4	31.2
01/09/2016	02:00:00	37.0	39.7	33.4
01/09/2016	02:15:00	42.3	42.0	33.4
01/09/2016	02:30:00	42.0	39.7	32.7
01/09/2016	02:45:00	35.1	38.2	31.3
01/09/2016	03:00:00	36.5	40.9	31.3
01/09/2016	03:15:00	37.7	41.2	32.3
01/09/2016	03:30:00	36.2	39.7	32.4
01/09/2016	03:45:00	39.6	41.0	33.1
01/09/2016	04:00:00	36.7	40.3	32.4

Date	Time	Leq	L10	L90
01/09/2016	04:15:00	38.9	42.4	33.2
01/09/2016	04:30:00	39.5	43.4	33.5
01/09/2016	04:45:00	41.3	44.7	34.9
01/09/2016	05:00:00	38.1	42.4	31.0
01/09/2016	05:15:00	41.7	43.5	34.5
01/09/2016	05:30:00	36.7	40.9	31.2
01/09/2016	05:45:00	39.7	43.5	32.8
01/09/2016	06:00:00	39.7	43.2	31.5
01/09/2016	06:15:00	39.2	43.0	30.6
01/09/2016	06:30:00	38.1	41.4	30.6
01/09/2016	06:45:00	39.9	41.4	31.2
01/09/2016	07:00:00	40.3	44.1	32.2
01/09/2016	07:15:00	45.3	49.7	33.7
01/09/2016	07:30:00	45.3	49.1	36.6
01/09/2016	07:45:00	46.2	49.2	37.7
01/09/2016	08:00:00	47.7	51.4	38.7
01/09/2016	08:15:00	48.4	52.2	40.1
01/09/2016	08:30:00	47.6	51.2	40.8
01/09/2016	08:45:00	48.5	52.2	40.9
01/09/2016	09:00:00	51.6	55.9	44.2
01/09/2016	09:15:00	50.7	55.2	42.1
01/09/2016	09:30:00	54.1	57.7	46.5
01/09/2016	09:45:00	51.3	55.2	44.2
01/09/2016	10:00:00	51.2	54.2	45.2
01/09/2016	10:15:00	53.8	54.9	46.6
01/09/2016	10:30:00	52.1	56.3	46.5
01/09/2016	10:45:00	53.5	57.9	47.6
01/09/2016	11:00:00	53.1	56.1	48.4
01/09/2016	11:15:00	54.1	58.0	48.0
01/09/2016	11:30:00	54.6	57.1	45.2
01/09/2016	11:45:00	55.1	59.4	47.5
01/09/2016	12:00:00	53.5	58.2	46.8
01/09/2016	12:15:00	52.9	55.9	46.4
01/09/2016	12:30:00	54.1	59.0	48.4
01/09/2016	12:45:00	56.1	61.0	51.1
01/09/2016	13:00:00	53.7	57.2	49.8
01/09/2016	13:15:00	54.3	58.3	48.5
01/09/2016	13:30:00	54.2	59.3	49.6
01/09/2016	13:45:00	54.9	59.1	50.0
01/09/2016	14:00:00	54.2	59.1	49.2
01/09/2016	14:15:00	55.2	60.0	50.1
01/09/2016	14:30:00	58.4	62.5	50.1
01/09/2016	14:45:00	54.2	58.6	47.8
01/09/2016	15:00:00	53.8	57.7	47.9
01/09/2016	15:15:00	55.8	60.1	47.2

