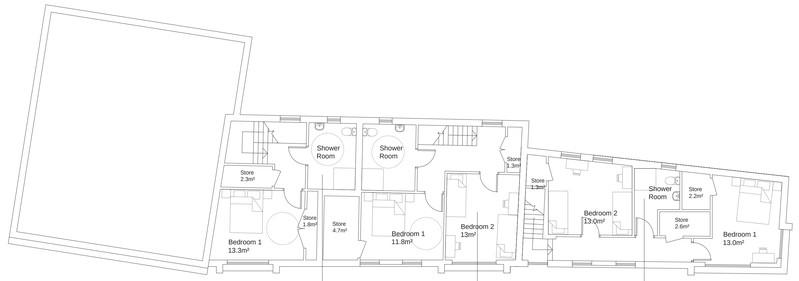
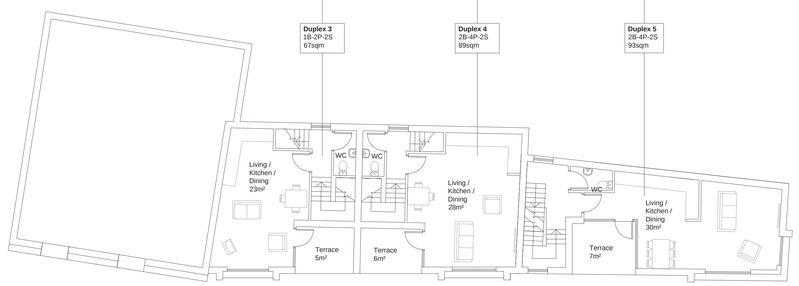


PROPOSED SECOND FLOOR PLAN

SCALE 1:100



PROPOSED FIRST FLOOR PLAN

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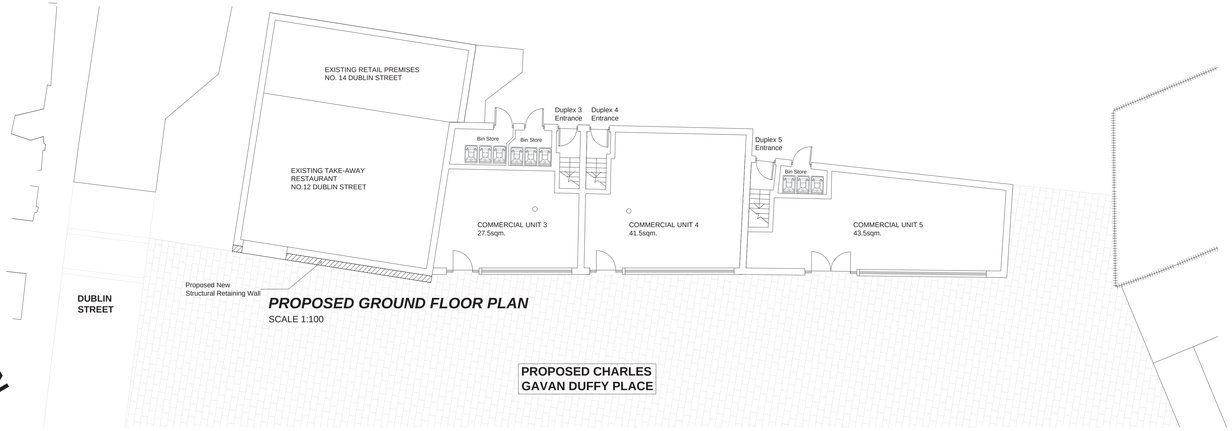

PROPOSED GROUND FLOOR PLAN

SCALE 1:100

PROPOSED CHARLES GAVAN DUFFY PLACE

PROPOSED SOUTH ELEVATION

SCALE 1:100

PROPOSED WEST ELEVATION

SCALE 1:100

PROPOSED DEVELOPMENT TO THE EAST EDGE OF CHARLES GAVAN DUFFY PLACE

NOTES

1. All measurements shown are in metres, and all levels are to ordnance datum unless otherwise indicated

2. All Coordinates are to Irish Grid, unless otherwise noted.

Rev	Issue Date	Description	App
-	-	-	-

Status	PLANNING
Client	Monaghan County Council
Project	Dublin Street South
Drawing	Development to East Edge of CGDP Proposed Floor Plans & Elevation
Scale	1:100 @ A0

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Drawn	moc	Checked	eh	Approved	moc
Date	23/11/23	Date	23/11/23	Date	23/11/23

Project Number	Drawing Number	Revision
A2156	200-102	-

All dimensions are in metres. Figured dimensions to be taken in preference to scale dimensions. Dimensions to be checked on site. © 2021 McAdam Design Ltd.

NOTES

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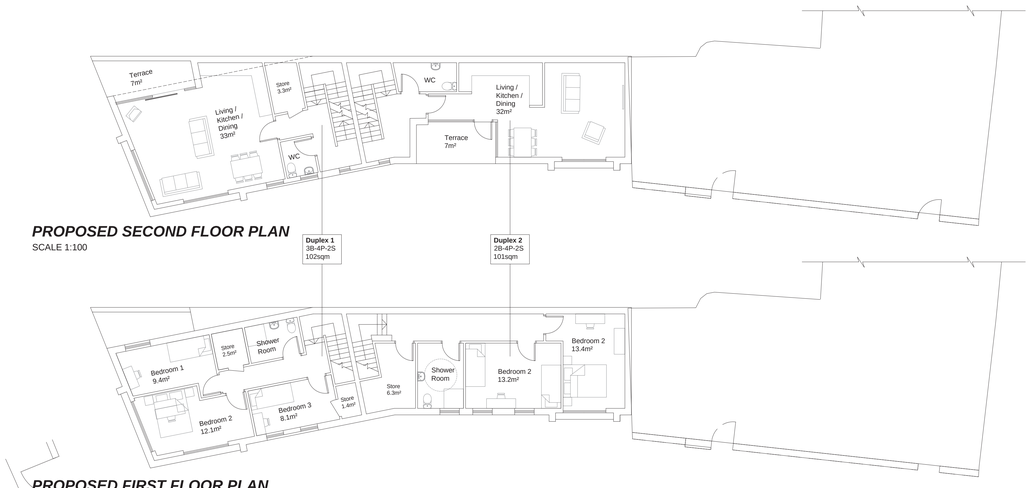

PROPOSED SECOND FLOOR PLAN
SCALE 1:100

PROPOSED FIRST FLOOR PLAN
SCALE 1:100

PROPOSED GROUND FLOOR PLAN
SCALE 1:100

PROPOSED CHARLES GAVAN DUFFY PLACE

PROPOSED SOUTH ELEVATION
SCALE 1:100

PROPOSED EAST ELEVATION
SCALE 1:100

PROPOSED DEVELOPMENT TO THE WEST EDGE OF CHARLES GAVAN DUFFY PLACE

Rev	Issue Date	Description	App
-	-	-	-

Status	PLANNING
Client	Monaghan County Council
Project	Dublin Street South
Drawing	Development to West Edge of CGDP Proposed Floor Plans & Elevation
Scale	1:100 @ A0

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Drawn	Checked	Approved
moc	eh	moc
Date 23/11/23	Date 23/11/23	Date 23/11/23

Project Number	Drawing Number	Revision
A2156	200-101	-

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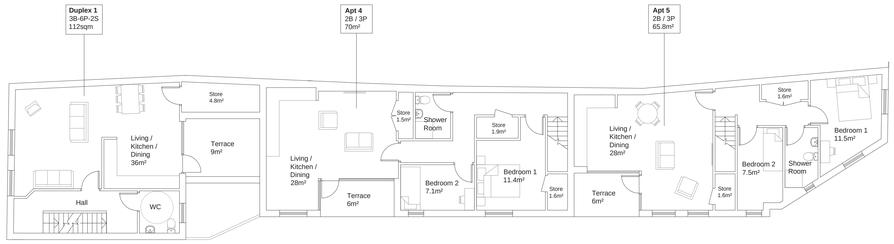
Appendix

2h

Housing Proposals

PROPOSED SECOND FLOOR PLAN

SCALE 1:100



PROPOSED FIRST FLOOR PLAN

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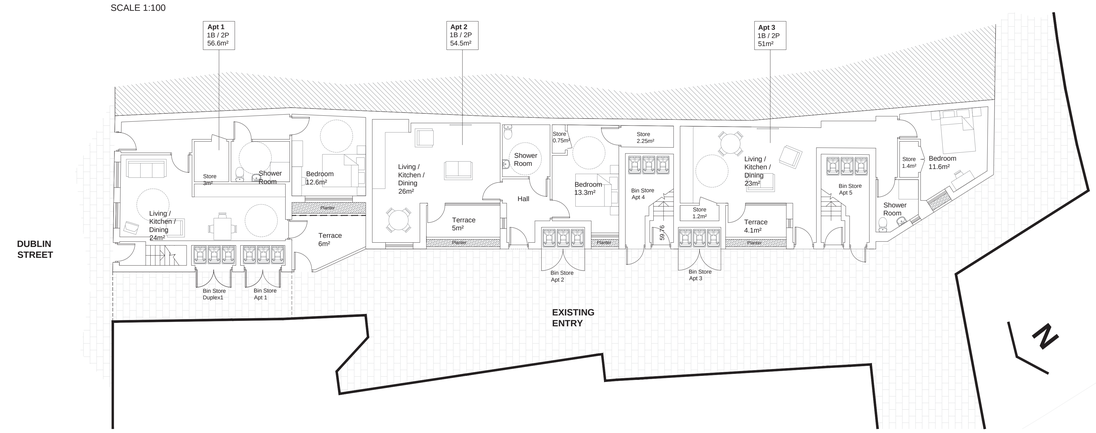


PROPOSED GROUND FLOOR PLAN

SCALE 1:100

SCHEDULE OF AREAS

Duplex 1	3B-6P-2S	
	Width (m)	Area (m²)
Bedroom 1	2.80	11.40
Bedroom 2	2.80	11.70
Bedroom 3	3.56	13.00
Total Storage Area		9.80
Total Kitchen / Living / Dining Area		36.00
Gross Internal Area		112.00

Apartment 1	1B-2P-1S	
	Width (m)	Area (m²)
Bedroom 1	3.40	14.6
Total Storage Area		3.00
Total Kitchen / Living / Dining Area		24.00
Gross Internal Area		58.80

Apartment 2	1B-2P-1S	
	Width (m)	Area (m²)
Bedroom 1	3.08	13.30
Total Storage Area		3.00
Total Kitchen / Living / Dining Area		26.00
Gross Internal Area		54.80

Apartment 3	1B-2P-1S	
	Width (m)	Area (m²)
Bedroom 1	2.97	12.30
Total Storage Area		2.8 (-15%)
Total Kitchen / Living / Dining Area		23.00
Gross Internal Area		51.00

Apartment 4	2B-3P-1S	
	Width (m)	Area (m²)
Bedroom 1	2.10	7.10
Bedroom 2	3.17	11.40
Total Storage Area		5.00
Total Kitchen / Living / Dining Area		28.00
Gross Internal Area		70.00

Apartment 5	2B-3P-1S	
	Width (m)	Area (m²)
Bedroom 1	2.80	11.50
Bedroom 2	2.10	7.50
Total Storage Area		3.2 (+38%)
Total Kitchen / Living / Dining Area		29.00
Gross Internal Area		65.80

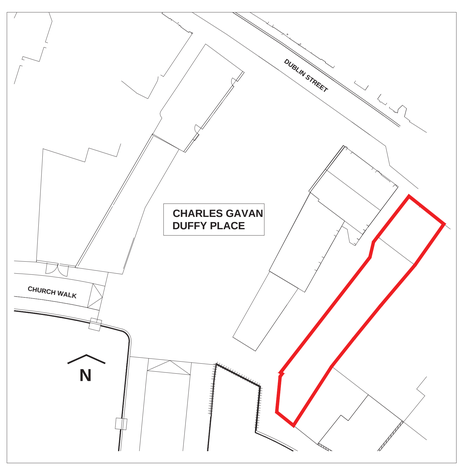
PROPOSED SOUTH ELEVATION

SCALE 1:100

PROPOSED WEST ELEVATION

SCALE 1:100

PROPOSED HOUSING DEVELOPMENT SITE



NOTES

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2. All Coordinates are to Irish Grid, unless otherwise noted.

Rev	Issue Date	Description	App

Status: PLANNING

Client: Monaghan County Council

Project: Dublin Street South

Drawing: Housing Development Site
Proposed Floor Plans & Elevations

Scale: 1:100 @ A0

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Drawn	Date	Checked	Date	Approved	Date
moc	23/11/23	eh	23/11/23	moc	23/11/23

Project Number	Drawing Number	Revision
A2156	200-103	-

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Proposed Elevation

Dublin St South – Housing Scheme

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Dublin St South – Housing Scheme

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Appendix

2i

Design Statements

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SOUTH DUBLIN STREET & BACKLANDS REGENERATION PROJECT

A2180

Design Statement - Architecture

PREPARED BY	CHECKED BY	APPROVED BY	ISSUE	DATE
MOC	KOS	CC	Rev1	30/11/23

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Contents

1 INTRODUCTION

1.1 Project Brief

McAdam Design were appointed by Monaghan County Council (MCC), to assist in addressing the issues raised in the Further Information (FI) request from An Bord Pleanála (ABP) in relation to the submitted planning application for the Regeneration Scheme, and the five associated submissions.
McAdam has provided architectural design services, and developed the high quality photomontages and visuals which describe the scheme.

Our work undertaken includes:

a) Review of the ABP FI request in conjunction with the 5 no. submissions from the specified prescribed bodies/third parties, with particular regard to architectural heritage issues raised.
b) Development and preparation of design proposals and high-quality architectural images for a new pedestrian square in Gavan Duffy Place
c) Update the current design proposals for the 3 existing alleyway connections from Dublin Street to the new scheme area. The design for these existing alleyways needs to incorporate new high-quality public realm (paving, street furniture, wayfinding, signage, landscaping) to create enlivened spaces and provide opportunities for new frontage developments and encourage the reuse and adaption of existing building in these locations.
d) Development and preparation of active frontage design proposals for the 3no. properties fronting onto the new pedestrian square in Gavan Duffy Place having regard to the matters raised in the ABP FI request.
e) Development and preparation of design proposals for housing units in existing alleyway

To address items b) & c) above we have collaborated with Optimised Environments Ltd (OPEN) who have provided Public Realm design expertise.

OPEN have produced a separate Design Statement relating to the Public Realm design aspects of the scheme.

1.2 Statement of Authority

McAdam Design is a multi-disciplinary design practice who have recently celebrated 60 years in existence. Our in-house Architectural department stands as a leading provider of urban development and design services in Northern Ireland, with experience in Ireland and the UK.

Project Lead

Michael O'Connor BA(Hons) Dip.Arch DAAS, is a Technical Director (Architect) at McAdam with over 20 years' experience as a Chartered Architect. Michael has extensive experience in urban design projects including: masterplanning; mixed use regeneration projects; urban infill and residential projects.

Proposed view of Gavan Duffy Place

2 DESIGN STATEMENT

2.1 Monaghan County Development Plan 2019-2025

The Proposed new development along the east and west edges of Charles Gavan Duffy Place (CGDP) has been designed in accordance with the principles set out in the Dublin Street Regeneration Plan (DSRP). The Monaghan County Development Plan 2019-2025 states that "it is an objective …… that all new development in the Dublin Street regeneration area and its associated backlands has regard to this plan." The key relevant principles of the DSRP include:

- Development should *complement and integrate* with the existing context. Integrate with the historic streetscape in a manner that is both contemporary and forward looking while complimenting the built heritage.
- Complimentary Contemporary Expression - High Quality Development – appropriate contemporary expression to compliment and act as an appropriate backdrop to existing historic structures.
- Living over the shop - with careful planning the upper floor levels have the potential to create attractive accommodation that would activate the street and provide passive surveillance. In this regard uses such as office, and smaller apartment dwellings may be appropriate.
- Active ground floor uses, fronting onto CGDP.
- Provide positive interaction between spaces and the built form, e.g building frontages, windows and entrances should face onto and overlook the street and public spaces.
- The urban form should contribute to the consolidation of the fine grain urban structures and the pattern of street blocks and buildings in the area. New developments should promote legibility in terms of the articulation of street level and roof top, the distinction of public and private areas, and primary circulation and entrances. Ensure that the height and massing of proposed new development does not impact negatively on the sustainable conservation of protected structures and the social and historic heritage of the town.
- Promote a *design led approach* to the redevelopment of infill and new development sites.

- Ensure that development delivers quality, attractive urban environments and a high level of amenity for commercial and residential developments. Promote building design that are sympathetic to and enhance the established built heritage and street patterns. Provide a new interpretation of the development of Monaghan town centre, while reinforcing its unique qualities and providing it with a new distinct identity.
- Provide for the use of high-quality materials which are durable and require a low level of maintenance, use of local or indigenous materials. Promote new design which is clearly modern and embrace recent construction methods.

2.2 Proposed Development to the West edge of CGDP

Fine urban grain structures – terrace frontage made up of 4 distinct components:

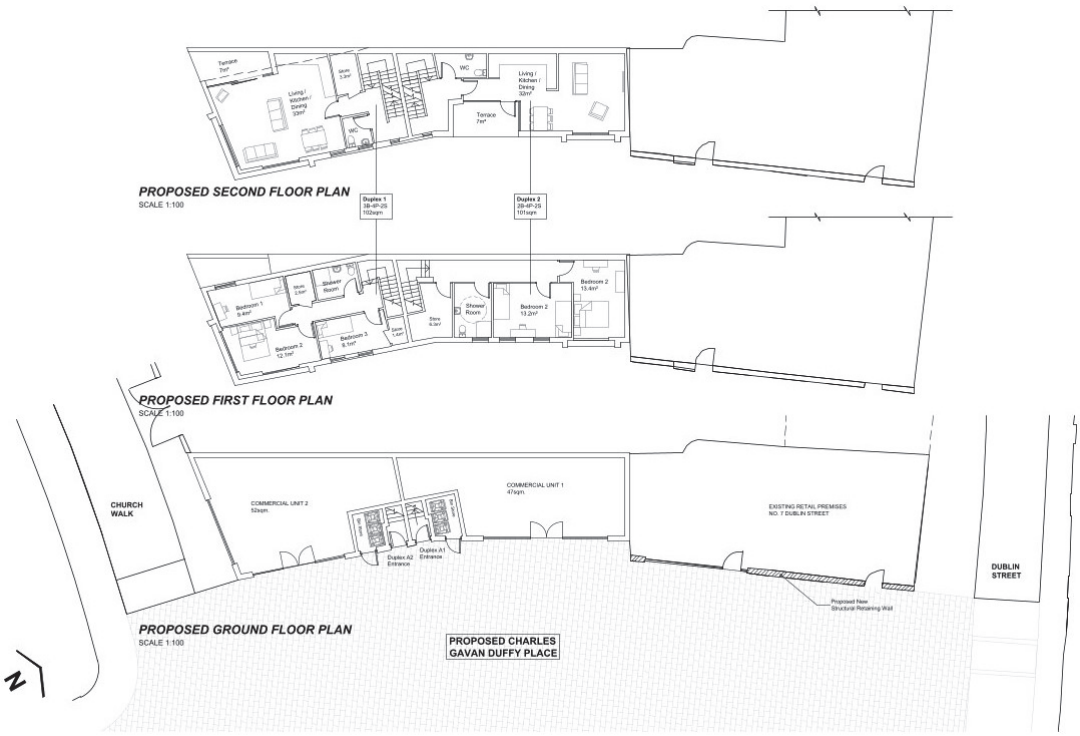
1. Gable of No.7 Dublin Street - 2 Storeys- new retaining gable will be constructed when the adjacent building is demolished. A single door at ground floor provides own door access to the residential apartment on the first floor, complimented by a first floor window. New gable façade rendered in complimentary tone to brickwork front façade.
2. Return to No.7 - 2½ Storeys - Façade and roof structure redeveloped with new:
   - 2 storey brick façade with shopfront 'punched opening' and new window to existing first floor apartment.
   - Flat roof structure with vertical face clad in pre-patinated standing seam zinc panels to replace existing slate pitched roof.
3. New 3 Storey infill to replace existing 2 storey return structure set back from adjacent above to follow ownership boundary – brick façade to ground and first floors with shopfront 'punched opening'. 2nd floor clad in pre-patinated standing seam zinc panels. Flat roof structure
4. New 3 Storey corner infill to replace existing single storey shed structure at different angle to adjacent above –ground floor brick façade with dual aspect with shopfront 'punched openings'. 2 storey rendered façade to 1st and 2nd floors. Flat roof structure

Scale & Massing

The terrace transitions from 2 storey height at Dublin St to 3 storey height at Church Walk. The parapet / ridge height increases from north to south. This helps to articulate the façade of the terrace and enhance the development scale at the southern corner with Church Walk to provide a 'book end' to the terrace composition and act as a gateway to the new urban space.

Active Frontage and 'over the shop' Living

- 3 No. ground floor commercial units for shops, café, professional services will provide an active frontage to west side of CGDP.
- 2 No. high quality duplex residential units above the commercial units will activate the street and provide passive surveillance.



Proposed Plans of Commercial and Residential Units

Character & Identity

The new development is designed to provide a *complimentary contemporary expression* to the existing built heritage and to provide CGDP with a new unique identity as follows:

- Use of layered, well-proportioned, rectilinear forms in complimentary textures and tones
- 2 storey glazed elements framed with projecting aluminium powder coated band.
- Asymmetrical arrangement of openings
- Punched openings with deep reveals
- Private external amenity space recessed into façade.

Material Palette

Selection of high-quality durable materials with a palette of complimentary light neutral tones including:

- Light grey smooth wirecut clay facing brick.
- Mid-grey powder coated aluminium windows and shopfronts.
- Light toned render
- Mid grey pre-patinated zinc standing seam cladding.
- External doors in warm toned vertical hardwood strips

Proposed Elevations – Complimentary Contemporary Expression

2.3 Proposed Development to the East edge of CGDP

The design approach to the eastern edge of CGDP is identical to the western albeit the terrace frontage is made up of 3 distinct components instead of 4.

In essence the new CGDP will be 'book ended' to Dublin Street by new retaining walled gables to the existing buildings either side of the new 'opening' and to the new Church Walk by 3 storey contemporary 'gateway' developments with rendered upper floors, punched openings and expansive double height corner glazed elements.

Proposed Elevations to East Edge of CGDP

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Dublin Street South & Backlands Regeneration Project

Design Statement: Public Realm

1. Statement of Authority

Optimised Environments Limited (OPEN | SLR) is a landscape-led multi-disciplinary practice with specialisms in public realm and landscape design. We have extensive experience in the design and delivery of urban projects comparable to Dublin Street South across the UK and Ireland, taking projects through from the definition of briefs to completion on site. We are passionate about the positive impact quality public space can make on the people who interact with it, and have developed expertise in developing an understanding of a place and developing proposals that are appropriate to enhancing a place.

The landscape proposals for Dublin Street South have been developed by Ben Palmer MA(Hons) CMLI, a Director at OPEN | SLR. Ben has over 20 years' experience as a Chartered Landscape Architect (CMLI) in the design and delivery of significant public realm and landscape, particularly projects focused on the regeneration or enhancement of urban places.

2. Public Realm Introduction

In combination with the architectural proposals, the public realm associated with Dublin Street South will provide a high quality environment that will raise the overall profile of the area and provide a legible, attractive, safe and engaging place for all to use and enjoy. A hierarchy of streets, alleyways and spaces form the foundation of the new urban structure proposed south of Dublin Street. Alterations to the adjoining streets will provide new connections to and from Dublin Street, enhancing the permeability of the area and providing a legible network of connections and spaces for pedestrian movements, seamlessly integrating into the existing urban fabric of Monaghan's Town Centre. The long term aspiration is for this new high quality setting to be a catalyst to encourage new development within the town centre, enriching the quality of the urban area.

Visualisation showing proposals for Charles Gavan Duffy Place.

The new public realm will be realised through a high quality palette of materials and street furniture, coordinating with recently delivered areas within Monaghan's Town Centre, including 'Diamond Square'. This approach ensures consistency, with areas combining to form a cohesive public realm identity for Monaghan.

New streets, alleyways and spaces are described below.

3. Charles Gavan Duffy Place

Charles Gavan Duffy Place will be a new fully pedestrianised public space connecting Dublin Street through to its 'backland' areas, opening up new sites for development and enhancing pedestrian linkages throughout this area. The new public space is formed by the demolition of existing structures fronting Dublin Street and their associated 'backland' areas. The proposals focus on fully pedestrianised high quality public realm, encouraging activity, social interaction and providing connections into a new reimagined urban place. New building frontages to the north and south provide a strong urban form, bringing animated edges and natural surveillance to the new space.

Spaces for encouraging dwell and activity.

Charles Gavan Duffy Place will benefit from a southerly orientation and will increase light onto Dublin Street. This area is intended as a multi-use space that can host events, open-air markets, pop-up commercial/retail uses, or occasional festivals. Vehicular access will be restricted to deliveries to commercial premises and waste collection for residential and commercial units. The proposed space creates a new setting and enables new opportunities for future infill development and reuse / adaptation of existing underutilised buildings on either side of the new space, creating opportunities for new commercial and residential activity. The Dublin Street Regeneration Plan 2017 suggested this area might be known as 'Charles Gavan Duffy Place'. It is proposed that this space will be dedicated to Charles Gavan Duffy, in recognition of his historical connections to this area, with aspirations to provide an appropriate high quality 'totem' information sign commemorating Charles Gavan Duffy.

The edges of Charles Gavan Duffy Place are designed to accommodate 'spill out' from adjacent ground floor uses.

Charles Gavan Duffy Place will be defined through warm toned natural stone paving, using a variety of surface textures and unit sizes to add detail and interest. This warmer toned paving will complement the surfaces used within the streets and alleyways, but will be unique within the area, marking Charles Gavan Duffy Place as an important space for Monaghan. Mature tree planting, raised planters and seating elements provide spatial definition, introducing edges for people to sit against and creating zones along the edges for café / bar spill out. The raised planters will contain a range of mulitstem trees, shrubs, ornamental grasses, perennials, and bulbs to provide seasonal colour and variety, and to enhance biodiversity. Lighting is provided throughout including 'catenary' lighting strung between carefully placed columns. This assists in creating a welcoming environment after dark and creates a human scale 'ceiling' within Charles Gavan Duffy Place.

Catenary lighting in Charles Gavan Duffy Place enhancing the environment after dark and providing a unique space within Monaghan's Town Centre.

A view of Charles Gavan Duffy Place looking towards Dublin Street.

4. Alleyways

The alleyways will be enhanced through high quality surfacing material, new lighting, and street furniture. These routes are an important historical piece of Monaghan's urban character and will be made to feel more welcoming through the new public realm treatment. Where appropriate signage, interpretation and artwork will be used to promote the alleyways and add a layer of vibrancy. Alongside these treatments, the alleyways will also accommodate functional aspects including access, parking, and deliveries associated with both the residential and commercial uses. The proposed landscape materials will coordinate with other recently completed spaces within Monaghan's Town Centre, with silver grey granite providing a light toned surface to these narrow spaces. Where the alleyways widen, spaces will be defined using complementary paving laid in small units. These will coordinate with Charles Gavan Duffy Place, providing a visual connection between the alleyways and the main space within the Dublin Street South proposals. Lighting will enhance safety and legibility within the alleyways, and the public realm proposals will ensure eye level views and clear site lines where possible. Where it can be accommodated, soft landscape and tree planting will be introduced using compact, upright forms of tree with light textured canopies.

Alleyway as a setting and access for new residential development.

5. Streets

The streets within Dublin Street South provide the framework for future development of the plots, and coordinate with the alleyways and Charles Gavan Duffy Place to create a cohesive environment for people to navigate. The streets will generally have silver grey granite footways, granite kerbs and asphalt roads. Some of the key streets will have a granite carriageway and lower upstand kerbs to promote pedestrian priority while still maintaining legibility for all. Semi-mature tree planting, seating elements, cycle racks and bins provide a functional and inclusive environment for all to navigate.

The interface between Charles Gavan Duffy Place and Dublin Street. The materials for Dublin Street are ultimately proposed to coordinate with the wider Town Centre. The warm toned paving of Charles Gavan Duffy Place will push out into Dublin Street to clearly mark its thresholds and promote it as a new urban space.

Simple but quality treatments to new streets within the Dublin Street South area.

6. Materiality

The materiality of the public realm will complement the architectural proposals and provide a high quality, legible and robust environment that integrates with the wider Town Centre. It will provide a contemporary urban realm that is also sensitive to the historic context, referencing recently used materials in adjacent areas such as 'Diamond Square'. The following outlines the key proposed material palette for Dublin Street South's public realm.

6.1. Hard Landscape

Charles Gavan Duffy Place Feature Paving: Warm toned natural stone, typically sandstone. To be cut in several unit sizes and to be finished with different surface textures to provide further detail and interest to the paving layout within Charles Gavan Duffy Place. The warm toned paving will be supplemented with feature bands to provide visual structure within the space.

Primary paving to Alleyways and Streets: Silver Grey natural stone, typically granite. To coordinate with recently installed town centre paving to create a cohesive public realm character for Monaghan's Town Centre. Smaller cut units to be used within the alleyways, and larger 'slabs' used within primary streets. Surface textures to be used to add interest and detail, particularly within the alleyways. Warmer toned natural stone setts will also be used within key areas of the alleyways to define spaces. In some areas of Sublin Street South, the carriageway will be laid in natural stone setts to emphasise a pedestrian priority environment.

Precast Paving to Streets: Streets within the wider Dublin Street South project area are proposed as quality precast paving units with a natural stone aggregate top surface. These will coordinate with the Primary Streets.

6.2. Soft Landscape

Street Tree Planting in Hard Landscape: Mature and Semi-Mature standard tree planting located within hard landscape areas. Size dependent on location, with larger specimens generally being used within key spaces such as Charles Gavan Duffy Place. To include proprietary tree pit and tree grille coordinating with adjacent paving. Trees to have clear stem to 2.5m to allow eye level views. Species to include:

- Pin Oak (Quercus palustris)
- Cypress Oak (Quercus robur 'Fastigiata')
- Lime (Tilia cordata 'Greenspire')
- Hornbeam (Carpinus betulus 'Frans Fontaine') and
- Cherry (Prunus 'Sunset Boulevard')

Street Tree Planting in Soft Landscape: Semi-Mature standard tree planting located within soft landscape areas. Trees to have clear stem to 2.5m to allow eye level views. Species to include:

- Rowan (Sorbus Spp)
- Lime (Tilia x euchlora)
- Cherry (Prunus Spp.) or Maple (Acer campestre 'Streetwise')

Multi-stem Tree Planting in Raised Planters: 3.5 – 4.0m tall multi-stem specimen trees with between 5 – 7 natural stems. Species to include:

- Birch (Betula pendula)
- Snowy Mespil (Amelanchier Lamarkii)
- Japanese Maple (Acer sp.)
- Cherry (Prunus sp.)

Shrub Planting: A mixture of specimen / evergreen shrubs, ornamental grasses, perennial species and bulb planting to provide year-round visual interest and a biodiverse species mix.

6.2. Street Furniture

Raised Planters: Precast and Weathering Steel raised planters with integrated seating. Notionally 600mm in height.

Benches: Linear seating elements with timber tops. Armrests and backrests to be included on 50% of the overall length.

Individual Seats: Reconstituted stone individual seats with a polished finish. To include backrests and arranged in clusters.

Cycle Stands: Stainless Steel 'Sheffield' type racks with visibility strips and tapping rail.

Litter Bins: Litter bins coordinating with others installed in the Town Centre.

Appendix

3a

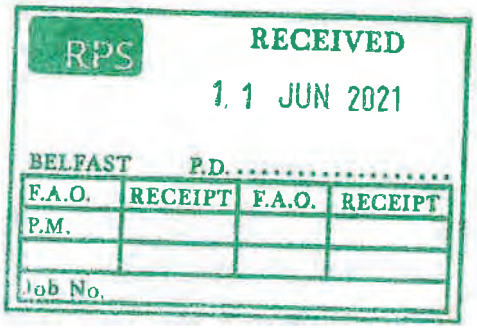
An Bord Pleanála Scoping Opinion

Our Case Number: ABP-309071-21

Your Reference: Monaghan County Council

An Bord Pleanála

RPS Consulting Engineers,
Elmwood House
74 Boucher Road
Belfast
Co. Antrim
BT12 6RZ



Date: 8th June 2021

Re: Environmental Impact Assessment Scoping Request
South Dublin Street & Backlands, Monaghan Town Centre, Co. Monaghan

Dear Sir / Madam,

In response to your request please now be advised that the following constitutes the Board's written opinion on the information to be contained in the Environmental Impact Assessment Report to be prepared in respect of the above-mentioned proposed development.

1. The Proposed Development – to include information on the site, design, size and other relevant features of the proposed development. The description of the project should make specific reference to demolition works that may be required as part of or to facilitate the development. In the case of the subject development, the description of development should include its context with regard to other permitted and proposed developments on the overall site and the extent of any demolition works required. The proposed development should be described in scaled drawings, photographs and photomontages.

2. The Existing Environment - The existing environment and the impacts of the development are explained by reference to its possible impact on the following environmental factors:

- Population, and Human Health,
- Biodiversity with particular attention to species and habitats protected under the Habitats and Birds Directive,

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- Land, Soil, Water, Air and Climate,
- Material Assets, Cultural Heritage and the landscape,
- The interaction between the above factors

In terms of the receiving environment, the EIAR shall include all areas that would be impacted upon, directly or indirectly, by the proposed development. The information contained in the EIAR should therefore be based on comprehensive surveys of the area and have regard to updated data bases which may exist in terms of architectural heritage and ecology. The EIAR should accurately describe the receiving environment in terms of geology, geomorphology and hydrology, as well as a physical description of the site proposed for development

3. The Likely Significant Effects of the Proposed Development - Impacts should address direct, indirect, secondary, cumulative, short, medium and long-term, permanent, temporary, positive and negative effects as well as impact interactions. None of the topics outlined above (Population and Human Health etc.) should be omitted, although their level of detail may differ depending on the likelihood of impacts. In accordance with the requirements of Article 94 of the Planning and Development Regulations, 2001 (as amended), the EIAR shall contain a reference list detailing the sources used for the impact descriptions and assessments used in the EIAR. The EIAR should also contain a list of experts who contributed to the development of the report, identifying for each expert, the part of the EIAR for which he / she is responsible, his / her experience or expertise and any additional information considered relevant to demonstrate the persons competence in the preparation of the EIAR. An assessment of the impact of the proposed development is required, with an assessment of the cumulative impact of existing and permitted developments in the vicinity. The assessment of cumulative impacts in the EIAR should also have regard, as far as is practicable, to the likely effects arising from future phases of the South Dublin Street and Backlands Regeneration Plan and the adjoining areas covered by the Local Area Action Plan for Lands to North East of Dublin Street Plan.

Further to the above, details of the environmental impacts of the development during the demolition, excavation, construction and operational phases of the development should also be described and assessed by reference to baseline information which should be collated and presented within the EIAR. The environmental impact of the aforementioned phases, including in particular noise and vibration impacts arising from the demolition works and construction phase impacts in terms of materials storage and containment within the site should also be

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described and assessed. The EIAR will be required to provide information regarding the nature, quantities and source of materials to be used in the overall development. Information will also be required on volumes and nature of waste materials likely to be generated in the demolition phase and proposed means for disposal of same. The EIAR should also provide an assessment of the expected effects arising from the vulnerability of the project to major accidents and disasters that are relevant to the project. These risks should be considered in the context of the factors of the environment.

4. The Measures to Mitigate Adverse Impacts - The EIAR shall give a description of the features of the proposed development and measures envisaged to avoid, prevent, reduce and, if possible, offset likely significant adverse effects on the environment. Where adverse impacts are likely to result, appropriate mitigation measures shall be identified where necessary – and shall clearly indicate where and with whom responsibility for the implementation of the mitigation measures lies. The EIAR shall also provide information relating to the monitoring of the impacts of the development on the environment.

5. The Consideration of Alternatives: The consideration of alternatives, in terms of location and design, as well as proposed uses, should also be addressed in the EIAR and should comprise a description of the reasonable alternatives relevant to the proposed development which were studied and the reason for the option chosen having regard to the effects on the environment. In undertaking this assessment of alternatives, the following should be borne in mind:

- It is not a requirement to revisit issues considered in the formulation of policy that has been the subject of SEA.
- Alternatives should be relevant to the project and its specific characteristics.
- The assessment of alternatives should include a description of the current state of the environment without implementing the project, i.e. the Do-Nothing scenario. This assessment should be the starting point for the consideration of impacts in the EIAR.
- In the assessment of alternatives, the level of detail provided should be reasonable and commensurate with the project.

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6. A Non-Technical Summary - The EIAR must contain a non-technical summary of the detailed information contained within the EIAR. The language of this summary shall be non-technical in nature and should provide clear details of the environmental effects the development will have, as well as all significant effects and mitigation measures proposed. The description of the development in this summary should clearly explain and describe all aspects of the proposed development such that the EIAR is accessible in terms of public understanding of the process and to facilitate full public participation and consultation in the process.
In terms of specific environmental topics, the development is likely to impact upon, the EIAR should, in particular, address the following matters:

- Population, and Human Health
- Biodiversity (for example fauna and flora),
- Land (for example land take), Soil (incl. organic matter, erosion, compaction, sealing), Water (for example hydro morphological changes, quantity and quality), Air and Climate (incl. greenhouse gas emissions, impacts relevant to adaptation),
- Material Assets, Cultural Heritage, (incl. architectural and archaeological aspects) and Landscape.
- Interactions between the above factors.

An outline of the specific issues considered relevant to the EIAR under these headings is given in the following sections:

7. Population, and Human Health

- As identified in the submitted Scoping Report, the scope of human health and the consideration of associated impacts extends to the assessment of those environmental factors which might lead to effects on human health (incl. noise, vibration, transport, air quality, amenity, water quality & flood risk).
- Given the nature of the existing site the EIAR should specifically address the likely effects on the health and safety of surrounding populations during all phases of the development, including demolition, excavation, construction and operational phases.

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- An assessment of the impact of the proposed development on the availability of local recreational facilities and overall level of amenity and the potential impacts arising for population and human health should be addressed in the EIAR.

8. Biodiversity

- Given the brownfield nature of the site, and its location within an urban setting, the EIAR should provide a clear baseline assessment of the existing receiving environment and the impact of the development on the ecology of the receiving environment.
- The EIAR should address any potential for disturbance arising from the construction activity and particularly any works required to remove any existing structures and hard surfaces. In particular, the potential for disturbance to any species using the adjoining river channel (Shambles River) or banks to this watercourse should be assessed.
- The site is not located within or close to a European site, however there are several sites in the wider area that may have an aquatic or mobile connection to the site. The proximity of the site to the Shambles River which has an ultimate downstream aquatic connection to the Lough Neagh and Lough Beg SPA (NI) is noted. The Slieve Beagh SPA and Slieve Beagh-Mullaghfad-Lisnaskea SPA (NI) are located to the W of the site and there may be a potential connection for mobile species.
- There is therefore a need to carry out Screening for Appropriate Assessment under the Habitats Directive and further assessment if necessary. The results of such assessments will inform the Biodiversity section of the EIAR. It is noted that the level of detail submitted with regard to the relationship with the Lough Neagh and Lough Beg SAC (NI) via downstream watercourses is not very clear. The appropriate assessment will need to focus on the potential impacts arising on the European sites arising from the operational and particularly the construction phases of the development.
- The scope and nature of the surveys, including aquatic surveys, as outlined in the submitted EIA Scoping Report (Sections 5 & 7) should be reviewed with the NPWS section of the Department of Housing, Local Government and Heritage, and work should comply with best practice for seasonality and scope, and the comments of the Development Applications Unit on these issues should be sought.

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- The EIAR should address the potential for the enhancement of the biodiversity of the site arising from the development and the measures undertaken to maximise these impacts, particularly along the Shambles River.
- The presence of Japanese Knotweed was noted on and around the site and the EIAR should contain an Invasive Species Management Plan to address the removal of this species and other invasive species (if present) and the subsequent treatment of the affected areas.

9. Land, Soil, Water, Air and Climate

Land and Soil

- The EIAR should provide information relating to the amount and description of materials disturbed or excavated on the site and proposals for the storage, reuse and disposal of material excavated or otherwise generated during the demolition and construction phases of development. Particular attention should be paid to the identification, removal and management of any contaminated soil.
- The impact of excavations required as part of the development should describe, assess and mitigate the potential impact of the proposed development on existing sub surface services that may be present on the site.
- An assessment of the impact of such excavations or other ground disturbances on surface waters should be provided.
- Provide details of the types and nature of materials imported to the site during construction together with construction methods to be employed and measures to prevent the importation of invasive species.
- Mitigation measures to prevent or minimize emissions from the site during demolition and construction phases, should also be provided.

Water

- The impact of materials to be excavated and/or stored on the site will require to be considered in terms of the potential impact on surface and ground waters in the area of the site, in particular impacts on the adjoining Shambles River. Changes to the existing hard surface will lead to alterations in surface water drainage patterns and the existing

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on-site surface water drainage system should be clarified as part of the EIAR and application documentation, and the impacts of the proposed development on these existing drainage networks should be clearly set out.

- There is an indication that the site is prone to flooding given its proximity to the River Shambles watercourse and a number of historic flood events have been recorded in the area. The EIAR should assess potential flooding impacts and risks in accordance with the document "The Planning System and Flood Risk Management – Guidelines for Planning Authorities" published by the OPW in November 2009.
- Also, with regard to flooding, the EIAR should detail how sustainable drainage methods are proposed to be incorporated into the design and the impact of the development on existing surface water discharges from the site to the local drainage network.
- The EIAR should provide information relating to the coordinated provision of physical infrastructure and services, in terms of the cumulative impact of any other proposals contained in the local area action plans for the surrounding area (incl. other phases of the South Dublin Street & Backlands Regeneration Plan and the Lands to North East of Dublin Street LAA Plan).
- Assessments regarding flood risk and drainage should detail and make provision for the accommodation of climate change impacts.

Air and Climate

- Impacts on **air**, it is considered that this will be potentially relevant during the demolition phase of development. The EIAR should therefore provide appropriate and up-to-date baseline data and describe any mitigation measures deemed necessary to minimise adverse impacts on air quality in the vicinity of the site and to mitigate dust and airborne pollution.
- Impacts on **climate** and greenhouse gas emissions, it is considered that this will be relevant during the construction and operational phase of development. The EIAR should therefore provide appropriate and up-to-date baseline data and describe any mitigation measures deemed necessary to minimise greenhouse gas emissions.

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10. Material Assets, Cultural Heritage and Landscape

Material Assets:

- Given the town centre location of the site, a description of the ***traffic impacts*** resulting from the proposed development shall be provided. The EIAR should address traffic generated by the development, during demolition, construction and operational phases, and should include information on the volume and type of traffic (including details of any unusually heavy, high or wide loads) likely to be generated during these phases of the development and the impact on main junctions in the vicinity of the site, notably the junctions along New Road/Broad Road to the S.
- The EIAR should consider the environmental effects of such heavy traffic and should clearly provide details regarding proposed routes to and from the site, in particular during the demolition and construction phases of the development.
- In considering traffic-related issues, the EIAR should address any cumulative issues which may/will arise in the overall development of lands covered by the local action area plans (South Dublin Street & Backlands Regeneration Plan and the Lands to North East of Dublin Street Plan) and should have regard to other major developments in the vicinity of the site.
- The development shall be described in terms of its permeability with surrounding areas and the traffic arrangements which will facilitate such permeability, including pedestrian and cycle traffic.

Cultural Heritage:

Archaeology:

- The entire site and adjoining lands are located within the Monaghan Town Centre Zone of Archaeological Importance, there are several Recorded Sites and Monuments in the study area including two Sites of Archaeological Importance within the site boundaries (to the side & rear of Court House/St Patricks Church and The Diamond/Church Square).
- Given the nature and location of the subject site, it is likely that development on site would have potential impacts on the archaeological heritage of the area. It is recommended that this issue be specifically investigated, and the results presented in the EIAR. The EIAR should assess the impact of the proposed development and

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potential cumulative impacts with other developments on the archaeological heritage of the area (incl. other phases of the South Dublin Street & Backlands Regeneration Plan and the LAAP for the Lands to North East of Dublin Street Plan).

- Baseline archaeological data should be provided for the site including location, extent and nature of any existing archaeological finds. Proposed mitigation measures to be undertaken, where such archaeological remains will be affected, shall be described.
- It is recommended that prior to finalization and submission of the EIAR that the National Monument Section of the Department of Culture Heritage and the Gaeltacht would be consulted with regard to extent and methodology of archaeological investigations at the site appropriate to inform the EIAR.

Built heritage:

- The site is partly located within and adjacent to three ***Architectural Conservation Areas*** (Dublin Street, The Diamond & Church Square). The EIAR should assess the impact of the proposed development and potential cumulative impacts with other developments on the lands on the character of the ACAs (incl. other phases of the South Dublin Street & Backlands Regeneration Plan and the LAAP for the Lands to North East of Dublin Street Plan).
- The impact of the proposed development on the character and setting of ***Protected Structures and NIAH Structures***, and other similar structures located within and adjacent to the site should be included in the EIAR. Such structures include buildings at the Diamond (incl. the Courthouse & St. Patrick's Church) and along Dublin Street (incl. the First Presbyterian Church & no.10 Dublin Street [birthplace of Gavan Duffy]).
- The EIAR should assess the impact of the proposed development and potential cumulative impacts with other developments on the character and setting of Protected Structures and NIAH Structures (incl. other phases of the South Dublin Street & Backlands Regeneration Plan and the LAAP for the Lands to North East of Dublin Street Plan).
- Consideration should also be given to structures of architectural merit which are at a remove from the site, but which may be affected due to works associated with the proposed development. Structures of architectural merit should include those buildings

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which contribute to the character of the area and which may or may not be included in the RPS and NIAH for Monaghan.

- It is recommended that prior to finalization and submission of the EIAR that the Built Heritage Section of the Department of Culture Heritage and the Gaeltacht would be consulted.

Landscape:

- The EIAR should include description of the proposed planning and landscaping of the site, both hard and soft to include materials, levels and plant species. This information should be augmented by a detailed landscaping and planting plan for the development.
- An assessment of the proposed development on the receiving urban landscape will be required to be undertaken as part of the EIAR. This assessment should address existing visually prominent and functional features in the urban landscape and should provide an assessment of the visual impact of the development as it relates to the surrounding heritage areas including the ACAs, Protected Structures and NIAH Structures at Church Street, The Diamond and Dublin Street.
- The landscape section of the EIAR should include a series of photomontages or other forms of visual aid, and the views should be taken to and from the surrounding locations including the surrounding streets (incl. the ACAs, Protected Structures & NIAH Structures at Church Street, The Diamond and Dublin Street), and other identified sensitive receptors.

11. Interactions between the above factors

The EIAR should include detailed consideration between the above factors were considered relevant.

Attached for your information is a copy of the Board Direction and the Inspector's report, along with a copy of the 1 submission received on this case.

Yours faithfully,

Sarah Kerley
Executive Officer
Direct Line: 01-8737287

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An Bord Pleanála

Inspector's Report
ABP-309071-21

Development	Public Realm Scheme in Monaghan Town Centre.
Location	South Dublin Street & Backlands, Monaghan Town.
Planning Authority	Monaghan County Council.
Planning Authority Reg. Ref.	
Applicant(s)	Monaghan County Council.
Type of Application	EIA Scoping request under Article 95 of the Planning and Development Regulations, 2001 as amended.
Date of Site Inspections	23rd April 2021
Inspector	Karla Mc Bride

1.0 Site Location and Description

1.1. The site is located in Monaghan Town Centre, mainly to the rear of The Diamond and Dublin Street, and to the fore of Monaghan Shopping Centre. The surrounding area is characterised by a mix of retail, commercial, community, institutional and ecclesiastical buildings. The site comprises lands at 8-14 South Dublin Street, and lands to the rear of 1-9 The Diamond and 1-26 Dublin Street, incorporating the Courthouse and Lower Courthouse car parks at Castle Street.

1.2 The site is bound to the NW by the buildings at Church Square and The Diamond (incl. the Court House & St. Patrick's Church) and NE by the 2 and 3-storey commercial buildings along Dublin Street; to the SW by the shopping centre and SE by a car park with the Shambles River beyond; to the E by the First Presbyterian Church and graveyard; and to the W by the buildings along Dawson Street. Vehicular access is currently off New Road/Broad Road to the S and The Diamond to the NW. There a number of pedestrian access points to the site off Dublin Street.

1.3 The c.2.11ha site comprises several commercial buildings and backland areas encompassing vacant land, derelict structures, storage areas and rear access points, along with car parks, roads, footpaths, alleyways and incidental green spaces.

1.4 The site lies within a Zone of Archaeological Importance and it contains Sites of Archaeological Importance. It is proximate to three Architectural Conservation Areas, and several of the buildings in the vicinity are Protected Structures and/or listed in the National Inventory of Architectural Heritage (NIAH). There are a number of sensitive natural heritage sites in the wider area including Slieve Beagh SPA to the NW along with and several NHA designated lakes, bogs and woodlands, and Lough Neagh and Lough Beg SPA to the far NE in Northern Ireland.

1.5 Photographs and maps in Appendix 1 describe the site and environs in more detail.

2.0 Proposed Development

2.1 The site forms part of the lands covered by the South Dublin Street and Backlands Regeneration Plan and the Council has secured funding from the Urban Regeneration and Development Fund to progress the works.

2.2 The proposed Public Realm Scheme would comprise:

- Demolition of 4 x properties (8-12 Dublin St.) and associated outbuildings.
- New structural masonry walls.
- Creation of new streets, junctions, civic spaces & pedestrian pavements
- Reduction in long stay car parking.
- Public realm improvements (incl. paving, street furniture & landscaping).
- Ancillary works (inc. utility & drainage improvements, regrading of land & retaining structures).
- Associated site works (incl. construction & access).

Note: A property on Dublin Street will be removed from the Record of Protected Structures (under S.55 of the P&D Act).

2.2. The EIA Scoping Report submitted with the scoping request concluded that the proposed development met the thresholds that trigger a mandatory requirement for EIA and EIAR. A Screening for AA report also concluded that the project is likely to have an effect on a European site and that an NIS was required.

3.0 Article 95(2) Planning & Development Regulations, 2001 as amended by Article 24 of the 2006 Regulations

3.1 In accordance with Article 95(2) of the Planning and Development Regulations, 2001 (as amended) the Board requested submissions or observations from the following prescribed bodies:

- Department of Communications, Climate Action and Environment,
- Department of Culture, Heritage and the Gaeltacht (DAU),
- Department of Housing, Planning and Local Government,
- Eastern and Midlands Regional Assembly,
- Environmental Protection Agency,
- An Chomhairle Ealaion,
- The Heritage Council,

- An Taisce, and
- Failte Ireland.

3.2 The following responses were received: -

An Taisce: raised concerns about the demolition of no.10 Dublin Street which has cultural heritage significance as the 1816 birthplace of Charles Gavan Duffy. Duffy was one of the leaders of the Young Ireland Movement, founder & editor of the Nation newspaper and 8th Premier of Victoria.

4.0 Legislative Context

4.1 The Planning Authority carried out a Screening Report for the proposed development which concluded that it met the thresholds that trigger a mandatory requirement for Environmental Impact Assessment (EIA) and is proposing the preparation and submission of an Environmental Impact Assessment Report (EIAR).

4.2. Planning and Development Act, 2000 (as amended) and Planning and Development Regulations, 2001 (as amended).

4.2.1. The formal Scoping Request from Monaghan County Council on the information to be contained within the EIAR was submitted under Article 95 of the Planning and Development Regulations, 2001(as amended) for a development proposed under Section 175 of the Planning and Development Act, 2000 (as amended).

4.2.2. ***Section 173(3) (a)*** of the Act states as follows:

"Where a person is required by or under this Act to submit an environmental impact statement to the Board, he or she may, before submitting the statement, request the Board to provide him or her with its opinion as to the information that should be contained in such statement, and the Board shall on receipt of such a request provide such opinion in writing."

4.2.3. ***Article 95*** of the Regulations (as amended by Article 24 of the 2006 Planning & Development Regulations) deals with the procedures for Scoping Requests, and provides details of the level of information to be submitted in order for the Board to provide a written opinion pursuant to the request.

4.2.4. ***Article 117*** of the Regulations relates to Local Authority Development and provides that before making an application for approval to the Board under section 175(3) of the Act, a local authority may, in accordance with article 95, request the Board to provide a written opinion on the information to be contained in the EIAR.

4.2.5. ***Schedule 6*** of the *Planning and Development Regulations, 2001*, sets out the information required to be contained within an EIAR. The EIAR must contain the information specified in section 1 and the information specified in section 2 to the extent that the information is relevant to the nature of the development in question and to the environmental features likely to be affected.

4.2.6. In providing such a *'written opinion on the information to be contained in the EIS'*, it is considered appropriate to have regard to the following Guidelines:

4.3. EPA Guidelines on the Information to be contained in Environmental Impact Statements, 2002 and EPA Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR), 2017.

4.3.1. Section 1.4 of the ***2002 Guidelines*** deals with scoping and provides that the scoping process identifies the issues and emphasizes those that are likely to be important during EIA and eliminates those that are not. The Guidelines provide that scoping must be focused on issues and impacts which are environmentally based, are likely to occur, and are significant and adverse.

4.3.2. Section 3.0 of the ***2017 Draft Guidelines*** relates to scoping and includes 3.3.4 Key Scoping Criteria, 3.3.5 Consideration of Other Assessments and 3.3.6 Selection of Headings Under Which to Arrange Issues. Section 3.3.4 states that all parties should be aware of the need to keep the EIAR as tightly focussed as possible and that scoping is usually guided by criteria including the use of 'Likely' and 'Significant' as the principal criteria for determining what should be addressed. Any issues that do not pass this test should be omitted (scoped out) from further assessment.

4.3.3. Section 3.3.6 of the guidelines identifies the headings under which to arrange issues and states that the prescribed environmental factors must all be addressed in an EIAR. As they are a necessary simplification of the relevant components of the environment, each factor is typically explored by examining a series of headings

and/or topics relevant to that factor, as indicated by the examples included in Annex IV of the Directive. These headings and topics are generally identified during the scoping process. Some typical headings and topics and their arrangement within an EIAR are shown below.

Annex IV(4) of amended Directive *'A description of the factors specified in Article 3(1) likely to be significantly affected by the project: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydro morphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.'*

4.4. EPA 'ADVICE NOTES ON CURRENT PRACTICE (in the preparation of Environmental Impact Statements)', 2003

4.4.1. These Advice Notes are designed to accompany the *Guidelines on the Information to be contained in Environmental Impact Statements*, also published by the EPA. The Advice Notes contain greater detail on many of the topics covered by the Guidelines and offer guidance on current practice for the structure and content of Environmental Impact Statements. The Advice Notes are divided into five sections, each providing detailed guidance on specific aspects to be considered in the preparation of an EIS.

5.0 Planning History

There is an extensive planning history relating to the surrounding town centre area however there are no recent planning applications of note for the development of the site and environs.

6.0 Policy Context

6.1. Monaghan County Development Plan, 2019-2025

Zoning objectives: located within Town Centre zone.

Specific Objectives: covered by Local Area Action Plans (N & S of Dublin Street)

Archaeological Heritage:

- Zone of Archaeological Importance
  - 12 Recorded Sites & Monuments in Study Area
- Sites of Archaeological Importance within site:
  - E of Court House/S of St. Patrick's Church
  - S of The Diamond/Church Square

Built Heritage:

- Adjacent to & bordering 3 x Architectural Conservation Areas:
  - Dublin Street
  - The Diamond
  - Church Square
- Several Protected Structures in vicinity including:
  - 1 & 8 The Diamond
  - 1, 10 & 24 Dublin Street
- Several NIAH structures in vicinity including:
  - The Courthouse
  - St. Patricks Church
  - First Presbyterian Church
  - Birthplace of Gavan Duffy (10 Dublin St.)

6.2. South Dublin Street & Backland Regeneration Plan

This plan seeks to provide guidance on the regeneration options for the future development of the area. It seeks to provide a range of civic spaces to support and animate the area, enhance the existing public realm on Dublin Street, with design for improved pedestrian use, and appropriate accommodation for vehicular access, services and parking, and to prioritise the design and implementation of a scheme to upgrade the public realm of the backlands are including a walkway along the River Shambles.

6.3. Natural Heritage Designations

There are several sensitive sites in the wider area including NHA designated lakes, bogs and woods. The closest European sites are listed below:

European site	Separation distance
Slieve Beagh SPA	c.10km NW
Maheraveely Marl Loughs SAC	c.12km W
Slieve Beagh-Mullaghfad-Lisnaskea SPA (NI)	c.15km NW
Slieve Beagh SAC (NI)	c.15km NW
Lough Neagh & Lough Beg SPA (NI)	c.39km N (straight line) c.58km N (aquatic)

7.0 Scoping Opinion

7.1. General Requirements

7.1.1. Schedule 6 of the *Planning and Development Regulations, 2001 (as amended)*, sets out the information required to be contained within an EIAR. The EIAR must contain the information specified in section 1 and the information specified in section 2 to the extent that the information is relevant to the nature of the development in question and to the environmental features likely to be affected.

7.1.2. In terms of the requirements of Schedule 6, and to assist assessment and increase clarity, the Environmental Impact Assessment Report (EIAR) should be systematically organized to provide sections describing the following:

The Proposed Development - to include information on the site, design, size and other relevant features of the proposed development. The description of the project should make specific reference to demolition works that may be required as part of or to facilitate the development. In the case of the subject development, the description of development should include its context with regard to other permitted and proposed developments on the overall site and the extent of any demolition works required. The proposed development should be described in scaled drawings, photographs and photomontages.

The Existing Environment - The existing environment and the impacts of the development are explained by reference to its possible impact on the following environmental factors: -

- Population, and Human Health,
- Biodiversity with particular attention to species and habitats protected under the Habitats and Birds Directive.
- Land, Soil, Water, Air and Climate,
- Material Assets, Cultural Heritage and the landscape,
- The interaction between the above factors

In terms of the receiving environment, the EIAR shall include all areas that would be impacted upon, directly or indirectly, by the proposed development. The information contained in the EIAR should therefore be based on comprehensive surveys of the area and have regard to updated data bases which may exist in terms of architectural heritage and ecology. The EIAR should accurately describe the receiving environment in terms of geology, geomorphology and hydrology, as well as a physical description of the site proposed for development.

The Likely Significant Effects of the Proposed Development - Impacts should address direct, indirect, secondary, cumulative, short, medium and long-term, permanent, temporary, positive and negative effects as well as impact interactions. None of the topics outlined above (Population and Human Health etc.) should be omitted, although their level of detail may differ depending on the likelihood of impacts.

In accordance with the requirements of Article 94 of the Planning and Development Regulations, 2001 (as amended), the EIAR shall contain a reference list detailing the sources used for the impact descriptions and assessments used in the EIAR.

The EIAR should also contain a list of experts who contributed to the development of the report, identifying for each expert, the part of the EIAR for which he / she is responsible, his / her experience or expertise and any additional information considered relevant to demonstrate the persons competence in the preparation of the EIAR.

An assessment of the impact of the proposed development is required, with an assessment of the cumulative impact of existing and permitted developments in the vicinity. The assessment of cumulative impacts in the EIAR should also have regard, as far as is practicable, to the likely effects arising from future phases of the South Dublin Street and Backlands Regeneration Plan and the adjoining areas covered by the Local Area Action Plan for Lands to North East of Dublin Street Plan.

Further to the above, details of the environmental impacts of the development during the demolition, excavation, construction and operational phases of the development should also be described and assessed by reference to baseline information which should be collated and presented within the EIAR. The environmental impact of the

aforementioned phases, including in particular noise and vibration impacts arising from the demolition works and construction phase impacts in terms of materials storage and containment within the site should also be described and assessed.

The EIAR will be required to provide information regarding the nature, quantities and source of materials to be used in the overall development. Information will also be required on volumes and nature of waste materials likely to be generated in the demolition phase and proposed means for disposal of same.

The EIAR should also provide an assessment of the expected effects arising from the vulnerability of the project to major accidents and disasters that are relevant to the project. These risks should be considered in the context of the factors of the environment.

The Measures to Mitigate Adverse Impacts - The EIAR shall give a description of the features of the proposed development and measures envisaged to avoid, prevent, reduce and, if possible, offset likely significant adverse effects on the environment. Where adverse impacts are likely to result, appropriate mitigation measures shall be identified where necessary – and shall clearly indicate where and with whom responsibility for the implementation of the mitigation measures lies. The EIAR shall also provide information relating to the monitoring of the impacts of the development on the environment.

The Consideration of Alternatives: The consideration of alternatives, in terms of location and design, as well as proposed uses, should also be addressed in the EIAR and should comprise a description of the reasonable alternatives relevant to the proposed development which were studied and the reason for the option chosen having regard to the effects on the environment. In undertaking this assessment of alternatives, the following should be borne in mind:

- It is not a requirement to revisit issues considered in the formulation of policy that has been the subject of SEA.
- Alternatives should be relevant to the project and its specific characteristics.

- The assessment of alternatives should include a description of the current state of the environment without implementing the project, i.e. the Do-Nothing scenario. This assessment should be the starting point for the consideration of impacts in the EIAR.
- In the assessment of alternatives, the level of detail provided should be reasonable and commensurate with the project.

A Non-Technical Summary - The EIAR must contain a non-technical summary of the detailed information contained within the EIAR. The language of this summary shall be non-technical in nature and should provide clear details of the environmental effects the development will have, as well as all significant effects and mitigation measures proposed. The description of the development in this summary should clearly explain and describe all aspects of the proposed development such that the EIAR is accessible in terms of public understanding of the process and to facilitate full public participation and consultation in the process.

In terms of specific environmental topics, the development is likely to impact upon, the EIAR should, in particular, address the following matters:

- Population, and Human Health
- Biodiversity (for example fauna and flora),
- Land (for example land take), Soil (incl. organic matter, erosion, compaction, sealing), Water (for example hydro morphological changes, quantity and quality), Air and Climate (incl. greenhouse gas emissions, impacts relevant to adaptation),
- Material Assets, Cultural Heritage, (incl. architectural and archaeological aspects) and Landscape.
- Interactions between the above factors.

An outline of the specific issues considered relevant to the EIAR under these headings is given in the following sections:

7.1.3. **Population, and Human Health**

- As identified in the submitted Scoping Report, the scope of human health and the consideration of associated impacts extends to the assessment of those environmental factors which might lead to effects on human health (incl. noise, vibration, transport, air quality, amenity, water quality & flood risk).

- Given the nature of the existing site the EIAR should specifically address the likely effects on the health and safety of surrounding populations during all phases of the development, including demolition, excavation, construction and operational phases.

- An assessment of the impact of the proposed development on the availability of local recreational facilities and overall level of amenity and the potential impacts arising for population and human health should be addressed in the EIAR.

7.1.4. **Biodiversity**

- Given the brownfield nature of the site, and its location within an urban setting, the EIAR should provide a clear baseline assessment of the existing receiving environment and the impact of the development on the ecology of the receiving environment.

    - The EIAR should address any potential for disturbance arising from the construction activity and particularly any works required to remove any existing structures and hard surfaces. In particular, the potential for disturbance to any species using the adjoining river channel (Shambles River) or banks to this watercourse should be assessed.
    - The site is not located within or close to a European site, however there are several sites in the wider area that may have an aquatic or mobile connection to the site. The proximity of the site to the Shambles River which has an ultimate downstream aquatic connection to the Lough Neagh and Lough Beg SPA (NI) is noted. The Slieve Beagh SPA and Slieve Beagh-Mullaghfad-Lisnaskea SPA (NI) are located to the W of the site and there may be a potential connection for mobile species.

- There is therefore a need to carry out Screening for Appropriate Assessment under the Habitats Directive and further assessment if necessary. The results of such assessments will inform the Biodiversity section of the EIAR. It is noted that the level of detail submitted with regard to the relationship with the Lough Neagh and Lough Beg SAC (NI) via downstream watercourses is not very clear. The appropriate assessment will need to focus on the potential impacts arising on the European sites arising from the operational and particularly the construction phases of the development.
- The scope and nature of the surveys, including aquatic surveys, as outlined in the submitted EIA Scoping Report (Sections 5 & 7) should be reviewed with the NPWS section of the Department of Housing, Local Government and Heritage, and work should comply with best practice for seasonality and scope, and the comments of the Development Applications Unit on these issues should be sought.
- The EIAR should address the potential for the enhancement of the biodiversity of the site arising from the development and the measures undertaken to maximise these impacts, particularly along the Shambles River.
- The presence of Japanese Knotweed was noted on and around the site and the EIAR should contain an Invasive Species Management Plan to address the removal of this species and other invasive species (if present) and the subsequent treatment of the affected areas.

7.1.5. **Land, Soil, Water, Air and Climate**

Land and Soil:

- The EIAR should provide information relating to the amount and description of materials disturbed or excavated on the site and proposals for the storage, reuse and disposal of material excavated or otherwise generated during the demolition and construction phases of development. Particular attention should be paid to the identification, removal and management of any contaminated soil.

- The impact of excavations required as part of the development should describe, assess and mitigate the potential impact of the proposed development on existing sub surface services that may be present on the site.
- An assessment of the impact of such excavations or other ground disturbances on surface waters should be provided.
- Provide details of the types and nature of materials imported to the site during construction together with construction methods to be employed and measures to prevent the importation of invasive species.
- Mitigation measures to prevent or minimize emissions from the site during demolition and construction phases, should also be provided.

Water:

- The impact of materials to be excavated and/or stored on the site will require to be considered in terms of the potential impact on surface and ground waters in the area of the site, in particular impacts on the adjoining Shambles River. Changes to the existing hard surface will lead to alterations in surface water drainage patterns and the existing on-site surface water drainage system should be clarified as part of the EIAR and application documentation, and the impacts of the proposed development on these existing drainage networks should be clearly set out.
- There is an indication that the site is prone to flooding given its proximity to the River Shambles watercourse and a number of historic flood events have been recorded in the area. The EIAR should assess potential flooding impacts and risks in accordance with the document "The Planning System and Flood Risk Management – Guidelines for Planning Authorities" published by the OPW in November 2009.
- Also, with regard to flooding, the EIAR should detail how sustainable drainage methods are proposed to be incorporated into the design and the impact of the development on existing surface water discharges from the site to the local drainage network.

- The EIAR should provide information relating to the coordinated provision of physical infrastructure and services, in terms of the cumulative impact of any other proposals contained in the local area action plans for the surrounding area (incl. other phases of the South Dublin Street & Backlands Regeneration Plan and the Lands to North East of Dublin Street LAA Plan).
- Assessments regarding flood risk and drainage should detail and make provision for the accommodation of climate change impacts.

Air and Climate:

- Impacts on ***air***, it is considered that this will be potentially relevant during the demolition phase of development. The EIAR should therefore provide appropriate and up-to-date baseline data and describe any mitigation measures deemed necessary to minimise adverse impacts on air quality in the vicinity of the site and to mitigate dust and airborne pollution.
- Impacts on ***climate*** and greenhouse gas emissions, it is considered that this will be relevant during the construction and operational phase of development. The EIAR should therefore provide appropriate and up-to-date baseline data and describe any mitigation measures deemed necessary to minimise greenhouse gas emissions.

7.1.6. **Material Assets, Cultural Heritage and Landscape**

Material Assets:

- Given the town centre location of the site, a description of the ***traffic impacts*** resulting from the proposed development shall be provided. The EIAR should address traffic generated by the development, during demolition, construction and operational phases, and should include information on the volume and type of traffic (including details of any unusually heavy, high or wide loads) likely to be generated during these phases of the development and the impact on main junctions in the vicinity of the site, notably the junctions along New Road/Broad Road to the S.

- The EIAR should consider the environmental effects of such heavy traffic and should clearly provide details regarding proposed routes to and from the site, in particular during the demolition and construction phases of the development.
- In considering traffic-related issues, the EIAR should address any cumulative issues which may/will arise in the overall development of lands covered by the local action area plans (South Dublin Street & Backlands Regeneration Plan and the Lands to North East of Dublin Street Plan) and should have regard to other major developments in the vicinity of the site.
- The development shall be described in terms of its permeability with surrounding areas and the traffic arrangements which will facilitate such permeability, including pedestrian and cycle traffic.

Cultural Heritage:

Archaeology

- The entire site and adjoining lands are located within the Monaghan Town Centre Zone of Archaeological Importance, there are several Recorded Sites and Monuments in the study area including two Sites of Archaeological Importance within the site boundaries (to the side & rear of Court House/St Patricks Church and The Diamond/Church Square).
- Given the nature and location of the subject site, it is likely that development on site would have potential impacts on the archaeological heritage of the area. It is recommended that this issue be specifically investigated, and the results presented in the EIAR. The EIAR should assess the impact of the proposed development and potential cumulative impacts with other developments on the archaeological heritage of the area (incl. other phases of the South Dublin Street & Backlands Regeneration Plan and the LAAP for the Lands to North East of Dublin Street Plan).
- Baseline archaeological data should be provided for the site including location, extent and nature of any existing archaeological finds. Proposed mitigation measures to be undertaken, where such archaeological remains will be affected, shall be described.

- It is recommended that prior to finalization and submission of the EIAR that the National Monument Section of the Department of Culture Heritage and the Gaeltacht would be consulted with regard to extent and methodology of archaeological investigations at the site appropriate to inform the EIAR.

Built heritage

- The site is partly located within and adjacent to three ***Architectural Conservation Areas*** (Dublin Street, The Diamond & Church Square). The EIAR should assess the impact of the proposed development and potential cumulative impacts with other developments on the lands on the character of the ACAs (incl. other phases of the South Dublin Street & Backlands Regeneration Plan and the LAAP for the Lands to North East of Dublin Street Plan).
- The impact of the proposed development on the character and setting of ***Protected Structures and NIAH Structures***, and other similar structures located within and adjacent to the site should be included in the EIAR. Such structures include buildings at the Diamond (incl. the Courthouse & St. Patrick's Church) and along Dublin Street (incl. the First Presbyterian Church & no.10 Dublin Street [birthplace of Gavan Duffy]).
- The EIAR should assess the impact of the proposed development and potential cumulative impacts with other developments on the character and setting of Protected Structures and NIAH Structures (incl. other phases of the South Dublin Street & Backlands Regeneration Plan and the LAAP for the Lands to North East of Dublin Street Plan).
- Consideration should also be given to structures of architectural merit which are at a remove from the site, but which may be affected due to works associated with the proposed development. Structures of architectural merit should include those buildings which contribute to the character of the area and which may or may not be included in the RPS and NIAH for Monaghan.
- It is recommended that prior to finalization and submission of the EIAR that the Built Heritage Section of the Department of Culture Heritage and the Gaeltacht would be consulted.

Landscape:

- The EIAR should include description of the proposed planning and landscaping of the site, both hard and soft to include materials, levels and plant species. This information should be augmented by a detailed landscaping and planting plan for the development.
- An assessment of the proposed development on the receiving urban landscape will be required to be undertaken as part of the EIAR. This assessment should address existing visually prominent and functional features in the urban landscape and should provide an assessment of the visual impact of the development as it relates to the surrounding heritage areas including the ACAs, Protected Structures and NIAH Structures at Church Street, The Diamond and Dublin Street.
- The landscape section of the EIAR should include a series of photomontages or other forms of visual aid, and the views should be taken to and from the surrounding locations including the surrounding streets (incl. the ACAs, Protected Structures & NIAH Structures at Church Street, The Diamond and Dublin Street), and other identified sensitive receptors.

7.1.7. **Interactions between the above factors**

The EIAR should include detailed consideration between the above factors were considered relevant.

8.0 Conclusion

8.1. I consider that the above written opinion provides appropriate scoping for the EIAR to be prepared in relation to the proposed development, in accordance with the requirements of Section 173 of the Planning and Development Act, 2000 and Articles 95 and 177 of the Planning and Development Regulations, 2001.

I recommend that Monaghan County Council be furnished with a copy of this written opinion, and also copies of the submissions received under Article 95(2) of the Planning and Development Regulations, 2001, as amended.

Karla Mc Bride

Karla Mc Bride
Planning Inspector
28th April 2021

An Bord Pleanála

Board Direction
BD-008330-21
ABP-309071-21

At a meeting held on 27/05/2021, the Board considered the scoping report of the Inspector, and the documents and submissions on file generally.

The Board agreed that the Inspector's written opinion provides an appropriate scoping for the Environmental Impact Assessment Report to be prepared in respect of the proposed development and directed that Monaghan County Council be furnished with a copy of this written opinion together with a copy of all submissions received under Article 95(2) of the Planning and Development Regulations 2001, as amended.

Board Member: Dave Walsh **Date:** 27/05/2021

An Taisce
The National Trust for Ireland

An Bord Pleanala.

3rd March 2021.

RE CO MONAGHAN

EIA SCOPING FOR PROPOSED DEVELOPMENT AT DUBLIN ST MONAGHAN INCLUDING PROPOSED DEMOLITION OF 1816 CHARLES GAVIN DUFFY BIRTHPLACE AT NO 10 DUBLIN ST

Thank you for notice on EIA scoping on the above and request for raising of relevant considerations.

There is major EIA sensitivity issue in relation to **Cultural Heritage** as the proposed development involves the demolition of the 1816 birthplace of Charles Gavin Duffy. With Thomas Davis, William Smith O Brien, Thomas Francis Meagher and John Mitchell he was one of the main leaders in the Young Ireland movement of the 1840s and Co founder with Davis and first editor of the Nation newspaper

He went on to be a significant figure in the history of Australia becoming premier of Victoria where he played a major rile in land reform

He died in France and his body was brought back for burial in Glasnevin cemetery beside that of Daniel O Connell in 1903

Attached is his Wikipedia entry

Ian Lumley

Charles Gavan Duffy

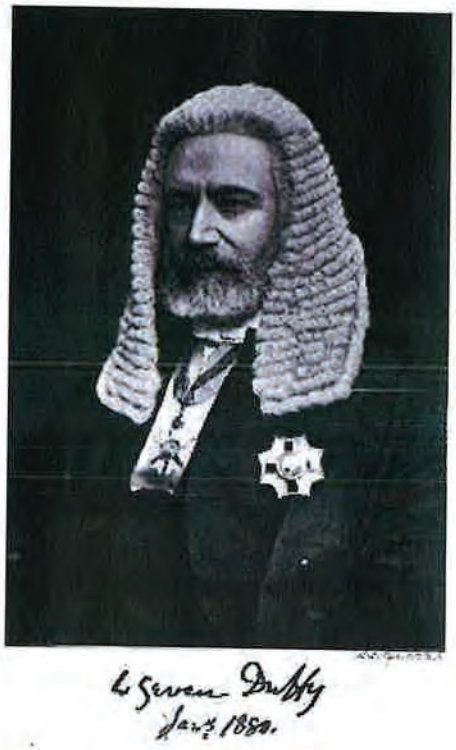
From Wikipedia, the free encyclopedia
Jump to navigationJump to search
For the Canadian judge and politician, see C. Gavan Duffy.

For his grandson, a judge of the Supreme Court of Victoria, see Charles Leonard Gavan Duffy.

The Right Honourable

Sir Charles Gavan Duffy

KCMG, PC



Duffy in 1880

8th Premier of Victoria

In office

19 June 1871 – 10 June 1872

Monarch Queen Victoria

Preceded by Sir James McCulloch

Succeeded by	James Francis
Personal details	
Born	12 April 1816 Monaghan Town, County Monaghan, Ireland
Died	9 February 1903 (aged 86) Nice, France
Nationality	Irish, Australian
Spouse(s)	Emily McLaughlin, Susan Hughes, Louise Hall
Profession	Politician

Sir Charles Gavan Duffy, KCMG, PC (12 April 1816 – 9 February 1903), was an Irish nationalist, journalist, poet and politician; a Young Irelander who, following emigration to Australia, was to become the 8th Premier of Victoria and one of the commanding figures in Victorian political history.

The suburb of Duffy in the Australian Capital Territory is named after him.

Contents

Ireland[edit]

Early life and career[edit]

Duffy was born at No. 10 Dublin Street in Monaghan Town, County Monaghan, Ireland, the son of a Catholic shopkeeper.[1][2] He was educated in Belfast at St Malachy's College and in the collegiate department of the Royal Belfast Academical Institution (RBAI, usually known as 'Inst'), where he studied logic, rhetoric and *belles-lettres*.

One day when Duffy was aged 18, Charles Hamilton Teeling, a United Irish veteran of the 1798 rising, walked into his mother's house (his father had died when he was 10). Teeling was establishing a journal in Belfast and asked Duffy to accompany him on a round of calls to promote it in Monaghan. Inspired by Teeling's recollections of '98, Duffy began contributing to the journal, *The Northern Herald*.[3]

In Belfast, Duffy went on to edit the *The Vindicator*, an O'Connellite journal launched by Thomas O'Hagan (later the first Catholic to become Lord Chancellor of Ireland in centuries). At the same time, he began studying law at the King's Inns in Dublin.

Duffy was admitted to the Irish Bar in 1845. But before then he established himself in literary circles as the editor of *Ballad Poetry of Ireland*[4] (1843),[5] and in political circles as editor of a new Dublin weekly, *The Nation*.

The Nation[edit]

In 1842, Duffy co-founded *The Nation* with Thomas Osborne Davis, and John Blake Dillon.[6] Contributors were notable for including nationally minded Protestants: in addition to Davis, Jane Wilde, Margaret Callan, John Mitchel, John Edward Pigot and William Smith O'Brien. All were members or supporters of Daniel O'Connell's Repeal Association, dedicated to a restoration of an Irish parliament through a reversal of the 1800 Acts of Union.

When he had first followed O'Connell, Duffy concedes that he had "burned with the desire to set up again the Celtic race and the catholic church".[7] But in *The Nation* (which repeatedly invoked memory of the United Irishmen) Duffy committed himself to a "nationality" that would embrace as easily "the stranger who is within our gates" as "the Irishman of a hundred generations."[8] This expansive, ecumenical, view of the opinion-forming tasks of the paper brought him into conflict with the clericalism of the broader movement.

At issue with O'Connell[edit]

O'Connell's paper, *The Pilot*, did not hesitate to identify religion as The "positive and unmistakable" mark of distinction between Irish and English.[9] As leader of the Catholic Association, O'Connell had fought to secure not only Catholic entry to Parliament but also

the prerogatives and independence of the Catholic Church. It was, he maintained, "a national Church" and should the people "rally" to him, they would "have a nation for that Church".[10] O'Connell, at least privately, was of the view that "Protestantism would not survive the Repeal ten years". He assured Dr Paul Cullen (the future Cardinal and Catholic Primate of Ireland) that once an Irish parliament had swept aside Ascendancy privilege, "the great mass of the Protestant community would with little delay melt into the overwhelming majority of the Irish nation".[11]

In 1845, the Dublin Castle administration proposed to educate Catholics and Protestants together in a non-denominational system of higher education. *The Nation* welcomed the proposition, but O'Connell, claiming that there had been "unanimous and unequivocal condemnation" from the bishops", opposed. Disregarding Thomas Davis's plea that "reasons for separate education are reasons for [a] separate life", and declaring himself content to take a stand "for Old Ireland", O'Connell rejected the "godless" colleges.[12][13]

For Duffy there was a further, less liberal basis, for his disaffection: O'Connell's repeated denunciations of a "vile union" in the United States "of republicanism and slavery", and his appeal to Irish Americans to join in the abolitionist struggle.[14] Duffy believed the time was not right "for gratuitous interference in American affairs". Not least because of the desire for American support and funding, it was a common view.[15]

Young Ireland[edit]

Charles Gavan Duffy circa 1845

Main articles: Young Irelander Rebellion of 1848, Young Ireland, and The Nation (Irish newspaper)

Following Davis's sudden death in 1845, Duffy appointed Mitchel deputy editor. Against the background of increasingly violent peasant resistance to evictions and of the onset of famine, Mitchell brought a more militant tone. When the conservative *Standard* observed that the new Irish railways could be used to transport troops to quickly curb agrarian unrest, Mitchel

responded that the tracks could be turned into pikes and trains ambushed. O'Connell publicly distanced himself from *The Nation*—it appeared to some setting Duffy, as the editor, up for prosecution.[16] When the courts failed to convict, O'Connell pressed the issue, seemingly intent on effecting a break with those he referred to disdainfully as "Young Irelanders"—a reference to Giuseppe Mazzini's anti-clerical and insurrectionist Young Italy.

In 1847 the Repeal Association tabled resolutions declaring that under no circumstances was a nation justified in asserting its liberties by force of arms. The Young Irelanders had not advocated physical force,[17] but in response to the "Peace Resolutions" Meagher argued that if Repeal could not be carried by moral persuasion and peaceful means, a resort to arms would be a no less honourable course.[18] O'Connell's son John forced the decision: the resolution was carried on the threat of the O'Connells themselves quitting the Association.

Duffy and the other Young Ireland dissidents associated with his paper withdrew and formed themselves as the Irish Confederation.

In the desperate circumstances of the Great Famine and in the face of martial-law measures that, following O'Connell's death, a number of Repeal Association MPs had approved in Westminster, Duffy conceded the case taking "the no less honourable course". With Mitchel he was arrested, leaving it to Meagher, O'Brien and Dillon to raise the standard of revolt—a republican tricolour with which Meagher had returned from revolutionary Paris, its colours intended to symbolise the reconciliation of Catholic (green) and Protestant (orange). But with the rural priesthood against them and the body of their support confined to the garrisoned towns, their efforts issued in a small demonstration that broke up after its first armed encounter, the Battle of Ballingarry. Their death sentences for treason commuted, the leaders were transported to Van Diemen's Land (Tasmania). Duffy alone escaped. Defended by Isaac Butt he was freed after his fifth trial.

On his release, Duffy toured famine-stricken Ireland with the renowned Scottish writer Thomas Carlyle. Duffy had invited Carlyle, a staunch Calvinist and Unionist, in the vain hope that he might help sway establishment opinion in favour of humane and practical relief. Increasingly he was convinced that agrarian reform was the nation's existential issue and one that could form the basis for a non-sectarian national movement. In 1842 he had already allied himself with James Godkin[19] who had abandoned a bible mission to campaign for the rights of the Catholic tenants he had been tasked with herding into the Protestant fold.[20]

The League of North and South[edit]

Uniting activists across the sectarian and constitutional divide, in 1852 the Irish Tenant Right League helped return Duffy (for New Ross) and 49 other tenant-rights MPs to Westminster.[21] In November 1852, Lord Derby's short-lived Conservative government introduced a land bill to compensate Irish tenants on eviction for improvements they had made to the land. The bill passed in the House of Commons in 1853 and 1854, but failed win consent of the landed grandees in the House of Lords.[22]

What Duffy optimistically hailed as the "League of North and South" unravelled. In the Catholic South, Archbishop Cullen approved the Catholic MPs breaking their pledge of

independent opposition and accepting positions in a new Whig administration.[23][24] In the Protestant North William Sharman Crawford and other League candidates had their meetings broken up by Orange "bludgeon men".[25]

In 1855 the cause of the Irish tenants, and indeed of Ireland generally, seemed to Duffy more hopeless than ever. Broken in health and spirit, he published in 1855 a farewell address to his constituency, declaring that he had resolved to retire from parliament, as it was no longer possible to accomplish the task for which he had solicited their votes.[26]

An "Irish Mazzini"[edit]

To the cause of tenant rights Cullen was sympathetic,[27] but of Duffy he was deeply suspicious. Following O'Connell he described Duffy as an "Irish Mazzini"—condemnation from a man who had witnessed the Church's humiliation under Mazzini's Roman Republic in 1849. Duffy in turn accused the Church under Cullen of pursuing a "Roman policy" in Ireland "hostile to its nationality."[28]

Until O'Connell's death, Duffy suggested that Rome had "believed in the possibility of an Independent Catholic State" in Ireland, but that since O'Connell's death could "only see the possibility of a Red Republic". The Curia had, as a result, returned to "her design of treating Ireland as an entrenched camp of Catholicity in the heart of the British Empire, capable of leavening the whole." Ireland for this purpose had to be"thoroughly imperialised, loyalised, welded into England."[28]

Cullen has been described as the man who "borrowed the British Empire." Under his leadership the Irish church developed an "Hiberno-Roman" mission that was ultimately extended through Britain to the entire English-speaking world.[29] But Cullen's biographers would argue that Duffy travestied Cullen and his church's complex and nuanced relationship to Irish nationalism.[30]—perhaps as much as Cullen caricatured Duffy's separatism.

Marriage[edit]

In 1842, he married Emily McLaughlin, who died in 1845. He married Susan Hughes in 1846, with whom he had six children.[22]

Australia[edit]

Emigration and new political career[edit]

The cause of the Irish tenants, and indeed of Ireland generally, seemed to Duffy more hopeless than ever. Broken in health and spirit, he published in 1855 a farewell address to his constituency, declaring that he had resolved to retire from parliament, as it was no longer possible to accomplish the task for which he had solicited their votes. In 1856 he emigrated with his family to Australia.[26] After being feted in Sydney and Melbourne, he settled in the newly formed Colony of Victoria.[31] Duffy was followed to Melbourne by Margaret Callan. Her daughter was later to marry Duffy's eldest son by his first marriage, John Gavan Duffy.

Duffy initially practised law in Melbourne, but a public appeal was soon held to enable him to buy the freehold property necessary to stand for the colonial Parliament. He was immediately elected to the Legislative Assembly for Villiers and Heytesbury in the Western District in 1856. A *Melbourne Punch* cartoon depicted Duffy entering Parliament as a bog Irishman carrying a shillelagh atop the parliamentary benches (*Punch*, 4 December 1856, p. 141).[32] He later represented Dalhousie and then North Gippsland.

Duffy's Land Act[edit]

Duffy stood on a platform of land reform. With the collapse of the Victorian Government's Haines Ministry, during 1857, another Irish Catholic, John O'Shanassy, unexpectedly became Premier. Duffy was his deputy as well as Commissioner for Public Works, President of the Board of Land and Works, and Commissioner for Crown Lands and Survey. Irish Catholics serving as Cabinet Ministers was hitherto unknown in the British Empire and the Melbourne's Protestant establishment was ill-prepared "to countenance so startling a novelty".[33]

Duffy's Land Act was passed in 1862. Like the Nicholson Act of 1860 which it modified, the Duffy Act provided, in specified areas, for new and extended pastoral licences. It was an effort to break the land-holding monopoly of the so-called "squatter" class. However, the bill had been amended into ineffectiveness by the Legislative Council so that it was easy for the Squatters to employ dummies and extend their control. Duffy's attempts to correct the legislation were defeated. Historian Don Garden commented that "Unfortunately Duffy's dreams were on a higher plane than his practical skills as a legislator and the morals of those opposed to him."[34]

In 1858–59, *Melbourne Punch* cartoons linked Duffy and O'Shanassy with images of the French Revolution to undermine their Ministry. One famous *Punch* image, "Citizens John and Charles", depicted the pair as French revolutionaries holding the skull and cross bone flag of the so-called *Victorian Republic*.[35] The O'Shanassy Ministry was defeated at the 1859 election and a new government formed.

Premier of Victoria[edit]

In 1871 Duffy led the opposition to Premier Sir James McCulloch's plan to introduce a land tax, on the grounds that it unfairly penalised small farmers. When McCulloch's government was defeated on this issue, Duffy became Premier and Chief Secretary (June 1871 to June 1872). Victoria's finances were in a poor state and he was forced to introduce a tariff bill to provide government revenue, despite his adherence to British free trade principles.

An Irish Catholic Premier was very unpopular with the Protestant majority in the colony, and Duffy was accused of favouring Catholics in government appointments, an example being the appointment of John Cashel Hoey, who had been his successor as editor of The Nation, to a position in London. In June 1872 his government was defeated in the Assembly on a confidence motion allegedly motivated by sectarianism. He was succeeded as premier by the conservative James Francis and later resigned the leadership of the liberal party in favour of Graham Berry.[22]

Speakership and retirement[edit]

Grave of Charles Gavan Duffy, Glasnevin, Dublin.

When Berry became Premier in 1877 he made Duffy Speaker of the Legislative Assembly, a post he held without much enthusiasm until 1880. Thereafter he quit politics and retired to southern France where he wrote his memoirs: *The League of North and South, 1850–54* (1886) and *My Life in Two Hemispheres* (1898).

In exile in France, Duffy was an enthusiastic supporter of the Melbourne Celtic Club, which aimed to promote Irish Home Rule and Irish culture.[36] His sons also became members of the club.

In recognition of his services to Victoria, he was knighted in 1873 and made KCMG in 1877. He married for a third time in Paris in 1881, to Louise Hall, and they had four more children.[22]

Notable children[edit]

- John Gavan Duffy was a Victorian politician between 1874 and 1904.

- Sir Frank Gavan Duffy, was Chief Justice of the High Court of Australia 1931–35.[37]
- Louise Gavan Duffy (1884-1969) was the joint secretary of the nationalist women's organization, Cumann na mBan, and was an Irish republican present at the 1916 Easter Rising and an Irish language enthusiast who founded an Irish language school, Scoil Bhride (St Bridget)'s Girls School in Earlsfort Terrace, Dublin.[38]
- George Gavan Duffy, was an Irish politician and a signatory to the Anglo-Irish Treaty in 1921. From 1936 onward he was a justice on the Irish High Court, becoming its president from 1946 until his death in 1951. One year before his death, he heard the *Tilson Case*, in which he applied the *ne temere* decree to the letter as de Valera's 1937 Irish Constitution gave the Roman Catholic Church in Ireland a "special position".[39]

Additionally, a grandson, Charles Leonard Gavan Duffy, was a judge on the Supreme Court of Victoria, Australia.[40]

Death[edit]

Sir Charles Gavan Duffy died in Nice, France in 1903, aged 86.[22]

Works[edit]

Texts on Wikisource:

- *My Life in Two Hemispheres* (1898)[41]

Notes[edit]

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External links[edit]

- Media related to Charles Gavan Duffy at Wikimedia Commons
- Works related to Charles Gavan Duffy at Wikisource
- Works by Charles Gavan Duffy at Project Gutenberg
- Works by or about Charles Gavan Duffy at Internet Archive
- Poetry of Ireland, with references to Duffy
- Early Life in Monaghan by Charles Gavan Duffy

Political offices		
Preceded by **James McCulloch**	**Premier of Victoria** 1871–1872	Succeeded by **James Francis**

show

Appendix

3b

Department of Housing Local Government & Heritage Correspondence

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

Your Ref: ABP- JA18.314501-22
Our Ref: 177AE South Dublin Street Regen
(Please quote in all related correspondence)

15 May, 2023

Mr Cathal Flynn
Directorate of Economic Development, Planning & Capital Projects
Monaghan County Council,
County Offices,
The Glen,
Monaghan, H18 YT50

By email: CFlynn@monaghancoco.ie

Application by Monaghan County Council for the South Dublin Street and Backlands Regeneration Project at properties at 7- 13 Dublin Street, lands to the rear of 1-9 The Diamond and 1-26 Dublin Street, incorporating sections of the Northern Standard property, the Courthouse car park, Lower Courthouse car park, Castle Road, and N54 Macartan (Broad) Road, Roosky and Tirkeenan, Monaghan Town Centre, Monaghan.

A chara

The Department refers to the above referenced planning application, our response to An Bord Pleneála (ABP) and also to the referral back to Monaghan County Council for further engagement with this Department.

It is noted that the proposed development covers an area of approximately 2.72ha and comprises urban regeneration and public realm proposals, as part of the South Dublin Street and Backlands Regeneration Project.

Having engaged with Monaghan County Council the Department now has a clearer understanding of the nature, purpose and extent of the development and of the nature of the existing vernacular built environment.

The proposed area of development resides within the Zone of Archaeological Significance and the National Monuments Service Zone of Notification for the historic town of Monaghan. The Department's previous comments and observations in that regard stand, i.e., that the potential of this area to contain significant archaeological deposits subsurface is considered moderate to low.

Regarding the impacted built heritage and taking account of the clarifications provided by Monaghan County Council officials as to the vernacular nature of the impacted buildings, the extensive and intrusive interventions made over the decades, and irreversible loss of original fabric, detail and aspect, the Department are now inclined to set aside earlier observations.

The commitments by Monaghan County Council to ensure the consistency of this development with the proposal that gave rise to a successful application for funding from the Historic Towns Initiative (€247,952 for conservation works on Dublin St.) are noted

The historical urban mapping referenced previously describes the enclosed space and curved line of Dublin Street connecting the central historic spaces of the Diamond and the Old Cross Square. The mapping includes the elements that are part of the setting and character of this place including the scale and rhythm of the street-fronted buildings and arched entrances linking to the long burgage/building plots to the rear.

In this context, the Department now note that the proposed intervention will work to retain historic urban legibility curves while creating a portal to a vibrant town civic space, with appropriate recognition of the historic and cultural backdrop. It is now understand that this pedestrian priority interconnection draws on the historic precedent of pedestrian archways routes in the town. It nods too to the Town Centre First Policy established by the Department of Housing, Local Government & Heritage that sets out the importance of cultural heritage (archaeological, built, and natural) for well-being and sense of place.

The Department is supportive of heritage-led regeneration that meets the ambitions of the Housing for All and Town Centre First policies, which are underpinned by the UN Sustainable Development Goals (SDG's). Sustainable development requires careful consideration of the use of cultural assets for societal well-being, climate action and community resilience. In that context, we note the primacy in this development of civic space and the repurposing commitments.

Is mise le meas**,**

Joanne Lyons
Development Applications Unit
Administration

Appendix

3c

Stage 1 Approval Confirmation

An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

22nd November 2023

Olga McConnon,
Acting Director of Housing,
Monaghan County Council,
Council Offices,
The Glen, Monaghan.

Dept. Ref: N18-2-242

Re: 6 Apts @ 15 Dublin St, Monaghan Town

Stage 1 Approval

Dear Olga,

Thank you for the recent proposal seeking a Stage 1 approval for the above named project.

Following an assessment by the Department, a Stage 1 approval is hereby confirmed with an all-in budget of €2,215,837 (incl. VAT). This approval is subject to Monaghan County Council complying with the requirements listed below and in the budget notes in Appendix 1

- With next Stage submission the Local Authority providing a Tender Report for Procurement of Consultants including details of fee agreement

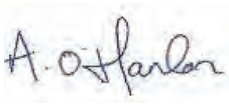
- Monaghan Co. Co. carrying out extensive survey works to identify and having absolute understanding of the works/risks required to demolish the existing building and constructing a new building in its place in addition to verifying the budget requirements. There are concerns as to the buildability, as the property above the arch is excluded from the property purchase and does not form part of the application, this will require significant structural interventions and agreements with neighbouring property owners/commercial leaseholders.

- Monaghan Co. Co. providing a detailed cost plan as part of the Stage 2 submission informed by a detailed survey/investigations and resultant scope of works.

As a Stage 1 approval is now deemed to be in order your Stage 2 submission is due into the Department by 14 February, 2024 per Circular 2/2018 relating to "New Timelines for the Preparation and Assessment of Local Authority Social Housing Capital Projects (the 4 stage approval process).

Oifigí an Rialtais, Sráid an tSrutháin, Béal an Átha, Maigh Eo, F26 E8N6
Government Offices, Brook Street, Ballina, Mayo, F26 E8N6
T +353 9624209 | aishling.o'hanlon@housing.gov.ie
www.housing.gov.ie

Yours sincerely,



_____

Aishling O'Hanlon,
Social Housing Capital Investment Unit 1,

Cc: Samantha Boyle, Lorcan Maccinna, Michelle Mulligan (MCC)
Patrick Dowling, Alan Heatly (DHLG&H)

Appendix 1

Stage 1 Approved Budget for 6 Homes @ 15 Dublin St, Monaghan Town

	Stage 1 Submission €	Stage 1 Recommended Budget €	Notes
Construction Estimate [ex Abnormal] (incl VAT)	1,380,700.00	1,450,000	
Abnormal Costs (incl. VAT)	300,000.00	300,000	
Total Construction Estimate (incl VAT)	1,680,700.00	1,750,000	Note 1
Cost of Site	150,000.00	150,000	Note 2
Technical Fees / Salaries	210,000.00	230,000	Note 3
Contract Monitoring & Management	21,000.00	15,419	Note 4
Site Investigations / Surveys	25,000.00	25,000	Note 5
Utilities [ESB, gas, water etc.]	30,000.00	30,000	Note 5
Other Costs			
Public Art	14,000.00	15,418	Note 6
LA Administration	30,000.00	N/A	Note 7
Total ALL IN COST €	2,160,700.00	2,215,837	

Note 1
Recommended budget for Construction works.

Note 2
Allowance for site purchase costs as per LA submitted amount. Further details to be provided as part of the Stage 2 Submission including vouched documentation including agreements and fee receipts etc.

Note 3
Recommended allowance for Design Team Fees. Tender reports to be provided in respect appointments and procurement to adhere to the requirements of the CWMF.

Note 4
Recommended budget for LA Contract Monitoring and Management (where full external design team is provided) in accordance with Circular 23/2018.

Note 5
Provisional allowance made, subject to receipt of vouched documentation in due course.

Note 6
Allowance for Art Budget has been based upon the provisions in alignment with Per Cent for Art Scheme. Please confirm the Art Project that was commissioned and when claiming for same provide vouched documentation.

Note 7
LA Admin Fee has ceased.

Appendix

4a

Baseline Noise Monitoring Survey

APPENDIX 4.A
Baseline Noise Monitoring Survey

SUMMARY OF BASELINE NOISE MONITORING SURVEY

RPS was commissioned by Monaghan County Council to undertake a Noise and Vibration Impact Assessment (NVIA) of lands within Monaghan town centre and the proposals for redevelopment of this site, as described within Chapter 2 Project Description of this EIAR. A baseline noise monitoring survey was undertaken in relation to this proposal.

Figure 4.A.1 below shows the noise monitoring locations (NML) where the baseline noise monitoring survey was undertaken.

Figure 4.A.1: Noise Monitoring Locations

As the proposed development site is an open area it is not possible to set up and leave noise monitoring equipment operating unattended for an extended period of time. Therefore, to be representative of existing noise sources RPS have undertaken attended noise monitoring for both daytime and night-time at 4 locations as detailed in Figure 4.A.1 above.

The details of the baseline noise monitoring survey including a description of the noise monitoring location, date, time and sound level meter used are summarised in Table 4.A.1 below.

Table 4.A.1: Summary of Baseline Noise Monitoring Survey

Noise Monitoring Location	Description of Noise Monitoring Location	Date	Time	Sound Level Meter
NML 1	To the northern boundary of the proposed redevelopment site along Dublin Street	19/05/2021	06:00 – 07:00	Norsonic 140
		19/05/2021	07:45 – 10:45	
NML 2	To the east of the proposed redevelopment site at Old Cross Square and Rooskey Vale.	19/05/2021	05:40 – 06:55	Rion NL-52
		19/05/2021	11:10 – 14:10	
NML 3	To the south of the proposed redevelopment site at Castle Road	26/05/2021	05:40 – 06:55	Rion NL-52
		26/05/2021	07:10 – 10:10	
NML 4	To the west of the proposed redevelopment site at Dawson Street.	26/05/2021	06:00 – 07:00	Norsonic 140
		26/05/2021	07:00 – 10:00	

The specification and calibration certificates of the Sound Level Meter's used can be found in section 1.2 below.