Date	Time	Leq	L10	L90
01/09/2016	15:30:00	53.7	59.4	45.0
01/09/2016	15:45:00	55.3	60.8	45.5
01/09/2016	16:00:00	54.5	58.5	46.5
01/09/2016	16:15:00	54.0	58.7	46.1
01/09/2016	16:30:00	54.6	59.6	46.5
01/09/2016	16:45:00	53.7	59.1	42.5
01/09/2016	17:00:00	54.1	59.5	43.4
01/09/2016	17:15:00	53.0	56.0	44.0
01/09/2016	17:30:00	52.3	55.4	43.4
01/09/2016	17:45:00	53.2	56.8	43.4
01/09/2016	18:00:00	54.9	59.8	47.0
01/09/2016	18:15:00	54.1	57.7	45.5
01/09/2016	18:30:00	53.8	58.5	44.0
01/09/2016	18:45:00	53.8	58.9	44.7
01/09/2016	19:00:00	53.9	59.2	46.0
01/09/2016	19:15:00	55.5	60.2	46.8
01/09/2016	19:30:00	49.7	55.3	40.7
01/09/2016	19:45:00	49.8	54.7	41.5
01/09/2016	20:00:00	47.5	52.7	39.8
01/09/2016	20:15:00	52.6	57.7	44.7
01/09/2016	20:30:00	49.8	55.0	43.2
01/09/2016	20:45:00	50.1	53.7	42.9
01/09/2016	21:00:00	49.0	53.6	43.0
01/09/2016	21:15:00	49.0	53.2	41.9
01/09/2016	21:30:00	49.6	54.6	42.6
01/09/2016	21:45:00	50.0	54.3	43.5
01/09/2016	22:00:00	50.4	55.2	43.1
01/09/2016	22:15:00	52.7	56.4	45.0
01/09/2016	22:30:00	53.1	58.2	46.1
01/09/2016	22:45:00	53.3	57.6	45.7
01/09/2016	23:00:00	48.9	53.4	42.2
01/09/2016	23:15:00	49.0	53.2	42.5
01/09/2016	23:30:00	46.8	51.0	40.8
01/09/2016	23:45:00	49.9	53.8	42.6
02/09/2016	00:00:00	49.7	54.2	43.5
02/09/2016	00:15:00	46.9	50.5	40.5
02/09/2016	00:30:00	44.0	47.9	39.2
02/09/2016	00:45:00	44.4	48.4	38.5
02/09/2016	01:00:00	45.2	49.1	40.2
02/09/2016	01:15:00	44.7	49.4	37.5
02/09/2016	01:30:00	46.2	49.9	39.9
02/09/2016	01:45:00	45.6	49.0	39.6
02/09/2016	02:00:00	45.1	49.4	39.3
02/09/2016	02:15:00	46.2	50.2	39.7
02/09/2016	02:30:00	45.5	49.4	39.3

Date	Time	Leq	L10	L90
02/09/2016	02:45:00	44.8	48.9	38.2
02/09/2016	03:00:00	43.0	46.9	36.3
02/09/2016	03:15:00	43.5	45.7	34.9
02/09/2016	03:30:00	44.6	48.8	38.1
02/09/2016	03:45:00	47.7	51.1	41.4
02/09/2016	04:00:00	41.8	44.7	36.7
02/09/2016	04:15:00	43.0	44.4	35.7
02/09/2016	04:30:00	43.8	44.8	37.5
02/09/2016	04:45:00	43.1	45.0	37.5
02/09/2016	05:00:00	43.9	46.4	37.7
02/09/2016	05:15:00	40.3	44.1	34.3
02/09/2016	05:30:00	42.3	43.2	35.7
02/09/2016	05:45:00	42.4	44.6	35.9
02/09/2016	06:00:00	43.1	46.6	38.4
02/09/2016	06:15:00	44.9	48.1	40.0
02/09/2016	06:30:00	44.5	47.6	39.4
02/09/2016	06:45:00	44.0	46.5	38.2
02/09/2016	07:00:00	45.5	48.7	39.0
02/09/2016	07:15:00	44.7	46.9	38.2
02/09/2016	07:30:00	48.4	52.1	44.5
02/09/2016	07:45:00	48.4	49.3	41.5
02/09/2016	08:00:00	47.5	49.5	39.2
02/09/2016	08:15:00	50.7	53.2	43.2
02/09/2016	08:30:00	51.8	54.8	43.5
02/09/2016	08:45:00	51.6	53.7	43.8
02/09/2016	09:00:00	48.6	51.8	43.3
02/09/2016	09:15:00	51.0	55.1	43.5
02/09/2016	09:30:00	50.7	54.7	42.4
02/09/2016	09:45:00	52.1	56.8	43.6
02/09/2016	10:00:00	50.3	55.2	42.1
02/09/2016	10:15:00	52.6	57.5	43.5
02/09/2016	10:30:00	50.9	55.4	41.3
02/09/2016	10:45:00	50.2	54.8	41.7
02/09/2016	11:00:00	51.9	57.3	43.0
02/09/2016	11:15:00	55.1	60.0	45.8
02/09/2016	11:30:00	50.9	56.1	40.8
02/09/2016	11:45:00	51.9	57.0	41.4
02/09/2016	12:00:00	49.7	56.2	40.4
02/09/2016	12:15:00	52.0	58.2	41.3
02/09/2016	12:30:00	50.7	57.4	39.4
02/09/2016	12:45:00	51.9	56.9	40.7
02/09/2016	13:00:00	49.9	56.9	39.3
02/09/2016	13:15:00	50.2	56.3	40.2
02/09/2016	13:30:00	49.3	55.4	38.9
02/09/2016	13:45:00	51.3	57.4	41.0