1.1 Methodology

At each NML the microphone was placed at a height of 1.2 - 1.5m above ground level, and equipped with an all-weather wind shield which also provides water resistance.

The proprietary wind shield used is certified by the manufacture as meeting Type 1 / Class 1 precision standards. All noise measurements were made at a height of 1.2 – 1.5m above ground level.

The following parameters were recorded during each noise monitoring period:

- L_{Aeq} The continuous equivalent A-weighted sound pressure level.
- L_{Amax} This is the maximum A-weighed sound level measured during the sample period.
- L_{Amin} This is the minimum A-weighted sound level measured during the sample period.
- L_{A10} This is the A-weighted sound level that is exceeded for noise for 10% of the sample period.
- L_{A90} This is the A-weighted sound level that is exceeded for 90% of the sample period.

The weather during each set of measurements was conducive to the measurement of existing noise climate during the attended and unattended surveys being predominately dry and with wind speeds remaining below 5 m/s.

Noise monitoring will be completed in accordance with guidance included in:

- BS 7445:2003, The Description and Measurement of Environmental Noise - Part 1: Guide to Quantities and Procedures; and
- Environmental Protection Agency (EPA) Office of Environmental Enforcement (OEE) - Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (2016).

1.2 Sound Level Meter Specifications and Calibration Certificates

The calibration certificates and sound level meter specifications from the noise survey equipment are detailed in Table 4.A.2, Table 4.A.3, Figure 4.A.2, and Figure 4.A.3 below.

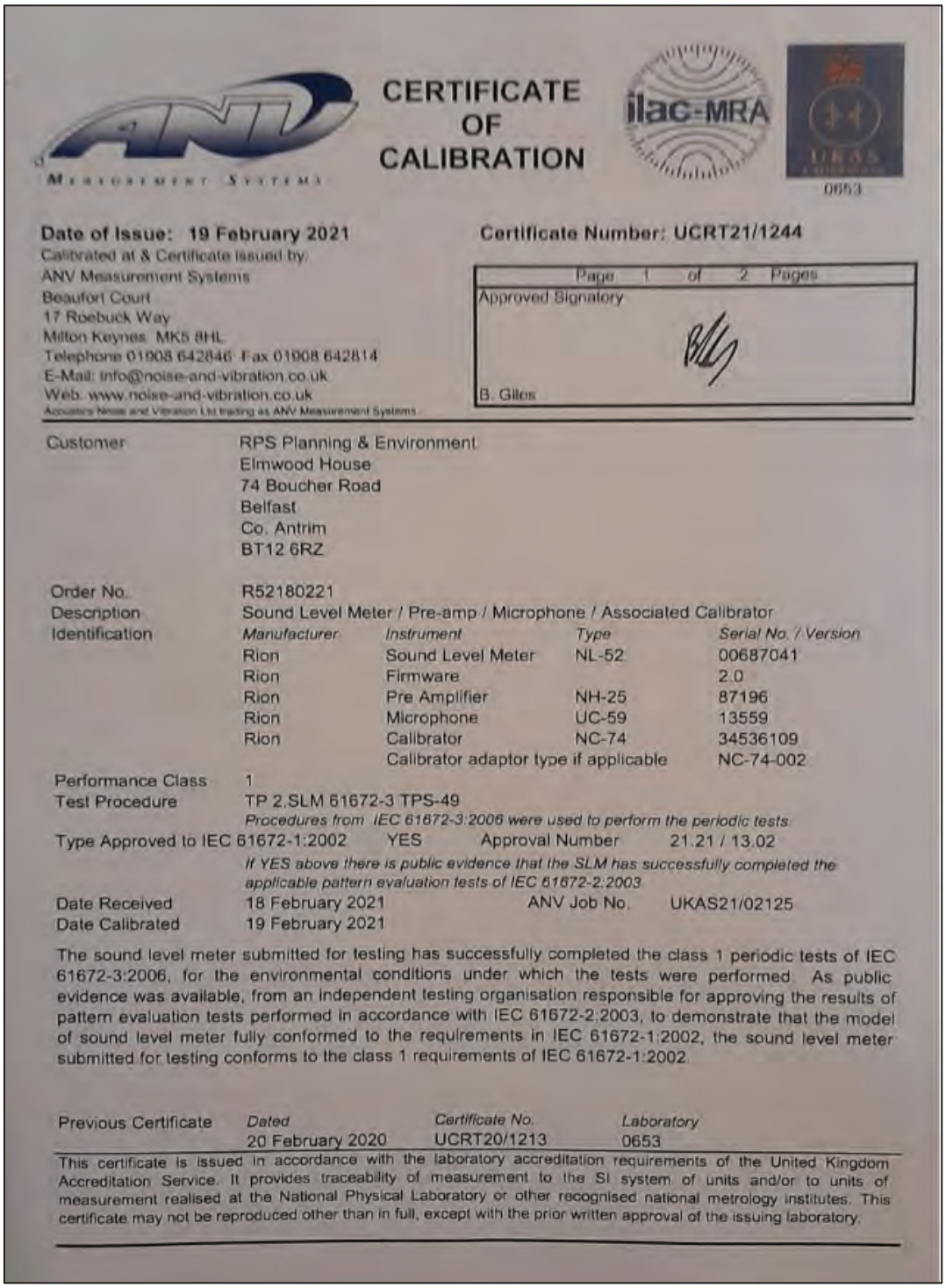
Table 4.A.2: Noise Instrument Record for Rion NL-52

Equipment	Model / Type	Serial Number	Calibration Certificate Number	Last Calibration Date
Sound Level Meter	Rion NL-52	00687041	UCRT20/1213	20/02/2020
Preamplifier	Rion NH-25	87196	UCRT20/1213	20/02/2020
Microphone	Rion UC-59	13559	UCRT20/1213	20/02/2020

Table 4.A.3: Noise Instrument Record for Norsonic 140: Used at NML 1 and NML 4

Equipment	Model / Type	Serial Number	Calibration Certificate Number	Last Calibration Date
Sound Level Meter	Norsonic 140	1402992	U33023	03/10/2019
Preamplifier	Norsonic 1209	12364	33023	03/10/2019
Microphone	GRAS 40AF	102675	33022	03/10/2019

Figure 4.A.2: Calibration Certificate of Rion NL-52: Used at NML 2 and NML 3



CERTIFICATE OF CALIBRATION

0653

Date of Issue: 19 February 2021

Certificate Number: UCRT21/1244

Calibrated at & Certificate issued by:
ANV Measurement Systems
Beaufort Court
17 Roebuck Way
Milton Keynes MK5 8HL
Telephone 01908 642846 Fax 01908 642814
E-Mail: info@noise-and-vibration.co.uk
Web: www.noise-and-vibration.co.uk
Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages

Approved Signatory

B. Giles

Customer	RPS Planning & Environment Elmwood House 74 Boucher Road Belfast Co. Antrim BT12 6RZ
Order No.	R52180221
Description	Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification	*Manufacturer*	*Instrument*	*Type*	*Serial No. / Version*
	Rion	Sound Level Meter	NL-52	00687041
	Rion	Firmware		2.0
	Rion	Pre Amplifier	NH-25	87196
	Rion	Microphone	UC-59	13559
	Rion	Calibrator	NC-74	34536109
		Calibrator adaptor type if applicable		NC-74-002

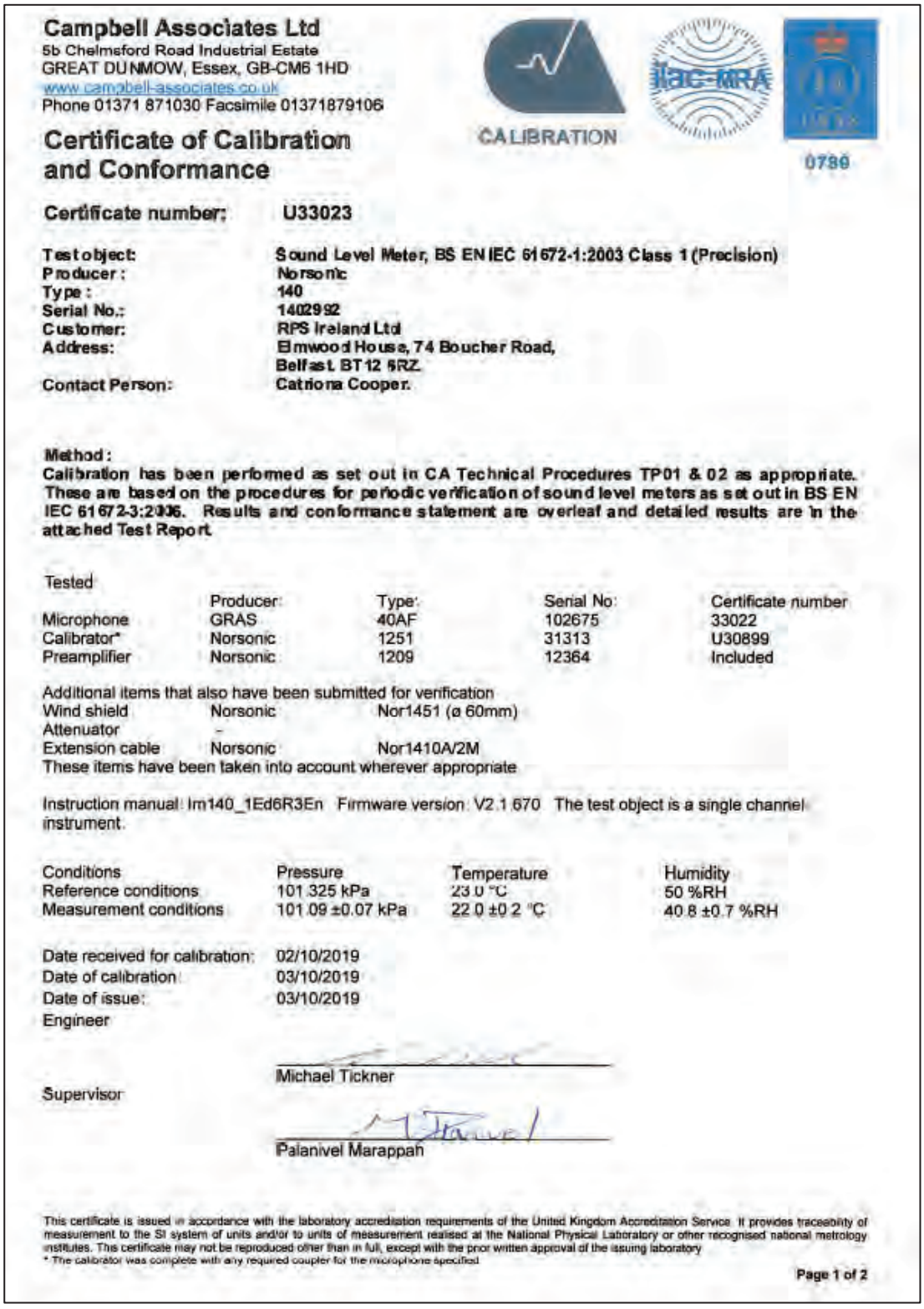
Performance Class	1		
Test Procedure	TP 2.SLM 61672-3 TPS-49		
	Procedures from IEC 61672-3:2006 were used to perform the periodic tests.		
Type Approved to IEC 61672-1:2002	YES	Approval Number	21.21 / 13.02
	If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003.		
Date Received	18 February 2021	ANV Job No.	UKAS21/02125
Date Calibrated	19 February 2021		

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.

Previous Certificate	*Dated*	*Certificate No.*	*Laboratory*
	20 February 2020	UCRT20/1213	0653

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

Figure 4.A.3: Calibration Certificate of Norsonic 140



Campbell Associates Ltd
5b Chelmsford Road Industrial Estate
GREAT DUNMOW, Essex, GB-CM6 1HD
www.campbell-associates.co.uk
Phone 01371 871030 Facsimile 01371879106

CALIBRATION

0799

Certificate of Calibration and Conformance

Certificate number: U33023

Test object:	**Sound Level Meter, BS EN IEC 61672-1:2003 Class 1 (Precision)**
Producer:	**Norsonic**
Type:	**140**
Serial No.:	**1402992**
Customer:	**RPS Ireland Ltd**
Address:	**Elmwood House, 74 Boucher Road, Belfast. BT12 6RZ.**
Contact Person:	**Catriona Cooper.**

Method:
Calibration has been performed as set out in CA Technical Procedures TP01 & 02 as appropriate. These are based on the procedures for periodic verification of sound level meters as set out in BS EN IEC 61672-3:2006. Results and conformance statement are overleaf and detailed results are in the attached Test Report.

Tested

	Producer:	Type:	Serial No:	Certificate number
Microphone	GRAS	40AF	102675	33022
Calibrator*	Norsonic	1251	31313	U30899
Preamplifier	Norsonic	1209	12364	Included

Additional items that also have been submitted for verification

Wind shield	Norsonic	Nor1451 (ø 60mm)
Attenuator	-	
Extension cable	Norsonic	Nor1410A/2M

These items have been taken into account wherever appropriate

Instruction manual: Im140_1Ed6R3En Firmware version: V2.1.670 The test object is a single channel instrument.

Conditions	Pressure	Temperature	Humidity
Reference conditions	101.325 kPa	23.0 °C	50 %RH
Measurement conditions	101.09 ±0.07 kPa	22.0 ±0.2 °C	40.8 ±0.7 %RH

Date received for calibration:	02/10/2019
Date of calibration:	03/10/2019
Date of issue:	03/10/2019

Engineer

Michael Tickner

Supervisor

Palanivel Marappan

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2 NOISE MONITORING LOCATION 1

NML1 was located close to residential properties, within the north side of the proposed redevelopment site along Dublin Street. A number of buildings next to these existing residential properties on Dublin Street will be demolished. The baseline environment at these residential properties closest to proposed demolition and construction should be reflected in NML1.

2.1 NML 1 Night time Measurements

The results of the night time noise monitoring survey at NML1 is shown below in Table 4.A.4.

Table 4.A.3: Night time Noise Monitoring Results at NML1 dB (19/05/2021)

Date	Time	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
19/05/2021	06:00	64.4	88.5	31.7	60.1	37.2
19/05/2021	06:15	57.6	81.2	35.6	59.4	38.7
19/05/2021	06:30	73.9	103.7	36.2	68.8	39.7
19/05/2021	06:45	62.1	81.2	37.1	64.4	40.6

The dominant noise source during the night time noise monitoring survey at NML1 was road traffic noise from cars and HGV's passing on Dublin Street.

2.2 NML 1 Daytime Measurements

The results of the daytime noise monitoring survey at NML1 are shown below in Table 4A.5.

Table 4.A.4: Daytime Noise Monitoring Results at NML1 dB (19/05/2021)

Date	Time	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
19/05/2021	07:45	66.5	87.6	40.5	70.3	44.3
19/05/2021	08:00	66.8	85.9	39.4	69.7	46.4
19/05/2021	08:15	71.2	95.8	38.8	73.6	48.9
19/05/2021	08:30	69.6	90.3	42.0	71.7	50.6
19/05/2021	08:45	66.4	85.7	41.0	70.3	49.6
19/05/2021	09:00	64.2	81.8	40.0	68.4	46.8
19/05/2021	09:15	67.4	87.8	41.3	70.0	48.6
19/05/2021	09:30	64.4	85.8	38.6	67.3	43.9
19/05/2021	09:45	65.8	86.0	42.3	68.4	48.4
19/05/2021	10:00	64.8	83.2	40.6	67.2	47.7
19/05/2021	10:15	66.3	87.2	40.1	67.4	45.5
19/05/2021	10:30	65.7	90.4	41.8	67.4	47.6

The dominant noise source during the daytime noise monitoring survey at NML1 was road traffic noise from cars and HGV's passing on Dublin Street.

A photograph of the noise equipment set up at NML1 is shown in photograph 4A.1 below.

Photograph 4A.1: Photograph of Noise Monitoring Location 1

3 NOISE MONITORING LOCATION 2

NML2 was located close to residential properties at Old Cross Square and Rooskey Vale, to the eastern boundary of the proposed redevelopment site.

3.1 NML 2 Night time Measurements

The results of the night time noise monitoring survey at NML2 is shown below in Table 4.A.5.

Table 4.A.5: Night time Noise Monitoring Results at NML2 dB (19/05/2021)

Date	Time	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
19/05/2021	05:40	72.6	101.2	48.0	75.9	55.7
19/05/2021	05:55	71.0	85.6	44.7	75.5	56.4
19/05/2021	06:10	70.6	90.2	44.7	74.2	52.5
19/05/2021	06:25	73.2	93.4	47.6	77.6	58.3
19/05/2021	06:40	75.2	98.9	53.3	78.8	65.1

The dominant noise source during the night time noise monitoring survey at NML2 was road traffic noise from cars and HGV's passing on Old Square Road and Broad Road.

3.2 NML 2 Daytime Measurements

The results of the daytime noise monitoring survey at NML2 are shown below in Table 4A.7.

Table 4.A.6: Daytime Noise Monitoring Results at NML2 dB (19/05/2021)

Date	Time	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
19/05/2021	11:10	76.0	91.5	60.3	78.8	68.1
19/05/2021	11:25	76.3	95.5	60.2	78.3	68.3
19/05/2021	11:40	76.0	94.3	57.0	79.2	68.5
19/05/2021	11:55	76.9	96.3	59.7	80.5	69.1
19/05/2021	12:10	76.9	99.7	60.7	79.5	68.8
19/05/2021	12:25	75.1	91.4	63.4	78.0	69.1
19/05/2021	12:40	76.1	94.5	61.9	78.9	69.0
19/05/2021	12:55	76.1	91.5	64.1	79.5	70.0
19/05/2021	13:10	77.8	102.5	63.3	79.8	68.7
19/05/2021	13:25	77.1	100.5	63.4	80.3	68.3
19/05/2021	13:40	76.1	100.7	61.7	79.0	67.9
19/05/2021	13:55	75.7	91.2	61.6	79.0	68.1

The dominant noise source during the daytime noise monitoring survey at NML2 was road traffic noise from cars and HGV's passing on Dublin Street. A lawnmower was audible at approximately 11:55hrs at a nearby residential property. Noise from schoolchildren passing was audible from approximately 13:00hrs to 13:30hrs.

A photograph of the noise equipment set up at NML2 is shown in photograph 4A.2 below.

Photograph 4A.2: Photograph of Noise Monitoring Location 2

4 NOISE MONITORING LOCATION 3

NML3 was located at to the southern boundary of the proposed redevelopment site at Castle Road. This location is representative of the existing residential properties on Broad Road and Canal Street. These are the closest residential properties to the operational phase of the proposed road realignment.

4.1 NML 3 Night time Measurements

The results of the night time noise monitoring survey at NML3 is shown below in Table 4.A.7.

Table 4.A.7: Night time Noise Monitoring Results at NML3 dB (26/05/2021)

Date	Time	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
26/05/2021	05:40	60.7	78.7	40.3	64.9	47.9
26/05/2021	05:55	59.7	77.3	37.7	62.9	44.8
26/05/2021	06:10	58.2	77.6	39.1	62.2	45.5
26/05/2021	06:25	60.8	84.2	38.0	62.1	46.6
26/05/2021	06:40	62.4	82.3	42.1	64.0	49.6

The dominant noise source during the night time noise monitoring survey at NML3 was road traffic noise from cars and HGV's passing on Castle Road and Canal Street.

4.2 NML 3 Daytime Measurements

The results of the daytime noise monitoring survey at NML3 are shown below in Table 4.A.8.

Table 4.A.8: Daytime Noise Monitoring Results at NML3 dB (26/05/2021)

Date	Time	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
26/05/2021	07:10	62.8	83.6	43.6	64.5	49.2
26/05/2021	07:25	63.8	85.7	44.8	65.8	51.7
26/05/2021	07:40	66.6	89.7	47.5	70.3	55.1
26/05/2021	07:55	65.2	89.4	49.7	66.1	55.2
26/05/2021	08:10	64.4	81.8	49.2	67.5	55.2
26/05/2021	08:25	65.3	83.6	50.6	68.0	56.4
26/05/2021	08:40	63.8	88.1	50.5	66.3	55.7
26/05/2021	08:55	66.3	92.5	48.6	66.2	54.6
26/05/2021	09:10	63.4	84.5	49.6	65.5	55.0
26/05/2021	09:25	63.8	83.6	49.0	65.9	55.3
26/05/2021	09:40	65.0	84.7	45.8	66.5	54.1
26/05/2021	09:55	64.7	87.1	44.7	65.7	54.0

The dominant noise source during the daytime noise monitoring survey at NML3 was road traffic noise from cars and HGV's passing on Castle Road and Canal Street.

A photograph of the noise equipment set up at NML3 is shown in photograph 4A.3 below.

Photograph 4A.3: Photograph of Noise Monitoring Location 3

5 NOISE MONITORING LOCATION 4

NML4 was located close to residential properties along Dawson Street to the western boundary of the proposed redevelopment site.

5.1 NML 4 Night time Measurements

The results of the night time noise monitoring survey at NML4 is shown below in Table 4.A.9.

Table 4.A.9: Night time Noise Monitoring Results at NML4 dB (26/05/2021)

Date	Time	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
26/05/2021	06:00	58.7	77.0	37.4	61.8	41.3
26/05/2021	06:15	60.1	81.3	37.9	62.3	42.3
26/05/2021	06:30	62.3	78.6	40.0	66.6	45.4
26/05/2021	06:45	65.4	85.8	40.7	69.0	49.2

The dominant noise source during the night time noise monitoring survey at NML4 was road traffic noise from cars and HGV's passing on Market Street and Dawson Street.

5.2 NML 4 Daytime Measurements

The results of the daytime noise monitoring survey at NML4 are shown below in Table 4.A.10.

Table 4.A.10: Daytime Noise Monitoring Results at NML4 dB (26/05/2021)

Date	Time	L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
26/05/2021	07:00	64.8	83.7	43.4	69.0	49.5
26/05/2021	07:15	65.7	82.0	42.5	69.0	52.2
26/05/2021	07:30	64.9	80.6	43.9	68.6	52.6
26/05/2021	07:45	65.6	80.2	46.3	69.2	54.2
26/05/2021	08:00	66.4	81.6	49.1	70.1	55.1
26/05/2021	08:15	66.9	85.7	51.6	69.6	58.4
26/05/2021	08:30	66	79.3	50.5	68.9	57.5
26/05/2021	08:45	66.7	85.9	53.3	68.9	58.4
26/05/2021	09:00	67.4	87.3	51.9	69.6	58.7
26/05/2021	09:15	65.8	87.3	47.2	67.8	55.2
26/05/2021	09:30	67.2	88.4	47.4	68.1	56.5
26/05/2021	09:45	65.3	82.9	50.5	68.0	57.7

The dominant noise source during the daytime noise monitoring survey at NML4 was road traffic noise from cars and HGV's passing on Market Street and Dawson Street.

A photograph of the noise equipment set up at NML4 is shown in photograph 4A.4 below.

Photograph 4A.4: Photograph of Noise Monitoring Location 4

Appendix

4b

Construction Noise Assessment

APPENDIX 4.B

Construction Noise Assessment

Table 4.B.1: Construction Noise Receptors and BS 5228 ABC Category

Construction Receptor ID	Residential	Sensitivty	Representative Noise Monitoring Location	BS5228 ABC Category (daytime) dB	NRA Guideline dB
1	No	Medium	4	70	70
2	No	Medium	4	70	70
3	No	Medium	4	70	70
4	No	Medium	4	70	70
5	No	Medium	4	70	70
6	No	Medium	4	70	70
7	No	Medium	3	70	70
8	Yes	High	1	70	70
9	Yes	High	1	70	70
10	Yes	High	1	70	70
11	Yes	High	1	70	70
12	Yes	High	1	70	70
13	Yes	High	1	70	70
14	Yes	High	2	70	70
15	Yes	High	2	70	70
16	Yes	High	2	70	70
17	Yes	High	2	70	70
18	Yes	High	2	70	70
19	Yes	High	2	70	70
20	Yes	High	2	70	70
21	Yes	High	2	70	70
22	Yes	High	2	70	70
23	Yes	High	2	70	70
24	Yes	High	2	70	70
25	Yes	High	2	70	70
26	Yes	High	2	70	70
27	Yes	High	2	70	70
28	Yes	High	2	70	70
29	Yes	High	2	70	70
30	Yes	High	2	70	70
31	Yes	High	2	70	70
32	Yes	High	2	70	70
33	Yes	High	2	70	70
34	Yes	High	2	70	70

Construction Receptor ID	Residential	Sensitivty	Representative Noise Monitoring Location	BS5228 ABC Category (daytime) dB	NRA Guideline dB
35	Yes	High	2	70	70
36	Yes	High	2	70	70
37	Yes	High	3	70	70
38	Yes	High	3	70	70
39	Yes	High	3	70	70
40	Yes	High	3	70	70
41	Yes	High	3	70	70
42	Yes	High	3	70	70
43	Yes	High	3	70	70
44	Yes	High	3	70	70
45	Yes	High	3	70	70
46	Yes	High	3	70	70
47	Yes	High	3	70	70
48	Yes	High	3	70	70
49	Yes	High	3	70	70
50	Yes	High	3	70	70
51	Yes	High	3	70	70
52	Yes	High	3	70	70
53	Yes	High	3	70	70
54	Yes	High	3	70	70
55	Yes	High	3	70	70
56	Yes	High	3	70	70
57	Yes	High	3	70	70
58	Yes	High	3	70	70
59	Yes	High	3	70	70
60	Yes	High	3	70	70
61	Yes	High	3	70	70
62	Yes	High	3	70	70
63	Yes	High	3	70	70
64	Yes	High	3	70	70
65	Yes	High	3	70	70
66	Yes	High	3	70	70
67	Yes	High	3	70	70
68	Yes	High	3	70	70
69	Yes	High	3	70	70

Construction Receptor ID	Residential	Sensitivty	Representative Noise Monitoring Location	BS5228 ABC Category (daytime) dB	NRA Guideline dB
70	Yes	High	4	70	70
71	Yes	High	4	70	70
72	Yes	High	4	70	70
73	Yes	High	4	70	70
74	Yes	High	4	70	70
75	Yes	High	4	70	70
76	Yes	High	4	70	70
77	Yes	High	4	70	70
78	Yes	High	4	70	70
79	Yes	High	4	70	70
80	Yes	High	4	70	70
81	Yes	High	4	70	70
82	Yes	High	4	70	70
83	Yes	High	4	70	70
84	Yes	High	4	70	70
85	Yes	High	4	70	70
86	Yes	High	4	70	70
87	Yes	High	4	70	70
88	Yes	High	4	70	70
89	Yes	High	4	70	70
90	Yes	High	4	70	70
91	Yes	High	1	70	70
92	Yes	High	1	70	70
93	Yes	High	1	70	70
94	Yes	High	1	70	70
95	Yes	High	1	70	70
96	Yes	High	1	70	70
97	Yes	High	1	70	70
98	Yes	High	1	70	70
99	Yes	High	1	70	70
100	Yes	High	1	70	70

Table 4.B.2: Distance from Construction Noise Receptors to Construction Phase Boundaries

Construction Receptor ID	Site Boundary (m)	Demolition (m)				Road Construction and Road Surfacing (m)
		Area 1	Area 2	Area 3	Area 4	
1	24	37	190	131	188	47
2	36	119	350	227	251	39
3	195	278	105	387	410	200
4	338	412	483	518	554	341
5	442	528	445	636	655	449
6	293	384	599	478	480	307
7	331	500	477	455	395	333
8	8	98	284	14	97	49
9	2	104	321	10	86	45
10	1	113	336	9	74	43
11	8	122	360	14	66	45
12	11	130	274	23	59	50
13	11	169	262	82	45	78
14	157	312	248	206	192	223
15	150	307	240	203	184	214
16	164	321	236	219	196	225
17	170	328	326	228	201	228
18	167	324	223	229	195	221
19	184	342	224	247	212	238
20	95	246	73	167	115	136
21	105	253	67	179	123	140
22	75	203	294	141	81	88
23	141	281	279	213	155	166
24	146	286	271	218	160	171
25	153	293	276	225	167	178
26	160	299	256	232	173	184
27	167	307	260	239	181	191
28	139	278	169	219	158	163
29	147	287	166	227	167	172
30	200	345	136	290	230	224
31	231	376	164	321	261	249
32	388	528	157	461	403	413
33	217	370	207	325	264	221
34	100	248	207	205	145	136

Construction Receptor ID	Site Boundary (m)	Demolition (m)				Road Construction and Road Surfacing (m)
		Area 1	Area 2	Area 3	Area 4	
35	96	244	209	206	147	124
36	96	244	201	210	152	115
37	96	244	193	212	154	111
38	46	188	181	175	127	62
39	33	175	160	163	116	63
40	31	172	64	167	123	52
41	28	169	63	170	129	41
42	28	170	212	175	136	32
43	15	173	168	185	148	19
44	94	249	244	222	166	100
45	88	249	245	225	169	94
46	72	249	254	232	179	77
47	66	248	202	233	181	70
48	60	252	270	243	192	62
49	55	254	262	250	201	54
50	56	258	256	255	207	55
51	58	261	328	261	213	55
52	62	267	287	269	222	58
53	65	270	262	274	228	60
54	73	278	258	286	242	66
55	123	327	255	323	271	119
56	169	372	253	365	312	165
57	200	403	295	391	337	197
58	106	311	315	326	283	99
59	118	324	249	342	300	113
60	140	346	226	368	327	135
61	234	439	225	448	400	227
62	279	480	235	465	408	276
63	332	533	240	515	458	328
64	350	555	257	552	499	344
65	289	494	269	497	447	282
66	361	567	253	583	537	357
67	357	562	121	590	549	354
68	476	659	180	714	684	477
69	300	465	167	530	509	304
70	508	588	168	698	723	512

Construction Receptor ID	Site Boundary (m)	Demolition (m)				Road Construction and Road Surfacing (m)
		Area 1	Area 2	Area 3	Area 4	
71	451	529	168	639	666	454
72	180	256	172	366	395	183
73	162	216	179	317	365	166
74	140	191	660	292	341	144
75	140	187	601	287	338	144
76	138	184	371	284	336	145
77	138	182	447	280	334	148
78	70	101	398	192	252	111
79	79	102	499	186	250	111
80	67	78	474	153	219	86
81	190	227	556	315	378	212
82	207	246	525	337	398	224
83	259	292	492	372	440	286
84	264	286	580	351	424	294
85	344	373	696	445	516	374
86	334	353	508	406	483	360
87	328	342	346	389	467	349
88	460	488	581	557	630	488
89	459	482	315	541	617	490
90	467	486	347	535	614	494
91	334	378	356	357	438	383
92	109	178	433	118	192	153
93	105	179	548	113	185	149
94	100	179	342	108	177	144
95	120	210	404	128	183	163
96	132	222	390	140	193	175
97	140	230	536	149	201	183
98	148	236	537	156	210	191
99	147	232	390	155	213	190
100	148	230	80	156	217	192

Table 4.B.3: Construction Noise Predictions

Construction Receptor ID	BS5228 CategoryC/NR A Guideline	Clearing Site (dB)	Demolition (dB)				Ground Excavation (dB)	Road Construction and Road Surfacing (dB)	Paving and Public Realm (dB)
			Area 1	Area 2	Area 3	Area 4			
1	70	76.4	82.3	68.2	71.5	68.3	75.8	64.6	75.0
2	70	72.8	72.3	62.9	66.7	65.8	72.2	66.1	71.5
3	70	58.2	64.9	73.4	62.0	61.6	57.6	52.0	56.8
4	70	53.4	61.5	60.1	59.5	58.9	52.8	47.3	52.0
5	70	51.1	59.4	60.8	57.7	57.5	50.5	45.0	49.7
6	70	54.6	62.1	58.3	60.2	60.2	54.1	48.3	53.3
7	70	53.6	59.8	60.2	60.6	61.9	53.0	47.6	52.2
8	70	86.2	74.0	64.7	90.8	74.1	85.6	64.1	84.8
9	70	98.5	73.5	63.7	93.5	75.1	98.0	64.9	97.2
10	70	109.2	72.8	63.3	94.3	76.4	108.6	65.3	107.9
11	70	86.3	72.1	62.7	90.8	77.5	85.7	64.9	84.9
12	70	82.9	71.5	65.1	86.5	78.4	82.4	64.1	81.6
13	70	82.7	69.2	65.4	75.6	80.7	82.2	60.1	81.4
14	70	60.0	63.9	65.9	67.5	68.1	59.5	51.0	58.7
15	70	60.4	64.1	66.2	67.6	68.5	59.9	51.4	59.1
16	70	59.7	63.7	66.3	67.0	67.9	59.1	51.0	58.3
17	70	59.4	63.5	63.5	66.6	67.8	58.8	50.8	58.0
18	70	59.5	63.6	66.8	66.6	68.0	59.0	51.1	58.2
19	70	58.6	63.1	66.8	66.0	67.3	58.1	50.5	57.3
20	70	64.4	66.0	76.5	69.4	72.6	63.9	55.3	63.1
21	70	63.5	65.8	77.3	68.8	72.0	62.9	55.1	62.2
22	70	66.5	67.7	64.4	70.8	75.7	65.9	59.2	65.1
23	70	61.0	64.8	64.9	67.2	70.0	60.4	53.6	59.7
24	70	60.7	64.7	65.1	67.0	69.7	60.1	53.3	59.3
25	70	60.2	64.5	65.0	66.7	69.4	59.7	53.0	58.9
26	70	59.9	64.3	65.6	66.5	69.0	59.3	52.7	58.5
27	70	59.5	64.1	65.5	66.2	68.7	58.9	52.4	58.2
28	70	61.1	64.9	69.2	67.0	69.8	60.5	53.7	59.7
29	70	60.6	64.7	69.4	66.7	69.4	60.1	53.3	59.3
30	70	58.0	63.1	71.1	64.6	66.6	57.4	51.0	56.6
31	70	56.7	62.3	69.5	63.7	65.5	56.1	50.1	55.4
32	70	52.2	59.3	69.9	60.5	61.7	51.6	45.7	50.9
33	70	57.2	62.4	67.5	63.6	65.4	56.7	51.1	55.9

Construction Receptor ID	BS5228 CategoryC/NR A Guideline	Clearing Site (dB)	Demolition (dB)				Ground Excavation (dB)	Road Construction and Road Surfacing (dB)	Paving and Public Realm (dB)
			Area 1	Area 2	Area 3	Area 4			
34	70	64.0	65.9	67.5	67.6	70.6	63.4	55.3	62.6
35	70	64.3	66.1	67.4	67.5	70.5	63.8	56.2	63.0
36	70	64.3	66.0	67.7	67.4	70.2	63.7	56.8	63.0
37	70	64.3	66.1	68.1	67.3	70.1	63.7	57.1	63.0
38	70	70.7	68.3	68.7	68.9	71.7	70.2	62.1	69.4
39	70	73.7	69.0	69.7	69.6	72.5	73.1	62.0	72.3
40	70	74.1	69.1	77.7	69.4	72.0	73.6	63.7	72.8
41	70	75.0	69.2	77.8	69.2	71.6	74.4	65.7	73.7
42	70	75.0	69.2	67.3	68.9	71.1	74.5	67.9	73.7
43	70	80.3	69.1	69.3	68.5	70.4	79.7	72.3	78.9
44	70	64.5	65.9	66.1	66.9	69.4	64.0	58.0	63.2
45	70	65.1	65.9	66.0	66.8	69.3	64.5	58.6	63.7
46	70	66.8	65.9	65.7	66.5	68.8	66.2	60.3	65.4
47	70	67.5	65.9	67.7	66.4	68.7	67.0	61.1	66.2
48	70	68.4	65.8	65.2	66.1	68.1	67.9	62.2	67.1
49	70	69.2	65.7	65.4	65.8	67.7	68.6	63.3	67.8
50	70	69.0	65.6	65.6	65.7	67.5	68.4	63.3	67.6
51	70	68.7	65.5	63.5	65.5	67.2	68.1	63.2	67.3
52	70	68.1	65.3	64.7	65.2	66.9	67.6	62.8	66.8
53	70	67.7	65.2	65.4	65.0	66.6	67.1	62.5	66.3
54	70	66.7	64.9	65.6	64.7	66.1	66.2	61.6	65.4
55	70	62.1	63.5	65.7	63.6	65.1	61.6	56.5	60.8
56	70	59.4	62.4	65.7	62.6	63.9	58.9	53.7	58.1
57	70	57.9	61.7	64.4	62.0	63.3	57.4	52.1	56.6
58	70	63.5	64.0	63.8	63.5	64.8	62.9	58.1	62.1
59	70	62.5	63.6	65.9	63.1	64.3	62.0	57.0	61.2
60	70	61.1	63.0	66.7	62.5	63.5	60.5	55.4	59.7
61	70	56.6	61.0	66.7	60.8	61.8	56.0	50.9	55.2
62	70	55.0	60.2	66.4	60.5	61.6	54.5	49.2	53.7
63	70	53.5	59.3	66.2	59.6	60.6	53.0	47.7	52.2
64	70	53.1	58.9	65.6	59.0	59.9	52.5	47.3	51.7
65	70	54.8	59.9	65.2	59.9	60.8	54.2	49.0	53.4
66	70	52.8	58.7	65.7	58.5	59.2	52.2	47.0	51.5
67	70	52.9	58.8	72.1	58.4	59.0	52.4	47.0	51.6

Construction Receptor ID	BS5228 CategoryC/NR A Guideline	Clearing Site (dB)	Demolition (dB)				Ground Excavation (dB)	Road Construction and Road Surfacing (dB)	Paving and Public Realm (dB)
			Area 1	Area 2	Area 3	Area 4			
68	70	50.4	57.4	68.7	56.7	57.1	49.8	44.4	49.1
69	70	54.4	60.4	69.4	59.3	59.7	53.9	48.4	53.1
70	70	49.8	58.4	69.3	56.9	56.6	49.3	43.8	48.5
71	70	50.9	59.3	69.3	57.7	57.3	50.3	44.9	49.5
72	70	58.9	65.7	69.1	62.5	61.9	58.3	52.8	57.5
73	70	59.8	67.1	68.8	63.8	62.6	59.2	53.6	58.4
74	70	61.0	68.2	57.4	64.5	63.1	60.5	54.9	59.7
75	70	61.0	68.4	58.2	64.6	63.2	60.5	54.9	59.7
76	70	61.1	68.5	62.4	64.8	63.3	60.6	54.8	59.8
77	70	61.2	68.6	60.8	64.8	63.3	60.6	54.6	59.9
78	70	67.1	73.7	61.8	68.1	65.8	66.5	57.1	65.8
79	70	66.0	73.6	59.9	68.4	65.9	65.4	57.1	64.6
80	70	67.5	76.0	60.3	70.1	67.0	67.0	59.3	66.2
81	70	58.4	66.7	58.9	63.8	62.3	57.9	51.5	57.1
82	70	57.7	66.0	59.4	63.2	61.8	57.1	51.0	56.3
83	70	55.7	64.5	60.0	62.4	60.9	55.1	48.9	54.3
84	70	55.5	64.7	58.5	62.9	61.3	55.0	48.6	54.2
85	70	53.2	62.4	57.0	60.8	59.6	52.7	46.6	51.9
86	70	53.5	62.9	59.7	61.6	60.1	52.9	46.9	52.1
87	70	53.7	63.1	63.0	62.0	60.4	53.1	47.1	52.3
88	70	50.7	60.0	58.5	58.9	57.8	50.2	44.2	49.4
89	70	50.7	60.1	63.8	59.1	58.0	50.2	44.2	49.4
90	70	50.6	60.1	63.0	59.2	58.0	50.0	44.1	49.2
91	70	53.5	62.3	62.8	62.8	61.0	52.9	46.4	52.1
92	70	63.2	68.8	61.1	72.4	68.1	62.6	54.3	61.9
93	70	63.5	68.8	59.0	72.8	68.5	63.0	54.6	62.2
94	70	64.0	68.7	63.1	73.1	68.9	63.4	54.8	62.6
95	70	62.4	67.4	61.7	71.6	68.6	61.8	53.8	61.1
96	70	61.6	66.9	62.0	70.9	68.1	61.0	53.2	60.2
97	70	61.0	66.6	59.2	70.4	67.7	60.5	52.7	59.7
98	70	60.6	66.3	59.2	69.9	67.4	60.0	52.4	59.2
99	70	60.6	66.5	62.0	70.0	67.2	60.1	52.4	59.3
100	70	60.6	66.6	75.8	69.9	67.1	60.0	52.4	59.2

Figure 4.B.1: Construction Noise Receptors, Locations of Proposed Construction Activity and Construction Buffer (500m)

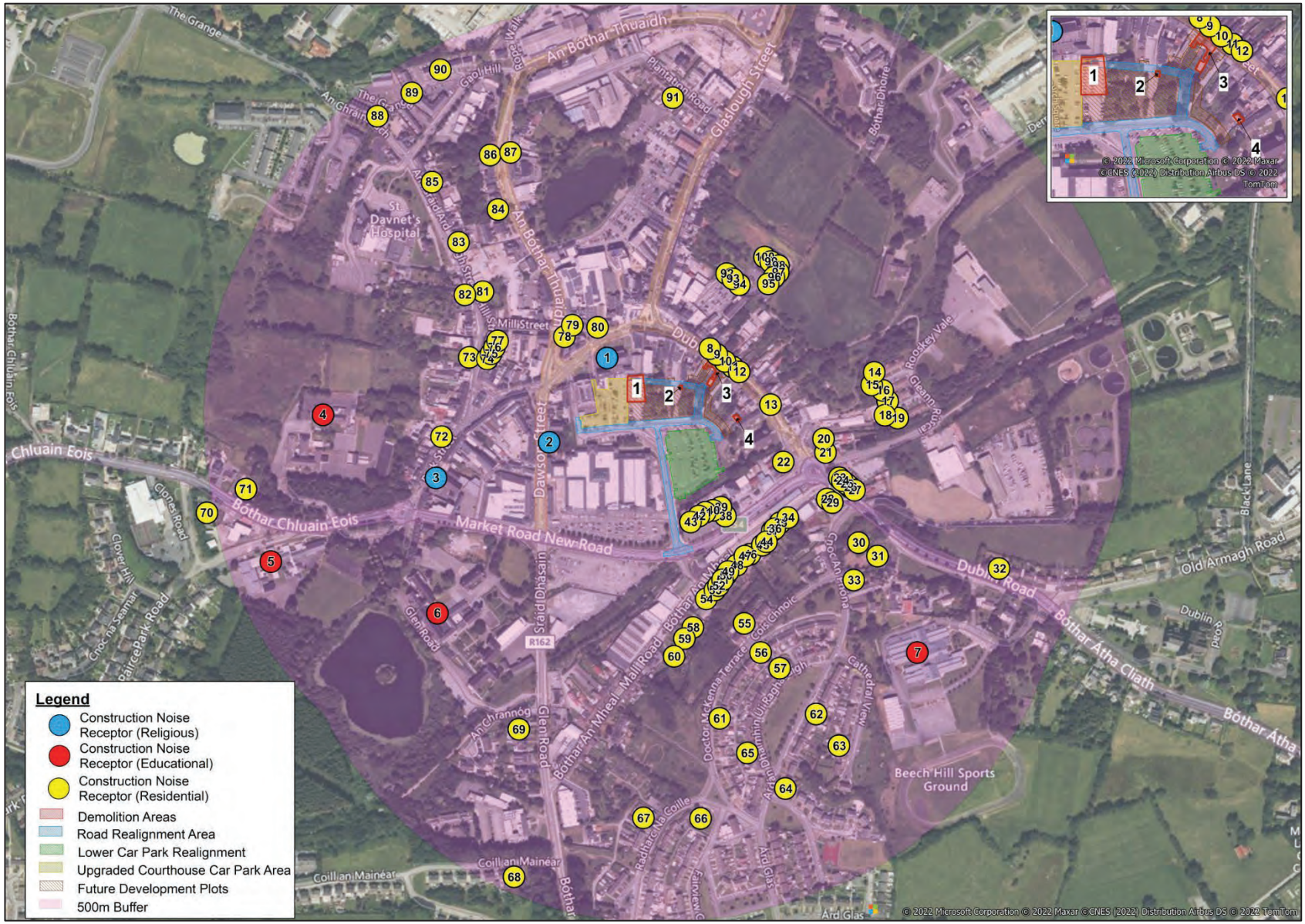
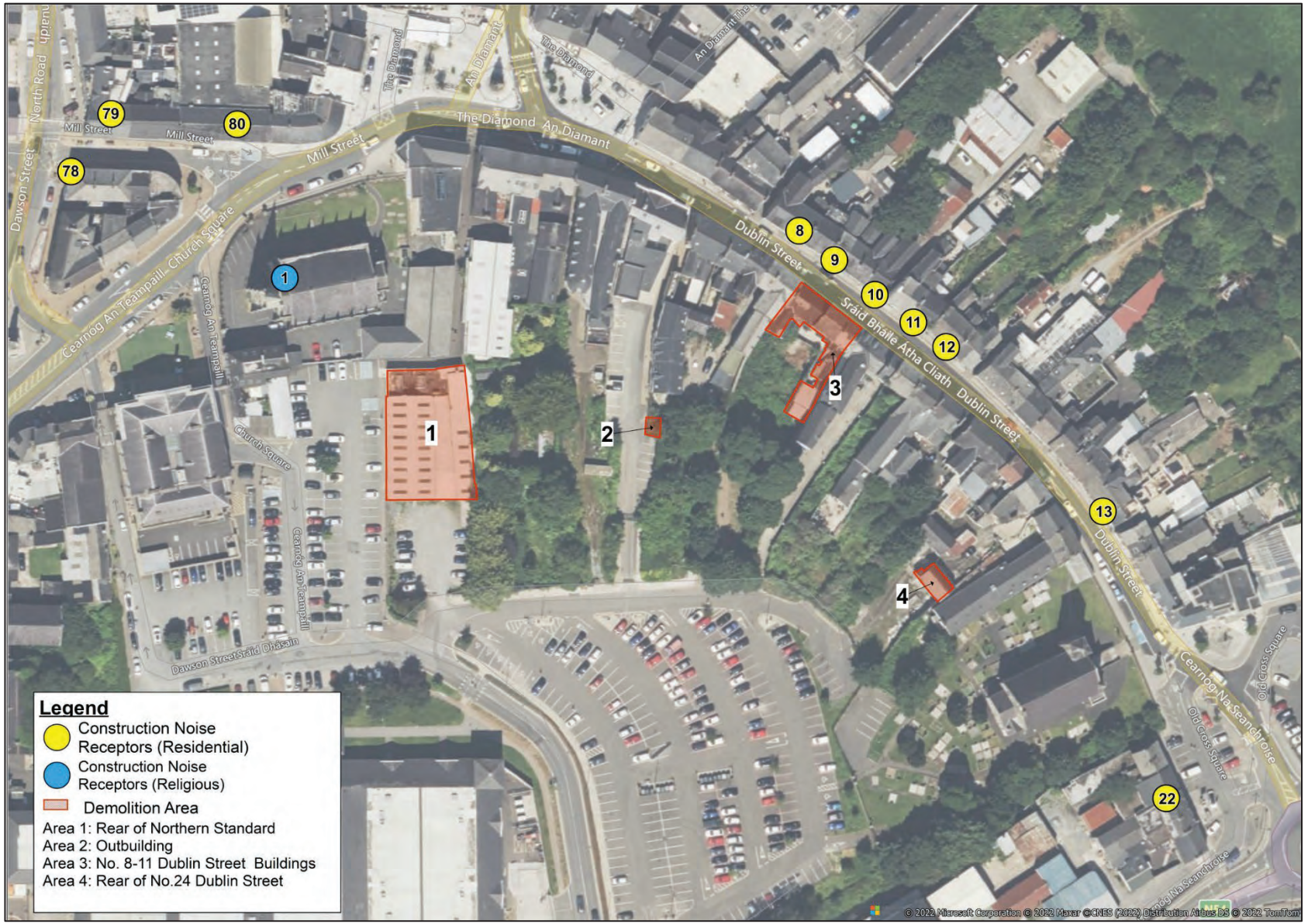


Figure 4.B.2: Demolition Areas and Construction Noise Receptors



Appendix

7a

Monaghan Public Realm Preliminary Risk Assessment Final March 2021

MONAGHAN PUBLIC REALM

Preliminary Risk Assessment (Desk Study) Report

IBR1284
Monaghan Public Realm
Preliminary Risk
Assessment (Desk Study)
Report
Final
22 March 2021

rpsgroup.com

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
Final	Preliminary Risk Assessment (Desk Study)	J. Fullerton, Project Scientist	J. McGrath, Associate	J. McGrath, Associate	22/03/2021

Approval for issue

Joseph McGrath 22 March 2021

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1 INTRODUCTION

1.1 Project description

RPS was appointed by Monaghan County Council to undertake a Preliminary Risk Assessment (Desk Study) Report in for the proposed development of a large scale public realm scheme in Monaghan town centre.

This report describes the research and assessments undertaken to assess the site ground conditions and the potential for any ground contamination that may have arisen from the site's present and historical uses.

RPS Consulting Engineers have been engaged by Monaghan County Council (MCC) to provide design and construction management services for the "South Dublin Street and Backlands Regeneration Scheme" Public Realm Improvement Project. This scheme is Phase 1 of a wider regeneration masterplan for the Dublin Street area of Monaghan Town. This project is progressed through the Urban Regeneration and Development Fund under Project Ireland 2040.

The proposed Dublin Street regeneration scheme area is located to the southeast of the town core, extending from The Diamond to the northwest, south eastwards along Dublin Street, and is defined to the southeast by the Presbyterian Church to the south at Old Cross Square. The regeneration scheme area is defined by the terraces of dwellings to Dublin Street to the north east, and the long rear gardens to the south. Monaghan County Council have the following long term vision to enhance the physical and special quality of Dublin Street.