Date	Time	Leq	L10	L90
02/09/2016	14:00:00	50.8	55.9	42.2
02/09/2016	14:15:00	52.3	57.9	42.3
02/09/2016	14:30:00	51.1	56.9	41.2
02/09/2016	14:45:00	49.0	53.2	39.2
02/09/2016	15:00:00	51.8	56.0	42.1
02/09/2016	15:15:00	47.0	53.4	36.0
02/09/2016	15:30:00	48.1	54.4	37.5
02/09/2016	15:45:00	48.8	54.6	37.5
02/09/2016	16:00:00	50.0	56.7	40.8
02/09/2016	16:15:00	53.1	58.4	45.0
02/09/2016	16:30:00	52.0	58.0	42.2
02/09/2016	16:45:00	53.6	57.5	44.5
02/09/2016	17:00:00	52.4	58.3	43.5
02/09/2016	17:15:00	51.8	57.2	42.5
02/09/2016	17:30:00	48.3	54.9	40.3
02/09/2016	17:45:00	49.6	56.2	39.3
02/09/2016	18:00:00	50.0	55.0	40.7
02/09/2016	18:15:00	49.4	52.9	40.1
02/09/2016	18:30:00	50.0	55.2	41.1
02/09/2016	18:45:00	52.9	58.2	43.2
02/09/2016	19:00:00	48.6	51.6	39.8
02/09/2016	19:15:00	51.4	56.5	41.8
02/09/2016	19:30:00	50.5	55.5	40.6
02/09/2016	19:45:00	50.5	55.4	39.8
02/09/2016	20:00:00	49.9	55.6	39.7
02/09/2016	20:15:00	49.8	54.7	38.9
02/09/2016	20:30:00	48.0	52.9	38.0
02/09/2016	20:45:00	50.6	55.1	41.2
02/09/2016	21:00:00	49.6	54.4	38.7
02/09/2016	21:15:00	50.3	55.0	38.6
02/09/2016	21:30:00	48.8	54.9	38.6
02/09/2016	21:45:00	48.8	53.1	37.3
02/09/2016	22:00:00	47.6	52.9	37.5
02/09/2016	22:15:00	47.3	52.6	37.4
02/09/2016	22:30:00	47.5	52.9	35.0
02/09/2016	22:45:00	44.9	49.8	33.3
02/09/2016	23:00:00	43.9	48.8	31.8
02/09/2016	23:15:00	44.0	45.2	30.9
02/09/2016	23:30:00	45.6	50.1	32.3
02/09/2016	23:45:00	45.1	48.8	30.9
03/09/2016	00:00:00	42.4	44.7	30.2
03/09/2016	00:15:00	43.3	42.8	29.0
03/09/2016	00:30:00	42.5	44.0	29.3
03/09/2016	00:45:00	44.7	48.8	31.1
03/09/2016	01:00:00	42.5	41.8	31.5