"Dublin Street together with its backlands offers a unique opportunity to create a new and viable town centre quarter, with the potential to accommodate additional shopping, office, cultural, residential and new employment zone. It offers the opportunity to address the weaknesses of the area and to maximise its strengths; to enhance pedestrian and vehicular movement, to enhance the existing built heritage; to integrate with the historic streetscape in a manner that is both contemporary and forward looking while complimenting the built heritage; to create an integrated and commercially robust, viable proposal, and a vibrant and sustainable new urban quarter in Monaghan."

The study area (site) (Figure 2.2) has a mixture of both private and publicly developed lands with some lands undeveloped in private ownership. The site comprises of car park in the south marked by River Shambles as boundary, courthouse car park in the northwest, private and/or public property in the north and northeast.

1.2 Report Objectives and Scope

The objectives of this report are as follows:

- Collate desk study information regarding the site and surrounds to allow the identification of potential contaminant sources, potential pathways and potential receptors in accordance with Land contamination risk management (LCRM). This will form the basis of the Preliminary Risk Assessment and production of a Conceptual Site Model (CSM).
- Collation of existing geo-environmental data to facilitate a risk assessment with regard to potential risks to human health and environmental risks.
- Assessment of the above to determine if intrusive investigation and further assessment will be necessary.

1.3 Previous studies

Three geotechnical studies have been conducted in the past and are summarised below:

- By Glover Site Investigation Ltd (Report No. 04-663), ground investigation points (BH1 to BH7) have been conducted in the southern car park in December 2004. This investigation data is not available but it is referenced in later ground investigations.

- By Glover Site Investigation Ltd (Report No. 05-021), a bedrock probe survey was conducted which consisted of 16 nos. of dynamic cone tests in the southern car park in January 2005.

- By Priority Geotechnical Ltd in October 2009 (Report No. PC7089) consisting of a significant number of ground investigation points covering a large area. This study was conducted to facilitate civil works for Monaghan town. Only 1 no. of rotary open hole (BH10), 2 nos. cable percussion borehole (BH1032 and BH1033), 4 nos. rotary cored boreholes (BHR13, BHR14, BHR21 and BHR22), 7 nos. trial pits (TP24, TP25, TP25A, TP26, TP41, TP43 and TP44) are relevant to this study area. However all of these ground investigation points are located on the periphery of the site.

Two hydrogeological assessments were carried out for the southern car park area:

- By Malone O'Regan Environmental Services Ltd in January 2007 (Report: RT-NN-1257/02).

- By Webber Associates (Doc. No. 1200, Job No. 705) in July 2007, consisting of 6 nos. rotary drilled boreholes (B1, C, D, E, F and G) whose exact locations are unknown. This was a reassessment carried out following the assessment by Malone O'Regan.

- A Flood Risk Assessment for River Shambles was carried out for the site by Doran Consulting in July 2

1.4 Sources of Information

Sources of information used in the production of this report include:

- Internet based aerial photography
- Ordnance Survey Ireland mapviewer
- (http://maps.osi.ie/publicviewer/#V2,719558,734710,9,7)
- Geological Survey Ireland Spatial Resources Map Viewer – Department of Communications, Climate Action and Environment (http://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228)
- http://www.epa.ie/radiation/radonmap/
- Environmental Protection Agency Radon Map (http://www.epa.ie/radiation/radonmap/)
- Geological Survey of Ireland Geotechnical Data Viewer (http://spatial.dcenr.gov.ie/GeologicalSurvey/GeoTechnicalViewer/index.html)
- Environmental Protection Agency map viewer (https://gis.epa.ie/EPAMaps/)
- Reports from previous studies and ground investigations as mentioned in Section 1.3
- Land and Soil EPA maps (Geohive maps)
- Topolographical Drawing : MGT0528-RPS-00-XX-M3-C-XP0002
- Drainage Drawing : MGT0528-RPS-00-XX-DR-C-DR001
- General Arrangement Drawing : MGT0528-RPS-00-XX-DR-C-GA001
- Utilities Drawing : MGT0528-RPS-00-XX-DR-C-UT0001

1.5 Guidance

The following guidance documents have been used in the production of this report;

- Land contamination risk management (LCRM) - How to assess and manage the risks from land contamination. Environment Agency, October 2020.
- Redeveloping Land Affected by Contamination – A developers Guide to Planning Considerations and Environmental Responsibilities. DAERA, April 2019.

1.6 Risk Assessment

1. Underpinning the guidance within LCRM is a source-pathway-receptor methodology, which is used to identify Significant Pollutant Linkages (SPLs). The following definitions apply:-
2.

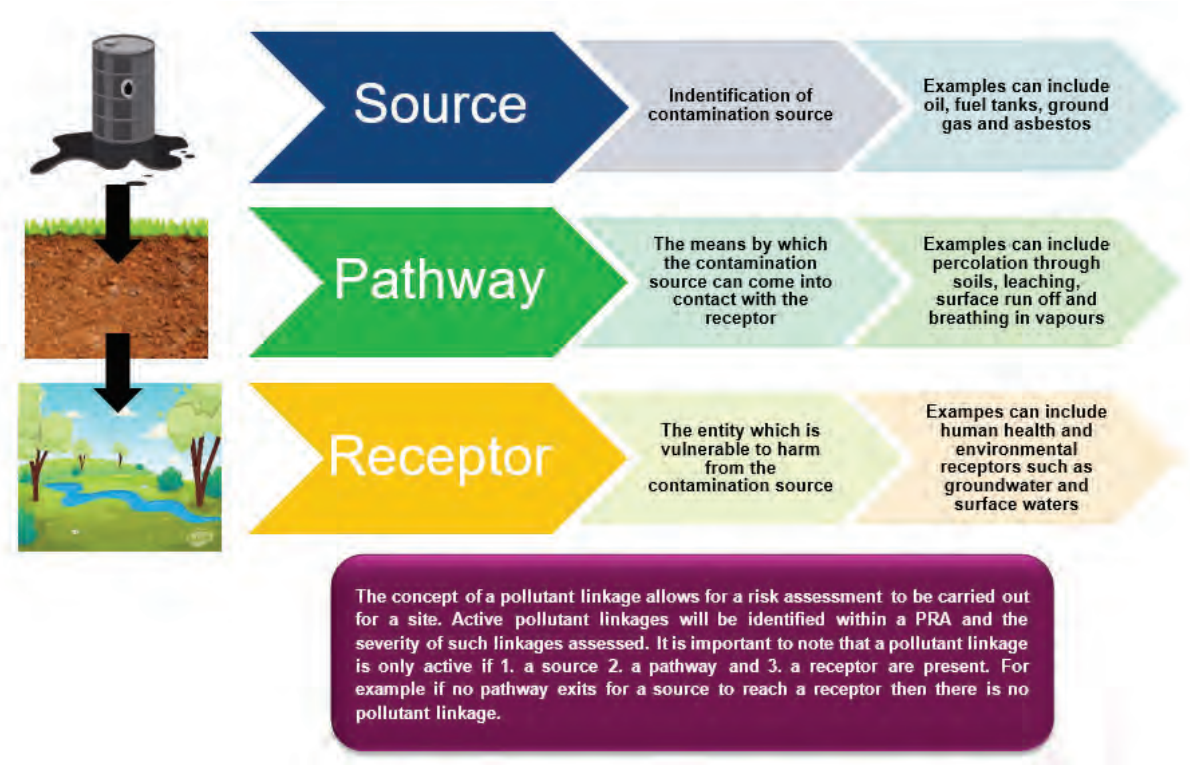
- **Source**: a contaminant or pollutant that is in, on or under the land and that has the potential to cause harm or pollution;
- **Pathway**: a route by which a receptor is or could be affected by a contaminant

- **Receptor**: something that could be adversely affected by a contaminant, for example a person, controlled waters, an organism, an ecosystem, or Part 2A receptors such as buildings, crops or animals

3. An important thread throughout the overall process of risk assessment is the need to formulate and develop a conceptual model for the site, which supports the identification and assessment of pollutant linkages. Development of the conceptual model forms the main part of the preliminary risk assessment, and the model is subsequently refined or revised as more information and understanding is obtained through the risk assessment process. A risk is present only when a source-pathway-receptor linkage is present and active. Without a pollutant linkage, there is not a risk, even if a contaminant is present.

1.7 Pollutant Linkage Diagram

Figure 1.1 Pollutant Linkage Diagram



1.8 Limitations

This report is for the use of Monaghan County Council only and should not be relied upon by other parties unless specifically advised by RPS in writing. Furthermore, new information, design changes, changed practices or new legislation may necessitate revised interpretation of the report after its date of submission.

This report has been prepared by RPS on the basis of the available information received during the study period. Although every reasonable effort has been made to obtain all relevant information, all potential contaminants, environmental constraints or liabilities associated with the site may not necessarily have been revealed. A robust site walkover survey would have been beneficial to identify any onsite and offsite contamination sources such as fuel tanks. This was not possible due to Coronavirus restrictions imposed by the Irish Government on limiting travel across the Northern Ireland Republic of Ireland border.

2 SITE DESCRIPTION

2.1 Site Location

As shown in Figure 2.1, the site is located within the central core of Monaghan Town centre in the Republic of Ireland, approximately 6.90km from the Northern Ireland border.

The site is located at Irish grid reference 267304 Easting, 333645 Northing.

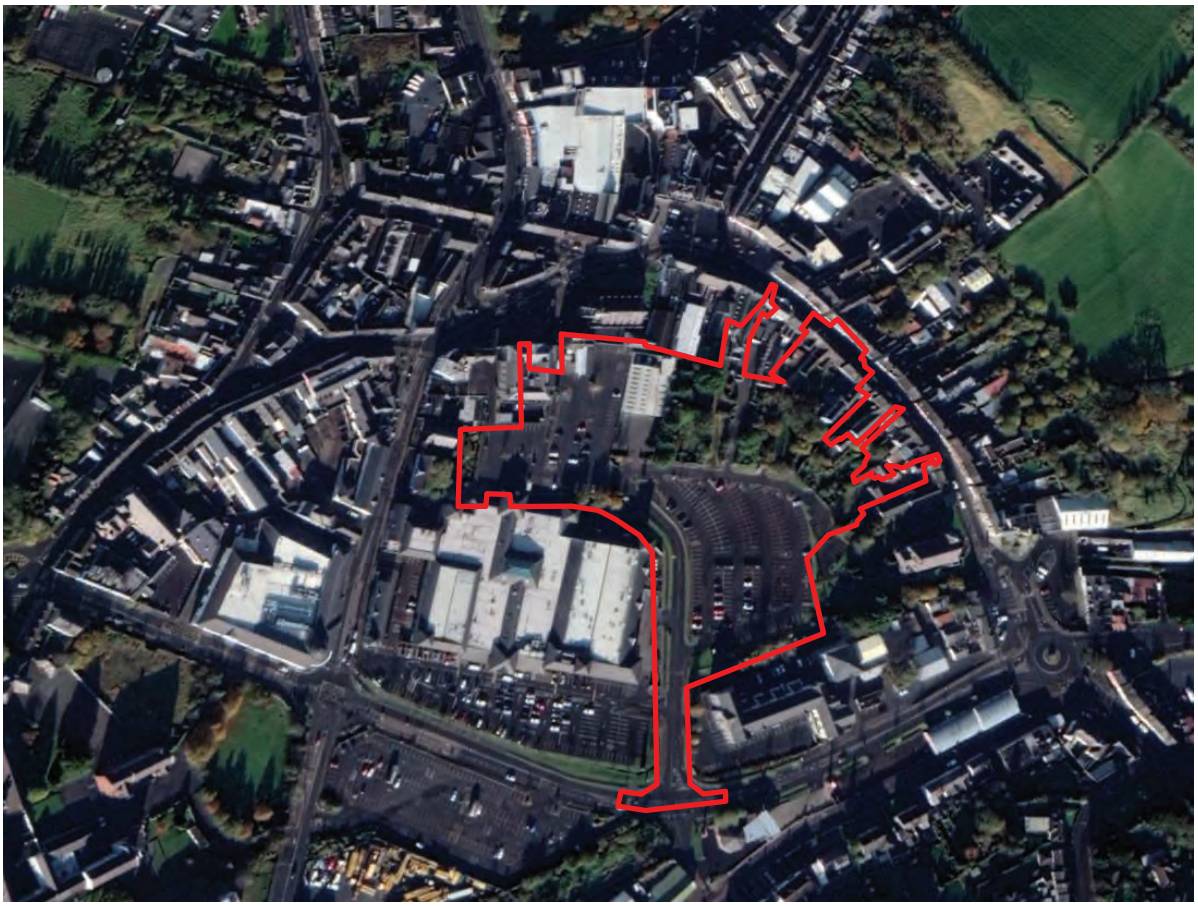
Figure 2.1 Site Location

2.2 Study Area

The existing site layout is shown in Figure 2.2. A site walkover was completed at the site by RPS personnel by the planning team (as such there was not a primary focus of this survey on contaminated land) in June 2020.

The proposed Dublin Street regeneration scheme area is located to the southeast of the town core, extending from The Diamond to the northwest, south eastwards along Dublin Street, and is defined to the southeast by the Presbyterian Church to the south at Old Cross Square. The regeneration scheme area is defined by the terraces of dwellings to Dublin Street to the north east, and the long rear gardens to the south. Monaghan County Council have the following long term vision to enhance the physical and special quality of Dublin Street.

Figure 2.2 Existing Site Layout



2.2.1 Current Site Use

The site currently comprises several retail /commercial buildings (both vacant and in-use) and backland areas comprising vacant / derelict land and properties, storage areas, and rear access points. It also contains extensive areas of existing car parking, roads/road infrastructure, pedestrian alleyways, and incidental green space.

2.2.2 Ground Cover

Ground cover within the site is surfaced primarily in hardstanding. Portions of the application site are landscaped with trees and low level vegetation.

2.2.3 Localised site topography

Topography

The ground slopes from north towards south. The site has four topographical areas and are as follows:

a. Courthouse parking area – located at the northwest part of the site, the land slopes from approximately from 60mOD in the north to 56mOD to the south of this car park.

b. Structure with open space – located in the northern part of the site and adjacent to the courthouse carpark, the land is relatively flat with approximate level of 56mOD in southern half of area. The ground falls from 60mOD in the north to 55.5mOD in the south of this region.

c. Southern car park – located to the south of the site, the ground gently rolls from approximately 55.5mOD in the north to approximately 53mOD in the south of this region.

d. North east region – this is region is quite flat with ground level approximately 56.5mOD

The ground suddenly drops between the courthouse car park and the structure with open space region.

2.2.4 Contamination Sources

There are no indications of contamination in the published data or ground investigations. Possible sources of contamination on this site include coal tar in bitumen and hydrocarbon runoff. These are unlikely to affect the design.

2.2.5 Application Site Details

Table 2.1 Application Site Details

Site Address	Grid Reference	Approximate Site Area
Monaghan Urban ED, Monaghan Municipal District, County Monaghan, H18 WK60, Republic of Ireland.	267304 Easting, 333645 Northing.	c.2 Hectares

2.3 Surrounding Land-use

The pertinent surrounding land uses of the site are listed in Table 2.2.

Table 2.2 Surrounding Land Uses

Boundary	Surrounding Land Uses of the Proposed Development
North	Lands to the north comprise mixed use commercial and residential properties.
East	Various commercial premises make up the land use top the east of the site. There is extensive green space to the east and Monaghan GAA club. A waste water treatment facility is also located to the east at c.330m.
South	Lands to the south comprise mixed use commercial and residential properties.
West	Commercial developments such as Tesco and Monaghan Shopping Centre occupy the land use to the west of the site. A large carpark can be seen to the east of the site.

2.4 Proposed Development

This Preliminary Risk Assessment has been prepared for the proposed development which focuses on a major public realm scheme within Monaghan town centre, which includes demolition of four buildings and associated outbuildings and structures, creation of a new street and civic space (Gavan Duffy Place), and public realm improvements throughout South Dublin Street including new paving, lighting, drainage, and all other associated works.

3 SITE HISTORY

3.1 Historical Development of the Site

A review of available historical ordnance survey maps was undertaken to ascertain the development history of the site. Table 3.1 provides a summary of potentially contaminating activities during the history of the site and its surrounding area; snapshots of the maps are included in Appendix A.

Table 3.1 Historical Site and Surrounding Area Development

Date	Site History	Surrounding Land Use History
1829-41	The site is occupied with a number of buildings and infrastructure, the street network is existent in this epoch with Dublin Street, Dawson Street and Male Road. Monaghan is a well-established townland in this period.	A quarry can be seen to the east of the site at c.130m and an Infirmary on mapping at c.100m. Monaghan Lake is annotated to the north of the site. A large jail (Gaol) is present to the west of Monaghan Town at c.280m. A brewery is annotated to the south west of the site at c.300m.
1897-1913	As above but Monaghan has experienced further growth and expansion in various infrastructure within the site locations.	A gas works is present to the east at approximately 250m of the site and a Saw Mill to the west at a distance of approximately 150m. The jail is now annotated as Monaghan County Infirmary. A grave yard dis present on historical mapping approximately 50m west of Old Cross Square to the south of Dublin Street.
1829-41	As above	As above
Google Earth 2001 - 2020	The site does not experience any significant changes during this period.	The surrounding area experiences minor alternation and new builds.

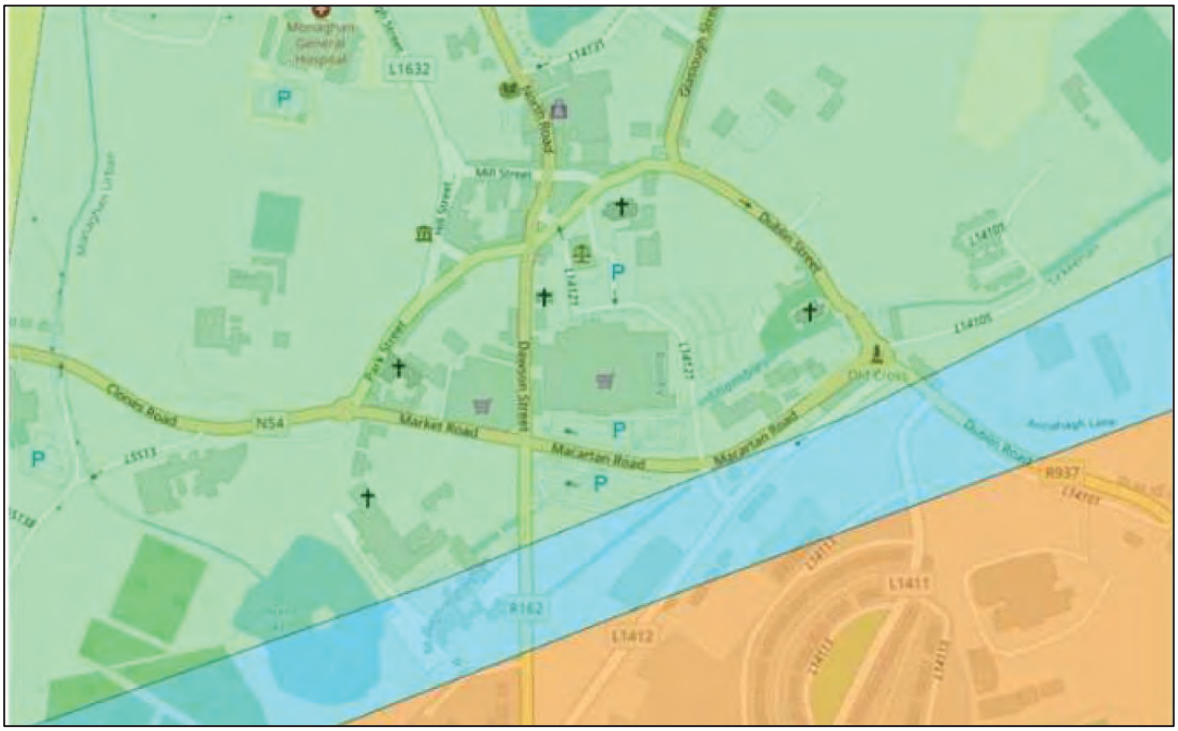
4 SITE GEOLOGY AND HYDROGEOLOGY

A desk study of published material held on the Geological Survey Ireland Spatial Resources (online portal) was undertaken to provide an initial overview of ground conditions at the site. The following describes the findings of this preliminary research.

4.1 Solid Geology

The geology of the area is characterised by carboniferous limestone. This is observed from the Geological Survey of Ireland (GSI), 1:100,000 mapping (Figure 4.1) and from the descriptions available from the boreholes for the site. .

Figure 4.1 Solid Geology (taken from GSI)



4.2 Drift Geology

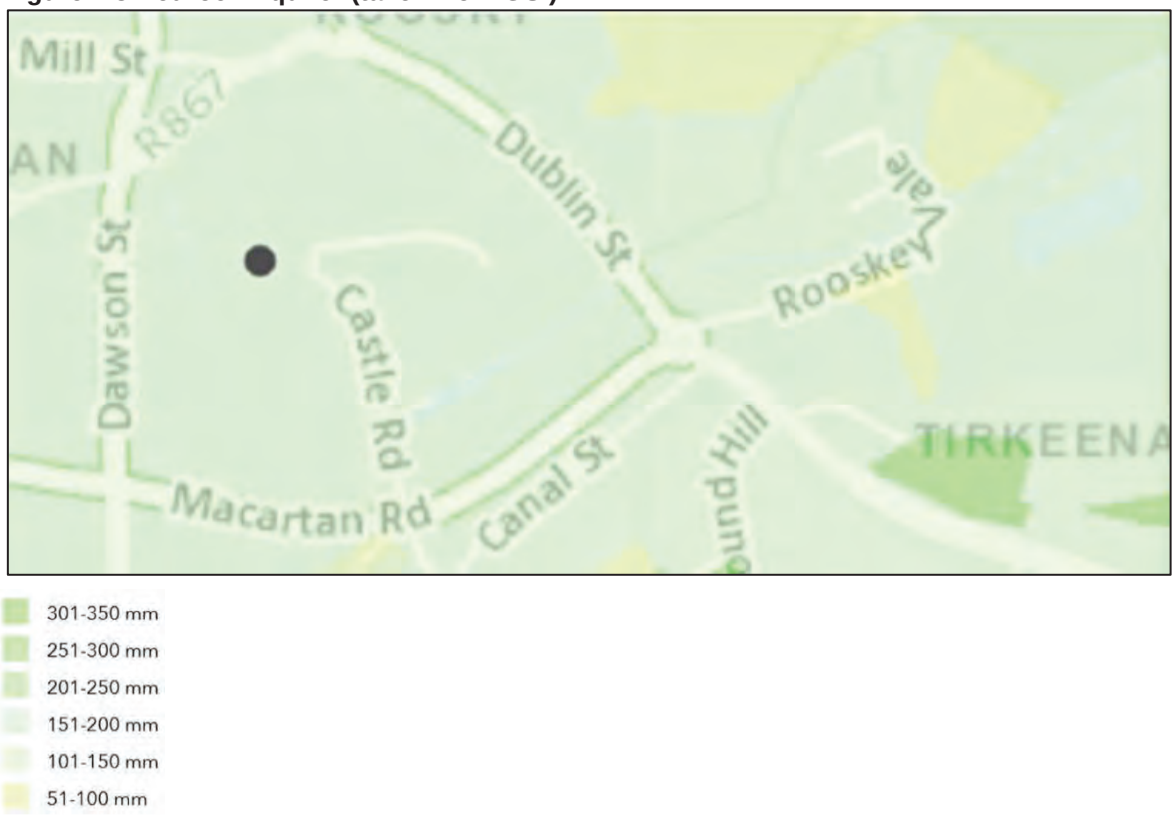
Review of the quaternary sediments map for the area shows that the scheme is majority made up of made ground and partly from till derived from limestone on the north eastern side of the site. Quaternary sediments mapping for the study area are presented in Figure 4.2.

Figure 4.2 Drift Geology (taken from GSI)

4.3 Hydrogeology

The GSI map for groundwater recharge for the site (Figure 4.3), sets a value of 151 to 200mm. The site specific hydrology study conducted indicate a 1 in 100 year flow of 5.4m3/s for a catchment area of 2km2. The predicted flood level is 53.4mOD which indicates that the southern part of the site can get inundated.

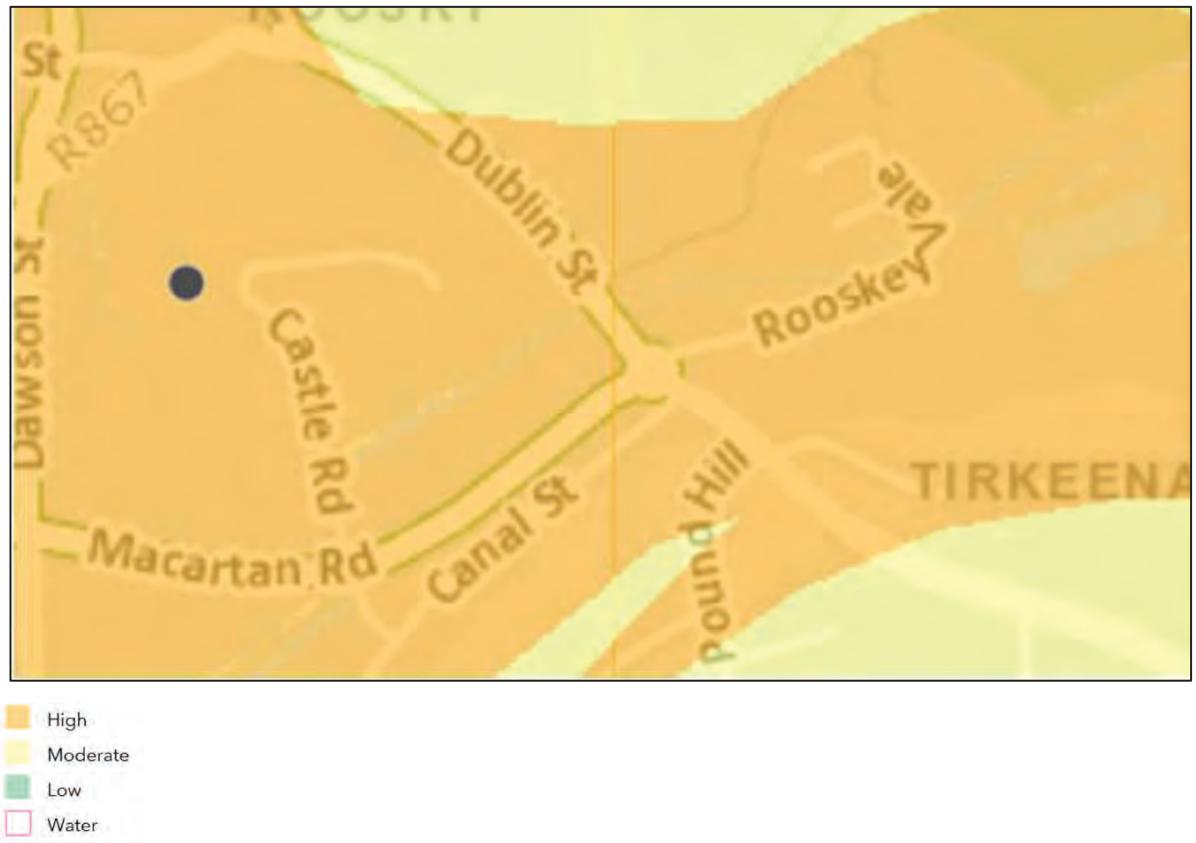
Figure 4.3 Bedrock Aquifer (taken from GSI)



4.4 Groundwater Vulnerability

According to the GSI map for groundwater vulnerability (Figure 4.4), the site has “high” vulnerability indicating that the natural groundwater may be easily contaminated by human activities.

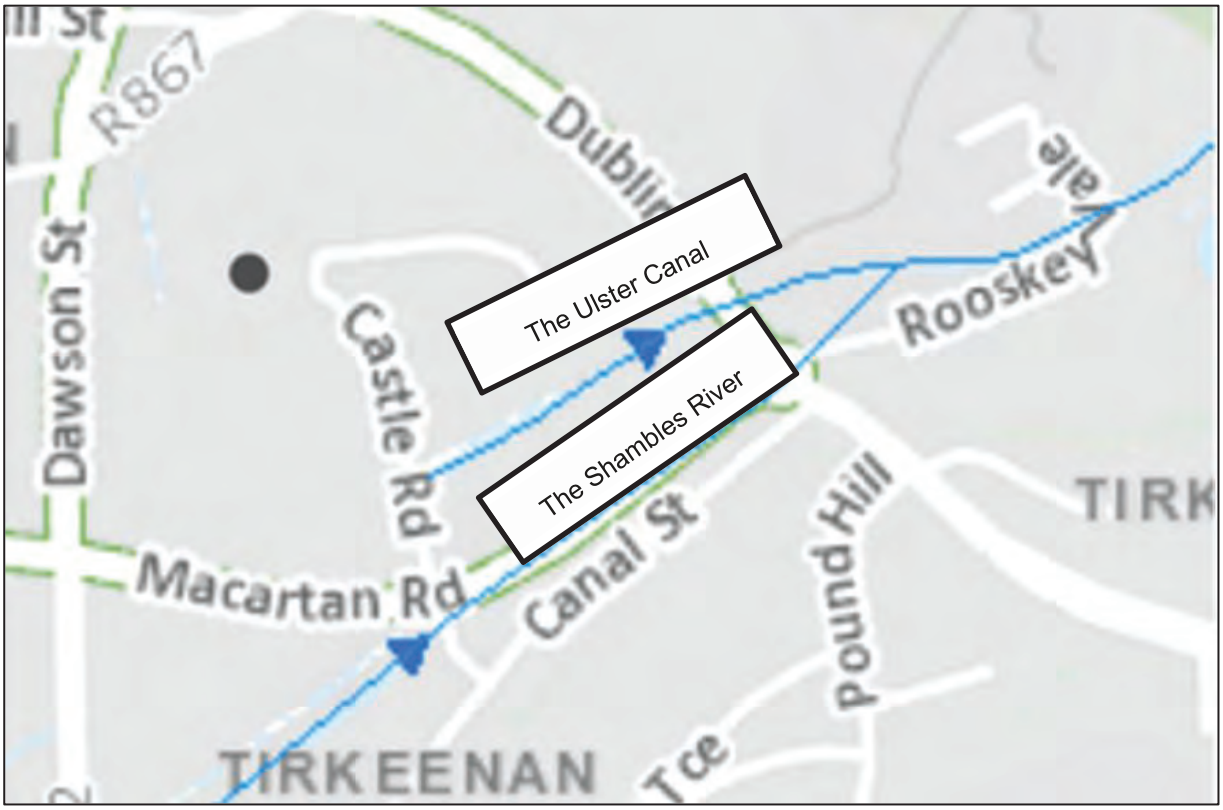
Figure 4.4 Groundwater Vulnerability (taken from GSI)



4.5 Surface Water Hydrology

To the south of the site flows the culverted Shambles River in an easterly direction is located as seen in Figure 4.5. The Ulster Canal is located just north of this to the south of the large Tesco carpark.

Figure 4.5 Surface Water Features (Mapping by GSI)



5 PREVIOUS SITE ASSESSMENT

As previously referenced in section 1.3 of this report a number of previous assessments have been undertaken in the vicinity of the site, these will be used to gain an understanding of the ground conditions. All reports are contained in Appendix B for further consultation.

5.1 Glover Site Investigation Ltd - Dynamic cone tests in the southern car park in January 2005.

5.1.1 Ground Conditions

The following descriptions are based on ground investigations in the southern car park. 17 no. Dynamic Cone Penetrometer tests (DCPs) have been carried out in the southern car park region. Blow count of < 5/100 mm has been found to occur between 0 to 3.5m BGL to a depth of 0.7 to 10m BGL. This indicates that made ground is between 0 to 3.5m thick followed by Peat and/or organic Silt and Clay.

1. Made ground - From the available borehole logs of the southern car park, along the Dublin road and Castle road, the Made ground is described as a combination of Bitmac, Hardcore and Spalls, and Stiff, very gravelly fine sandy Clay or Medium dense Gravel with cobbles and boulders. The thickness of Made ground is between 1.0m to 2.35m, according to the borehole logs.

2. Topsoil - Topsoil is described in the ground investigation logs as peaty of approximately 0.5m thick.

3. Peat - Peat is noted in the southern car park. It is described as very soft dark brown silty and fibrous. It is overlain by Made ground and underlain by Marl. The thickness as per the available borehole logs is between 2.0m to 3.5m. The SPT N value is between 1 and 2.

4. Marl - Very soft to soft marl is described in the borehole logs as fine sandy Clay and whiteish grey Silt with shell fragments. The thickness of this layers varies between 1.0m to 3.6m. It is found between 1.0m to 3.5m BGL. The SPT N value is 2 to 7.

5. Glacial Till - Described as stiff gravelly sandy Clay with thickness varying between 0.6m to 5.9m. The SPT N value ranges from 19 to refusal.

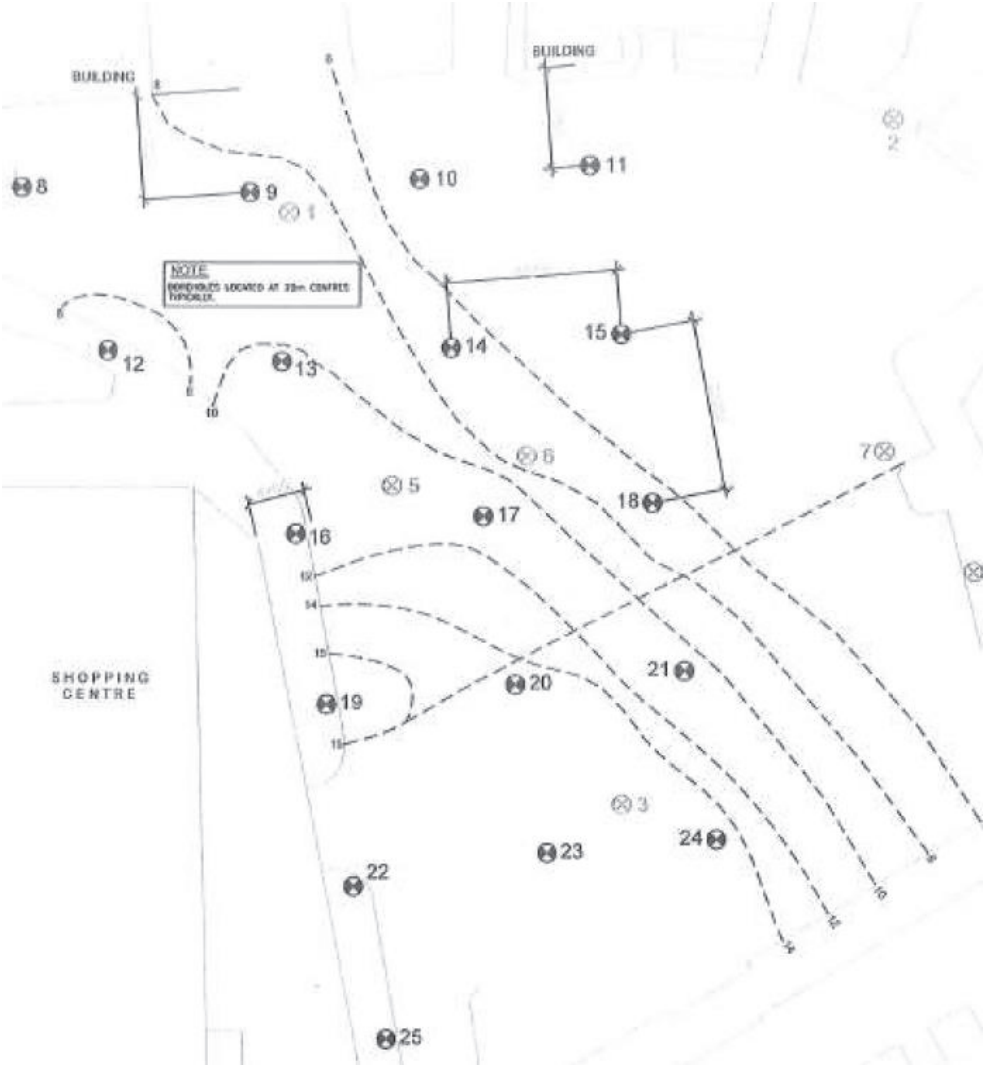
6. Gravel - Described as loose to medium dense silty sandy Gravel with thickness varying between 2.5m to 4.0m. The SPT N value ranges between 6 to 34.

7. Bedrock - Bedrock is defined in the borehole logs as moderately strong fine grained carboniferous Limestone. The depth of rockhead ranges from 2.5m BGL to 14.5m BGL. Greater depths to rockhead are observed towards the south.

According to earlier studies carried out to establish the bedrock levels in the southern car park, the rockhead depth contours indicate shallower depths in the northeast and greater depths towards the southwest (Figure 5.1)

8. Groundwater - Groundwater was encountered in all the boreholes in the southern car park. The depth varied between 1.0m to 3.5m BGL, with greater depths in the north.

Figure 5.1 Bedrock level contours (Glover Site Investigation Limited)



5.2 Monaghan Town Collection Network, Priority Geotechnical Drilling Report, 2009.

5.2.1 Scope of works

In July 2007, T.J. O' Connor & Associates, Consulting Engineers commissioned Priority Geotechnical, PGL on behalf of their Client, Monaghan County Council, to carry out a ground investigation for the proposed Monaghan Town, Collection Network. The purpose of the geotechnical ground investigation was to obtain sufficient geotechnical information for the design of the proposed civil works. The investigation, which was specified by T.J. O' Connor, Consulting Engineers, initially comprised, as per the Tender Bill of Quantities, of seventy (70) number rotary open hole boreholes, sixty (65) number rotary cored boreholes, one hundred and eighty nine (189) number trial pit excavations and twenty three (23) number slit trenches, all associated sampling, in-situ testing, laboratory work and factual reporting. The scope of the works was subsequently extended to include for cable percussion boreholes. This investigation was carried out in accordance with the contract specification and relevant standards. The initial and additional fieldwork was carried out from August 2007 to June 2008. This full report is contained within Appendix C.

The ground investigation locations most relevant to the Monaghan public realm scheme are as follows;

- BH10, BH13, BH14, BHR21 BHR22, BH1032 and BH1033.

The general stratigraphic sequence of ground conditions encountered at these exploratory borehole is as follows;

Table 5.1 Borehole stratigraphy summary

Borehole	Range of thickness	Stratum encountered
BH10	0.1m to 9.0m	PEAT
BH13	0.1m to 20m	Slightly sandy slightly gravelly CLAY
BH14	0.1m to 2.5m	Made ground: Clause-804, tarmacadam, concrete and block paving.
BHR21	0.1m to 20m	Slightly sandy slightly gravelly CLAY

Borehole	Range of thickness	Stratum encountered
BHR22	0.1m to 2.5m	Made ground: Clause-804, tarmacadam, concrete and block paving.
BH1032	0.1m to 2.5m	Made ground: Clause-804, tarmacadam, concrete and block paving.
BH1033	0.1m to 2.5m	Made ground: Clause-804, tarmacadam, concrete and block paving.

- TP025, TP025A, TP026, TP041, TP042, TP043 and TP044

The general stratigraphic sequence of ground conditions encountered at these locations is as follows;

Table 5.2 Trial pit stratigraphy summary

Borehole	Range of thickness	Stratum encountered
TP024	0.1 to 2.5m	Made ground: Clause-804, tarmacadam, concrete and block paving.
TP025	0.3m to 3.358m	Made ground (Fill): Slightly sandy slightly gravelly CLAY/SILT, silty very gravelly SAND and very silty very sandy GRAVEL with plastic, concrete, brick and tarmacadam
TP025A	0.3m to 3.358m	Made ground (Fill): Slightly sandy slightly gravelly CLAY/SILT, silty very gravelly SAND and very silty very sandy GRAVEL with plastic, concrete, brick and tarmacadam
TP026	0.3m to 3.358m	Made ground (Fill): Slightly sandy slightly gravelly CLAY/SILT, silty very gravelly SAND and very silty very sandy GRAVEL with plastic, concrete, brick and tarmacadam
TP041	0.3m to 3.358m	Made ground (Fill): Slightly sandy slightly gravelly CLAY/SILT, silty very gravelly SAND and very silty

Borehole	Range of thickness	Stratum encountered
		very sandy GRAVEL with plastic, concrete, brick and tarmacadam
TP042	0.1m to 9.0m	PEAT
TP043	0.3m to 3.358m	Made ground (Fill): Slightly sandy slightly gravelly CLAY/SILT, silty very gravelly SAND and very silty very sandy GRAVEL with plastic, concrete, brick and tarmacadam
TP044	0.3m to 3.358m	Made ground (Fill): Slightly sandy slightly gravelly CLAY/SILT, silty very gravelly SAND and very silty very sandy GRAVEL with plastic, concrete, brick and tarmacadam

5.2.2 Fieldwork

The fieldwork was carried out in general accordance with BS 5930 (1999) Code of Practice for Site Investigation and Part 9 of BS 1377 (1990), Method of Tests for Soil for Civil Engineering Purposes, in situ Tests. Dando 2000, cable percussive rigs were used to advance the boreholes through overburden deposits using 200mm diameter casing. Rotary boreholes were advanced using a Deltabase 520 rig, a Soil Mech PSM 8G rig and a Hill Twister Core Drill rig through overburden deposits using Symmetrex 131, nominal 150mm diameter casing in open-hole drilling and through rock using double lined core barrel, at nominal diameter 76mm. A compressed air-mist flush was used for rotary drilling. Trial pit and slit trench excavations were excavated using both a JCB and a mini digger, as detailed on the logs. The exploration locations were selected by T.J. O'Connor & Associates, and set out on site from existing features and the co-ordinates provided. The exploratory locations were surveyed using Trimble V8 GPS equipment to the Ordinance Survey national grid system of co-ordinates and elevations to Malin Head datum.

5.2.3 Ground conditions encountered

The overall study area throughout Monaghan was generally characterised by slightly sandy, slightly gravelly CLAY/SILT, very clayey/silty very gravelly SAND, very clayey/silty SAND and GRAVEL, very sandy very silty GRAVEL and PEAT to depths up to 20.0m below existing ground level (bgl). Topsoil was on average 350mm thick.

Madeground/ Fill was encountered and described as slightly sandy slightly gravelly CLAY/SILT, silty very gravelly SAND and very silty very sandy GRAVEL, with pieces of concrete, brick, tarmacadam and plastic, to a maximum depth of 3.0m bgl being between 150mm and 2500mm thickness. Tarmacadam surfacing was on average 165mm thick ranging between 15mm and 500mm thickness. The Cl 804 sub-base was on average 360mm thick ranging from 100mm thick to 1000mm thickness. Concrete was encountered at a number of locations being 265mm thickness on average, ranging from100mm to 800mm in thickness.

Based on the SPT N Values the PEAT was very soft to soft with N values of 1 to 8. The cohesive CLAY and SILT deposits were very soft to stiff with N values of 3 to 58. Based on the SPT N values, the granular deposits are described as being loose to very dense, with N values 2 to 52. At location BH53 soft to firm SILT was found to under-lay PEAT to depth from 2.7m to 9.0m bgl. BH54 soft to firm CLAY was encountered from ground level to 6.3m bgl. BH59 soft to firm CLAY was encountered from ground level to 5.9m bgl. Soft SILT was encountered at BHR35 from 1.3m to 5.8m bgl.

LIMESTONE was encountered throughout the site at depths of between 1.3m to 18.4m bgl, which was described as moderately weak to very strong having Point Load indices of 0.18MPa and 21.25MPa. Fossiliferous MARL was encountered in BHR08 at 14.32m to 17.5m bgl. At location BHR01 SPT, N values within the LIMESTONE indicated soft CLAY infill materials. Solid Core Recovery of 0% to 7% indicated highly weathered rock. BH02 indicated similar anomalies with PEAT being encountered within the rock and N values of 0 to 8 being recorded indicating infill or highly weathered rock in the upper zone.

MUDSTONE was encountered at BHR31 inter-bedded with SANDSTONE from 6.1m to 10.0m. MUDSTONE was found to underlie the LIMESTONE at BHR37, BHR38 at a depth of 11.76m to 13.48m bgl. The MUDSTONE was described as weak to moderately weak, non-intact.

SANDSTONE was encountered at BHR17 and BHR64, BHR65 at a depth of 2.6m to 13.1m bgl. The SANDSTONE was described as strong to very strong. GREYWACKE was encountered at BHR58 to BHR62 at a depth of 2.5m to 8.5m bgl. The GREYWACKE was described as moderately weak to strong.

5.2.4 Groundwater

Groundwater was encountered during both trial pit excavation and cable tool boring at a number of locations. Groundwater was typically encountered between 1.5m bgl and 5.0m bgl in boreholes and between 2.0m bgl to 3.0m bgl in trial pit excavations. Forty two (42) number 50mm diameter standpipe installations where constructed and are identified in section 5.1 of the Monaghan Town Collection Network, Priority Geotechnical Drilling Report, 2009.

The groundwater strikes detail the level at which groundwater was encountered and that level to which it rose after a 20minute period. This may not reflect the static groundwater level. The standpipe

installations should be monitored to determine static groundwater level. It should also be appreciated that seasonal fluctuations in groundwater level may occur.

5.3 Proposed Mixed Use Development, Rooskey, Monaghan Town, Co. Monaghan, Hydrogeology Assessment, by Webber Associates 2007.

5.3.1 Background to assessment

Monaghan County Council is redeveloping the Lower Courthouse Carpark, Monaghan Town as a mixed use development. Part of this development includes a three tier basement excavation. This full report is contained in Appendix C.

5.3.2 Site assessment

Several site investigations and ground and groundwater assessments have been carried out at the site, the findings of such reports indicated that very high permeabilities for both overburden and rock. On this basis, substantial groundwater entry into the basement excavation was predicted which would make it difficult if not impossible to construct the basement.

In order to fully assess this problem further, a supplementary site investigation was designed by WA and carried out by Irish Geotechnical Services Ltd. (IGSL) in May 2007. The purpose of the site investigation was to assess the ground and groundwater conditions specifically for basement design and excavation. The investigation included the following;

- 1 number cable percussion borehole;
- 6 number rotary drilled boreholes;
- 6 number standpipe piezometer installations;
- 6 number variable head permeability tests;
- 8 number Packer Permeability tests; and
- 1 number pump test.

Rock cores were retained for logging and laboratory testing.

5.3.3 Ground conditions

The site investigations indicate that two different stratigraphic profiles are present on site. In the northern section of the site, rockhead is typically found about 5m below ground level. This is overlain by Glacial Till. Surface level is about 55 MoD.

The southern section of the site is differentiated by a sudden drop in rockhead level to approximately 15m below ground level. This section of the site has been uplifted by 3m as it was once marshland. This made ground overlies a thick layer of peat over Glacial Till, surface level is about 53 MoD.

Summaries of both of these northern and southern portion profiles of the site are summarised in tables 5.1 and 5.2 below.

Table 5.3 Summary of ground conditions in northern section of the site

Stratum	Description	Depth top base		Thickness	
		Min	Max	Min	Max
Made Ground	Tarmacadam and fill (cobbles and boulders)	1.5	3	1.5	3
Peat	Fibrous – found in one borehole	3.5	3.5	2	2
Glacial Clay	Silty sandy clay	3.4	5.6	0.4	2.6
Glacial Gravels	Silty sandy gravels	4	6	1	4.1
Limestone	Moderate to highly weathered, fractured clay infill	4.5*	6.4*	Base not seen	Base not seen

Table 5.4 Summary of ground conditions in southern section of the site

Stratum	Description	Depth top base		Thickness	
		Min	Max	Min	Max
Made Ground	Tarmacadam and fill (cobbles and boulders)	3.2	4.5	3.2	4.5
Peat	Fibrous – found in one borehole	7.6	11.2	4.4	6.7
Glacial Clay	Silty sandy clay	9	13.5	1.4	2.5
Glacial Gravels	Silty sandy gravels	10	17.7	1	4.2
Limestone	Moderate to highly weathered, fractured clay infill	12.5*	17.7*	Base not seen	Base not seen

* Rockhead

5.3.4 Groundwater

Groundwater was encountered in all exploratory boreholes. Water strikes were typically encountered between 1.7m and 4.2m below ground level.

Standpipe piezometers were installed in six boreholes. A summary pf levels are tabulated below in table 5.3.

Table 5.5 Summary of piezometer levels

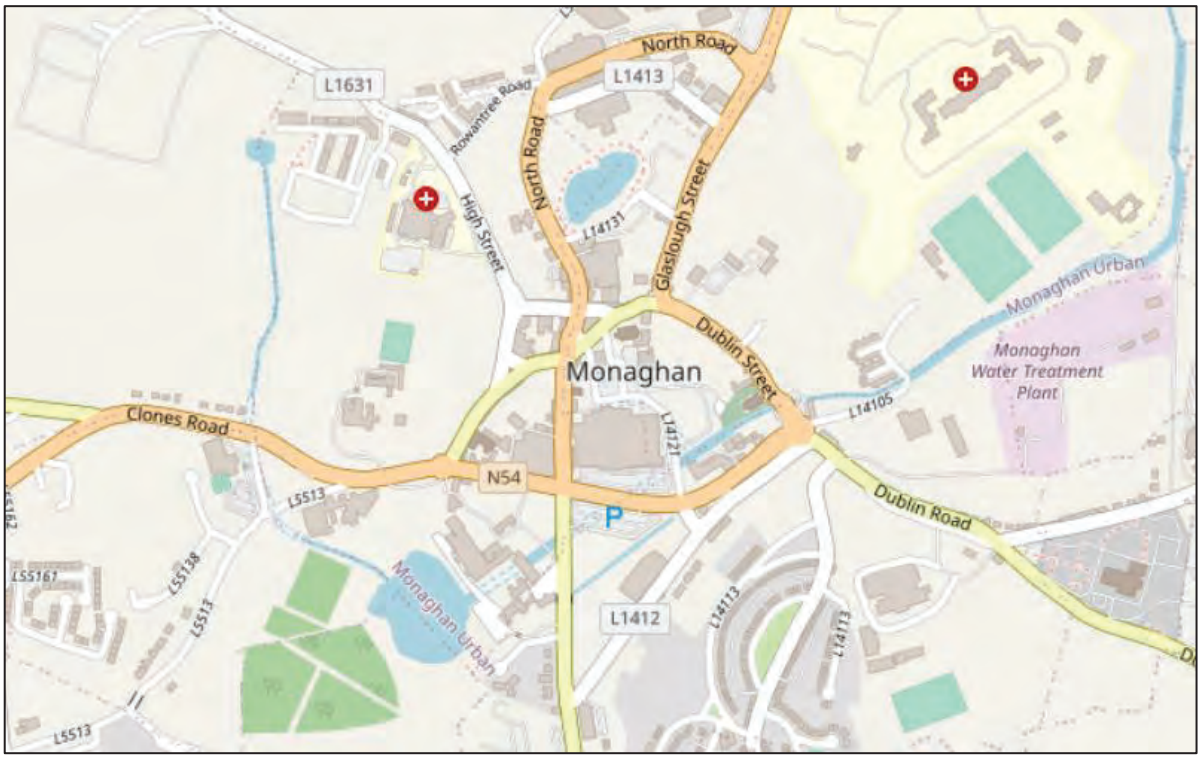
Borehole	Surface Levels (MoD)	Depth to water (m bgl)
B1	55.2	2.5
C	55.6	2.8
D	55.5	2.6
E	55.6	2.8
F	53.2	1.2*
G	53.2	0.6*

*Results not available at time of writing report, highest recorded strike instead

6 LICENSES AND PERMITS

A search was undertaken on the Environmental Protection Agency map viewer to investigate if any Industrial Emission licences (IELs) and Integrated Pollution Control (IPC) sites which are present surrounding the site. As seen from Figure 6.1 below no IELs or IPCs are present.

Figure 6.1 Industrial Emission licences (IELs) and Integrated Pollution Control (IPC)



7 OVERVIEW OF POTENTIAL CONTAMINATION

7.1 Introduction

The nature of potential contamination that may have arisen from the past activities on and surrounding the site is considered below.

7.2 On Site Sources

7.2.1 Current Land Use

Current on site land use contamination sources are limited but a possible source may include made ground beneath the site, of unknown nature and quantity. Made ground underlying the site would have the potential to generate elevated concentrations of ground borne gases such as Methane and/or Carbon dioxide and the depletion of Oxygen levels. Due to the end use of the site being an outdoor public realm the likelihood of ground gas impacting any receptors is low as the majority of the site will be covered in hardstanding breaking the pathway. In areas of the public realm that will be soft landscaped ground gas is still unlikely to be a risk given no new buildings are proposed.

Other sources of contamination may be associated with any fuel storage tanks on site used to heat both commercial and residential properties, however these have not been identified from this desk study. Fuel tanks (if present) may have the potential to contaminate sub soils and groundwater bodies beneath the site and wider site area. Given the sites end use and the majority of the site being covered in hardstanding an exposure pathway to human health will be broken. The likelihood of hydrocarbon contamination associated with any fuel tanks impacting human health or groundwater/surface waters is deemed to be minimal. Surface waters such as the Shambles River is culverted and the likelihood of contaminated groundwater intrusion is minimised due to this. The Ulster Canal is also likely lined in the form of impermeable material such as natural clays or stone.

7.2.2 Previous Land Use – Historical Development

Review of historical mapping shows the site has experienced development over time. The street network around Monaghan such as South Dublin Street and The Diamond to the northwest have been occupied by infrastructure developments such as commercial properties. Such activities once occupying the site footprint are not associated with an overly contaminative nature, any contamination if present in the past will have likely degraded and diluted overtime and the chance of this impacting the application site today is minimal.

7.2.3 Radon Gas

As demonstrated on the Environmental Protection Agency (EPA) Radon Map, the site falls within a 10km grid square with less than one per cent of the homes estimated to be above the Reference Level.

7.3 Off site sources

7.3.1 Surrounding Land Uses – Current

The surrounding land use comprises predominantly commercial retail properties along the public realm scheme area. Current offsite contamination sources are limited but may be associated with any fuel tanks in the site vicinity and the waste water treatment works to the east of the site at c.330m. An Applegreen petrol filling station is located approximately 450m west of the site boundary, this has the potential to be a source of contamination however given the substantial distance from the site the risk here is relatively low. A second petrol filling station approximately 20m south west, this is however downgradient from the site and should not impact the application site.

Given the sites end use and the majority of the site being covered in hardstanding the likelihood of hydrocarbon contamination associated with any fuel tanks impacting human health receptors or groundwater/surface waters is deemed to be minimal.

7.3.2 Surrounding Land Uses – Historical

Potentially contaminating activities have historically been present in the area surrounding the site.

It is evident from a consultation with available historical maps, in the period of 1829-41 a quarry can be seen to the east of the site at c.130m and an Infirmary on mapping at c.100m. Monaghan Lake is annotated to the north of the site. A large jail (Gaol) is present to the west of Monaghan Town at c.280m. A brewery is annotated to the south west of the site at c.300m.

From 1897-1913 A gas works is present to the east at approximately 250m of the site and a Saw Mill to the west at a distance of approximately 150m. The jail is now annotated as Monaghan County Infirmary. A grave yard is present on historical mapping approximately 50m west of Old Cross Square to the south of Dublin Street.

It is noted that none of the above off site potential contamination sources have survived to the current day. Any contamination associated with these former industries if present in the past will have likely degraded and diluted overtime and the chance of this impacting the application site today is minimal.

8 CONCEPTUAL SITE MODEL AND RISK ASSESSMENT

8.1 Conceptual Site Model

Risk estimation involves detailed evaluation of source - pathway - receptor scenarios to determine whether a linkage exists between any sources of contamination and potential receptors. A risk exists where a receptor is exposed to a source of contamination, via a pathway. If any element of the source-pathway-target linkage is absent, then no risk is present.

In order to consider potential risks at the site, a conceptual site model was developed, to examine the potential source - pathway - receptor linkages that may exist on the site. The conceptual model and the risk assessment for the site are illustrated in Table 7.1.

Table 7.8.1 Risk Assessment & Site Conceptual Model

Source	Potential Pathway(s)	Potential Receptor(s)	Relevant Source – Pathway – Receptor Linkage	Further Investigation Required
On site sources				
Soil gas: Made Ground or highly organic soils may contain high organic content that is degrading and producing Methane, Carbon dioxide and depleted Oxygen gases.	Migration along cracks in foundations and service trenches Breaking ground surface to facilitate works.	Humans in the form of current and future site users.	Made Ground or highly organic soils underlying the study area could contain high organic content that can degrade and produce Methane, Carbon Dioxide and depleted oxygen gases. However, as no buildings are proposed as part of the public realm upgrades, no receptor will exist for ground gas ingress.	No
Possible fuel storage tank/s.	Direct contact, ingestion and inhalation of vapours. Subsurface infiltration, leaching from sub-soils and groundwater flow.	Humans in form of future site users, site workers, landscaping and maintenance workers. Shallow groundwater, bedrock aquifer and The Shambles River/Ulster Canal.	Fuel tanks (if present) may have the potential to contaminate sub soils and groundwater bodies beneath the site and wider site area. Given the sites end use and the majority of the site being covered in hardstanding an exposure pathway to human health will be broken. As a result the likelihood of hydrocarbon contamination associated with any fuel tanks impacting human health or groundwater/surface waters is deemed to be minimal.	No
Off site sources				
Possible fuel storage tank/s.	Direct contact, ingestion and inhalation of vapours. Subsurface infiltration, leaching from sub-soils and groundwater flow.	Humans in form of future site users, site workers, landscaping and maintenance workers. Shallow groundwater, bedrock aquifer and The Shambles River/Ulster Canal.	Fuel tanks (if present) may have the potential to contaminate sub soils and groundwater bodies beneath the site and wider site area. Given the sites end use and the majority of the site being covered in hardstanding an exposure pathway to human health will be broken. As a result the likelihood of hydrocarbon contamination associated with any fuel tanks impacting human health or groundwater/surface waters is deemed to be minimal.	No

9 CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

The desk study has highlighted that no significant pollutant linkages are considered to be present within the study area. The proposed public realm upgrade involves minor alterations to the existing area. Upon completion, paving and or hardstanding will cover the site negating any potential risk to human health.

9.2 Recommendations

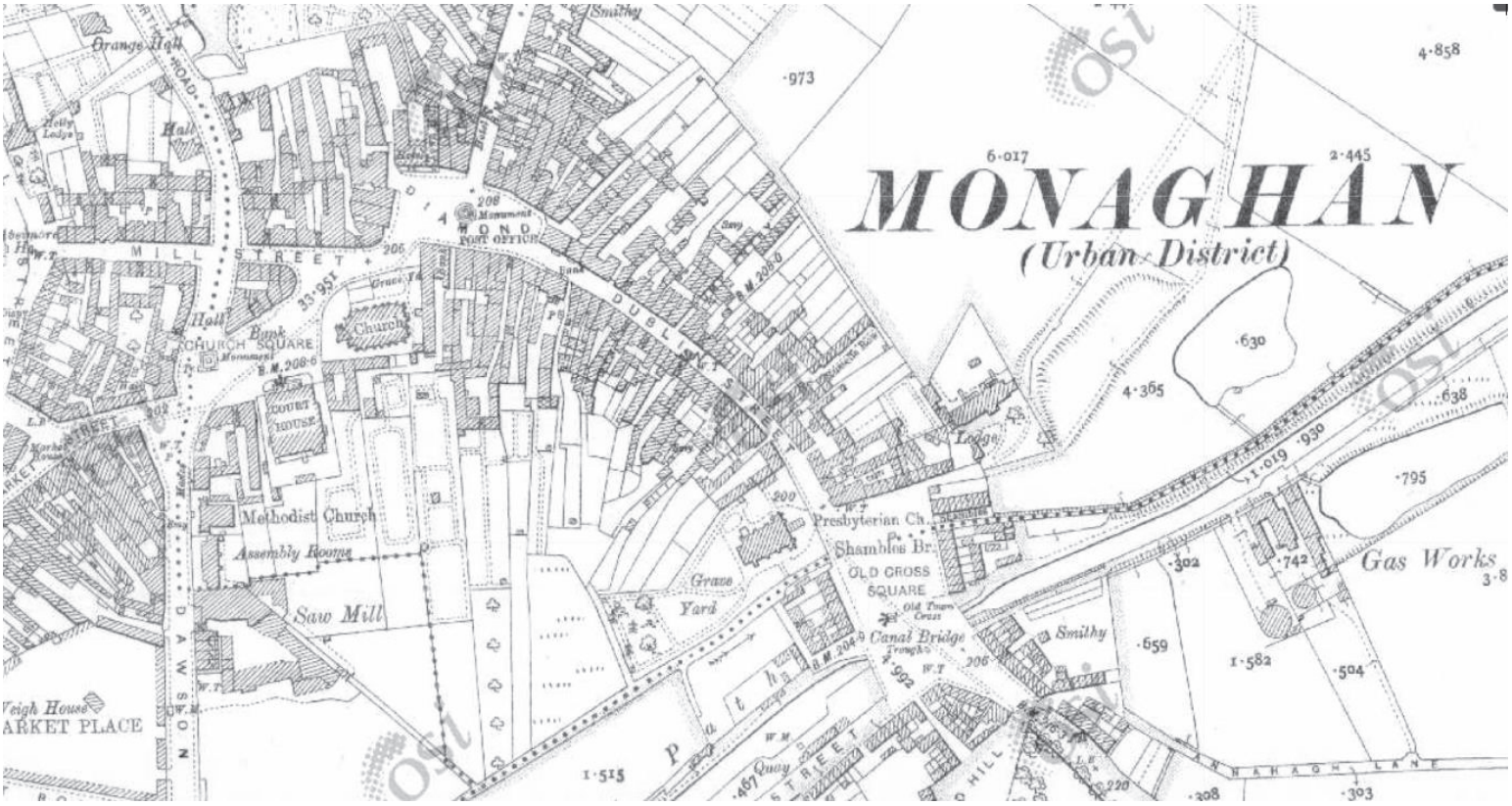
During construction works, should unexpected contamination be encountered in soils or groundwater with visual or olfactory signs of contamination, samples of the potentially contaminated material should be obtained and sent for chemical analysis. An updated risk assessment should be completed to assess risks to human health and environmental receptors. Should unacceptable risks be identified then appropriate remedial works will be conducted and agreement sought from the relevant regulatory bodies.

Appendix A

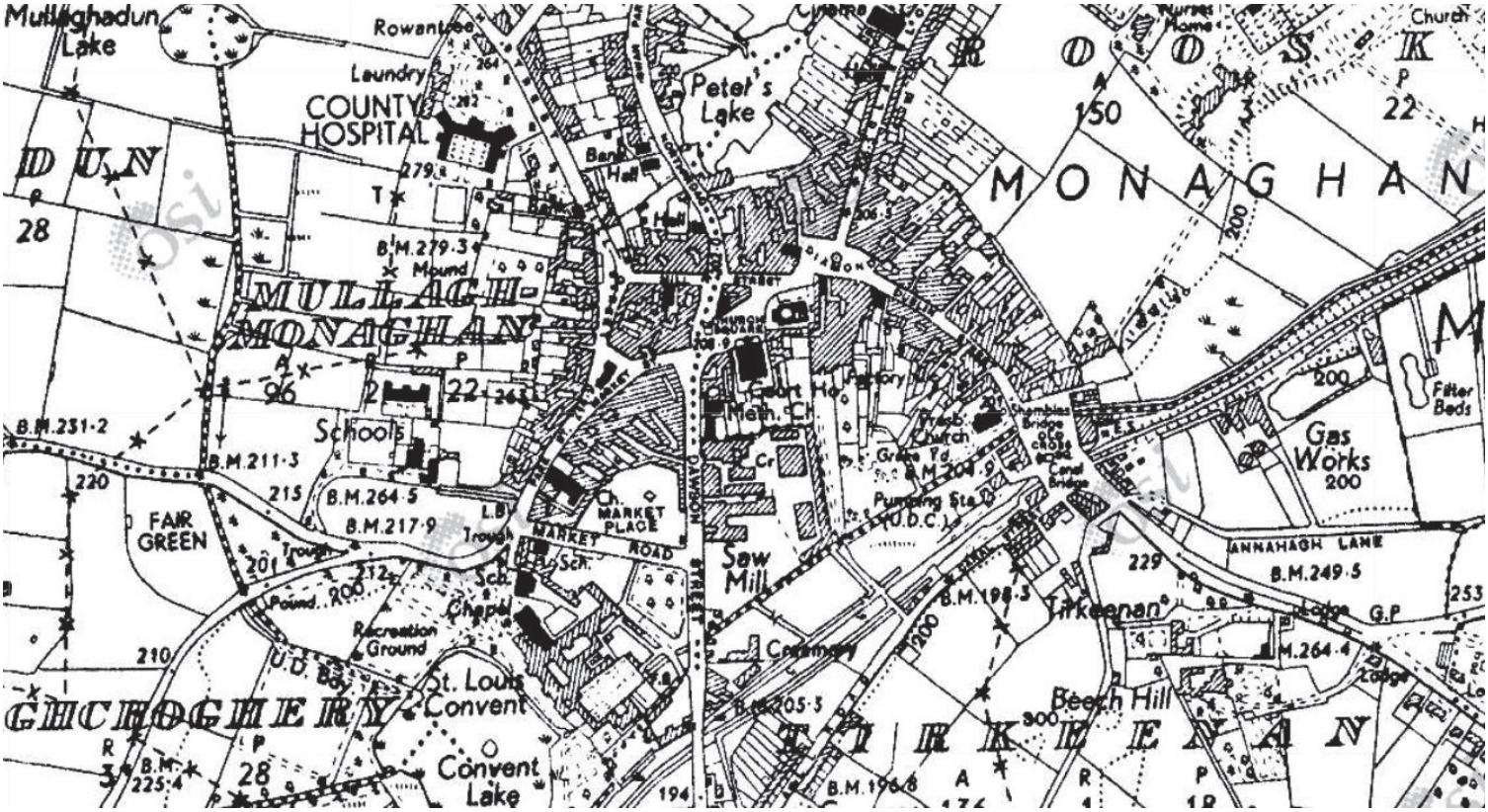
Historical Maps

OSI Historical map, 1829-1841

OSI Historical map, 1897-1913



OSI Historical map, 1913



Appendix B

Previous Assessment Reports

Monaghan Mixed Use Development Monaghan Town

Bedrock Probe Survey

Report No: 05-021

Client :P Clarke & Sons Ltd

Engineer: Malone O'Regan

January 2005

Monaghan Mixed Use Development
Monaghan Town

Bedrock Probe Survey

CONTENTS Page No.

Appendices

Monaghan Mixed Use Development
Monaghan Town

Bedrock Probe Survey

1 AUTHORITY

On the instructions of Malone O'Regan, Consulting Engineers, acting on behalf of the Client, P. Clarke & Sons Ltd, a site investigation was undertaken at the above site to establish the bedrock levels with regard to the proposed retail development in the present car park at Monaghan Mixed Use Retail Development in the centre of Monaghan Town in County Monaghan. Please also refer to Glover's earlier report (No. 04-663) dated December 2004.

2 SCOPE

The investigation was to include the drilling of probe boreholes and the preparation of a report on the findings.

3 DESCRIPTION OF FIELD WORK

Eighteen boreholes were drilled by means of three tracked Competitor 130 Drilling Rigs using dynamic cone penetration tests.

The boreholes were drilled during a night possession the car park on the night of Friday 14th January 2005.

The dynamic cone tests were carried out using dynamic super heavy techniques.

The logs of number of blows per 100mm of penetration plotted against depth, are displayed in Appendix 2. The results of bedrock in seven earlier boreholes carried out on the site are also included.

All of the above works were carried out to BS 5930 the Code of Practice for Site Investigation.

4 BRIEF GEOLOGY OF THE SITE

The geological map of the area shows the bedrock to be the Carboniferous Limestone Formations and the quaternary geological map gives the drift as alluvial deposits underlain by fluvio glacial gravels which are in turn overlain by glacial till (boulder clay).

Appendix 1

Borehole Location Plan

Appendix 2

Borehole Probe Logs

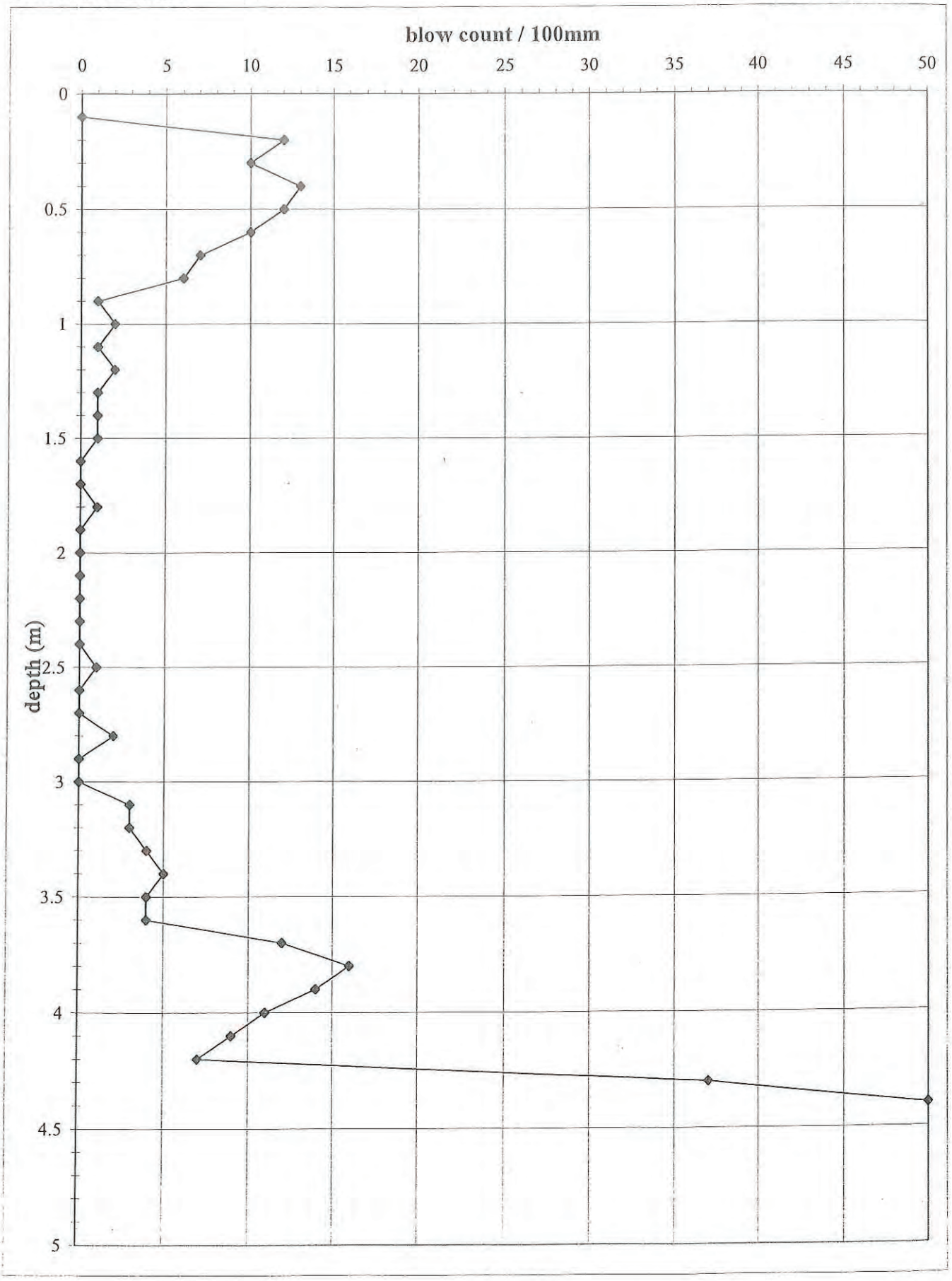
GLOVER SITE INVESTIGATIONS LIMITED

Glover Site Investigations Ltd.

Dynamic Probing (super heavy) DPSH (Clause 3.2 of BS1377 : Part 9 : 1990)

Project: Monaghan MixedUse - Development **Report No:** 05-021

Probe Number: 10 **Date:** 14th Jan 05

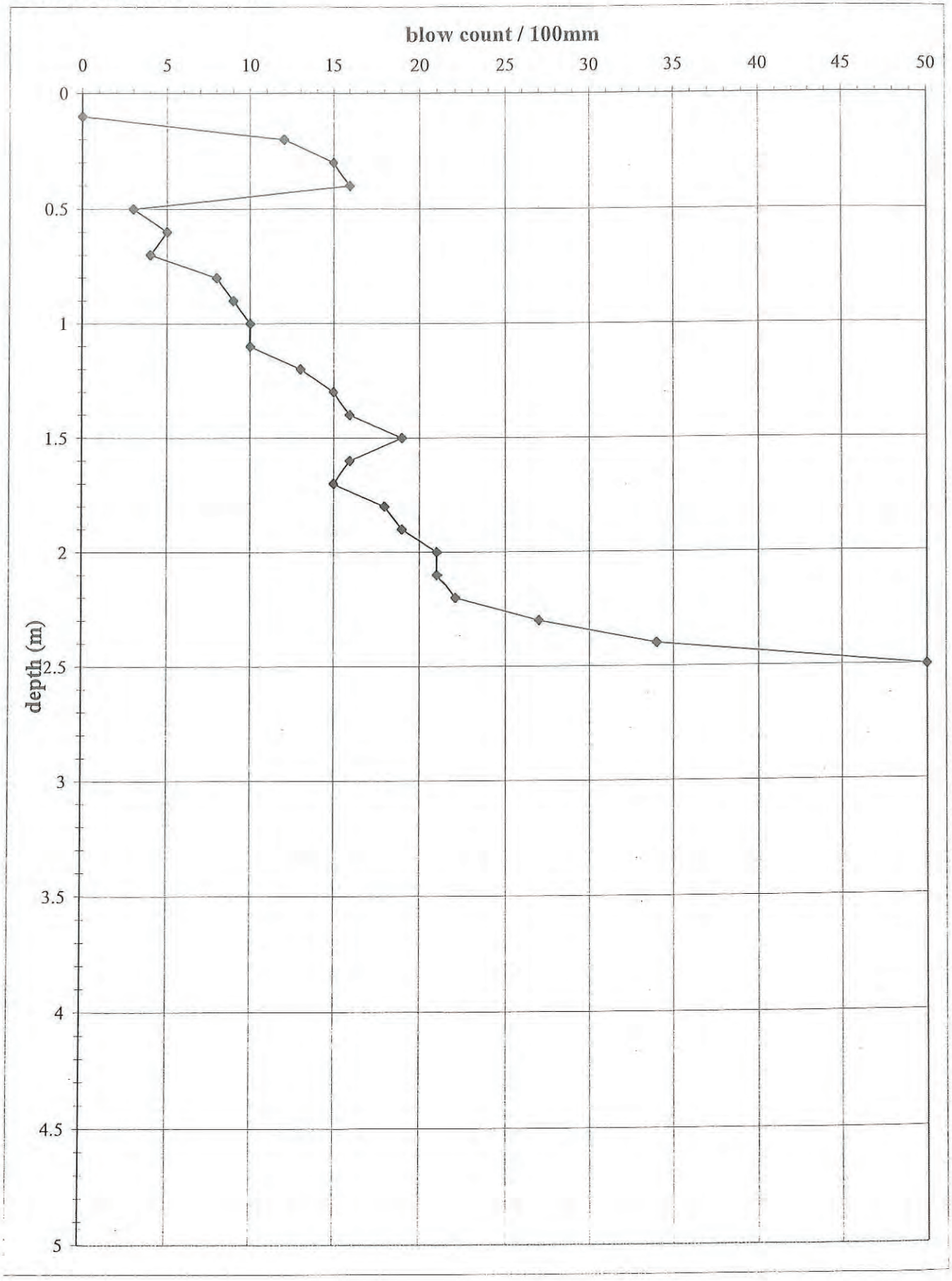


Glover Site Investigations Ltd.

Dynamic Probing (super heavy) DPSH (Clause 3.2 of BS1377 : Part 9 : 1990)

Project: Monaghan MixedUse - Development **Report No:** 05-021

Probe Number: 11 **Date:** 14th Jan 05

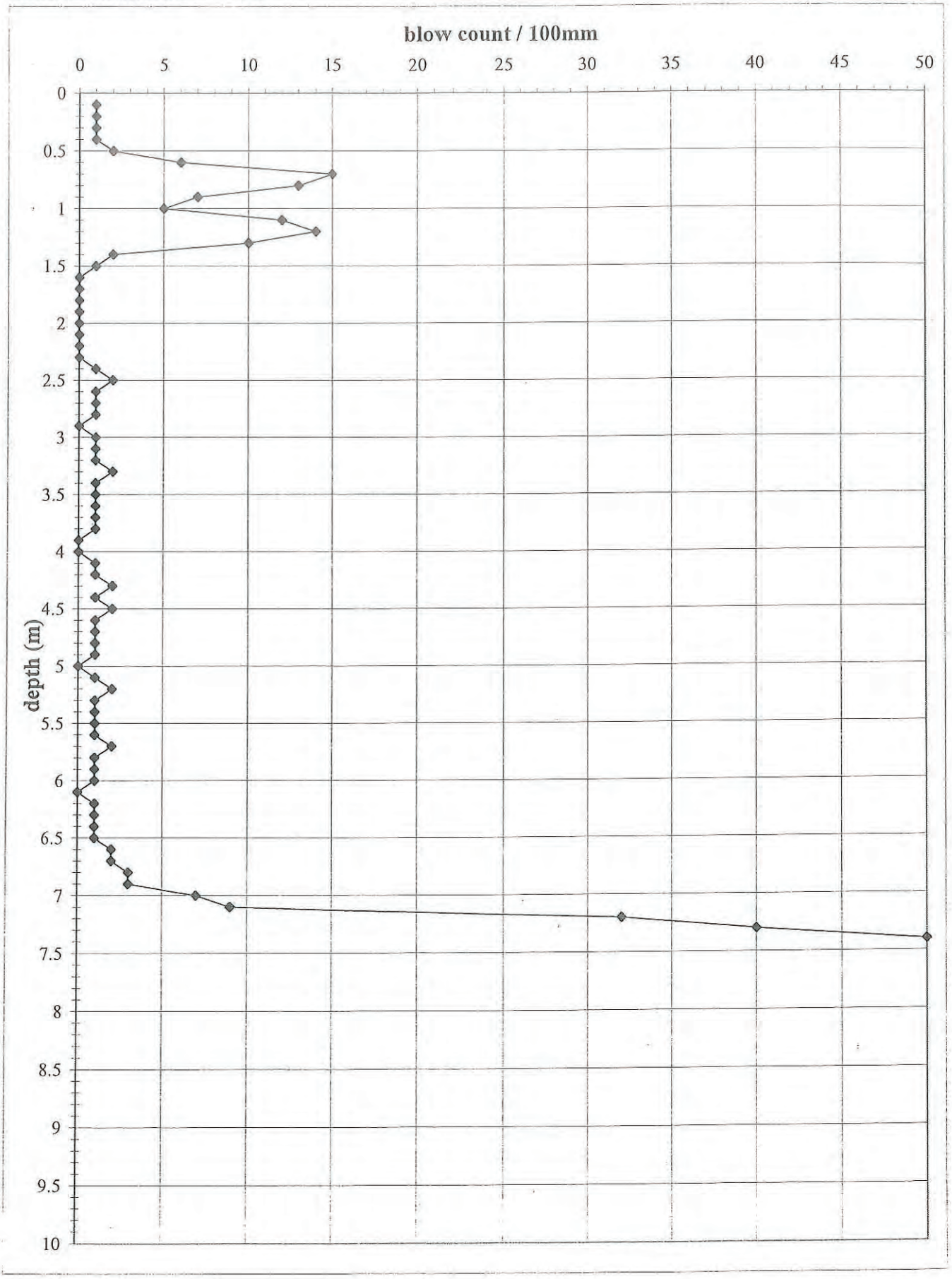


Glover Site Investigations Ltd.

Dynamic Probing (super heavy) DPSH (Clause 3.2 of BS1377 : Part 9 : 1990)

Project: Monaghan MixedUse - Development **Report No:** 05-021

Probe Number: 12 **Date:** 14th Jan 05

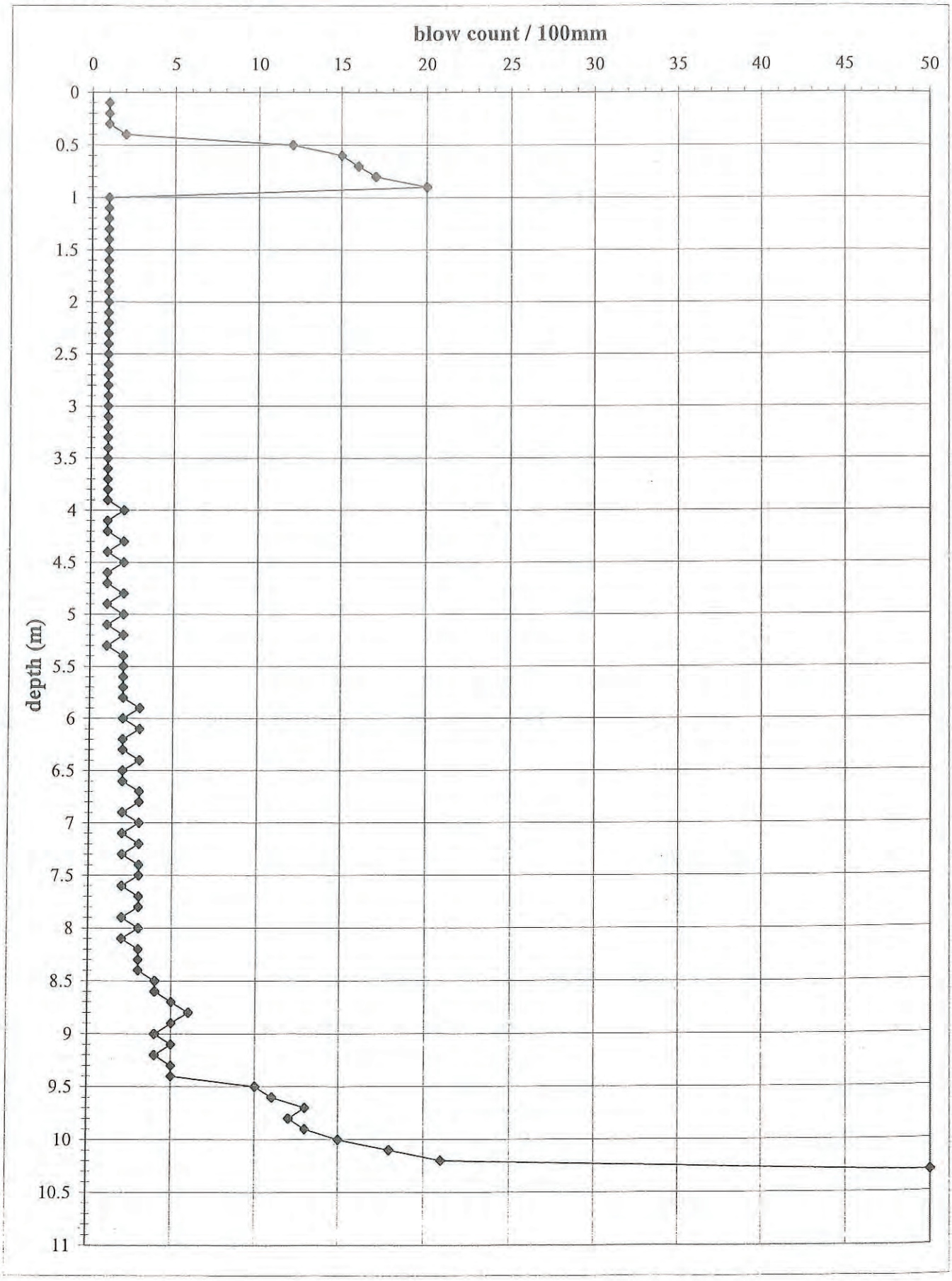


Glover Site Investigations Ltd.

Dynamic Probing (super heavy) DPSH (Clause 3.2 of BS1377 : Part 9 : 1990)

Project: Monaghan MixedUse - Development **Report No:** 05-021

Probe Number: 13 **Date:** 14th Jan 05

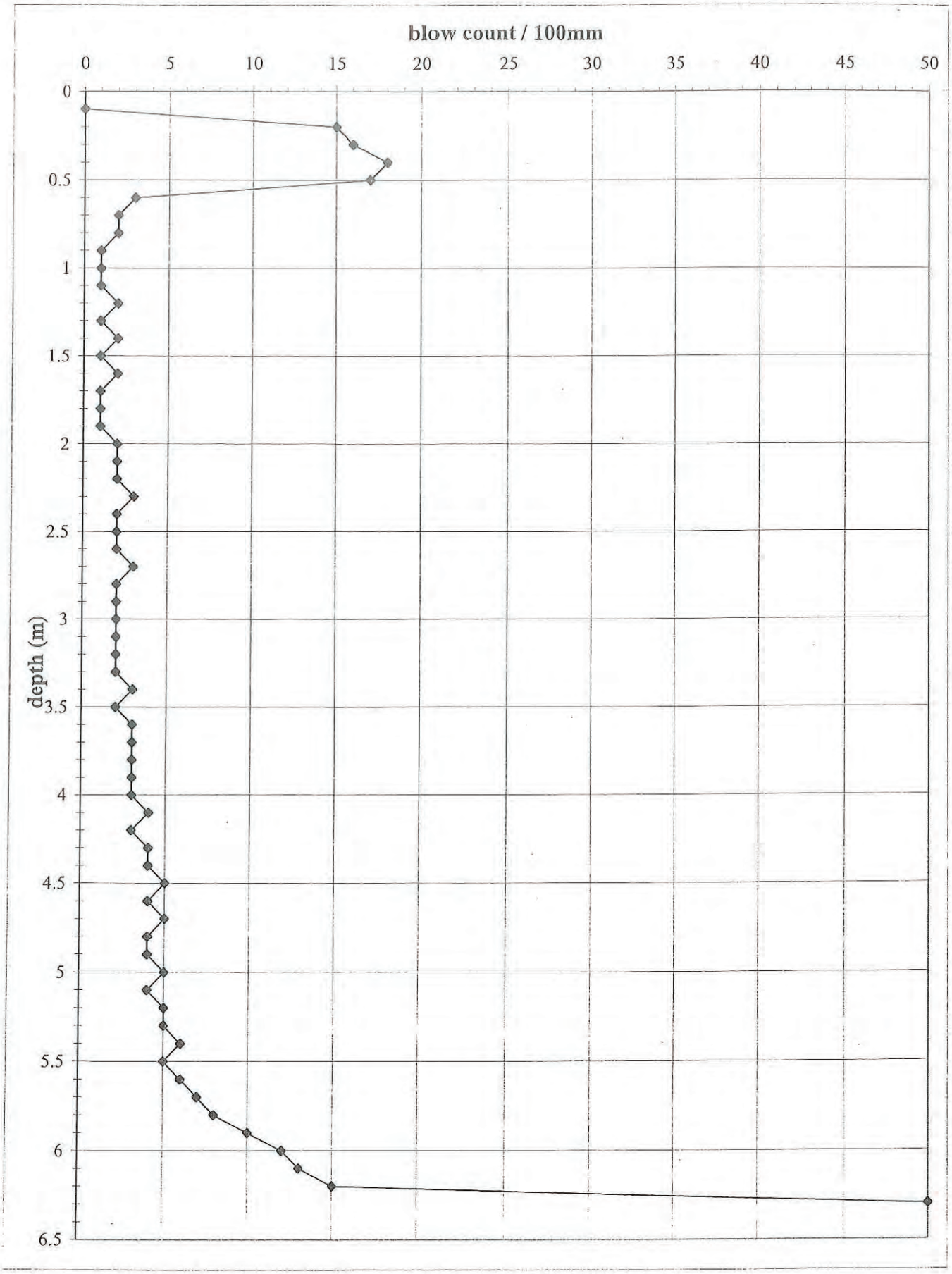


Glover Site Investigations Ltd.

Dynamic Probing (super heavy) DPSH (Clause 3.2 of BS1377 : Part 9 : 1990)

Project: Monaghan MixedUse - Development **Report No:** 05-021

Probe Number: 14 **Date:** 14th Jan 05

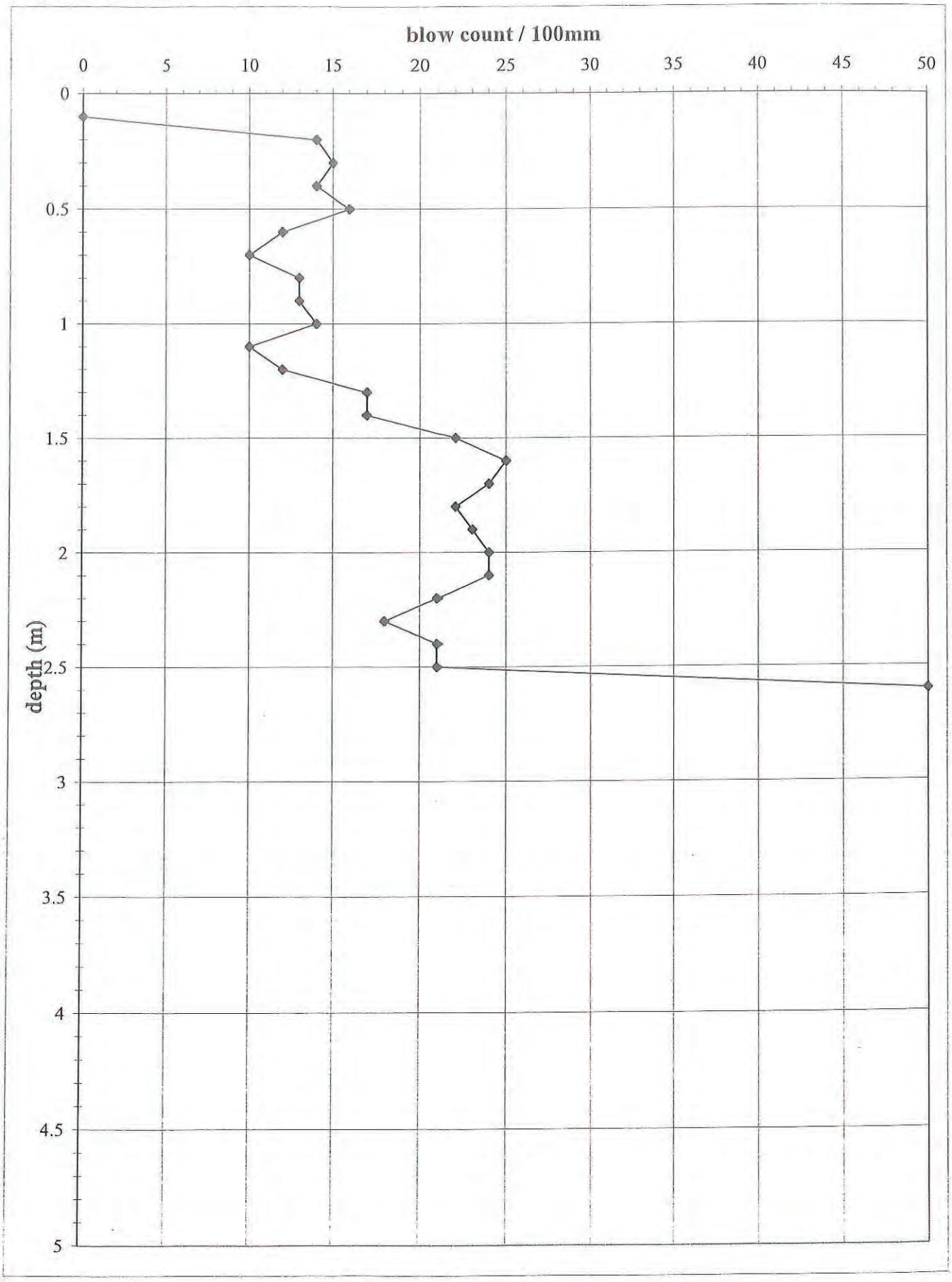


Glover Site Investigations Ltd.

Dynamic Probing (super heavy) DPSH (Clause 3.2 of BS1377 : Part 9 : 1990)

Project: Monaghan MixedUse - Development **Report No:** 05-021

Probe Number: 15 **Date:** 14th Jan 05

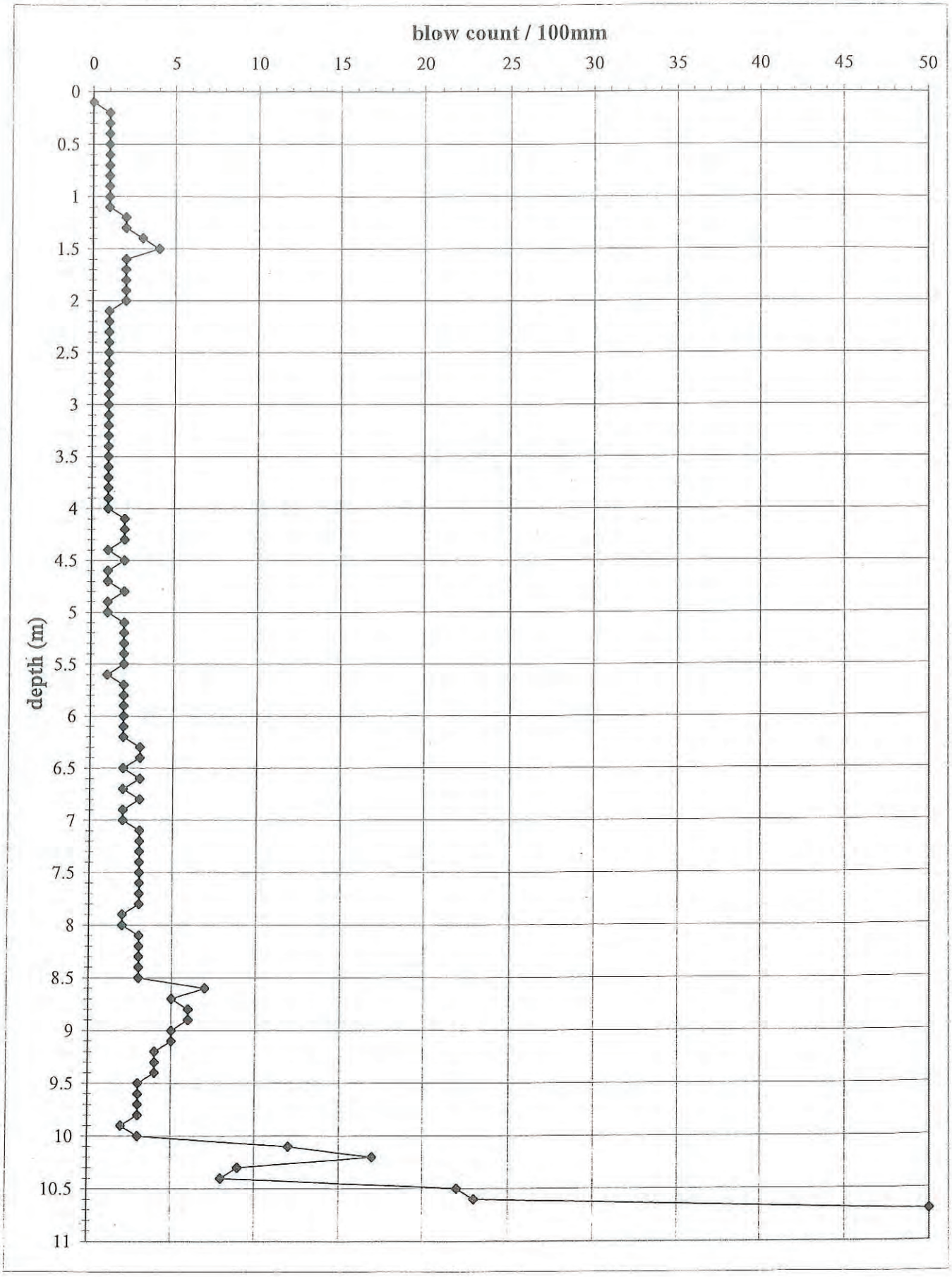


Glover Site Investigations Ltd.

Dynamic Probing (super heavy) DPSH (Clause 3.2 of BS1377 : Part 9 : 1990)

Project: Monaghan MixedUse - Development **Report No:** 05-021

Probe Number: 16 **Date:** 14th Jan 05

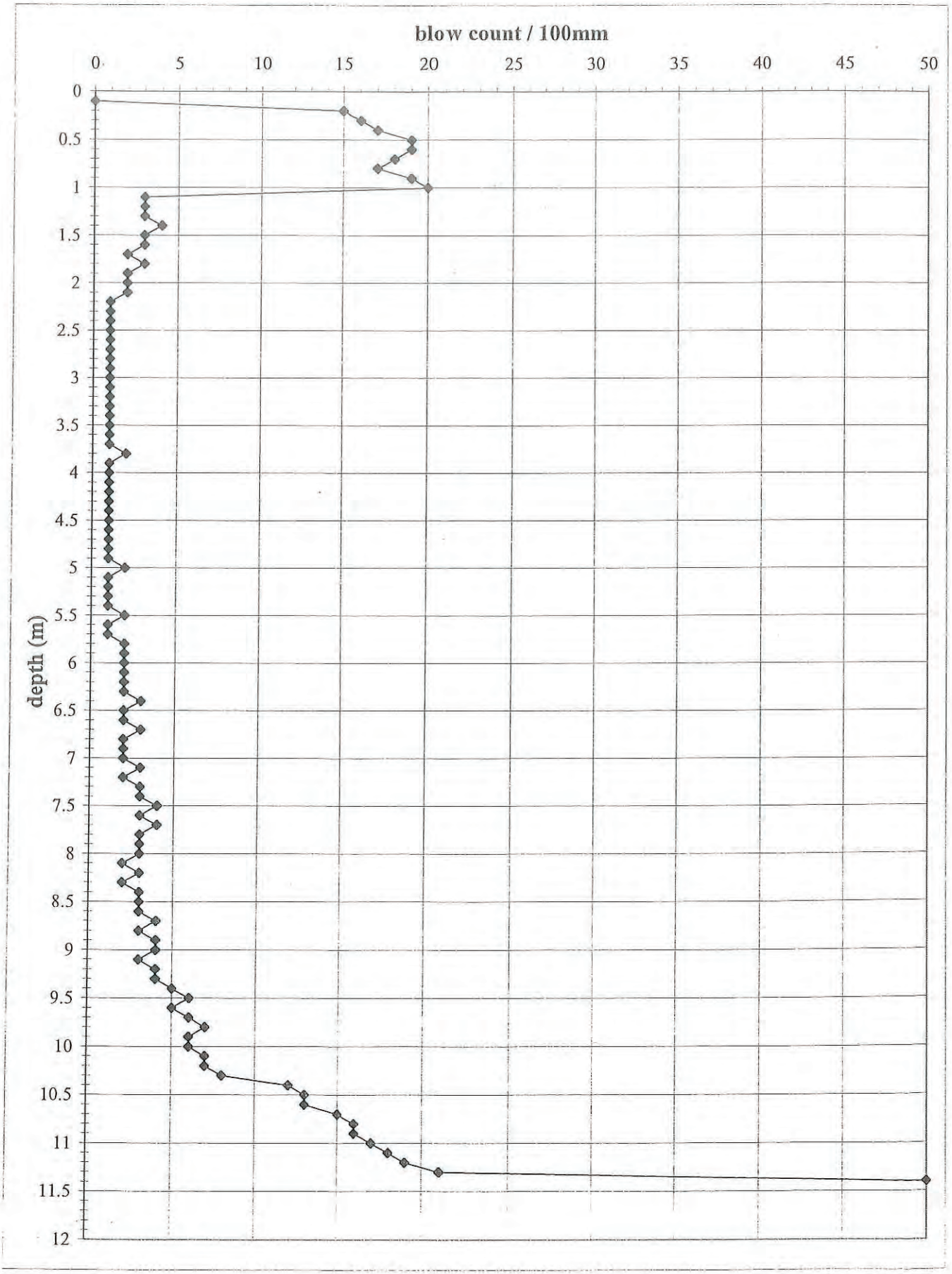


Glover Site Investigations Ltd.