Date	Time	Leq	L10	L90
03/09/2016	01:15:00	42.4	42.8	30.2
03/09/2016	01:30:00	40.8	44.1	32.9
03/09/2016	01:45:00	40.1	42.2	32.7
03/09/2016	02:00:00	42.1	43.7	30.5
03/09/2016	02:15:00	45.3	44.1	32.7
03/09/2016	02:30:00	40.8	39.6	30.8
03/09/2016	02:45:00	41.1	41.0	27.9
03/09/2016	03:00:00	40.0	41.5	26.5
03/09/2016	03:15:00	44.7	44.2	30.5
03/09/2016	03:30:00	42.1	41.8	29.6
03/09/2016	03:45:00	41.9	41.5	31.0
03/09/2016	04:00:00	44.1	45.3	31.7
03/09/2016	04:15:00	42.9	44.2	29.9
03/09/2016	04:30:00	38.3	42.7	31.4
03/09/2016	04:45:00	39.1	40.0	26.4
03/09/2016	05:00:00	41.5	43.3	32.6
03/09/2016	05:15:00	44.0	38.0	33.3
03/09/2016	05:30:00	41.6	39.4	34.2
03/09/2016	05:45:00	41.3	38.4	34.3
03/09/2016	06:00:00	46.4	44.0	34.7
03/09/2016	06:15:00	45.2	41.0	34.8
03/09/2016	06:30:00	41.8	38.8	32.6
03/09/2016	06:45:00	41.5	40.6	33.9
03/09/2016	07:00:00	44.3	43.6	34.3
03/09/2016	07:15:00	45.9	50.4	32.7
03/09/2016	07:30:00	44.4	46.4	39.5
03/09/2016	07:45:00	45.5	45.3	38.5
03/09/2016	08:00:00	47.3	50.8	40.5
03/09/2016	08:15:00	49.4	52.1	38.7
03/09/2016	08:30:00	45.7	48.9	35.0
03/09/2016	08:45:00	48.7	52.0	39.3
03/09/2016	09:00:00	48.0	52.8	37.0
03/09/2016	09:15:00	49.5	53.9	38.4
03/09/2016	09:30:00	47.3	50.4	37.3
03/09/2016	09:45:00	50.8	53.5	39.6
03/09/2016	10:00:00	50.5	53.1	41.2
03/09/2016	10:15:00	46.2	48.3	37.2
03/09/2016	10:30:00	49.7	53.4	39.8
03/09/2016	10:45:00	48.9	51.9	38.4
03/09/2016	11:00:00	47.0	46.8	38.8
03/09/2016	11:15:00	49.4	53.4	39.7
03/09/2016	11:30:00	48.8	54.4	39.8
03/09/2016	11:45:00	50.0	52.8	40.0
03/09/2016	12:00:00	50.8	52.4	39.6
03/09/2016	12:15:00	51.8	50.1	41.9

Date	Time	Leq	L10	L90
03/09/2016	12:30:00	52.8	49.2	41.6
03/09/2016	12:45:00	53.9	48.1	43.6

Appendix ii Sound Level meter(s) Calibration Certificates

Calibration Certificate

Certificate Number 2015002932

Customer:
Environmental Measurement
Unit 12
Dublin, 24, Ireland

Model Number	831	***Procedure Number***	D0001.8384
Serial Number	0003919	***Technician***	Ron Harris
Test Results	**Pass**	***Calibration Date***	1 Apr 2015
Initial Condition	As Manufactured	***Calibration Due***	
Description	Larson Davis Model 831	***Temperature***	23.47 °C ± 0.01 °C
		Humidity	49.7 %RH ± 0.5 %RH
		Static Pressure	86.36 kPa ± 0.03 kPa

Evaluation Method ***Tested with:***
PRM831, S/N 036773
377B02, S/N 151523

Data reported in dB re 20 µPa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8378.

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2005.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2008.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the stability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
SRS DS360 Ultra Low Distortion Generator	07/08/2014	07/08/2015	006311
Hart Scientific 2626-S Humidity/Temperature Sensor	05/16/2014	05/16/2015	006943
Larson Davis CAL200 Acoustic Calibrator	08/06/2014	08/06/2015	007027
Larson Davis Model 831	03/05/2015	03/05/2016	007182
1/2 inch Microphone - P - 0V	03/11/2014	03/11/2015	007185
Larson Davis CAL291 Residual Intensity Calibrator	09/26/2014	09/26/2015	007287

Larson Davis, a division of PCB Piezotronics, Inc
1681 West 820 North
Provo, UT 84601, United States
716-684-0001

ACCREDITED

LARSON DAVIS
A PCB PIEZOTRONICS DIV.

5/1/2015 12:17:14PM

CERTIFICATE OF CALIBRATION

Issued by: **MTS Calibration Ltd**

Laboratory address: 17 Elvington Close
Billingham TS23 3YS
England

Telephone: +44 (0)1642 876 410

Please note delivery address below

Date of Issue: 07 April 2016 **Certificate Number:** 28575

Sound Level Meter Periodic Tests to BS EN 61672-3: 2006 Class 1

Client: Fitzsimons Walsh

Instrument Make:	**Larson Davis**	***Microphone Make:***	**PCB**
Instrument Model:	**831**	***Microphone Model:***	**377B02**
Serial Number:	**0002920**	***Serial Number:***	**151523**
Preamplifier Make:	**PCB**	***Calibrator Make:***	Larson Davis
Preamplifier Model:	**PRM831**	***Calibrator Model:***	CAL200
Serial Number:	**036773**	***Calibrator Serial Number:***	9175
		Calibrator Adaptor:	none
		Calibrator Certification Ref:	S 6560

Other Accessories supplied:

none

MTS Calibration Ltd has obtained evidence which is generally available to the public that an independent testing organisation responsible for pattern approvals has demonstrated that this model of sound level meter has successfully completed the pattern evaluation tests of IEC 61672-2: 2003. This instrument, which was constructed to the requirements of BS EN 61672-1:2002 Class 1, has been tested using the procedures for periodic testing as specified in BS EN 61672-3: 2006.

The sound level meter submitted for testing has successfully completed the Class 1 periodic tests of IEC 61672-3: 2006 for the environmental conditions under which the tests were performed. As public evidence was available from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2: 2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1: 2002, the sound level meter submitted for testing conforms to the Class 1 requirements of IEC 61672-1: 2002

In conducting these measurements, it was necessary to use manufacturer's data. This was taken from the instruction manual of the instrument.

I831.01 Rev J

The instrument was within the above specification as received - no modifications were made

Ambient Temperature at Calibration (deg C)	23.9	Calibration check frequency (Hz)	1000.1
Ambient Pressure at Calibration (mPa)	1004.1	Reference Sound Pressure Level (dBA)	114.0
Ambient Relative Humidity at Calibration (%)	35.9	Reference Level Range dB	Normal

Test Equipment:

Equipment	Manufacturer	Model	Serial No.	Traceability Ref.	Cal. Due
Condenser Microphone	Larson Davis	2541	7300	TE 157	Oct-17
Acoustic Calibrator 1kHz	Larson Davis	CAL200	9175	TE 208	Sep-17
Acoustic Calibrator	Brüel & Kjær	4226	2141963	TE 206	Sep-16
Signal Generator (set 2)	Agilent	33120A	MY40007806	TE 160	Sep-16
Real-Time Frequency Analyser (set 3)	Larson Davis	2900	0510	TE 165	Oct-16

Date of Receipt: 5 April 2016
Date of Periodic Test 7 April 2016
Date of Certificate: 7 April 2016

Authorised signatory:

Tony Sherris

Page: 1 **of:** 12

MTS Calibration Ltd
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Restoration of sandpit at

Boherkill, Co Kildare

Further information Item 14

Report prepared for Michael Ennis by
Roger Goodwillie, M.Sc., MCIEEM

September 2016

1. INTRODUCTION

This report is written in response to Item 14 in the request for further information by Kildare County Council. This required

a) a detailed habitat map
b) a breeding bird survey, particularly of birds of conservation concern
c) bio-security measures necessary to prevent the establishment of invasive species

The report is written by Roger Goodwillie, a Member of the Chartered Institute of Ecology and Environmental Management and is based on field visits in May and June 2015 and July 2016.