Dynamic Probing (super heavy) DPSH (Clause 3.2 of BS1377 : Part 9 : 1990)

Project: Monaghan MixedUse - Development **Report No:** 05-021

Probe Number: 17 **Date:** 14th Jan 05

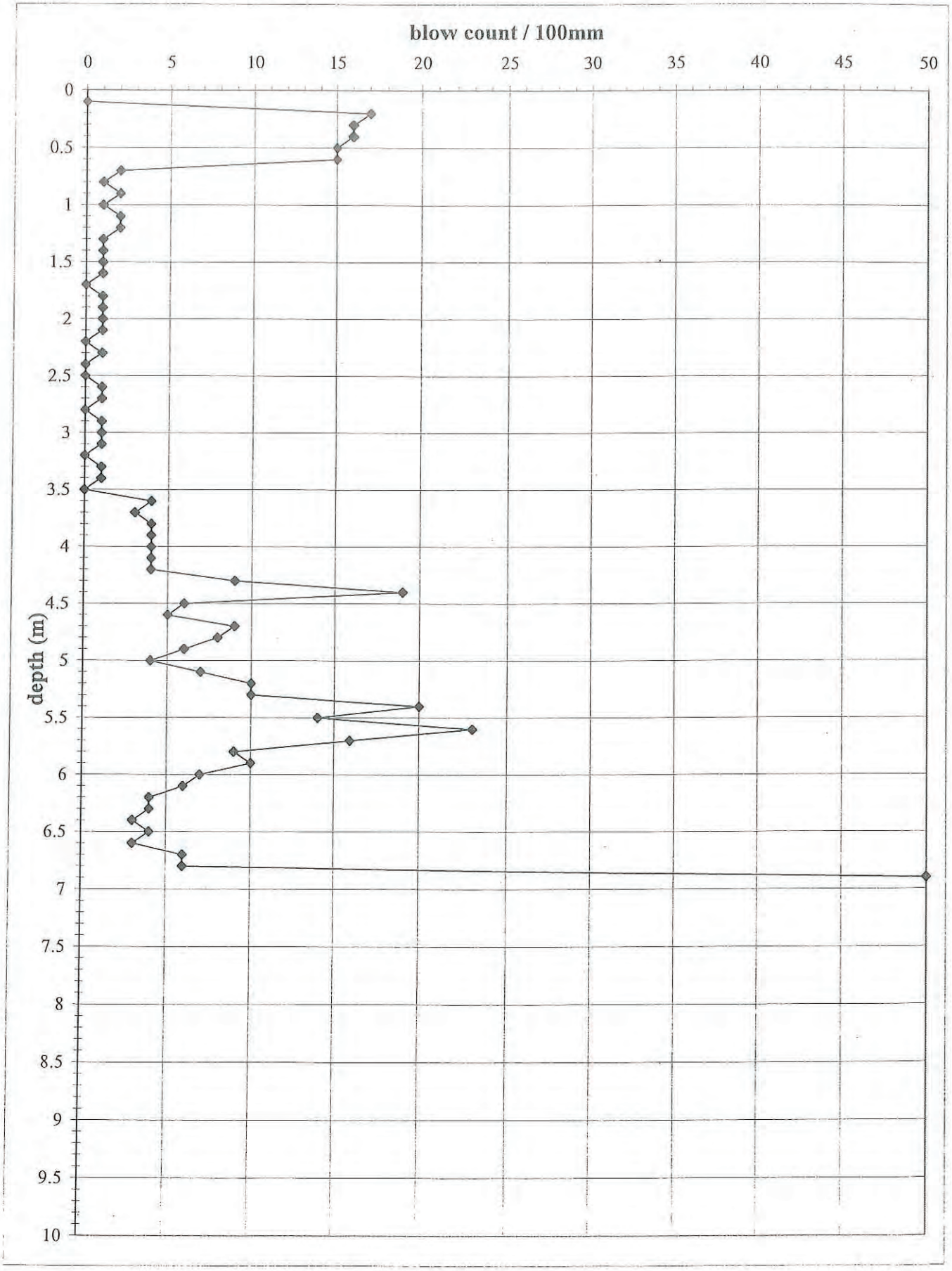


Glover Site Investigations Ltd.

Dynamic Probing (super heavy) DPSH (Clause 3.2 of BS1377 : Part 9 : 1990)

Project: Monaghan MixedUse - Development **Report No:** 05-021

Probe Number: 18 **Date:** 14th Jan 05

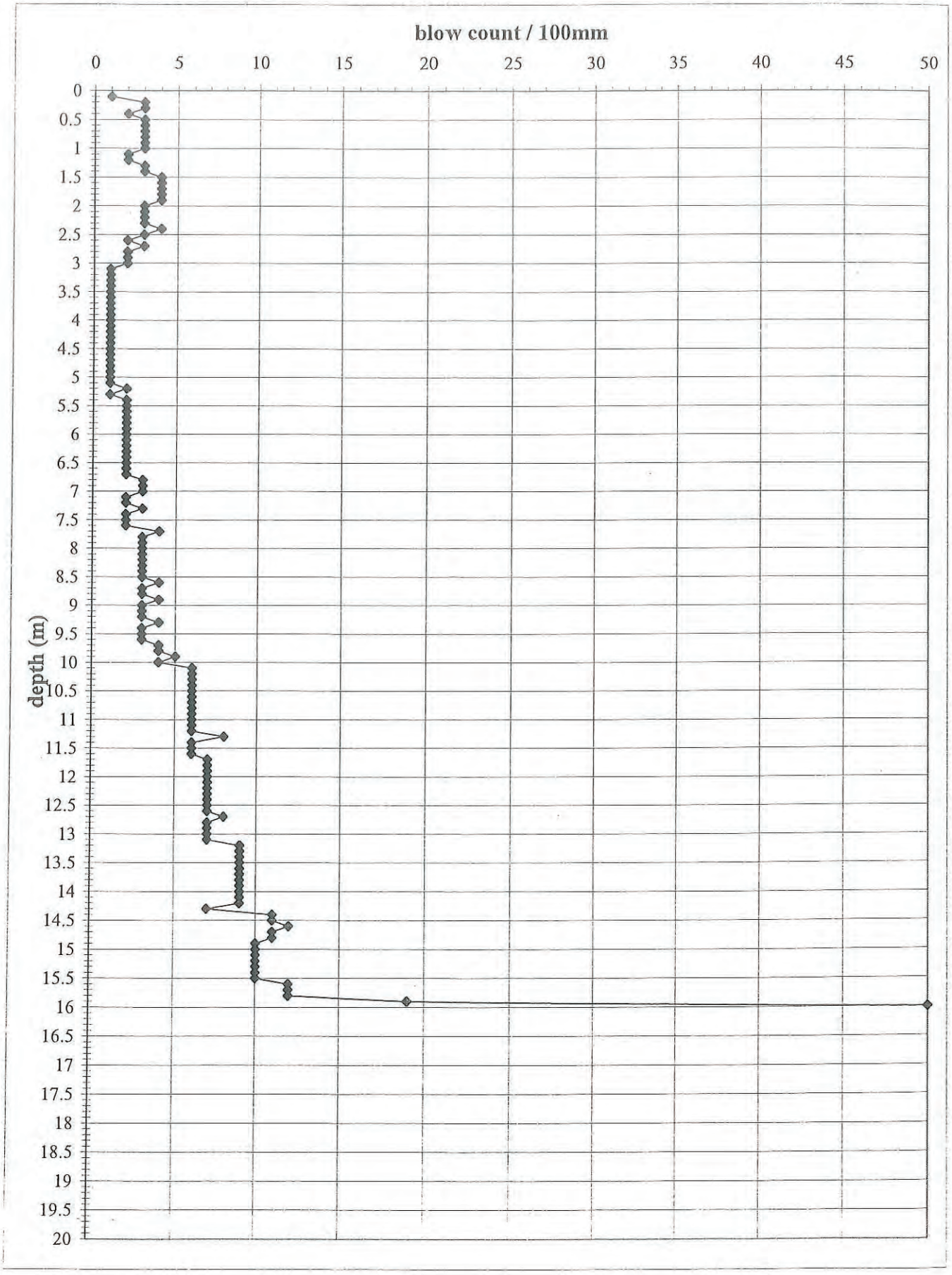


Glover Site Investigations Ltd.

Dynamic Probing (super heavy) DPSH (Clause 3.2 of BS1377 : Part 9 : 1990)

Project: Monaghan MixedUse - Development **Report No:** 05-021

Probe Number: 19 **Date:** 14th Jan 05

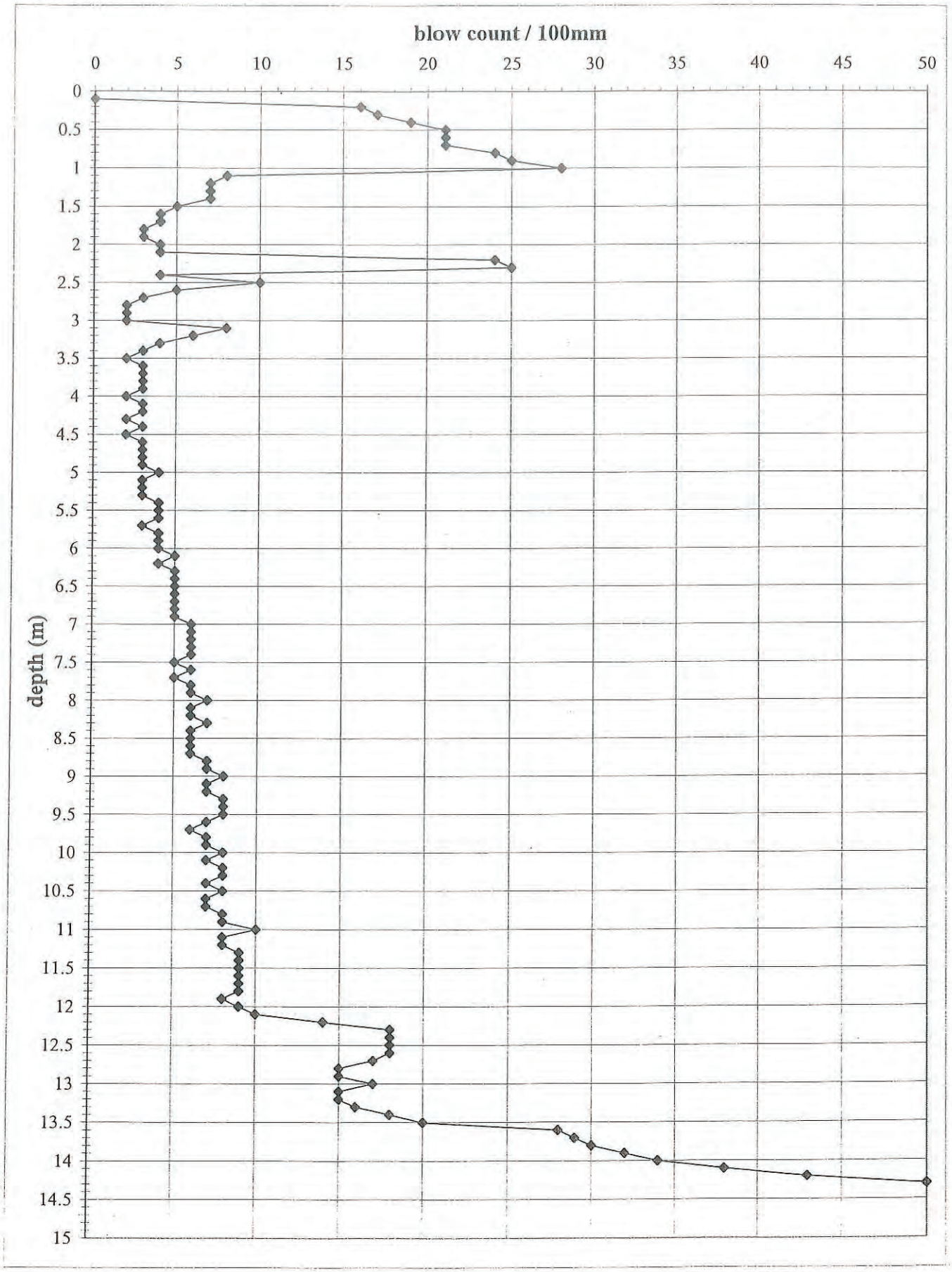


Glover Site Investigations Ltd.

Dynamic Probing (super heavy) DPSH (Clause 3.2 of BS1377 : Part 9 : 1990)

Project: Monaghan MixedUse - Development **Report No:** 05-021

Probe Number: 20 **Date:** 14th Jan 05

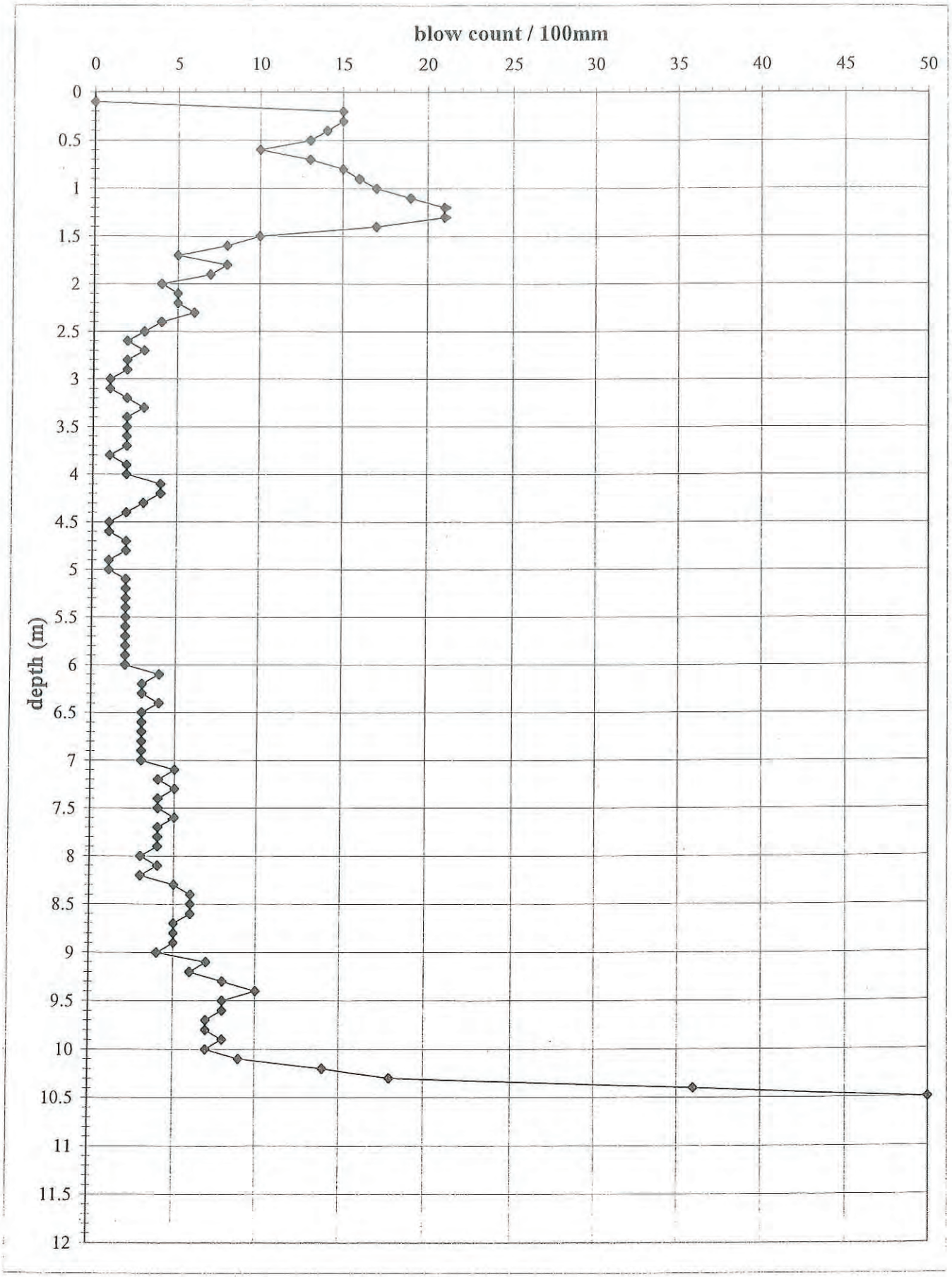


Glover Site Investigations Ltd.

Dynamic Probing (super heavy) DPSH (Clause 3.2 of BS1377 : Part 9 : 1990)

Project: Monaghan MixedUse - Development **Report No:** 05-021

Probe Number: 21 **Date:** 14th Jan 05

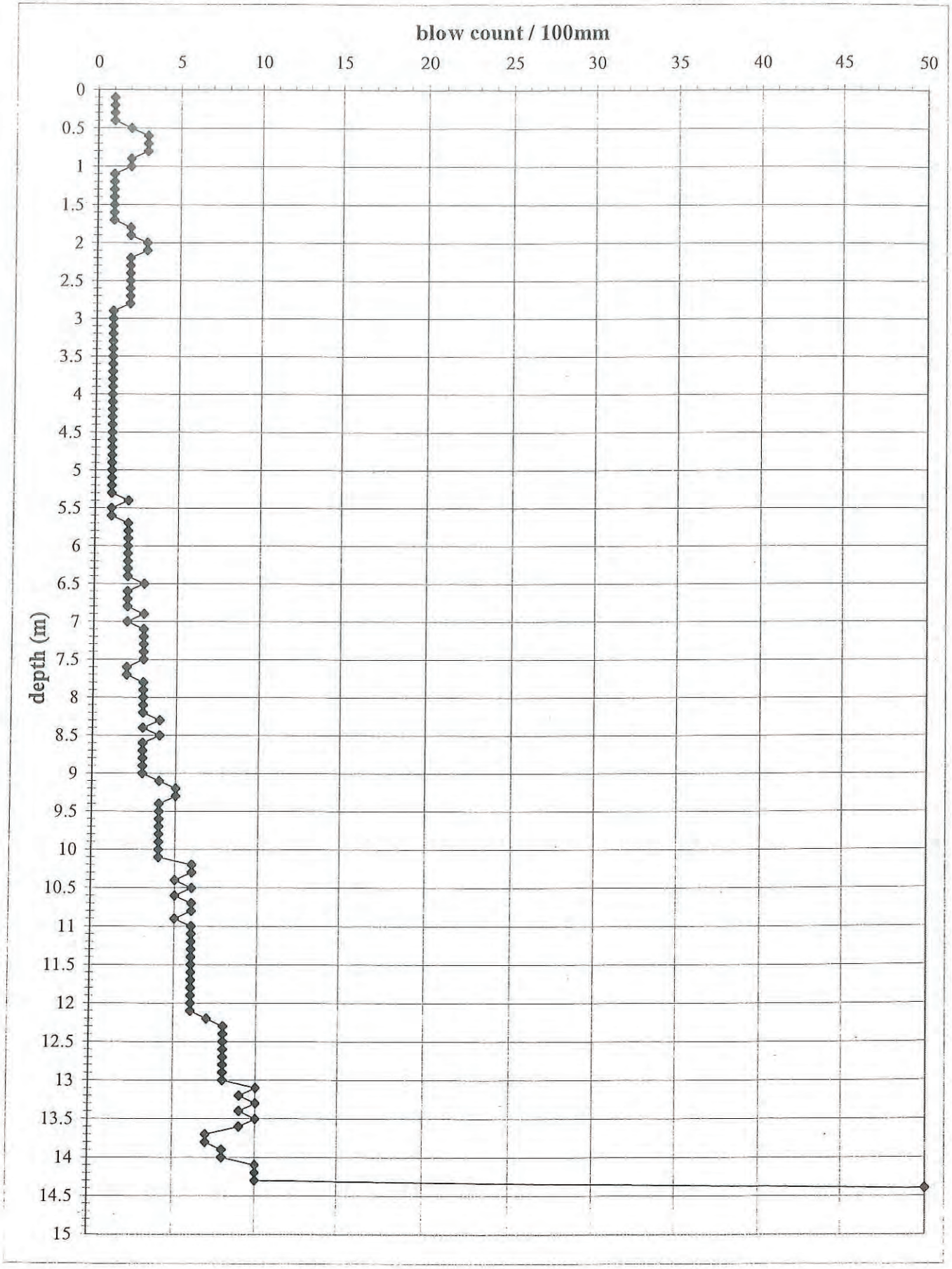


Glover Site Investigations Ltd.

Dynamic Probing (super heavy) DPSH (Clause 3.2 of BS1377 : Part 9 : 1990)

Project: Monaghan MixedUse - Development **Report No:** 05-021

Probe Number: 22 **Date:** 14th Jan 05

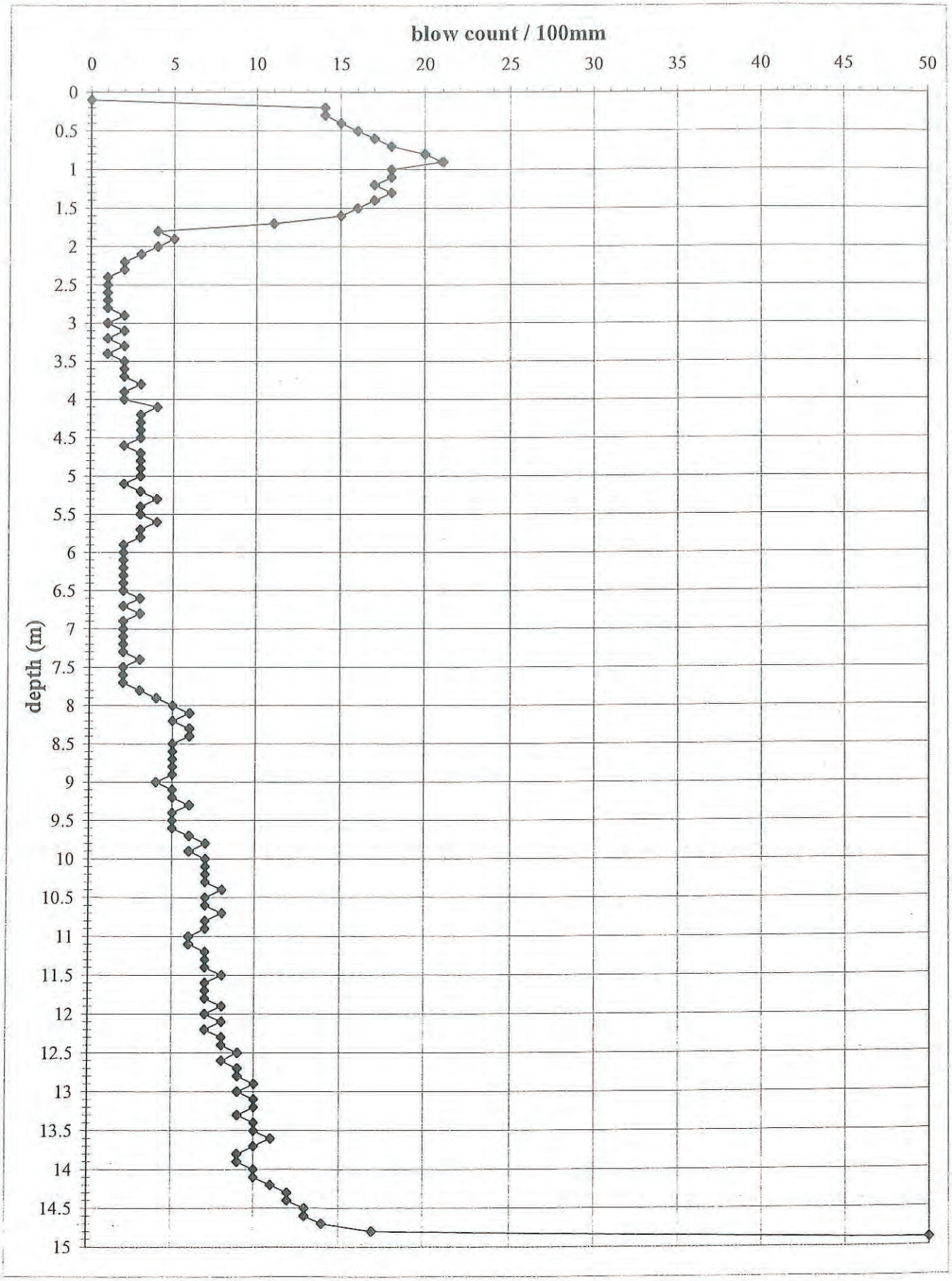


Glover Site Investigations Ltd.

Dynamic Probing (super heavy) DPSH (Clause 3.2 of BS1377 : Part 9 : 1990)

Project: Monaghan MixedUse - Development **Report No:** 05-021

Probe Number: 23 **Date:** 14th Jan 05

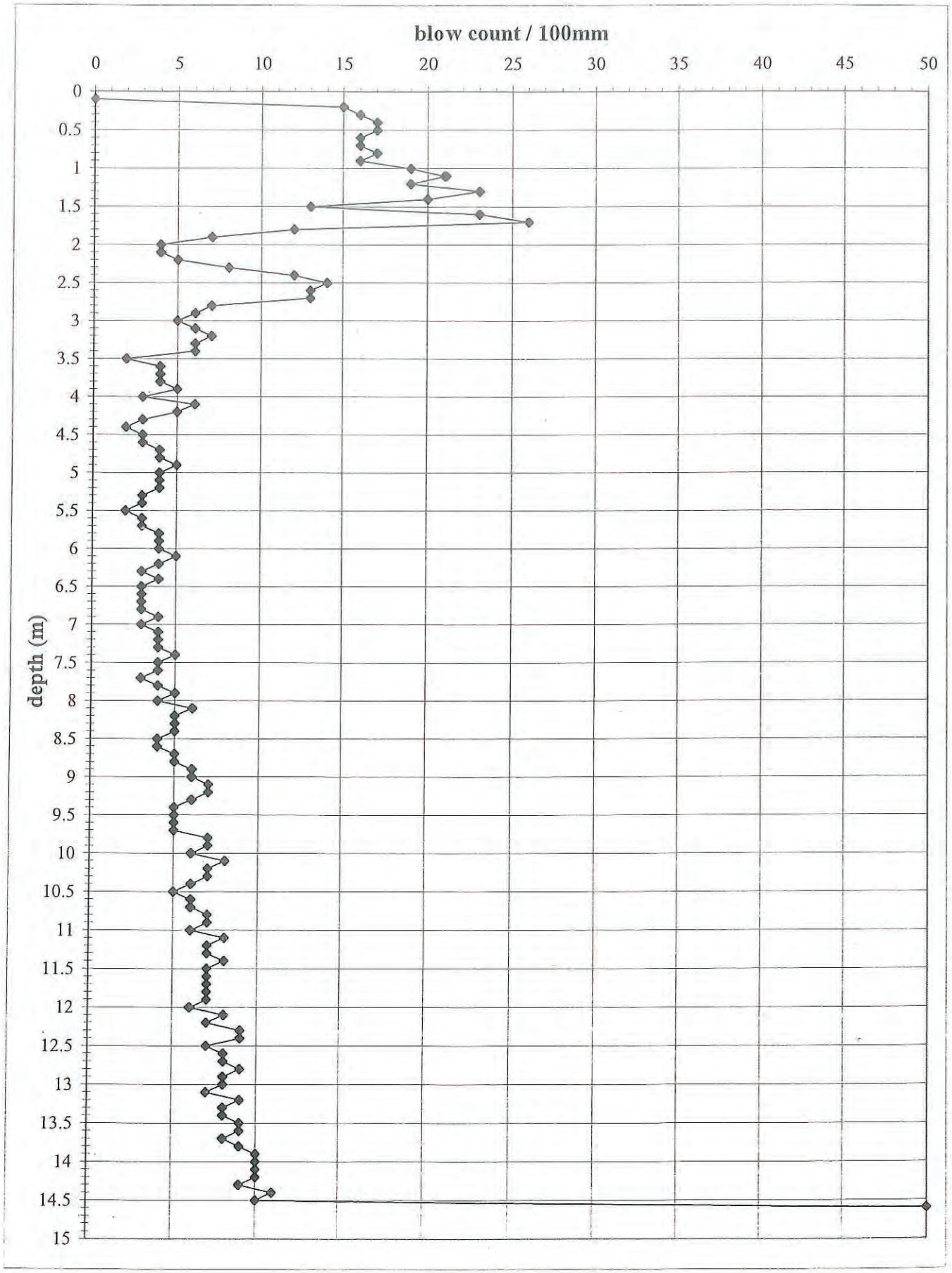


Glover Site Investigations Ltd.

Dynamic Probing (super heavy) DPSH (Clause 3.2 of BS1377 : Part 9 : 1990)

Project: Monaghan MixedUse - Development **Report No:** 05-021

Probe Number: 24 **Date:** 14th Jan 05

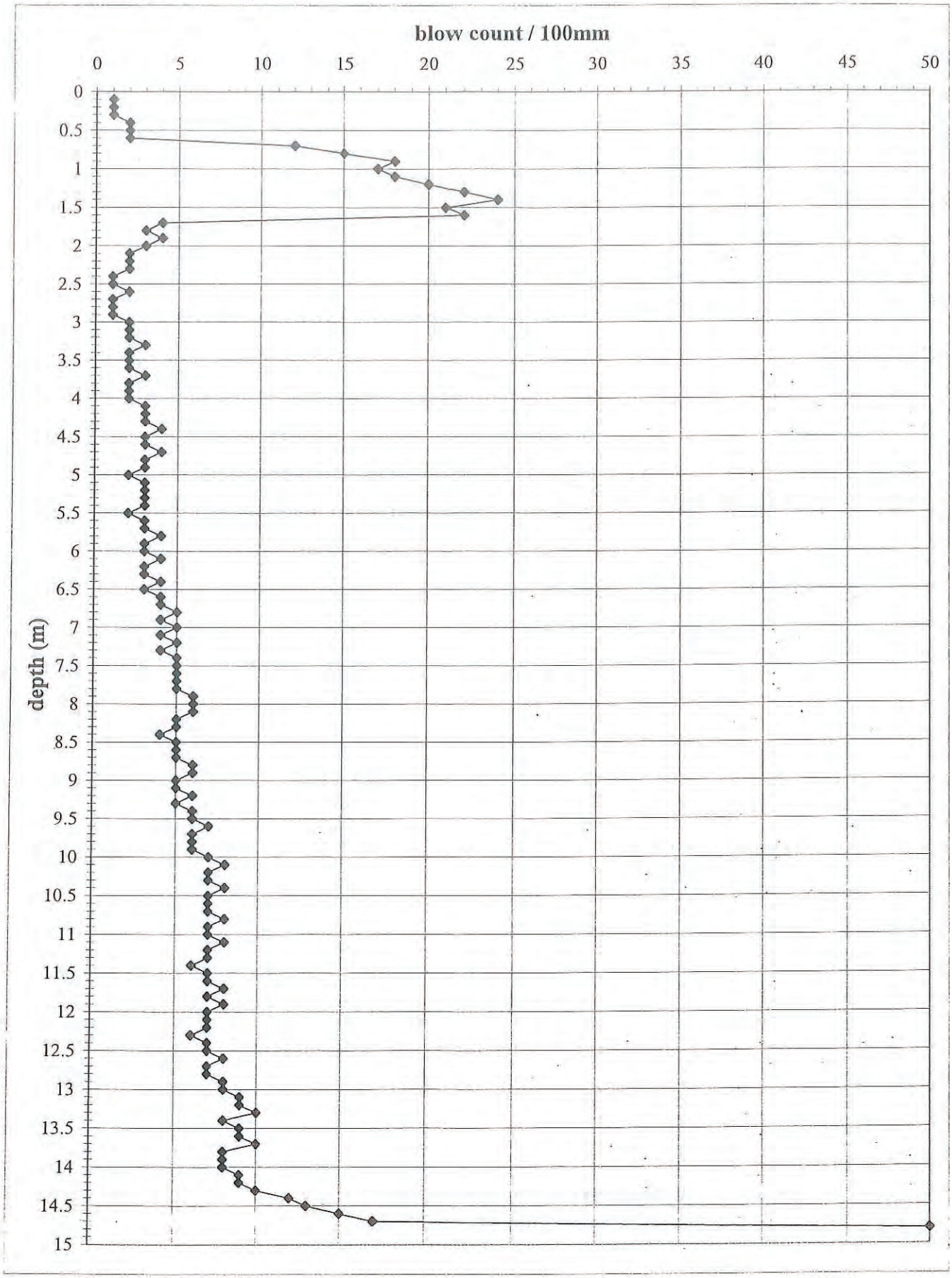


Glover Site Investigations Ltd.

Dynamic Probing (super heavy) DPSH (Clause 3.2 of BS1377 : Part 9 : 1990)

Project: Monaghan MixedUse - Development **Report No:** 05-021

Probe Number: 25 **Date:** 14th Jan 05



Glover Site Investigations Ltd

Site	Number
MIXED USE DEVELOPMENT, MONAGHAN TOWN	BH1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
COMPETITOR 130 RIG	125mm to 10.00m			04-411
	Location	**Dates**	**Engineer**	**Sheet**
	AS PLAN	18/08/04	ALBERT FRY ASSOCIATES	1/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.18	BITMAC		
					(0.32)	HARDCORE		
0.50-0.95 0.50	SPT N=15 J		3,4/3,4,4,4		0.50	MADE GROUND: Stiff very friable grey and black very gravelly fine sandy CLAY containing pieces of brick and containing roots and rootlets		
					(0.35)			
1.00-1.45	SPT N=10		4,5/4,3,2,1		0.85	Grey sandy angular HARDCORE and SPALLS		
					(0.55)			
1.50-1.95 1.50	SPT N=2 J		1/1,,1		1.40	Very soft dark brown silty PEAT containing roots and stems		
					(0.50)			
2.00-2.45 2.00	SPT N=1 J		1/,,1		1.90	Very soft (wet) dark brown silty and fibrous PEAT		
2.50-2.95 2.50	SPT N=1 J		1/1		(1.60)			
3.00-3.45 3.00	SPT N=1 J		1/,,1					
3.50	J		Water Struck(1) at 3.50m.		3.50	Very soft whiteish grey and light grey organic SILT containing rootlets		▽1
3.50-3.95	SPT N=2		1/1,,1					
4.00	J							
4.50-4.95 4.50	SPT N=2 J		1/1,,1					
5.00-5.45 5.00	SPT N=2 J		1/1,,,1		(2.80)			
5.50-5.95 5.50	SPT N=2 J		1/1,,1					
6.00-6.45 6.00	SPT N=11 J		1/1,2,3,5					
					6.30	Medium dense (saturated) brown silty sandy fine to coarse GRAVEL		
7.00-7.45 7.00	SPT N=15 J		3,4/3,4,4,4					
					(2.50)			
8.00-8.45 8.00	SPT N=16 J		3,3/3,4,5,4					
					8.80	Stiff brown gravelly sandy CLAY with occasional cobbles and boulders		
9.00-9.45 9.00	SPT N=19 J		4,4/4,5,5,5					
					(0.90)			
9.80-9.83 9.80	SPT 0*/30 J		/50 18/08/04		9.70 10.00	Moderately strong grey fine grained CARBONIFEROUS LIMESTONE		

Remarks

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

Figure No. 04-411.BH1

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Glover Site Investigations Ltd

Site	Number
MIXED USE DEVELOPMENT, MONAGHAN TOWN	BH1

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
COMPETITOR 130 RIG	125mm to 10.00m			04-411
	Location	**Dates**	**Engineer**	**Sheet**
	AS PLAN	18/08/04	ALBERT FRY ASSOCIATES	2/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.00-10.02	SPT 0*/20		/50					

Remarks

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

Figure No. 04-411.BH1

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Glover Site Investigations Ltd

Site	Number
MIXED USE DEVELOPMENT, MONAGHAN TOWN	BH2

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
COMPETITOR 130 RIG	125mm to 3.80m			04-411
	Location	**Dates**	**Engineer**	**Sheet**
	AS PLAN	18/08/04	ALBERT FRY ASSOCIATES	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.10	BITMAC		
						HARDCORE		
0.50-0.95	SPT N=19		7,6/5,5,4,5					
1.00-1.45	SPT N=27		3,4/5,7,8,7		(1.40)			
					1.50	MADE GROUND: Stiff friable dark grey brown gravelly slightly organic fine sandy CLAY containing roots and rootlets and pieces of brick and slate		
1.60	J				(0.60)			
2.00-2.45	SPT N=5		2,3/2,1,1,1		2.10	Soft dark grey gravelly sandy CLAY containing occasional small pieces of brick		
2.50	J				(0.80)			
2.90-2.87	SPT 0*/30		Water Struck(1) at 2.90m. /10,13,18,18		2.90	Stiff brown gravelly sandy CLAY with some cobbles and boulders		▽1
					(0.60)			
3.50-3.52	SPT 0*/20		/50		3.50	Moderately strong grey fine grained CARBONIFEROUS LIMESTONE		
3.60-3.61	SPT 0*/10		/50		(0.30)			
3.70-3.72	SPT 0*/20		/50 18/08/04		3.80			
3.80-3.81	SPT 0*/10		/50			Complete at 3.80m		

Remarks

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

Figure No. 04-411.BH2

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Site: MIXED USE DEVELOPMENT, MONAGHAN TOWN			Number: BH3
Excavation Method: COMPETITOR 130 RIG	Dimensions: 125mm to 14.70m	Ground Level (mOD):	Client:	Job Number: 04-411
	Location: AS PLAN	Dates: 18/08/04	Engineer: ALBERT FRY ASSOCIATES	Sheet: 1/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.05	BITMAC		
						Grey HARDCORE		
0.50-0.95 0.50	SPT N=17 J		3,4/4,5,4,4		(1.05)			
			Water Struck(1) at 0.90m.					▽1
1.00-1.45 1.00	SPT N=18 J		4,4/4,5,4,5		1.10	Grey sandy HARDCORE		
					(0.60)			
1.50-1.95 1.50	SPT N=12 J		4,4/3,2,4,3		1.70			
					(0.35)	MADE GROUND: Medium dense dark grey and grey clayey sandy angular fine to coarse GRAVEL		
2.00-2.45 2.00	SPT N=31 J		4,4/3,2,12,14		2.05			
					(0.30)	MADE GROUND: Firm friable dark grey and black gravelly very sandy CLAY containing pieces of slate and rootlets		
					2.35			
						Medium dense (saturated) purple brown slightly silty sandy angular fine to coarse GRAVEL		
2.70-3.15 2.70	SPT N=34 J		5,5/6,13,9,6					
3.50-3.95 3.50	SPT N=21 J		9,4/4,5,6,6					
4.00-4.45 4.00	SPT N=21 J		3,4/5,5,6,5					
5.00-5.45 5.00	SPT N=20 J		4,4/4,5,6,5					
					(6.25)			
6.00-6.45 6.00	SPT N=22 J		5,5/5,6,5,6					
7.00-7.45 7.00	SPT N=26 J		5,5/5,8,7,6					
8.00-8.45 8.00	SPT N=29 J		5,6/6,7,8,8					
					8.60	Stiff brown gravelly sandy CLAY with some cobbles and boulders		
9.00-9.45 9.00	SPT N=30 J		7,6/7,8,8,7					
					(1.40)			
10.00-10.45	SPT N=32		5,6/7,8,8,9		10.00			

Remarks
Installed 19mm dia standpipe to 5.00m.

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

Figure No. 04-411.BH3

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Glover Site Investigations Ltd

Site	Number
MIXED USE DEVELOPMENT, MONAGHAN TOWN	BH3

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
COMPETITOR 130 RIG	125mm to 14.70m			04-411
	Location	**Dates**	**Engineer**	**Sheet**
	AS PLAN	18/08/04	ALBERT FRY ASSOCIATES	2/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
10.00	J					Stiff brown gravelly sandy CLAY with some cobbles		
11.00-11.45	SPT N=33		6,7/7,8,10,8					
11.00	J							
12.00-12.45	SPT N=35		7,7/7,8,10,10					
12.00	J				(4.40)			
13.00-13.45	SPT N=33		7,8/7,8,9,9					
13.00	J							
14.00-14.45	SPT N=40		8,9/9,10,11,11,10					
14.40	J				14.40			
14.50-14.52	SPT 0*/20		/50		(0.30)	Moderately strong grey fine grained CARBONIFEROUS LIMESTONE		
			18/08/04		14.70			
14.70-14.71	SPT 0*/10		/50			Complete at 14.70m		

Remarks	Scale (approx)	Logged By
	1:50	DC/HD
	Figure No.	
	04-411.BH3	

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Site: MIXED USE DEVELOPMENT, MONAGHAN TOWN			Number: BH4
Excavation Method: COMPETITOR 130 RIG	Dimensions: 125mm to 5.90m	Ground Level (mOD):	Client:	Job Number: 04-411
	Location: AS PLAN	Dates: 18/08/04	Engineer: ALBERT FRY ASSOCIATES	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	Peaty TOPSOIL		
0.50-0.95 0.50	SPT N=11 J		3,4/3,4,2,2		0.50	Crushed red brick and mortar		
					(0.40) 0.90	Soft friable dark grey organic fine sandy CLAY		
1.00-1.45 1.00	SPT N=3 J		1,1/1,1,,1		(0.20) 1.10	Very soft friable dark grey peaty CLAY		
1.50-1.95 1.50	SPT N=2 J		1,1/1,,1		(1.00)			
2.00-2.45 2.00	SPT N=2 J		1/1,,1		2.10	Very soft whiteish grey organic SILT and fine sandy SILT containing shell fragments and layers of grey sandy silty fine sand		
2.50-2.95 2.50	SPT N=2 J		1/1,,1		(1.10)			
3.00-3.45 3.00	SPT N=12 J		1/2,3,4,3		3.20	Loose grey sandy fine to coarse subrounded GRAVEL		
4.00-4.45 4.00	SPT N=18 J		4,5/4,4,5,5		(2.40)			
5.00-5.45 5.00	SPT N=27 J		5,5/6,7,8,6					
5.60-5.62 5.80-5.81	SPT 0*/20 SPT 0*/10		/50 /50 18/08/04		5.60 (0.30) 5.90	Moderately strong grey fine grained CARBONIFEROUS LIMESTONE		
5.90-5.91	SPT 0*/10		/50			Complete at 5.90m		

Remarks

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

Figure No. 04-411.BH4

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Glover Site Investigations Ltd

Site	Borehole Number
MIXED USE DEVELOPMENT IN MONAGHAN TOWN, CO. MONAGHAN	BH5

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
COMPETITOR 130 RIG	125mm cased to 11.70m		P. CLARKE & SONS LTD	04-663
	Location	**Dates**	**Engineer**	**Sheet**
	AS PLAN	10/12/04		1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						0.10	BITMAC		
0.50	B					(1.30)	MADE GROUND: Dense grey sandy fine to coarse subrounded GRAVEL with some cobbles and boulders (FILL)		
1.50-1.95 1.50	SPT N=5 J			2,1/1,1,2,1		1.40	Very soft grey slightly sandy organic CLAY		
2.00-2.45 2.00	SPT N=6 J			2,1/2,1,2,1					▽2
				Water Struck(1) at 2.60m.					▽1
3.00-3.45 3.00	SPT N=3 J			1/1,1,,1		(3.60)			
4.00-4.45 4.00	SPT N=3 J			1/1,1,,1					
5.00	J			Water Struck(2) at 5.00m, rose to 2.10m in 10 mins.		5.00	Loose brown silty sandy fine to coarse GRAVEL		▽2
5.00-5.45	SPT N=6			1,2/1,2,1,2		(1.50)			
6.50-6.95 6.50	SPT N=13 J			2,3/3,3,3,4		6.50	Medium dense brown silty sandy fine to coarse subrounded GRAVEL		
8.00-8.45 8.00	SPT N=14 J			3,3/3,4,3,4		(2.60)			
9.10	J					9.10	Stiff brown gravelly sandy CLAY with some cobbles and boulders		
9.50-9.95 9.50	SPT N=40 J			6,7/9,9,10,12		(0.90)			
						10.00			

Remarks

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

Figure No. 04-663.BH1

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Site	Borehole Number
MIXED USE DEVELOPMENT IN MONAGHAN TOWN, CO. MONAGHAN	BH5

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
COMPETITOR 130 RIG	125mm cased to 11.70m		P. CLARKE & SONS LTD	04-663
	Location	**Dates**	**Engineer**	**Sheet**
	AS PLAN	10/12/04		2/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
							Stiff brown gravelly sandy CLAY with some cobbles and boulders		
						(1.60)			
11.00-11.45 11.00	SPT N=52 J			10,12/12,13,13,14					
11.60-11.62	SPT 0*/0 50/20			/50 10/12/04		11.60 11.70	Moderately strong grey fine grained CARBONIFEROUS LIMESTONE		
11.60 11.70-11.71	J SPT 0*/0 50/10			/50			Complete at 11.70m		

Remarks	Scale (approx)	Logged By
	1:50	DC/HD
	Figure No.	
	04-663.BH1	

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Site	Borehole Number
MIXED USE DEVELOPMENT IN MONAGHAN TOWN, CO. MONAGHAN	BH6

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
COMPETITOR 130 RIG	125mm cased to 7.00m		P. CLARKE & SONS LTD	04-663
	Location	**Dates**	**Engineer**	**Sheet**
	AS PLAN	10/12/04		1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						0.10	BITMAC		
0.30	B						MADE GROUND: Dense grey sandy fine to coarse GRAVEL (FILL)		
						(1.00)			
1.10	J					1.10	Very soft grey and grey brown organic fine sandy CLAY		
1.50-1.95	SPT N=4			1,2/1,1,1,1					
1.50	J								
2.00-2.45	SPT N=5			3,2/1,2,1,1					
2.00	J			Water Struck(1) at 2.20m.					▽1
						(3.20)			▽2
3.00-3.45	SPT N=7			2,1/2,2,2,1					
3.00	J								
				Water Struck(2) at 4.30m, rose to 2.60m in 10 mins.		4.30			▽2
4.50	J						Medium dense brown silty sandy fine to coarse GRAVEL		
4.50-4.95	SPT N=14			3,3/3,4,3,4					
						(1.80)			
6.00-6.45	SPT N=32			3,3/6,7,9,10					
6.00	J					6.10	Stiff brown gravelly sandy CLAY with some cobbles and boulders		
						(0.80)			
6.90-6.92	SPT 0*/0			/50		6.90			
	50/20			10/12/04		7.00	Moderately strong grey fine grained CARBONIFEROUS LIMESTONE		
6.90	J								
7.00-7.01	SPT 0*/0			/50			Complete at 7.00m		
	50/10								

Remarks

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

Figure No. 04-663.BH6

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Glover Site Investigations Ltd

Site	Borehole Number
MIXED USE DEVELOPMENT IN MONAGHAN TOWN, CO. MONAGHAN	BH7

Boring Method	Casing Diameter	Ground Level (mOD)	Client	Job Number
COMPETITOR 130 RIG	125mm cased to 2.70m		P. CLARKE & SONS LTD	04-663
	Location AS PLAN	**Dates** 10/12/04	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						0.10	BITMAC		
0.30	J					(0.90)	MADE GROUND: Dense grey sandy fine to coarse subrounded GRAVEL with some cobbles (FILL)		
1.00-1.45	SPT N=5			1,2/1,2,1,1		1.00	Soft grey slightly organic sandy CLAY		
1.00	J					(0.60)			
				Seepage(1) at 1.60m.		1.60	Stiff grey gravelly sandy CLAY with some cobbles and boulders		▽1
2.00-2.45	SPT N=41			6,8/8,9,12,12		(1.00)			
2.00	J								
2.60-2.62	SPT 0*/0			/50		2.60	Moderately strong grey fine grained LIMESTONE		
	50/20			10/12/04		2.70			
2.60	J								
2.70-2.71	SPT 0*/0			/50			Complete at 2.70m		
	50/10								

Remarks
Two attempts at this borehole.