A) HABITAT MAP

The map has been produced based on the classification of Fossitt (2000). Although substantially inactive today the quarry retains a large area of bare sediment (active quarries and mines), either dumped in piles, collapsed from internal cliffs or on ground trafficked by machinery. Rainwater collects in places but there is no permanent water on site. Plants attempt to colonise the sediment but at first they are well scattered and make little impression on soil development (spoil and bare ground). Many of the initial species are leguminous (i.e. they fix nitrogen) and once there is some organic matter and nutrient content in the soil, a more permanent cover can develop (recolonising bare ground). At Boherkill there are few willows in this vegetation as yet and they are mostly associated with hedging along the western side of the pit. They are thus included in one of the hedgerow types – either low mounds of tall grasses, bracken or bushes (low hedge/bank) or those with trees, taller than 5m (hedgerow with trees).

B) BREEDING BIRDS

A sand quarry supplies little cover for nesting birds and the main species is the sand martin which had 10-20 pairs in 2015 and 20-25 pairs in 2016. The estimation figure derives from the fact that not all burrows are occupied and ones from preceding years are seldom used again. A small increase is consistent with overall trends (Balmer et al 2013) though data from two years is not conclusive.

No other species was proved to breed in the quarry void though pied wagtail may have succeeded in vegetation overhanging the lip. The other species seen in summer and probably breeding in the marginal trees and hedges were

Sparrowhawk (probably visiting only)	Wren
Jackdaw	Blackbird
Magpie	Song thrush
Hooded crow	Robin
Goldcrest	Dunnock
Coal tit	Chaffinch
Blue tit	Greenfinch
Willow warbler	Goldfinch

Since all these are frequent species there seemed no need for an accurate census of numbers, particularly since works at the quarry would not have any impact on marginal vegetation. No

yellowhammer were recorded on any of the site visits though they do occur in the north Kildare area. (The yellowhammer, like the sand martin, is an amber-listed bird of conservation concern in Colhoun & Cummins, 2013).

The position of the sand martin colony in the SW corner is shown on the habitat map. There is no likelihood of them colonising other faces in this quarry because there is little suitable sediment. The SW face will be the last place to be filled so there will be no impact on the bird for many years. On-going vehicular work will not cause disturbance and it is only when the clearance under the burrows is reduced to about 3m that the face will become unsuitable. By that time, it is quite likely that another quarry or riverbank site will have been exposed. They have little site loyalty and may abandon a site or colonise new areas in response to the condition of the exposed face when they arrive in spring (March/April). It is unrealistic to expect them to persist indefinitely at Boherkill whether the site is filled or not.

C) BIOSECURITY FOR INVASIVE SPECIES

Japanese knotweed is the main cause for concern as it is generally associated with buildings/gardens in urban areas that may be demolished, and also would become established if introduced

All personnel on site will be trained to identify Japanese and related knotweeds and know how to manage them.
An inventory of truck visits will be maintained on site and all incoming drivers will be made aware that

- it is illegal to dump Japanese knotweed waste in the countryside.
- waste containing Japanese knotweed will not be accepted and will be returned to the operator

A fenced quarantine area will be established at the site so that any loads which cannot be cleared on arrival will be retained and examined before disposal.

The disposal area will be monitored regularly in the growing season and if any plants appear, they will be treated in their first year with effective control measures.

References

Balmer, D., Gillings, S., Caffrey, B., Swann, B., Downie, I. & Fuller, R. 2013. *Bird Atlas 2007-11 – the breeding and wintering birds of Britain and Ireland*. BTO, Thetford.

Colhoun, K. & Cummins, S. 2013. Birds of conservation concern 2014-2019. *Irish Birds* 9, 523-544

Simplified habitat map of Boherkill Quarry with sand martin colony arrowed