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

Figure No. 04-663.BH7

Produced by the GEOtechnical DAtabase SYstem (GEODASY) (C) all rights reserved

Appendix 3

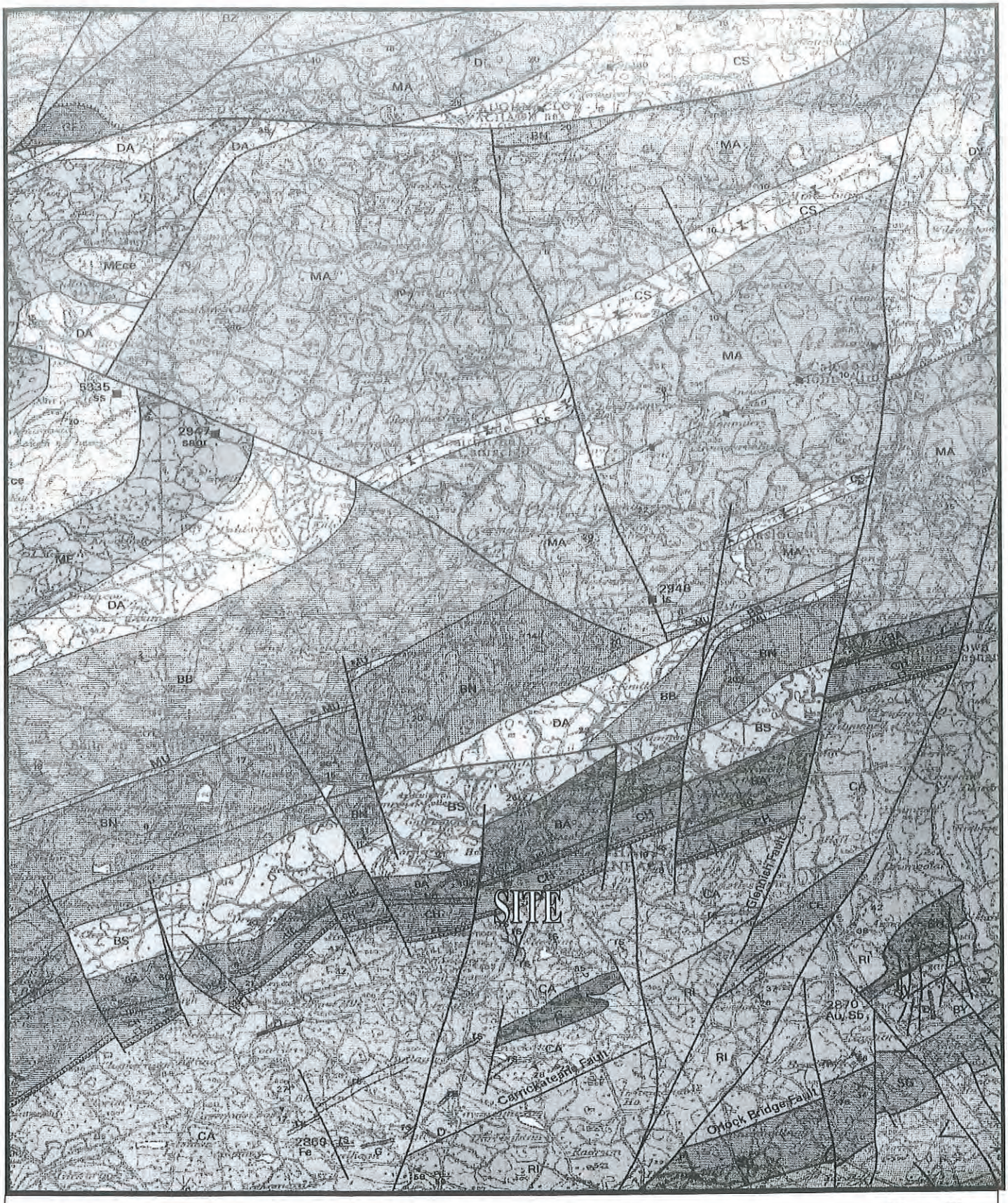
Plot of Bedrock Against Existing Ground Level

Appendix 4

Plot of Bedrock Against Assumed Datum Level

Appendix 5

Geological Map Of The Site

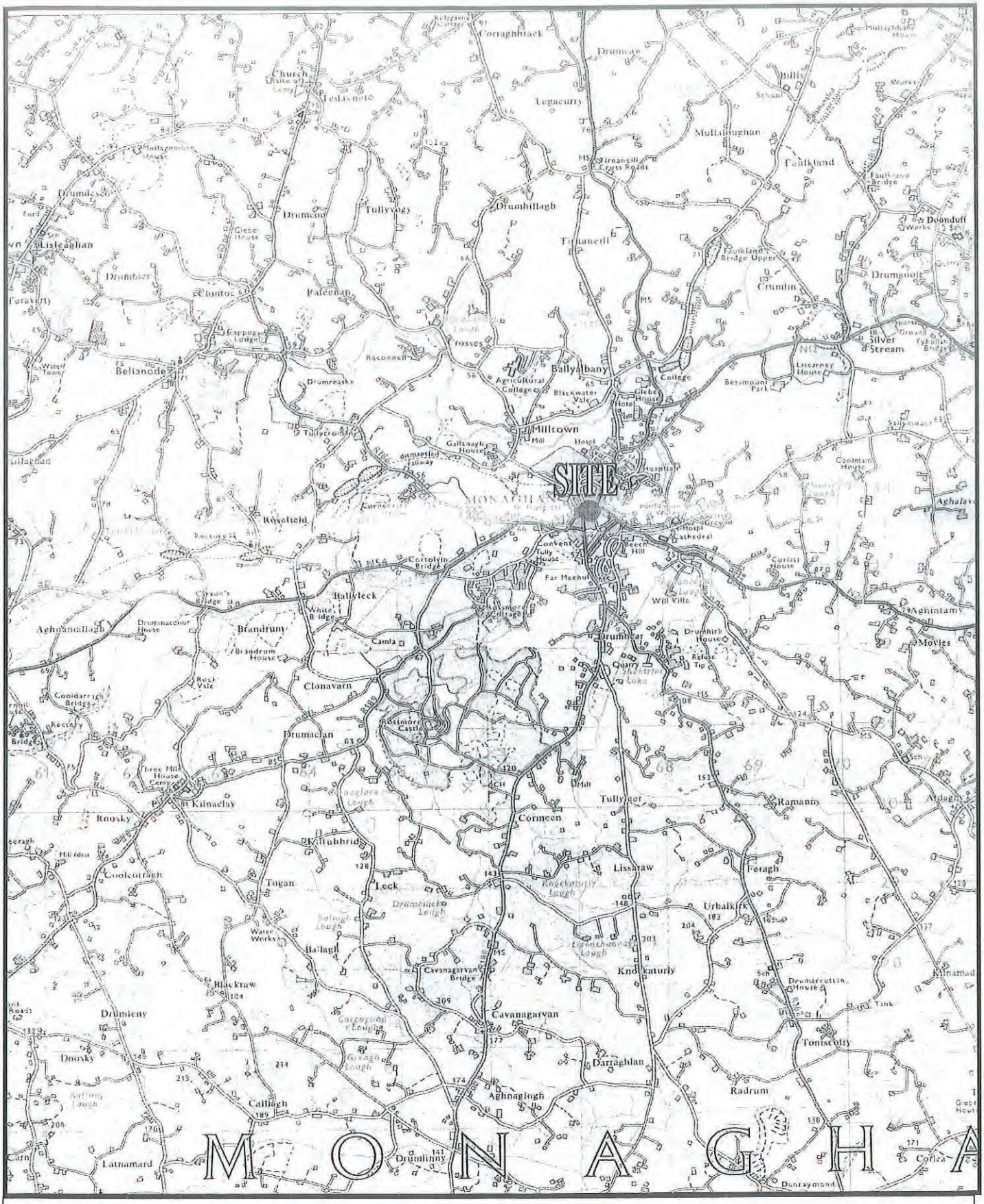


GEOLOGY LOCATION PLAN
MONAGHAN MIXED USE DEVELOPMENT
MONAGHAN
CILENT: P CLARKE & SONS
REPORT NO: 05-021 JANUARY 2005

GLOVER SITE INVESTIGATIONS LIMITED

Appendix 6

Site Location Plan



SITE LOCATION PLAN
MONAGHAN MIXED USE DEVELOPMENT
MONAGHAN
CILENT: P CLARKE & SONS
REPORT NO: 05-021 JANUARY 2005

GLOVER SITE INVESTIGATIONS LIMITED

PRIORITY GEOTECHNICAL LIMITED
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MONAGHAN TOWN COLLECTION NETWORK

REPORT ON GROUND INVESTIGATION

FACTUAL

REPORT NO. PC7089

Client: Monaghan County Council,
County Offices,
The Glen,
Monaghan,
Co. Monaghan

Engineer: T J O Connor & Associates,
Consulting Engineers,
Corrig House,
Corrig Road,
Sandyford,
Dublin 18

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Sandyford,
Dublin 18

REPORT CONTROL SHEET

Client	Monaghan County Council					
Employer's Representative	T.J O'Connor & Associates, Consulting Engineers					
Project Name	Monaghan Town Collection Network					
Report Name	Monaghan Town Collection Network Ground Investigation Factual Report					
Project Number	PC7089					
This Report Comprises of	RCS	TOC	Text	No. of Appendice	Drawings	Electronic data
	1	1	29	4	21	*.pdf, *.dwg

Revision	Status	Author(s)	Approved By	Issue Date
D01	Draft	GH	FNC	12.03.2008
F01	Final	GH	SC	18.03.2009
F02	Final	GH	SC	10.05.2009
F03	Final	Greg Hayes	NL	23.09.2009

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APPENDIX B **LABORATORY RESULTS**

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APPENDIX D **EXPLORATION LOCATION PLANS**

1 INTRODUCTION

1.1 SCOPE OF WORKS

In July 2007, T.J. O' Connor & Associates, Consulting Engineers commissioned Priority Geotechnical, PGL on behalf of their Client, Monaghan County Council, to carry out a ground investigation for the proposed Monaghan Town, Collection Network. The purpose of the geotechnical ground investigation was to obtain sufficient geotechnical information for the design of the proposed civil works.

The investigation, which was specified by T.J. O' Connor, Consulting Engineers, initially comprised, as per the Tender Bill of Quantities, of seventy (70) number rotary open hole boreholes, sixty (65) number rotary cored boreholes, one hundred and eighty nine (189) number trial pit excavations and twenty three (23) number slit trenches, all associated sampling, *in-situ* testing, laboratory work and factual reporting.

The scope of the works was subsequently extended to include for cable percussion boreholes. The final scope of works as completed is detailed in section 3.2.

This investigation was carried out in accordance with the contract specification and relevant standards. The initial and additional fieldwork was carried out from August 2007 to June 2008.

1.2 REPORTING

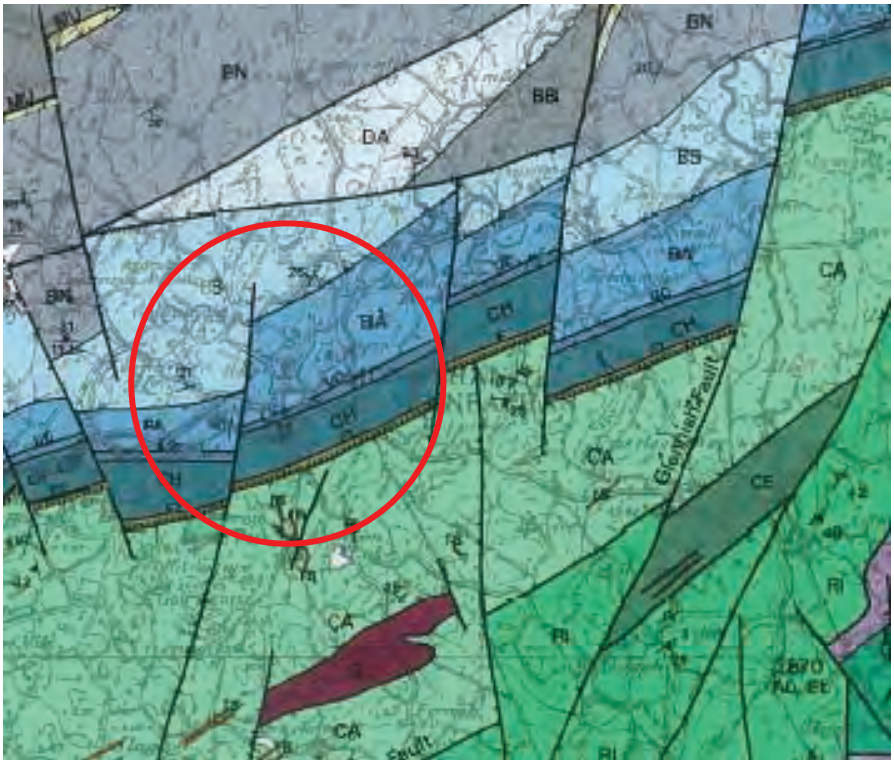
This report, PC7089-Rp-F02, presents the factual records of the completed fieldworks with respect to the ground investigation contract for Monaghan Town, Collection Network.

2 THE SITE

2.1 SITE GEOLOGY

The site was located in Monaghan Town and the surrounding townlands, in Co. Monaghan being primarily on public roads and streets and Greenfield areas.

The Geological Survey of Ireland, 1:100,000 mapping (Sheets 8) indicated that the geology of the area is characterised by the Ballyshannon Formation (BS), the Ballysteen Formation (BA), the Ulster Canal Formation (UC), the Cooldaragh Formation (CH), the Fearnaght Formation (FT) and the Coronea Formation (CA. The Ballyshannon Formation was described as crinoidal LIMESTONE and silty SHALE. The Ballysteen Formation was described as dark muddy LIMESTONE and SHALE. The Ulster Canal Formation was described as calcareous SANDSTONE, SHALE and MICRITE. The Cooldaragh Formation was described as pale brown-grey flaggy, silty MUDSTONE. The Fearnaght Formation was described as pale CONGLOMERATE and red SANDSTONE. The Coronea Formation was described as TURBIDITE, red SHALE and minor volcanics.



3 FIELDWORK

3.1 GENERAL

The fieldwork was carried out in general accordance with BS 5930 (1999) Code of Practice for Site Investigation and Part 9 of BS 1377 (1990), Method of Tests for Soil for Civil Engineering Purposes, *in situ* Tests. Dando 2000, cable percussive rigs were used to advance the boreholes through overburden deposits using 200mm diameter casing. Rotary boreholes were advanced using a Deltabase 520 rig, a Soil Mech PSM 8G rig and a Hill Twister Core Drill rig through overburden deposits using Symmetrex 131, nominal 150mm diameter casing in open-hole drilling and through rock using double lined core barrel, at nominal diameter 76mm. A compressed air-mist flush was used for rotary drilling. Trial pit and slit trench excavations were excavated using both a JCB and a mini digger, as detailed on the logs.

The exploration locations were selected by T.J. O'Connor & Associates, and set out on site from existing features and the co-ordinates provided. The exploratory locations were surveyed using Trimble V8 GPS equipment to the Ordinance Survey national grid system of co-ordinates and elevations to Malin Head datum.

The exploratory locations are shown on the Exploration Location Plans (drawing references: PC7089-SI-A to PC7089-SI-C, PC7089-SI-01 to PC7089-SI-18) presented in **APPENDIX D** of this report.

3.2 EXPLORATORY HOLES

The exploratory holes as completed during the ground investigation are detailed in the following table:

SUMMARY OF EXPLORATORY WORK UNDERTAKEN

Type	Quantity	Depth Range	Remarks
Cable Tool Boreholes[1]	80No.	0.5 to 7.5m	BH1000-BH1003A, BH1004, BH1004A-BH1006A, BH1007-BH1019A, BH1020, BH1020A, BH1021-BH1025A, BH1026-BH1030A, BH1031-BH1049A, BH1050-BH1051A, BH1052, BH1052A, BH1053-BH1059A, BH1060-BH1063A, BH1065, BH1065A and BH1066-BH1068.
Rotary Open Hole Boreholes	68	1.2m to 21.5m	BH01-BH05, BH07, BH13, BH15-BH31, BH33-BH70 including BH11A
Rotary Open Hole and Rotary Cored Boreholes	2	7.8m to 13.3m	BH06 and BH14
Rotary Cored Boreholes	66	1.3m to 20.1m	BHR01- BHR65 including BHR05A and BH06
Trial Pits	196	0.6m to 4.1m	TP001-TP189 and TP01A, TP008A, TP25A, TP29A, TP37A, TP45A and TP50A
Slit Trenches	26	1.2m to 2.4m	ST01-ST09, ST10.1, ST10.2, ST11-ST14, ST15.1, ST15.2, ST16-ST23 and ST01A

The exploratory records are presented in **APPENDIX A** and **APPENDIX C** and should be read in conjunction with the key sheets included. The records provide descriptions, in accordance with BS 5930 (1999), of the materials encountered and details of the samples taken, together with any observations made during the investigation.

[1] The green ID points, presented on the location plans, **APPENDIX D**, represented the additional cable tool borehole, BH1000.

3.3 GROUNDWATER MONITORING

Groundwater was recorded when encountered (strike) during rotary and cable tool boring, trial pit and slit trench excavations over a period of 20minutes, noting any changes that may occur. The groundwater recorded during the investigation is summarised in Section 5.1 and presented graphically on the logs in **APPENDIX A**.

Standpipes were constructed under instruction.

3.4 IN-SITU TESTING

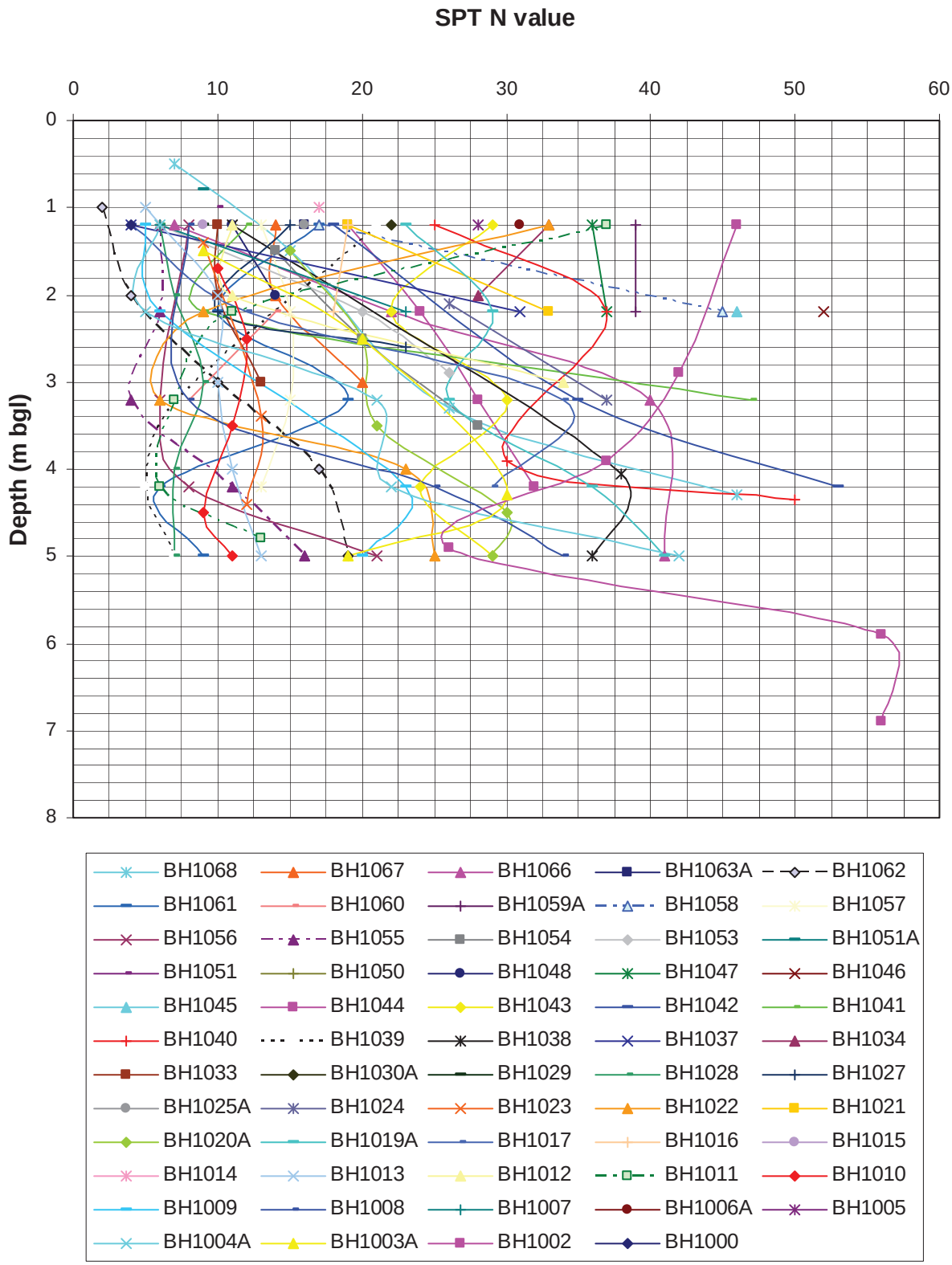
Standard Penetration Tests, N values[2], were carried out in the both cable tool and rotary boreholes typically at 1.0m intervals.

SUMMARY OF IN-SITU TESTING

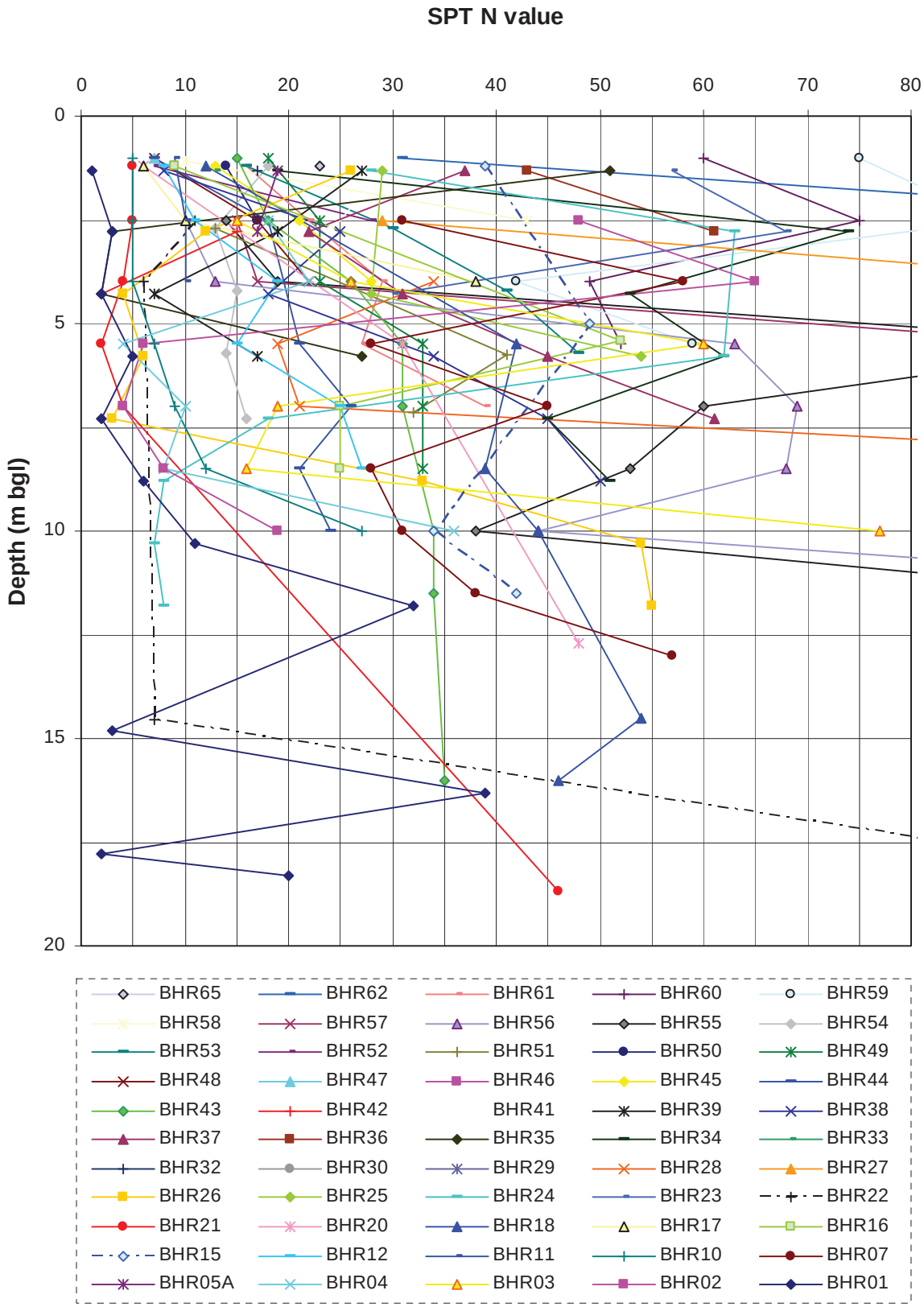
Type	No.	Remarks
Standard Penetration Test, N value	1202	N values ranging from N=0 to N=161 1067No SPT(C) and 135No. SPT (S)

[2] Where the SPT test did not allow for a full penetration of 300mm over four sets of 75mm intervals the progress was recorded and the test deemed a refusal as indicated on the logs.

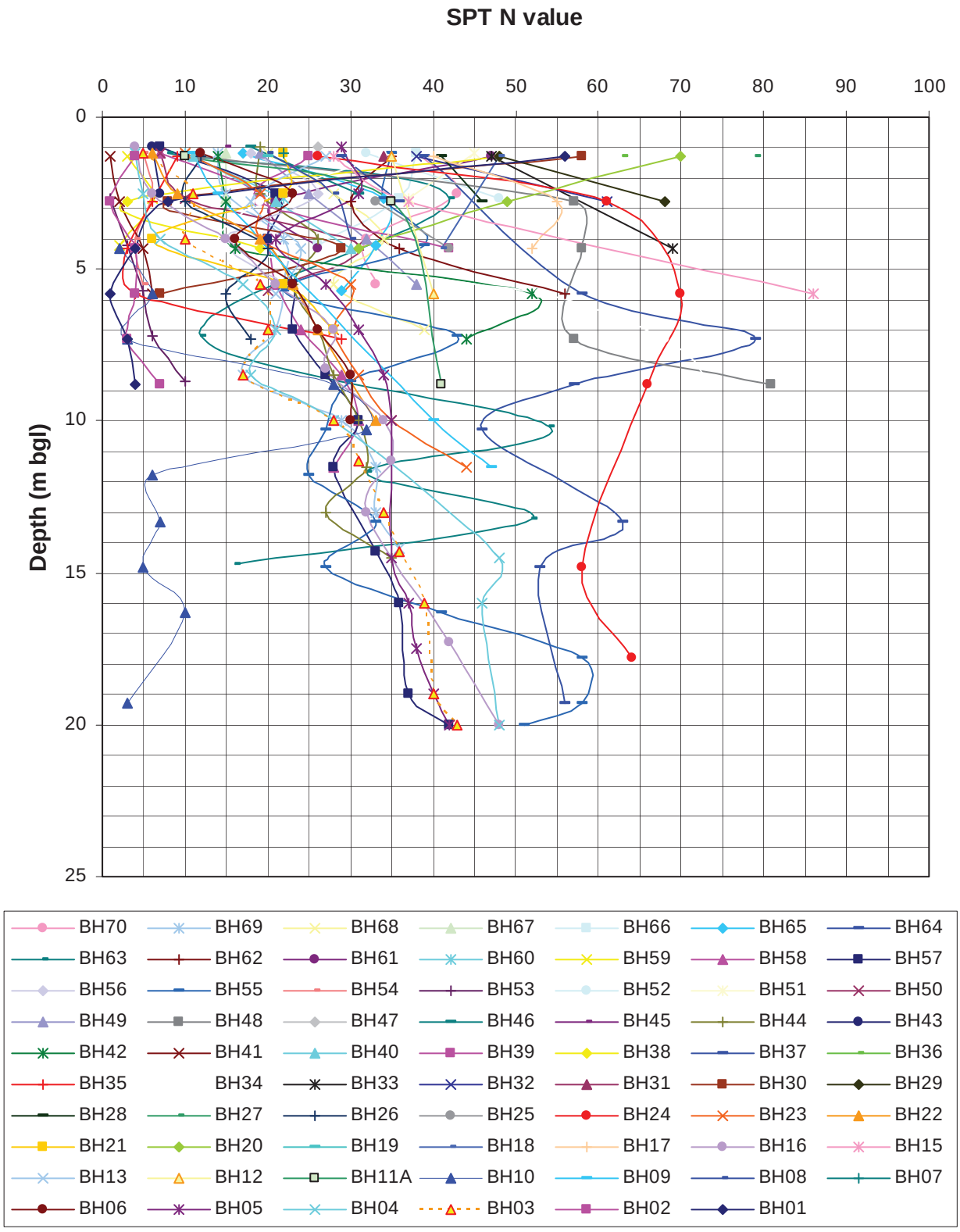
The distribution of Standard Penetration Test, SPT N values with depth is presented graphically below for cable tool boreholes (BH1000).



The distribution of Standard Penetration Test, SPT N values with depth is presented graphically below for rotary boreholes (BHR).



The distribution of Standard Penetration Test, SPT N values with depth is presented graphically below for rotary (open-hole) boreholes (BH).



4 LABORATORY TESTING

All samples were transported to Priority Geotechnical's laboratory in Midleton, Co. Cork, examined and prepared for scheduled testing. The following tests were scheduled by AGL on behalf of T.J.O'Connor & Associates. Subsequent scheduling of the additional cable tool boreholes was undertaken by PGL and approved by T.J. O'Connor & Associates.

Testing was carried out by PGL in accordance with BS1377 (1990), Methods of test for soils for civil engineering purposes.

The laboratory test results are presented in **APPENDIX B**. A summary of tests undertaken are detailed below.

4.1 SOIL

SUMMARY OF LABORATORY TESTING UNDERTAKEN

SOILS		
Type	**No.**	**Remarks**
Natural Moisture Content	275	Range 4.4% to 732%
Atterberg Limit	129	Liquid Limit 13% to 365% Plastic Limit 15% to 251% including NP non-plastic soils Plasticity Index 6 to 171
Particle Size Distribution	150	Including hydrometer analysis on fine soils 128 no.
pH SO_4 Loss On Ignition	30 30 10	pH 6.23 to 9.03 SO_4 0.01g/l to 0.668g/l 5.58% to 85.01%

4.2 ROCK

SUMMARY OF LABORATORY TESTING UNDERTAKEN

ROCK		
Type	**No.**	**Remarks**
Point Load Index , Is_{50}	338	Range 0.18MPa to 21.25MPa

5 GROUND CONDITIONS

The site was generally characterised by slightly sandy, slightly gravelly CLAY/SILT, very clayey/silty very gravelly SAND, very clayey/silty SAND and GRAVEL, very sandy very silty GRAVEL and PEAT to depths up to 20.0m below existing ground level (bgl). Topsoil was on average 350mm thick.

Madeground/ Fill was encountered and described as slightly sandy slightly gravelly CLAY/SILT, silty very gravelly SAND and very silty very sandy GRAVEL, with pieces of concrete, brick, tarmacadam and plastic, to a maximum depth of 3.0m bgl being between 150mm and 2500mm thickness. Tarmacadam surfacing was on average 165mm thick ranging between 15mm and 500mm thickness. The Cl 804 sub-base was on average 360mm thick ranging from 100mm thick to 1000mm thickness. Concrete was encountered at a number of locations being 265mm thickness on average, ranging from100mm to 800mm in thickness.

Based on the SPT N Values the PEAT was very soft to soft with N values of 1 to 8. The cohesive CLAY and SILT deposits were very soft to stiff with N values of 3 to 58. Based on the SPT N values, the granular deposits are described as being loose to very dense, with N values 2 to 52. At location BH53 soft to firm SILT was found to under-lay PEAT to depth from 2.7m to 9.0m bgl. BH54 soft to firm CLAY was encountered from ground level to 6.3m bgl. BH59 soft to firm CLAY was encountered from ground level to 5.9m bgl. Soft SILT was encountered at BHR35 from 1.3m to 5.8m bgl.

LIMESTONE was encountered throughout the site at depths of between 1.3m to 18.4m bgl, which was described as moderately weak to very strong having Point Load indices of 0.18MPa and 21.25MPa. Fossiliferous MARL was encountered in BHR08 at 14.32m to 17.5m bgl. At location BHR01 SPT, N values within the LIMESTONE indicated soft CLAY infill materials. Solid Core Recovery of 0% to 7% indicated highly weathered rock. BH02 indicated similar anomalies with PEAT being encountered within the rock and N values of 0 to 8 being recorded indicating infill or highly weathered rock in the upper zone.

MUDSTONE was encountered at BHR31 inter-bedded with SANDSTONE from 6.1m to 10.0m. MUDSTONE was found to underlie the LIMESTONE at BHR37, BHR38 at a depth of 11.76m to 13.48m bgl. The MUDSTONE was described as weak to moderately weak, non-intact.

SANDSTONE was encountered at BHR17 and BHR64, BHR65 at a depth of 2.6m to 13.1m bgl. The SANDSTONE was described as strong to very strong. GREYWACKE was encountered at BHR58 to BHR62 at a depth of 2.5m to 8.5m bgl. The GREYWACKE was described as moderately weak to strong.

The ground conditions are summarised in the following table:

SUMMARY OF GROUND CONDITIONS

Stratum Encountered	Range of Thicknesses, m	Locations
Topsoil	0.02m to 0.6m	BH1003A, BH1007, BH1015, BH1039, BH1040, BH1044, BH1050, BH1052, BH1052A, BH1057, BH1062, BH1063A, BH1065, BH1065A, BH1066, BH1068, BH13, BH24, BH34, BH36 - BH38, BHR20, BHR23, BHR26, BHR37 - BHR39, BHR58, TP035, TP041, TP042, TP048, TP050, TP050A, TP051 - TP055, TP057, TP063 - TP072, TP081, TP085, TP086, TP088 - TP090, TP094 - TP100, TP107, TP112 - TP116, TP128, TP132, TP141 - TP144, TP149, TP150, TP153 - TP158, TP160 - TP171, TP176, TP178 - TP182 and TP185 - TP189.
Madeground (Fill): Slightly sandy slightly gravelly CLAY/SILT, silty very gravelly SAND and very silty very sandy GRAVEL with plastic, concrete, brick and tarmacadam.	0.3m to 3.358m	BH1002, BH1003, BH1003A, BH1004, BH1004A, BH1006, BH1006A, BH1011, BH1016, BH1021, BH1022, BH1023, BH1024, BH1025, BH1025A, BH1026, BH1027, BH1030, BH1030A, BH1031, BH1035, BH1037, BH1038, BH1039, BH1041, BH1043, BH1045, BH1046, BH1047, BH1049, BH1049A, BH1052, BH1058, BH1059, BH1059A, BH1060, BH03, BH04, BH05, BH09, BH11A, BH13, BH35, BH38, BH50, BH58, BH65, BH69, BHR43, BHR47, BHR48, BHR54, ST01, ST04, ST08, ST09, ST10.1, ST11, ST16, ST17, ST22, TP005, TP008, TP008A, TP009, TP010, TP011, TP012, TP013, TP014, TP015, TP019, TP023, TP025, TP025A, TP026, TP028, TP035, TP037A, TP039, TP041, TP043, TP044, TP048, TP053, TP056, TP057, TP058, TP059, TP060, TP061, TP071, TP073, TP081, TP088, TP090, TP091, TP092, TP105, TP106, TP108, TP117, TP119, TP123, TP129, TP130, TP131, TP133, TP134, TP139, TP146, TP147, TP148, TP149, TP150, TP151, TP152, TP159 and TP184.

Stratum Encountered	Range of Thicknesses, m	Locations
Madeground: Clause-804, tarmacadam, concrete and block paving.	0.1m to 2.5m	BH1001, BH1002, BH1005, BH1006A, BH1008, BH1009, BH1011, BH1017, BH1018, BH1019A, BH1020A, BH1021, BH1027, BH1028, BH1029, BH1031, BH1032, BH1033, BH1040, BH1041, BH1043, BH1047, BH1048, BH1049A, BH1053, BH1054, BH1055, BH1056, BH1061, BH06, BH07, BH09, BH11, BH12, BH14, BH15, BH34, BH35, BH40, BH42, BH45, BH47, BH49, BH67, BHR01, BHR02, BHR03, BHR04, BHR05, BHR06, BHR08, BHR09, BHR11, BHR12, BHR14, BHR15, BHR18, BHR19, BHR20, BHR22, BHR23, BHR32, BHR34, BHR43, BHR44, BHR46, BHR47, BHR49, BHR50, BHR64, ST01, ST01A, ST02, ST03, ST04, ST05, ST06, ST07, ST08, ST09, ST10.1, ST10.2, ST11, ST12, ST13, ST14, ST15.1, ST15.2, ST16, ST17, ST18, ST19, ST20, ST21, ST22, ST23, TP001, TP001A, TP002, TP003, TP004, TP006, TP007, TP008, TP008A, TP009, TP010, TP011, TP012, TP013, TP014, TP015, TP016, TP018, TP019, TP020, TP021, TP022, TP023, TP024, TP025, TP025A, TP026, TP027, TP028, TP029A, TP030, TP031, TP032, TP033, TP034, TP036, TP037, TP037A, TP038, TP039, TP040, TP042, TP043, TP044, TP045, TP045A, TP046, TP047, TP049, TP050A, TP061, TP064, TP065, TP075, TP076, TP077, TP078, TP079, TP080, TP081, TP082, TP083, TP084, TP087, TP088, TP095, TP103, TP104, TP105, TP106, TP108, TP109, TP110, TP111, TP117, TP118, TP119, TP120, TP121, TP122, TP123,TP124, TP125, TP126, TP127, TP129, TP131, TP134, TP135, TP136, TP137, TP138, TP145, TP148, TP150, TP172, TP173, TP174, TP175, TP177, TP183 and TP184.
Slightly sandy slightly gravelly CLAY	0.1m to 20m	BH1000, BH1002, BH1004A, BH1004, BH1007, BH1013, BH1014, BH1016, BH1019A, BH1020A, BH1021, BH1023, BH1025, BH1025A, BH1027, BH1030A, BH1033, BH1034, BH1037, BH1038, BH1040, BH1041, BH1044, BH1051, BH1059A, BH1061, BH1062, BH1068, BH01, BH03, BH04, BH06 - BH09, BH11, BH11A, BH12, BH13, BH15 - BH17, BH19, BH21 - BH27, BH29 - BH42, BH44 - BH50, BH54 - BH59, BH61 - BH70, BHR01 - BHR03, BHR05, BHR05A, BHR06 - BHR08, BHR11, BHR12, BHR16 - BHR21, BHR23 - BHR26, BHR28, BHR30, BHR32, BHR34 - BHR39, BHR41 - BHR45, BHR47 - BHR50, BHR52 - BHR54, BHR56, BHR58 - BHR62, BHR65, ST01 - ST03, ST08, ST10.2, ST13, ST15.1, ST15.2, ST17, ST19, ST20, TP005, TP009, TP013 - TP015, TP017, TP018, TP020, TP021,TP023, TP024, TP029, TP029A, TP030 - TP034, TP036, TP040, TP042, TP046 - TP048, TP050 - TP052, TP054, TP060, TP062, TP063, TP067, TP069 - TP071, TP073 - TP080, TP083, TP085 - TP087, TP091 - TP102, TP104, TP106, TP109 - TP112, TP115, TP116, TP118, TP119, TP121, TP123, TP124, TP126 - TP128, TP130 - TP137, TP139, TP143 - TP146, TP148, TP150, TP152 - TP161, TP163 - TP165, TP168, TP172, TP174 - TP176, TP178, TP180, TP181, TP185, TP187 and TP188.
Slightly sandy slightly gravelly SILT/CLAY	0.2m to 11.5m	BH52, BHR10, ST05 - ST07, ST13, TP015, TP050A, TP055, TP096, TP138, TP162 and TP171.

Stratum Encountered	Range of Thicknesses, m	Locations
Slightly sandy slightly gravelly SILT	0.1m to 11.5m	BH1003A, BH1005, BH1008, BH1009, BH1011, BH1012, BH1013, BH1015, BH1016, BH1017, BH1018, BH1020A, BH1021, BH1024, BH1027, BH1028, BH1029, BH1031, BH1032, BH1034, BH1035, BH1036, BH1037, BH1041, BH1042, BH1043, BH1044, BH1046, BH1047, BH1048, BH1049A, BH1050, BH1051A, BH1052A, BH1053, BH1054, BH1055, BH1056, BH1059, BH1063A, BH1065A, BH1066, BH1067, BH12, BH53, BHR04, BHR14, BHR26, BHR35, BHR37 - BHR39, BHR46, ST07, ST12, ST15.2, TP002, TP005, TP045A, TP048, TP049, TP050A, TP053, TP056, TP066, TP069, TP072, TP077, TP079, TP081, TP082, TP085, TP089, TP095, TP102, TP103, TP113, TP114, TP143, TP144, TP146, TP149, TP150, TP153, TP158, TP159, TP162, TP163, TP167 - TP179
Slightly sandy slightly gravelly organic SILT	0.3m to 4.1m	BH1008, BH1009, BH1010, BH1011, BH1013, BH1015, BH1033, BH1055, BH1056 and BH1066.
PEAT	0.1m to 9.0m	BH1028, BH1039, BH1055, BH1056, BH01, BH02 - BH04, BH10, BH16, BH30, BH43, BH53, BHR02, BHR22, ST07, ST18, TP004, TP006, TP007, TP016, TP017, TP019, TP042, TP043, TP056, TP064, TP083, TP090, TP092, TP096, TP103, TP104, TP106, TP113 - TP116, TP149, TP150, TP163, TP164, TP167, TP170, TP178, TP179 and TP184.
Very silty very gravelly SAND	0.1m to 10.78m	BH1002, BH1003A, BH1010, BH1016, BH1017, BH1025, BH1027, BH1035, BH1041, BH1047, BH1050, BH1055, BH1057, BH1060, BH02, BH10, BH24, BH50, BH63, BHR01, BHR08, BHR27, BHR46, ST10.2, ST21, ST23, TP007, TP018, TP019, TP030, TP032, TP036, TP038 - TP040, TP067, TP076, TP077, TP090, TP091, TP104, TP107, TP120, TP122, TP124, TP125, TP127, TP129, TP136, TP138, TP140, TP141, TP145, TP147, TP151, TP153, TP156, TP159, TP161, TP162, TP166, TP168 - TP173 and TP177.
Very clayey/silty SAND and GRAVEL	0.45 m to 4.15m	BH1000, BH1012, BH1054, BH14, ST14, ST15.2, ST23, TP022 and TP173.
Very clayey/silty very sandy GRAVEL	0.1m to 10.2m	BH1002, BH1003A, BH1008, BH1010, BH1013, BH1022, BH1024, BH1027, BH1033, BH1034, BH1035, BH1036, BH1041, BH1045, BH1046, BH1047, BH1049, BH1049A, BH1050, BH1051A, BH1053, BH1060, BH1061, BH1062, BH1063A, BH1066, BH1067, BH1068, BH01, BH03, BH08, BH10, BH23, BH49 , BH56, BH70, BHR02 - BHR04, BHR14, BHR17, BHR18, BHR21, BHR22, BHR26, BHR30, BHR31, TP002 , TP003, TP011, TP020 - TP022, TP024, TP033, TP045A, TP046, TP050 - TP053, TP055, TP057 - TP059, TP061 - TP063, TP065, TP066, TP068, TP070 - TP072, TP074, TP076, TP082, TP093, TP112, TP115, TP116, TP126, TP142, TP151, TP152, TP156, TP169 - TP171, TP175 - TP177, TP179 - TP184, TP186 and TP189.
Slightly silty, slightly sandy, gravelly COBBLES	0.9m to 2.86m	BH1042, BH1052A, BH1058 and BH1060.
MUDSTONE	2.1m bgl to 13.48m bgl	BH51, BH52, BHR31, BHR36 – BHR38 and BHR63.

Stratum Encountered	Range of Thicknesses, m	Locations
SILTSTONE	1.2m bgl to 14.8m bgl	BHR17, BHR24, BHR30 and BHR64.
SANDSTONE	2.4m bgl to 13.1m bgl	BHR03, BHR12, BHR16, BHR17, BHR24, BHR31, BHR64 and BHR65.
LIMESTONE	0.9m bgl to 17.8m bgl	BH06, BH60, BH65 - BH67, BHR01 - BHR04, BHR05A, BHR06, BHR09 - BHR11, BHR13, BHR14, BHR16, BHR18, BHR22, BHR23, BHR25 - BHR30, BHR32 - BHR45, BHR47 - BH53, BHR55 - BHR57, TP025A and TP130.
GREYWACKE	2.5m bgl to 8.5m bgl	BHR58 – BHR62.

5.1 GROUNDWATER

Groundwater was encountered during both trial pit excavation and cable tool boring at a number of locations. Groundwater was typically encountered between 1.5m bgl and 5.0m bgl in boreholes and between 2.0m bgl to 3.0m bgl in trial pit excavations. Forty two (42) number 50mm diameter standpipe installations where constructed and are identified in the summary below. Groundwater strike details are provided and presented graphically on the logs presented in **APPENDIX A** and summarised as follows.

The groundwater strikes detail the level at which groundwater was encountered and that level to which it rose after a 20minute period. This may not reflect the static groundwater level. The standpipe installations should be monitored to determine static groundwater level. It should also be appreciated that seasonal fluctuations in groundwater level may occur.

SUMMARY OF GROUNDWATER STRIKE (BH, cable percussion)

Location	Depth of groundwater strike (m bgl)	Rose to (m bgl)	After (minutes)	Comments
BH1000				No groundwater encountered.
BH1001				No groundwater encountered.
BH1002				No groundwater encountered.
BH1003				No groundwater encountered.
BH1003A	3.3	3.25	20	-
BH1004				No groundwater encountered.
BH1004A				No groundwater encountered.
BH1005				No groundwater encountered.
BH1006				No groundwater encountered.
BH1006A				No groundwater encountered.
BH1007				No groundwater encountered.
BH1008				No groundwater encountered.
BH1009				No groundwater encountered.
BH1010	3.2	3	10	-
BH1010	3.2	3	20	-
BH1011				No groundwater encountered.
BH1012	1.5	1.5	20	-
BH1013	3.9	3.8	15	-
BH1013	3.9	3.8	20	-
BH1014				No groundwater encountered.
BH1015				No groundwater encountered.
BH1016	3.8	3.7	20	-
BH1017				No groundwater encountered.
BH1018				No groundwater encountered.
BH1019A				No groundwater encountered.
BH1020				No groundwater encountered.
BH1020A				No groundwater encountered.
BH1021				No groundwater encountered.

Location	Depth of groundwater strike (m bgl)	Rose to (m bgl)	After (minutes)	Comments
BH1022	4	3.6	20	-
BH1023				No groundwater encountered.
BH1024				No groundwater encountered.
BH1025				No groundwater encountered.
BH1025A				No groundwater encountered.
BH1026				No groundwater encountered.
BH1027	2.6	2	20	-
BH1027	4.55	4.35	20	-
BH1028				No groundwater encountered.
BH1029				No groundwater encountered.
BH1030				No groundwater encountered.
BH1030A				No groundwater encountered.
BH1031				No groundwater encountered.
BH1032				No groundwater encountered.
BH1033				No groundwater encountered.
BH1034	1.3	1.2	15	-
BH1034	1.3	1.2	20	-
BH1035	3.2	2.8	5	-
BH1035	3.2	2.8	20	-
BH1036				No groundwater encountered.
BH1037				No groundwater encountered.
BH1038				No groundwater encountered.
BH1039				No groundwater encountered.
BH1040				No groundwater encountered.
BH1041				No groundwater encountered.
BH1042				No groundwater encountered.
BH1043				No groundwater encountered.
BH1044				No groundwater encountered.
BH1045				No groundwater encountered.
BH1046	3	2.9	20	-
BH1047				No groundwater encountered.
BH1048				No groundwater encountered.
BH1049				No groundwater encountered.
BH1049A				No groundwater encountered.
BH1050				No groundwater encountered.
BH1051				No groundwater encountered.
BH1051A	1.2	1.2	20	Slow.
BH1052				No groundwater encountered.
BH1052A				No groundwater encountered.
BH1053				No groundwater encountered.
BH1054				No groundwater encountered.
BH1055				No groundwater encountered.
BH1056				No groundwater encountered.
BH1057				No groundwater encountered.
BH1058				No groundwater encountered.
BH1059				No groundwater encountered.
BH1059A	3.2	3	20	-
BH1060	1.4	1.35	20	-
BH1060	2.5	2	20	-
BH1060	4.2	2.6	20	-
BH1061				No groundwater encountered.
BH1062	1.5	1.3	15	Slow inflow

Location	Depth of groundwater strike (m bgl)	Rose to (m bgl)	After (minutes)	Comments
BH1062	1.5	1.3	20	Slow inflow
BH1063A				No groundwater encountered.
BH1065				No groundwater encountered.
BH1065A				No groundwater encountered.
BH1066				No groundwater encountered.
BH1067	2.4	2.4	20	Slow inflow.
BH1068	2.3	2.2	20	-

SUMMARY OF GROUNDWATER STRIKE (BH, rotary open-hole)

Location	Depth of groundwater strike (m bgl)	Rose to (m bgl)	After (minutes)	Comments
BH01	9	7.3	20	Standpipe installation
BH02				No groundwater encountered. Standpipe installation
BH03				No groundwater encountered.
BH04	2.5	-	-	Standpipe installation
BH05				No groundwater encountered.
BH06				No groundwater encountered.
BH07				No groundwater encountered.
BH08				No groundwater encountered.
BH09				No groundwater encountered.
BH10				No groundwater encountered.
BH11				No groundwater encountered.
BH11A				No groundwater encountered.
BH12				No groundwater encountered.
BH13	6.1	4.3	20	Standpipe installation
BH14				No groundwater encountered.
BH15	4.8	4.1	20	Standpipe installation
BH16	2.5	-	-	Standpipe installation
BH17				No groundwater encountered.
BH18	8.6	6.9	20	Standpipe installation
BH19	5.1	2.9	20	Standpipe installation
BH20	2.2	1.3	20	Standpipe installation
BH21	8.5	-	-	
BH22	4.2	-	-	
BH23				No groundwater encountered.
BH24				No groundwater encountered.
BH25				No groundwater encountered.
BH26				No groundwater encountered.
BH27				No groundwater encountered.
BH28				No groundwater encountered.
BH29	3.9	3.2	20	-
BH30				No groundwater encountered.
BH31				No groundwater encountered.
BH32				No groundwater encountered.
BH33				No groundwater encountered.
BH34				No groundwater encountered.

Location	Depth of groundwater strike (m bgl)	Rose to (m bgl)	After (minutes)	Comments
BH35	1.2	0.9	20	Standpipe installation
BH36				No groundwater encountered.
BH37				No groundwater encountered.
BH38	3.1	2.7	20	Standpipe installation
BH39				No groundwater encountered.
BH40				No groundwater encountered.
BH41				No groundwater encountered.
BH42				No groundwater encountered. Standpipe installation
BH43	2.3	-	-	Standpipe installation
BH44				No groundwater encountered.
BH45	4	-	-	Standpipe installation
BH46	4.5	-	-	-
BH47	2.5	-	-	Standpipe installation
BH48				No groundwater encountered.
BH49				No groundwater encountered. Standpipe installation
BH50				No groundwater encountered. Standpipe installation
BH51	4.2	-	-	-
BH52	4	-	-	Standpipe installation
BH53				No groundwater encountered.
BH54				No groundwater encountered. Standpipe installation
BH55				No groundwater encountered.
BH56				No groundwater encountered.
BH57				No groundwater encountered.
BH58				No groundwater encountered.
BH59				No groundwater encountered. Standpipe installation
BH60				No groundwater encountered.
BH61				No groundwater encountered. Standpipe installation
BH62	6.2	3.8	20	Standpipe installation
BH63	7.2	-	-	-
BH63	11.2	-	-	-
BH63	17	-	-	-
BH64				No groundwater encountered.
BH65	4.2	-	-	Standpipe installation
BH66				No groundwater encountered.
BH67	2.7	-	-	Standpipe installation
BH68	1.8	-	-	-
BH69	0.5	-	-	Standpipe installation
BH70				No groundwater encountered. Standpipe installation

SUMMARY OF GROUNDWATER STRIKE (BHR, rotary cored boreholes)

Location	Depth of groundwater strike (m bgl)	Rose to (m bgl)	After (minutes)	Comments
BHR01				No groundwater encountered.
BHR02				No groundwater encountered.
BHR03				No groundwater encountered.
BHR04				No groundwater encountered.
BHR05				No groundwater encountered.
BHR05A				No groundwater encountered.
BHR06				No groundwater encountered.
BHR07				No groundwater encountered.
BHR08				No groundwater encountered.
BHR09				No groundwater encountered.
BHR10				No groundwater encountered. Standpipe installation
BHR11				No groundwater encountered. Standpipe installation
BHR12				No groundwater encountered.
BHR13				No groundwater encountered.
BHR14				No groundwater encountered.
BHR15				No groundwater encountered.
BHR16				No groundwater encountered.
BHR17				No groundwater encountered. Standpipe installation
BHR18				No groundwater encountered.
BHR19				No groundwater encountered.
BHR20	12	-	-	-
BHR21	2.8	-	-	-
BHR22				No groundwater encountered.
BHR23	3.1	2.8	20	Standpipe installation
BHR24	13.3	6.1		-
BHR24	13.3	3.4	20	Standpipe installation
BHR25				No groundwater encountered.
BHR26	13.3	9.6	5	
	13.3	2.9	20	Standpipe installation
BHR27				No groundwater encountered.
BHR28				No groundwater encountered.
BHR29				No groundwater encountered.
BHR30				No groundwater encountered.
BHR31				No groundwater encountered.
BHR32				No groundwater encountered. Standpipe installation
BHR33				No groundwater encountered.
BHR34				No groundwater encountered.
BHR35				No groundwater encountered.
BHR36				No groundwater encountered.
BHR37				No groundwater encountered. Standpipe installation
BHR38	4	1.3	20	Standpipe installation
BHR39				No groundwater encountered.
BHR40				No groundwater encountered.
BHR41				No groundwater encountered. Standpipe installation
BHR42	5.2	-	-	-

Location	Depth of groundwater strike (m bgl)	Rose to (m bgl)	After (minutes)	Comments
BHR43				No groundwater encountered.
BHR44				No groundwater encountered.
BHR45				No groundwater encountered. Standpipe installation
BHR46				No groundwater encountered.
BHR47				No groundwater encountered.
BHR48				No groundwater encountered.
BHR49				No groundwater encountered.
BHR50				No groundwater encountered.
BHR51				No groundwater encountered. Standpipe installation
BHR52				No groundwater encountered.
BHR53				No groundwater encountered. Standpipe installation
BHR54				No groundwater encountered.
BHR55				No groundwater encountered.
BHR56				No groundwater encountered. Standpipe installation
BHR57				No groundwater encountered.
BHR58				No groundwater encountered.
BHR59				No groundwater encountered.
BHR60				No groundwater encountered.
BHR61	3	-	-	Standpipe installation
BHR62				No groundwater encountered.
BHR63				No groundwater encountered.
BHR64				No groundwater encountered.
BHR65				No groundwater encountered. Standpipe installation

SUMMARY OF GROUNDWATER STRIKE (TP, trial pit excavations)

Location	Depth of groundwater strike (m bgl)	Rose to (m bgl)	Comments
TP001	1.9	-	Inflow at 1.9m.
TP001A	2.1	1.8	Inflow at 2.1m, rose to 1.8m.
TP002			No groundwater encountered.
TP003			No groundwater encountered.
TP004			No groundwater encountered.
TP005	2.6	-	Inflow at 2.6m.
TP006			No groundwater encountered.
TP007	0.7	-	Trickle at 0.7m, odour of diesel noted.
TP008			No groundwater encountered.
TP008A			No groundwater encountered.
TP009	1	-	Seepage between 1.0m and 2.5m.
TP010			No groundwater encountered.
TP011	1.7	-	Seepage at 1.7m. Rose from 2.4m to 2.1m in 20 mins.
TP012			No groundwater encountered.
TP013			No groundwater encountered.
TP014			No groundwater encountered.

Location	Depth of groundwater strike (m bgl)	Rose to (m bgl)	Comments
TP015			No groundwater encountered.
TP016			No groundwater encountered.
TP017			No groundwater encountered.
TP018	2.8	2.65	Inflow at 2.8m, rose to 2.65m after 20 mins.
TP019	2.5	-	Slow inflow at 2.5m.
TP020			No groundwater encountered.
TP021			No groundwater encountered.
TP022			No groundwater encountered.
TP023			No groundwater encountered.
TP024	2.2	-	Slow inflow at 2.2m.
TP025			No groundwater encountered.
TP025A			No groundwater encountered.
TP026			No groundwater encountered.
TP027			No groundwater encountered.
TP028			No groundwater encountered.
TP029			No groundwater encountered.
TP029A			No groundwater encountered.
TP030			No groundwater encountered.
TP031			No groundwater encountered.
TP032			No groundwater encountered.
TP033			No groundwater encountered.
TP034	2.2	-	Slow inflow at 2.2m.
TP035			No groundwater encountered.
TP036			No groundwater encountered.
TP037			No groundwater encountered.
TP037A			No groundwater encountered.
TP038			No groundwater encountered.
TP039			No groundwater encountered.
TP040			No groundwater encountered.
TP041	1.6	-	Inflow at 1.6m.
TP042	2	-	Seepage at 2.0m.
TP043			No groundwater encountered.
TP044			No groundwater encountered.
TP045			No groundwater encountered.
TP045A			No groundwater encountered.
TP046	2.8	2.7	Inflow at 2.8m. Rose to 2.7m in 10 mins, and to 2.6m in 20 mins.
TP046	2.8	2.6	
TP047			No groundwater encountered.
TP048			No groundwater encountered.
TP049			No groundwater encountered.
TP050			No groundwater encountered.
TP050A	2.5	-	Slow inflow at 2.5m after 1 minute.
TP051			No groundwater encountered.
TP052			No groundwater encountered.
TP053	2.2	-	Inflow at 2.2m. Inflow at 4.0m, rose to 3.5 in 10 mins, and to 3.2m in 20 mins.
TP053	4	3.5	
TP053	4	3.2	
TP054			No groundwater encountered.
TP055	0.8	-	Rapid inflow at 0.80m and at 1.3m.

Location	Depth of groundwater strike (m bgl)	Rose to (m bgl)	Comments
TP055	1.3	-	
TP056			No groundwater encountered.
TP057	2.6		Inflow at 2.6m. Rose from 3.2m to 2.7m after 20 mins.
TP057	3.2	2.7	
TP058	2.6	-	Slow inflow at 2.6m.
TP059	1.7	-	Inflow at 1.7m.
TP060	1.9	-	Fast inflow at 1.9m.
TP061			No groundwater encountered.
TP062	2.9	-	Inflow at 2.9m. Rapid inflow at 3.3m, rose to 3.2 in 10 mins, and to 3.1m in 20 mins.
TP062	3.3	3.2	
TP062	3.301	3.1	
TP063	1.3	-	Inflow at 1.3m.
TP064	2.1	-	Slow inflow at 2.1m.
TP065			No groundwater encountered.
TP066			No groundwater encountered.
TP067			No groundwater encountered.
TP068			No groundwater encountered.
TP069	2	-	Slight seepage at 2.0m.
TP070	2.2	-	Inflow at 2.2m.
TP071	2.5	2.1	Inflow at 2.5m, rose to 2.1m in 10 mins.
TP072	2	1.8	Seepage at 2.0m. Rose to 1.8m after 20 mins.
TP073	2.2	-	Fast inflow at 2.2m.
TP074	2.5	-	Slow inflow at 2.5m.
TP075			No groundwater encountered.
TP076	2.95	2.85	Slow inflow at 2.9m. Inflow at 2.95m, rose to 2.85m in 10 mins.
TP076	2.9	-	Slow inflow at 2.9m. Inflow at 2.95m, rose to 2.85m in 10 mins.
TP077	2.7	-	Inflow at 2.7m.
TP078			No groundwater encountered.
TP079			No groundwater encountered.
TP080			No groundwater encountered.
TP081			No groundwater encountered.
TP082			No groundwater encountered.
TP083			No groundwater encountered.
TP084			No groundwater encountered.
TP085	2.2	-	Seepage at 2.2m.
TP086	2.8	-	Moderate inflow at 2.8m.
TP087			No groundwater encountered.
TP088			No groundwater encountered.
TP089			No groundwater encountered.
TP090	2.6	-	Inflow at 2.6m.
TP091	1.8	1.6	Fast inflow at 1.8m. Rose to 1.6m after 20 mins.
TP092			No groundwater encountered.
TP093			No groundwater encountered.
TP094			No groundwater encountered.
TP095	3	-	Very slow inflow at 3.0m.
TP096	1.3	-	Inflow at 1.3m from stone drain. Fast inflow at 3.2m, rose to 2.8m in 20 mins.
TP096	3.2	2.8	

Location	Depth of groundwater strike (m bgl)	Rose to (m bgl)	Comments
TP097			No groundwater encountered.
TP098			No groundwater encountered.
TP099			No groundwater encountered.
TP100			No groundwater encountered.
TP101			No groundwater encountered.
TP102			No groundwater encountered.
TP103			No groundwater encountered.
TP104	2	1.8	Inflow at 2.0, rose to 1.8m in 20 mins.
TP105			No groundwater encountered.
TP106	2	-	Slow inflow at 2.0m.
TP107			No groundwater encountered.
TP108			No groundwater encountered.
TP109			No groundwater encountered.
TP110			No groundwater encountered.
TP111			No groundwater encountered.
TP112	2.1	-	Slow inflow at 2.1m.
TP113	2.6	-	Slow inflow at 2.6m.
TP114	4	-	Seepage at 4.0m.
TP115	2.6	1	Inflow at 2.6m, rose to 1.0m after 20 mins.
TP116	3.3	3.1	Inflow at 3.3m, rose to 1.3m in 15 mins.
TP117			No groundwater encountered.
TP118			No groundwater encountered.
TP119			No groundwater encountered.
TP120			No groundwater encountered.
TP121			No groundwater encountered.
TP122			No groundwater encountered.
TP123			No groundwater encountered.
TP124			No groundwater encountered.
TP125			No groundwater encountered.
TP126	2.7	-	Slow inflow at 2.7m.
TP127			No groundwater encountered.
TP128			No groundwater encountered.
TP129	2.4	2	Steady inflow at 2.4m. Rose to 2.0m after 20 mins.
TP130			No groundwater encountered.
TP131			No groundwater encountered.
TP132	2.4	-	Steady inflow at 2.4m.
TP133	1.5	-	Seepage between 1.5m and 1.25m.
TP134			No groundwater encountered.
TP135			No groundwater encountered.
TP136			No groundwater encountered.
TP137			No groundwater encountered.
TP138	2.3	-	Inflow at 2.3m.
TP139			No groundwater encountered.
TP140	2.1	-	
TP140	2.901	2.65	
TP140	2.9	2.7	Inflow at 2.1m and 2.9m, rose to 2.7m in 10 mins, and to 2.65m in 20 mins.
TP141			No groundwater encountered.
TP142	1.8	-	Inflow at 1.8m. Rose from 3.0m to 2.2m.
TP142	3	2.2	

Location	Depth of groundwater strike (m bgl)	Rose to (m bgl)	Comments
TP143			No groundwater encountered.
TP144	2.8	-	Slow inflow at 2.8m.
TP145	2	-	Inflow at 2.0m.
TP146			No groundwater encountered.
TP147	1.7	-	Inflow at 1.7m.
TP148	1.4	-	Inflow at 1.4m, possibly from nearby drain. Rose from 2.0m to 1.4m after 20 mins.
TP148	2	1.4	
TP149			No groundwater encountered.
TP150			No groundwater encountered.
TP151			No groundwater encountered.
TP152	3.1	-	Moderate seepage at 3.1m.
TP153	3	-	Moderate inflow at 3.0m.
TP154	4.1	-	Slight inflow at 4.1m.
TP155			No groundwater encountered.
TP156	1.9	-	Inflow at 1.9m.
TP157			No groundwater encountered.
TP158	2.1	-	Slight seepage at 2.1m.
TP159			No groundwater encountered.
TP160			No groundwater encountered.
TP161			No groundwater encountered.
TP162	2	-	Moderate inflow at 2.0m.
TP163	2.5	-	Slow inflow at 2.5m.
TP164	3	-	Slow inflow at 3.0m.
TP165	1	-	Slow inflow at 1.0m.
TP166	2	-	Slow inflow at 2.0m.
TP167	3	2.7	Inflow at 3.0m, rose to 2.7m in 10 mins, and to 2.5m in 20 mins.
TP167	3.001	3.5	
TP168	2.4	-	Inflow at 2.4m.
TP169	1.8	-	Inflow at 1.8m.
TP170	1.9	-	Inflow at 1.9m. Rose from 2.0m to 1.90m in 10 mins, and to 1.85m in 20 mins.
TP170	2.001	1.95	
TP171			No groundwater encountered.
TP172			No groundwater encountered.
TP173			No groundwater encountered.
TP174			No groundwater encountered.
TP175			No groundwater encountered.
TP176			No groundwater encountered.
TP177			No groundwater encountered.
TP178	2.4	2.2	Inflow at 2.4m, rose to 2.2m in 10 mins, and to 2.1m in 20 mins.
TP178	2.401	2.1	
TP178	1.8	-	Inflow at 1.8m. Rose from 2.4m to 2.2m in 10 mins; and to 2.1m in 20 mins.
TP179			No groundwater encountered.
TP180	1.7	-	Inflow at 1.7m. Rose from 3.0m to 2.6m in 10 mins; and to 2.3m in 20 mins.
TP180	3	2.6	
TP180	3	2.3	

Location	Depth of groundwater strike (m bgl)	Rose to (m bgl)	Comments
TP181			No groundwater encountered.
TP182	1.5	-	Inflow at 1.5m. Rose from 2.0m to 1.9m in 10 mins, and to 1.85m in 20 mins.
TP182	2	1.9	
TP182	2	1.85	
TP183			No groundwater encountered.
TP184			No groundwater encountered.
TP185			No groundwater encountered.
TP186	1.3	-	Inflow at 1.3m. Rose from 1.5m to 1.4 in 10 mins, and to 1.3m in 20 mins.
TP186	1.501	1.3	
TP186	1.5	1.4	
TP187			No groundwater encountered.
TP188			No groundwater encountered.
TP189	1.4	-	Inflow at 1.4m. Rose from 2.3m to 2.2m in 10 mins.
TP189	2.3	2.2	

SUMMARY OF GROUNDWATER STRIKE (ST, excavations)

Location	Depth of excavation, m	Comments
ST01	1.6	No groundwater encountered.
ST01A	2	No groundwater encountered.
ST02	1.5	No groundwater encountered.
ST03	1.2	No groundwater encountered.
ST04	1.2	No groundwater encountered.
ST05	2	No groundwater encountered.
ST06	1.85	No groundwater encountered.
ST07	2	No groundwater encountered.
ST08	1.4	No groundwater encountered.
ST09	1.5	No groundwater encountered.
ST10.1	1.5	No groundwater encountered.
ST10.2	1.9	No groundwater encountered.
ST11	1.2	No groundwater encountered.
ST12	1.8	No groundwater encountered.
ST13	2	No groundwater encountered.
ST14	2	No groundwater encountered.
ST15.1	2	No groundwater encountered.
ST15.2	2.4	No groundwater encountered.
ST16	1.2	No groundwater encountered.
ST17	1.8	No groundwater encountered.
ST18	1.6	No groundwater encountered.
ST19	1.6	No groundwater encountered.
ST20	2	No groundwater encountered.
ST21	1.6	No groundwater encountered.
ST22	1.5	No groundwater encountered.
ST23	2	No groundwater encountered.

GROUNDWATER MONITORING IN STANDPIPE INSTALLATIONS

Location	Groundwater level, m bgl		
	19/12/2007	dd/mm/yyy	dd/mm/yyy
BH01	2.57		
BH02	0.92		
BH04	0.9		
BH13	1.86		
BH15	0.57		
BH16	0.85		
BH18	4.72		
BH19	1.27		
BH20	1.14		
BH35	1		
BH38	1.1		
BH42	2.3		
BH43	0.63		
BH45	damaged		
BH47	1.52		
BH49	2.35		
BH50	0.74		
BH52	-		
BH54	0.54		
BH59	0.74		
BH61	0.85		
BH62	1.3		
BH65	2.14		
BH67	2.51		
BH69	0.46		
BH70	4.29		
BHR10	0.9		
BHR11	0.89		
BHR17	2.2		
BHR23	2.2		
BHR24	**0.2**		
BHR26	2		
BHR32	1.43		
BHR37	dry		
BHR38	-		
BHR41	2.59		
BHR45	2.88		
BHR51	1.48		
BHR53	**5.42**		
BHR56	1.0		
BHR61	0.75		
BHR65	2.4		

- No access to installation

5.2 SLIT TRENCH EXCAVATIONS

Slit trench excavations identified the following services. Detailed logs are presented in **APPENDIX A** and summarised below. Concrete/ lean mix was identified as being cover to utility ducting, typically broadband services. It should be noted that the below summary may not be exhaustive and represents the utilities located at the slit trench locations and may not represent the location of utilities between these exploration locations.

SUMMARY OF UTILITIES ENCOUNTERED

ST Location	Utility Encountered
ST01	150mmm dia. clay, storm water drain, 4No. 100mm dia. green PVC ducts (broadband), 300mm dia. concrete storm water drain
ST01A	4No. 100mm dia. green PVC ducts (broadband), 75mm dia. lead pipe (assumed watermain)
ST02	4No. 100mm dia. green PVC ducts (broadband), 300mm dia. concrete stormwater drain, 300mm dia clay stormwater drain, 125mm dia. CI watermain
ST03	25mm dia. metal pipe, 75mm lead watermain, 4No. 100mm dia. green PVC ducts (broadband), 225mm dia clay stormwater drain, Concrete culvert, 150mm dia. CI/DI watermain, 100mm dia. metal pipe, 75mm dia. ducting (ESB)
ST04	150mm dia. CI watermain, 100mm dia. CI watermain, flagstone culvert, ESB warning tape
ST05	4No. 75mm dia. green PVC ducts (broadband), 2No. 100mm dia. DI/ CI watermain, 75mm watermain, 100mm uPVC foul drain.
ST06	2No. 100mm dia. green PVC ducts (broadband), 100mm dia. steel pipe, 75mm dia. steel watermain, 2No. 100mm PVC ducts, concrete.
ST07	Concrete, 225mm dia. concrete stormwater drain, 225mm clay foul drain, 75mm dia. steel pipe, 4No. 100mm dia. green PVC ducts (broadband),, 100mm dia DI/ CI watermain
ST08	120mm dia. CI pipe, 250mm dia. clay foul drain, 4No. 100mm dia. green PVC ducts (broadband), flagstone drain, stone culvert,
ST09	2No. 100mm dia. PVC ducts (ESB), 25mm dia. lead watermain, 200mm dia. CI gasmain, 150mm dia. DI/ CI watermain, 2No. 100mm dia. green PVC ducts (broadband),
ST10.1	75mm dia. HPPE watermain, 225mm dia. clay stormwater drain

ST Location	Utility Encountered
ST10.2	225mm dia. concrete stormwater drain, 4No. 75mm dia. green PVC ducts (broadband), 10mm dia. DI/ CI watermain, concrete
ST11	300mm dia. concrete stormwater drain, 100mm dia, HDPE watermain, 4No. 100mm dia. green PVC ducts (broadband),
ST12	4No. 100mm dia. green PVC ducts (broadband), 225mm dia. clay stormwater drain, 300mm dia. asbestos concrete foul drain, 150mm dia. steel watermain, 100mm dia. green PVC ducting, 150mm dia. concrete pipe.
ST13	Concrete, 150mm dia. concrete
ST14	No services encountered
ST15.1	300mm dia. concrete stormwater drain,
ST15.2	225mm dia. PVC drain, 4No. 75mm dia. green PVC ducts (broadband), 150mm dia. steel watermain, 225mm dia. concrete stormwater drain
ST16	300mm dia. concrete drain, 4No. 100mm dia. green PVC ducts (broadband), flagstone storm drain, 150mm dia. CI watermain,
ST17	700mm dia. concrete drain, 50mm dia. black PVC duct, 100mm dia. black PVC duct.
ST18	4No. 100mm dia. green PVC ducts (broadband), 4No. 100mm dia. green PVC ducts (broadband),
ST19	35mm dia. steel pipe
ST20	150mm dia. orange PVC drain, 2No. 100mm dia. green PVC ducts (broadband),, 100mm dia. HDPE watermain, 75mm dia. CI watermain.
ST21	75mm dia. steel watermain, 2No. 100mm dia. green PVC ducts (broadband), 100mm dia. HDPE watermain, 225mm dia concrete stormwater drain
ST22	200mm dia. concrete piep (ESB warning tape, timber), 100mm dia. black PVC ducts (ESB), 100mm dia. HDPE watremain, 50mm dia. HDPE watermain, 50mm dia. steel pipe.
ST23	2No. 75mm dia. green PVC ducts (broadband), 100mm dia HDPE watermain, 150mm dia. concrete drain, concrete

6 SUMMARY

1. The site was characterised by glacial deposits of very soft to very stiff slightly sandy, slightly gravelly CLAY/SILT and loose to very dense, very clayey/silty very gravelly SAND, very clayey/silty SAND and GRAVEL and very sandy very silty .

2. Made ground, described as slightly sandy slightly gravelly CLAY/SILT, silty very gravelly SAND and very silty very sandy GRAVEL, with pieces of concrete, brick, tarmacadam and plastic was encountered to a maximum depth of 2.04m bgl.

3. Many cobbles and boulders were encountered within the overburden soil strata.

4. Weak to moderately weak MUDSTONE was encountered at depths of between 2.1m bgl and 13.48m bgl.

5. Rock was found to be of varied lithology and was encountered at variable depths from between 0.9m bgl to 17.8m bgl.

6. SILTSTONE was encountered at depths of between 1.2m bgl and 14.8m bgl. Strong to very strong SANDSTONE was encountered at depths of between 2.4m bgl and 13.1m bgl. Moderately weak to very strong LIMESTONE was encountered at depths of between 0.9m bgl and 17.8m bgl. Moderately weak to strong GREYWACKE was encountered at depths of between 2.5m bgl and 8.5m bgl.

7. Groundwater was typically struck between 1.5m bgl and 4.0m bgl. Seasonal fluctuations may occur.

8. Forty two (42) number standpipe installations were constructed to monitor groundwater levels. Static groundwater levels were recorded as between 0.2m bgl and 5.42m bgl.

9. Slit trench excavation identified a number of utilities as detailed in **APPENDIX A, VOL. 2** and summarised in section 5.2.

10. Laboratory testing was undertaken to determine the classification and engineering characteristics of the soil and rock encountered during this ground investigation.

APPENDIX A.1

EXPLORATORY HOLE RECORDS

Key to Exploratory Hole Records	Key
Cable Tool Boreholes	BH1000-BH1003A, BH1004, BH1004A-BH1006A, BH1007-BH1019A, BH1020, BH1020A, BH1021-BH1025A, BH1026-BH1030A, BH1031-BH1049A, BH1050-BH1051A, BH1052, BH1052A, BH1053-BH1059A, BH1060-BH1063A, BH1065, BH1065A and BH1066-BH1068.
Rotary Open Hole Boreholes	BH01-BH07, BH13-BH31, BH33-BH70 including BH11A
Rotary Cored Boreholes	BHR01- BHR65 including BHR05A

KEY TO SYMBOLS ON EXPLORATORY HOLE RECORDS

All linear dimensions are in metres or millimetres

DESCRIPTIONS

**	Drillers Description
Friable	Easily crumbled

SAMPLES

U( )	Undisturbed 102mm diameter sample, ( ) denotes number of blows to drive sampler
U ( )F, U ( )P	F- not recovered, P - partially recovered
U38	Undisturbed 38mm diameter sample
P(F), (P)	Piston sample, F - not recovered, P - partially recovered
B	Bulk sample - disturbed
D	Jar Sample - disturbed
W	Water Sample
CBR	California Bearing Ratio mould sample
CS	Chemical Sample for Contamination Analysis
SPTLS	Standard Penetration Test S lump sample from split sampler.

CORE RECOVERY AND ROCK QUALITY

TCR	Total Core Recovery (% of Core Run)
SCR	Solid Core Recovery (length of core having at least one full diameter as % of core run)
RQD	Rock Quality Designation (length of solid core greater than 100mm as % of core run)

Where there is insufficient space for the TCR, SCR and RQD, the results may be found in the remarks column

If	Fracture Spacing in mm (Minimum/Average/Maximum) NI - non intact, NR - no recovery
AZCL	Assumed Zone of Core Loss

GROUNDWATER

▽	Groundwater strike
▼	Groundwater level after standing period
Date/Water	Date of shift (day/month)/Depth to water at end of previous shift shown above the date and depth to water at beginning of shift given below the date

INSITU TESTING

S	Standard Penetration Test - split barrel sampler
C	Standard Penetration Test - solid 60° cone
SW	Self Weight Penetration
IVp, HVp (R)	In Situ Vane Test, Hand Vane Test (R) demonstrates remoulded strength
K(F),(C),(R),(P)	Permeability Test
HP	Hand Penetrometer Test

MEASURED PROPERTIES

N	Standard Penetration Test - blows required to drive 300mm after seating drive
x/y	Denotes x blows for y mm within the Standard Penetration Test
x*/y	Denotes x blows for y mm within the seating drive
c_u	Undrained Shear Strength (kN/m^2)
CBR	California Bearing Ratio

ROTARY DRILLING SIZES

Index Letter	Nominal Diameter (mm)	
	Borehole	Core
N	75	54
H	99	76
P	120	92
S	146	113

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Borehole No **BHR01**

Sheet 1 of 3

Project Name:	**Project No.**	**Co-ords:**	**Hole Type**
Monaghan Town Collection Network	PC7089	267115E - 333475N	Rotary
Client: Monaghan County Council	**Dates:** 30/10/2007	**Level:** 53.93 m AOD	**Scale** 1:50

Well / Backfill	Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Casing / Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend
						53.13	0.80	Concrete.	
		1.30	CPT	N=1 (1,2/0,0,1,0) -	1.30	52.73	1.20	Soft, brown / black, slightly sandy, slightly gravelly organic CLAY.	
		2.80	CPT	N=3 (1,0/1,0,2,0) -	2.80			Grey SAND.	
		4.30	CPT	N=2 (0,0/1,0,0,1) -	4.30				
		5.80	CPT	N=5 (2,1/1,2,0,2) -	5.80				
		7.30	CPT	N=2 (0,2/1,0,1,0) -	7.30				
		8.80	CPT	N=6 (2,2/1,2,2,1) -	8.80				

Continued next sheet

Water	Depth (m)	Type	Results	Casing	Level	Depth

Groundwater:

Struck	Rose to	After	Sealed	Comment
-	-	-		No water encountered.

Hole Information:

Hole Depth	Casing Diameter	Casing Depth
11.80m 20.10m	150mm	11.80m

Chiselling:

Depths (m)	Time (hhmm)	Tool
to		

Remarks: Inspection pit dug.

Shift Data:

Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks
-	30/10/2007	0.00m	Start of Borehole
-	30/10/2007	11.80m	End of Borehole

Equipment & Methods: Delta Base 520
Compressed air-mist flush.

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Borehole No **BHR01**

Project Name:	**Project No.**	**Co-ords:**	**Hole Type**
Monaghan Town Collection Network	PC7089	267115E - 333475N	Rotary
Client: Monaghan County Council	**Dates:** 30/10/2007	**Level:** 53.93 m AOD	**Scale** 1:50

Well / Backfill	Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Casing / Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend
								Grey SAND.	
		10.30	CPT	N=11 (2,3/2,2,3,4) -	10.30				
		11.80	CPT	N=32 (7,8/9,7,8,8) -	11.80	41.95	11.98	Very strong, grey LIMESTONE cobbles. Weathering : Clay smearing on core and fracture surfaces, rounding of fracture edges.	
		11.80-14.80	29	7 17					
		14.80	CPT	N=3 (0,0/0,1,1,1) -	14.80				
		14.80-15.70	13	0 13					
		16.30	CPT	N=39 (1,4/5,11,11,12) -	16.30				
		15.70-17.20	16	4 0					
		17.80	CPT	N=2 (0,0/0,0,1,1) -	17.80				
		17.20-18.50	19	3 18					

Continued next sheet

Water	Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth

Groundwater:

Struck	Rose to	After	Sealed	Comment
-	-	-		No water encountered.

Hole Information:

Hole Depth	Casing Diameter	Casing Depth
11.80m 20.10m	150mm	11.80m

Chiselling:

Depths (m)	Time (hhmm)	Tool
to		

Remarks: Inspection pit dug.

Shift Data:

Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks
-	30/10/2007	0.00m	Start of Borehole
-	30/10/2007	11.80m	End of Borehole

Equipment & Methods: Delta Base 520
Compressed air-mist flush.

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Borehole No **BHR01**

Sheet 3 of 3

Project Name: Monaghan Town Collection Network

Project No. PC7089

Co-ords: 267115E - 333475N

Hole Type Rotary

Client: Monaghan County Council

Dates: 30/10/2007

Level: 53.93 m AOD

Scale 1:50

Well / Backfill	Water Strikes	Rotary Coring: Depth (m)	TCR	SCR	RQD	Casing / Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend
		18.30	CPT	N=20 (0,0/0,6,7,7)	-	18.30			Very strong, grey LIMESTONE cobbles. Weathering : Clay smearing on core and fracture surfaces, rounding of fracture edges.	
		18.50-20.10	9	6	9					
							33.83	20.10	End of Borehole at 20.10 m	

Water	Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth

Groundwater:

Struck	Rose to	After	Sealed	Comment
-	-	-		No water encountered.

Hole Information:

Hole Depth	Casing Diameter	Casing Depth
11.80m 20.10m	150mm	11.80m

Chiselling:

Depths (m)	Time (hhmm)	Tool
to		

Remarks: Inspection pit dug.

Shift Data:

Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks
-	30/10/2007	0.00m	Start of Borehole
-	30/10/2007	11.80m	End of Borehole

Equipment & Methods: Delta Base 520
Compressed air-mist flush.

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Borehole No **BHR17**

Sheet 1 of 1

Project Name:	**Project No.**	**Co-ords:**	**Hole Type**
Monaghan Town Collection Network	PC7089	267743E - 333508N	Rotary
Client: Monaghan County Council	**Dates:** 30/10/2007	**Level:** 60.28 m AOD	**Scale** 1:50

Well / Backfill	Water Strikes	Depth (m)	Type	Results	Casing / Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend
								Driller described CLAY.	
		1.20	CPT	N=6 (2,1/1,2,1,2) -	1.20	59.08	1.20	Dark grey GRAVEL of SILTSTONE.	
		1.20-2.50	2	0 0					
		2.50	CPT	N=10 (2,2/3,2,2,3) -	2.50	57.78	2.50		
						57.58	2.70	Brown, slightly sandy (fine to medium) slightly gravelly (fine to coarse, subangular) CLAY.	
								Strong, dark grey, medium-grained SANDSTONE.	
		2.50-4.00	32	13 20					
		4.00	CPT	N=38 (3,12/11,10,9,8)	4.00	56.28	4.00	AZCL. Driller described CLAY and GRAVEL.	
		4.00-5.50							
		5.50	CPT	50 (25 for 60mm) -	5.50	54.78	5.50		
						54.61	5.67	Brown, slightly sandy (fine to medium), slightly gravelly (fine to coarse, subangular) CLAY.	
		5.50-6.90	100	59 83				Strong, dark grey, medium-grained SANDSTONE. Weathering : Iron staining on fracture surfaces. Clay smearing and infilling on fractue surfaces. Pitting of core surfaces. Fractures : Fractures are predominantly sub-horizontal, dipping between 5 degrees and 25 degrees, with occasional 75 degree fractures.	
		6.90	CPT	50 (25 for 8mm) -	6.90				
		6.90-7.90	92	80 88					
		7.90-8.50	98	60 52					
		8.50	CPT	50 (25 for 7mm) -	8.50	51.78	8.50	End of Borehole at 8.50 m	

NImm min
140mm avg
290mm max

Water	Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth

Groundwater:

Struck	Rose to	After	Sealed	Comment
-	-	-		No water encountered.

Hole Information:

Hole Depth	Casing Diameter	Casing Depth
8.50m	150mm	8.50m

Chiselling:

Depths (m)	Time (hhmm)	Tool
to		

Remarks: Standpipe installed, response zone is from 4.0m to 1.0m.

Shift Data:

Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks
-	30/10/2007	0.00m	Start of Borehole
-	30/10/2007	8.50m	End of Borehole

Equipment & Methods: Delta Base 520
Compressed air-mist flush.

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Borehole No **BHR21**

Sheet 1 of 3

Project Name:	**Project No.**	**Co-ords:**	**Hole Type**
Monaghan Town Collection Network	PC7089	267319E - 333454N	Rotary
Client: Monaghan County Council	**Dates:** 02/11/2007	**Level:** 55.49 m AOD	**Scale** 1:50

Well / Backfill	Water Strikes	Samples & In Situ Testing: Depth (m)	Type	Results	Casing / Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend
								No recovery : Driller reported clayey GRAVEL.	
		1.20	CPT	N=5 (1,1/1,1,2,1) -	1.20	54.29	1.20		
								No recovery : Driller reports CLAY.	
		1.20-2.50	0	0 0					
	▽	2.50	CPT	N=5 (1,1/1,1,1,2) -	2.50				
		2.50-4.00	0	0 0					
		4.00	CPT	N=4 (1,1/1,1,1,1) -	4.00				
		4.00-5.50	0	0 0					
		5.50	CPT	N=2 (1,0/1,0,1,0) -	5.50				
		5.50-7.00	0	0 0					
		7.00	CPT	N=4 (1,2/1,1,1,1) -	7.00				
		7.00-8.50	0	0 0					
		8.50	CPT	N=1 (1,0/0,1,0,0) -	8.50				

Continued next sheet

Water	Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth

Groundwater:

Struck	Rose to	After	Sealed	Comment
2.80m	-	-	-	-

Hole Information:

Hole Depth	Casing Diameter	Casing Depth
12.70m 20.00m	150mm	12.70m

Chiselling:

Depths (m)	Time (hhmm)	Tool
to		

Remarks: -

Shift Data:

Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks
-	02/11/2007	0.00m	Start of Borehole
-	02/11/2007	12.70m	End of Borehole

Equipment & Methods: Delta Base 520
Compressed air-mist flush.

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Borehole No **BHR21**

Sheet 2 of 3

Project Name:	**Project No.**	**Co-ords:**	**Hole Type**
Monaghan Town Collection Network	PC7089	267319E - 333454N	Rotary
Client: Monaghan County Council	**Dates:** 02/11/2007	**Level:** 55.49 m AOD	**Scale** 1:50

Well / Backfill	Water Strikes	Rotary Coring: Depth (m)	TCR	SCR	RQD	Casing / Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend
		8.50-9.80	0	0	0				No recovery : Driller reports CLAY.	
		9.80	~~CPT~~	~~51 (15,10/11,40 for 20mm)~~		9.80	45.69	9.80	GRAVEL and cobbles of strong, grey LIMESTONE. 9.95m - 10.17m : Cobble 10.21m - 10.37m : Cobble	
		9.80-11.20	39	11	20					
		11.20	~~CPT~~	~~(75 for 17mm)~~	-	11.20				
		11.20-12.70	43	0	0					
		12.70	~~CPT~~	~~(75 for 22mm)~~	-	12.70				
		12.70-14.30	91	24	35				13.6m - 14.2m : Cobble	
		14.30	~~CPT~~	~~(75 for 13mm)~~	-	14.30				
		14.30-15.80	80	23	37				14.69m - 15.3m : Cobble	
		15.80	~~CPT~~	~~50 (15,10 for 10mm/50 for 26mm)~~		15.80				
		15.80-17.30	53	0	0					
		17.30	~~CPT~~	~~50 (12,13/15,15,20 for 21mm)~~		17.30				
		17.30-18.30	100	23	26					

Continued next sheet

Water	Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth

Groundwater:

Struck	Rose to	After	Sealed	Comment
2.80m	-	-	-	-

Hole Information:

Hole Depth	Casing Diameter	Casing Depth
12.70m 20.00m	150mm	12.70m

Chiselling:

Depths (m)	Time (hhmm)	Tool
to		

Remarks: -

Shift Data:

Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks
-	02/11/2007	0.00m	Start of Borehole
-	02/11/2007	12.70m	End of Borehole

Equipment & Methods: Delta Base 520
Compressed air-mist flush.

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Borehole No **BHR21**

Sheet 3 of 3

Project Name:	**Project No.**	**Co-ords:**	**Hole Type**
Monaghan Town Collection Network	PC7089	267319E - 333454N	Rotary
Client: Monaghan County Council	**Dates:** 02/11/2007	**Level:** 55.49 m AOD	**Scale** 1:50

Well / Backfill	Water Strikes	Rotary Coring Depth (m)	TCR	SCR	RQD	Casing / Flush	Level (m AOD)	Depth (m)	Stratum Description	Legend
		18.30-18.70	70	18	20				Remaining Detail : 18.04m - 18.30m : 18.04m - 18.3m : Cobble 18.3m - 18.4m : Cobble	
		18.70	CPT	N=46 (11,12/11,10,12,13)		18.70			18.86m - 19.26m : Cobble	
		18.70-20.00	69	15	29					
		20.00	CPT	(75 for 39mm)	-	20.00	35.49	20.00	End of Borehole at 20.00 m	

Water	Depth (m)	TCR	SCR	RQD	Fracture spacing	Casing	Level	Depth

Groundwater:

Struck	Rose to	After	Sealed	Comment
2.80m	-	-	-	-

Hole Information:

Hole Depth	Casing Diameter	Casing Depth
12.70m 20.00m	150mm	12.70m

Chiselling:

Depths (m)	Time (hhmm)	Tool
to		

Remarks: -

Shift Data:

Groundwater	Shift (dd/mm/yyyy)	Casing depth	Remarks
-	02/11/2007	0.00m	Start of Borehole
-	02/11/2007	12.70m	End of Borehole

Equipment & Methods: Delta Base 520
Compressed air-mist flush.

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MONAGHAN TOWN COLLECTION NETWORK

REPORT ON GROUND INVESTIGATION

FACTUAL

REPORT NO. PC7089

Client: Monaghan County Council,
County Offices,
The Glen,
Monaghan,
Co. Monaghan

Engineer: T J O Connor & Associates,
Consulting Engineers,
Corrig House,
Corrig Road,
Sandyford,
Dublin 18

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VOL. 2

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APPENDIX A.2

EXPLORATORY HOLE RECORDS

Key to Exploratory Hole Records	Key
Trial Pits	TP001-TP189 and TP01A, TP008A, TP25A, TP29A, TP37A, TP45A and TP50A
Slit Trenches	ST01-ST09, ST10.1, ST10.2, ST11-ST14, ST15.1, ST15.2, ST16-ST23 and ST01A

KEY TO SYMBOLS ON EXPLORATORY HOLE RECORDS

All linear dimensions are in metres or millimetres

DESCRIPTIONS

**	Drillers Description
Friable	Easily crumbled

SAMPLES

U( )	Undisturbed 102mm diameter sample, ( ) denotes number of blows to drive sampler
U ( )F, U ( )P	F- not recovered, P - partially recovered
U38	Undisturbed 38mm diameter sample
P(F), (P)	Piston sample, F - not recovered, P - partially recovered
B	Bulk sample - disturbed
D	Jar Sample - disturbed
W	Water Sample
CBR	California Bearing Ratio mould sample
CS	Chemical Sample for Contamination Analysis
SPTLS	Standard Penetration Test S lump sample from split sampler.

CORE RECOVERY AND ROCK QUALITY

TCR	Total Core Recovery (% of Core Run)
SCR	Solid Core Recovery (length of core having at least one full diameter as % of core run)
RQD	Rock Quality Designation (length of solid core greater than 100mm as % of core run)

Where there is insufficient space for the TCR, SCR and RQD, the results may be found in the remarks column

If	Fracture Spacing in mm (Minimum/Average/Maximum) NI - non intact, NR - no recovery
AZCL	Assumed Zone of Core Loss

GROUNDWATER

▽	Groundwater strike
▼	Groundwater level after standing period
Date/Water	Date of shift (day/month)/Depth to water at end of previous shift shown above the date and depth to water at beginning of shift given below the date

INSITU TESTING

S	Standard Penetration Test - split barrel sampler
C	Standard Penetration Test - solid 60° cone
SW	Self Weight Penetration
IVp, HVp (R)	In Situ Vane Test, Hand Vane Test (R) demonstrates remoulded strength
K(F),(C),(R),(P)	Permeability Test
HP	Hand Penetrometer Test

MEASURED PROPERTIES

N	Standard Penetration Test - blows required to drive 300mm after seating drive
x/y	Denotes x blows for y mm within the Standard Penetration Test
x*/y	Denotes x blows for y mm within the seating drive
c_u	Undrained Shear Strength (kN/m^2)
CBR	California Bearing Ratio

ROTARY DRILLING SIZES

Index Letter	Nominal Diameter (mm)	
	Borehole	Core
N	75	54
H	99	76
P	120	92
S	146	113

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Trial Pit No
TP028
Sheet 1 of 1

Project Name:	**Project No.**	**Co-ords:** 267591E - 333512N **Level:** 64.91 m AOD	**Date**
Monaghan Town Collection Network	PC7089		15/10/2007
Location: Monaghan Town		**Dimensions:** 3.50m; Depth 2.10m; 0.90m	**Scale** 1:25
Client: Monaghan County Council			**Logged By** LW

Samples & In Situ Testing				Level (m AOD)	Depth (m)	Stratum Description	Legend
Water	Depth (m)	Type	Results				
						Tarmacadam surfacing.	
				64.61	0.30		
						Clause-804 sub-base.	
				64.41	0.50		
						Possible Fill described as light brown, very silty, very gravelly SAND with occasional cobbles and boulders (0.40m x 0.60m; 1.00m x 0.70m).	
	0.50-1.00	B					
	0.50-1.00	D					
	1.00-2.10	B					
	1.00-2.10	D					
				62.81	2.10	Trial pit completed at 2.10 m	
Water	Depth (m)	Type	Results	Level	Depth		

Stability: Poor.
Plant: JCB.
Backfill: Tar, CI-804 & leanmix.

Groundwater: No groundwater encountered.

Remarks: Boulders below 0.50m; archeologist indicates that they may be from an old stone wall foundation.

HoleBASE III (Bd 422.00) Standard TrialpitLog v2 dated 27th Nov 03

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Trial Pit No
TP029
Sheet 1 of 1

Project Name:	**Project No.**	**Co-ords:** 267643E - 333466N **Level:** 69.60 m AOD	**Date**
Monaghan Town Collection Network	PC7089		10/10/2007
Location: Monaghan Town		**Dimensions:** 0.60m Depth 0.80m 0.80m	**Scale** 1:25
Client: Monaghan County Council			**Logged By** LW

Samples & In Situ Testing				Level (m AOD)	Depth (m)	Stratum Description	Legend
Water	Depth (m)	Type	Results				
				69.40	0.20	Tarmacadam surfacing.	
						Clause 804 sub-base.	
	0.00-0.80	B		69.20	0.40		
	0.00-0.80	D				Firm/ stiff, brown/ orange, gravellly (fine to medium, angular to sub-angular) CLAY with cobbles and boulders.	
				68.80	0.80	Trial pit completed at 0.80 m	
Water	Depth (m)	Type	Results	Level	Depth		

Stability: Moderate.
Plant: JCB.
Backfill: Arisings

Groundwater: No groundwater encountered.

Remarks: Trial pit terminated due to orange, PVC, wavin pipe running along the pit.

HoleBASE III (Bd 422.00) Standard TrialpitLog v2 dated 27th Nov 03

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Trial Pit No
TP029A
Sheet 1 of 1

Project Name:	**Project No.**	**Co-ords:** 267643E - 333466N **Level:** 69.60 m AOD	**Date**
Monaghan Town Collection Network	PC7089		10/10/2007
Location: Monaghan Town		**Dimensions:** Depth 2.00m, 3.50m × 0.90m	**Scale** 1:25
Client: Monaghan County Council			**Logged By** LW

Samples & In Situ Testing				Level (m AOD)	Depth (m)	Stratum Description	Legend
Water	Depth (m)	Type	Results				
				69.40	0.20	Tarmacadam surfacing.	
				69.20	0.40	Clause-804 sub-base.	
	0.40-1.00	B				Stiff, grey/ brown, gravelly (fine to medium, angular to sub-angular) CLAY with many cobbles and boulders.	
	0.40-1.00	D					
	1.40	D					
	1.00-2.00	B					
	1.00-2.00	D					
				67.60	2.00	Trial pit completed at 2.00 m	
Water	Depth (m)	Type	Results	Level	Depth		

Stability: Moderate.
Plant: JCB.
Backfill: Tar & Cl-804.

Groundwater: No groundwater encountered.

Remarks: -

HoleBASE III (Bd 422.00) Standard Trialpit Log v2 dated 27th Nov 03

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Trial Pit No
TP041
Sheet 1 of 1

Project Name:	**Project No.**	**Co-ords:** 267300E - 333477N **Level:** 54.40 m AOD	**Date**
Monaghan Town Collection Network	PC7089		15/08/2007
Location: Monaghan Town		**Dimensions:** Depth 2.20m; 2.60m × 1.10m	**Scale** 1:25
Client: Monaghan County Council			**Logged By** AM

Samples & In Situ Testing				Level (m AOD)	Depth (m)	Stratum Description	Legend
Water	Depth (m)	Type	Results				
				54.40	0.00	Firm, brown, slightly gravelly Topsoil with grass.	
	0.50-0.60	B		54.10	0.30	Fill described as firm, brown / grey, gravelly (fine to coarse grained, sub-angular to rounded) CLAY with many cobbles (0.20m x 0.15m) and occasional boulders (0.40m x0.40m).	
	0.50-0.60	D					
▽				53.60	0.80	Fill described as well-compacted, grey, slightly clayey, gravelly (fine to coarse grained, angular to sub-angular) COBBLES (0.20m x 0.20m) with many boulders (0.20m x 0.30m).	
	1.90-2.00	B					
	1.90-2.00	D					
				52.20	2.20	Trial pit completed at 2.20 m	
Water	Depth (m)	Type	Results	Level	Depth		

Stability: Poor below 1.0m.
Plant: JCB.
Backfill: Tar, CI-804 & arisings.

Groundwater: Inflow at 1.6m.

Remarks: Trial pit terminated due to presence of excess groundwater water and side wall instability.

HoleBASE III (Bd 422.00) Standard TrialpitLog v2 dated 27th Nov 03

APPENDIX B

LABORATORY RESULTS

Key to Laboratory Results Key

Natural Moisture Content

Atterberg Limit

Particle Size Distribution

pH

SO_4

Loss on Ignition

Point Load Index

KEY TO SYMBOLS ON LABORATORY TEST RESULTS SHEETS

U	Undisturbed Sample	
P	Piston Sample	
TWS	Thin Wall Sample	
B	Bulk Sample - Disturbed	
D	Jar Sample - Disturbed	
W	Water Sample	
pH	Acidity/Alkalinity Index	
SO_3	% - Total Sulphate Content (acid soluble)	
SO_3	g/ltr - Water Soluble Sulphate (Water or 2:1 Aqueous Soil Extract)	
+	Calcareous Reaction	
Cl	Chloride Content	
PI	Plasticity Index	
<425	% of material in sample passing 425 micron sieve	
LL	Liquid Limit	
PL	Plastic Limit	
MC	Water Content	
NP	Non Plastic	
γ_b	Bulk Density	
γ_d	Dry Density	
Ps	Particle Density	
U/D	Undrained/Drained Triaxial	
U/C	Unconsolidated/Consolidated Triaxial	
T/M	Single Stage/Multistage Triaxial	
100/38	Sample Diameter (mm)	
REM	Remoulded Triaxial Test Specimen	
TST	Triaxial Suction Test	
V	Vane Test	
DSB	Drained Shear Box	
RSB	Residual Shear Box	
RS	Ring Shear	
σ_3	Cell Pressure	
σ_1-σ_3	Deviator Stress	
c	Cohesion	
c_	Effective Cohesion Intercept	
ϕ	Angle of Shearing Resistance - Degrees	
ϕ_	Effective Angle of Shearing Resistance	
εf	Strain at Failure	
*	Failed under 1st Load	
**	Failed under 2nd Load	
#	Untestable	
##	Excessive Strain	
p_o	Effective Overburden Pressure	
m_v	Coefficient of Volume Decrease	
c_v	Coefficient of Consolidation	
Opt	Optimum	
Nat	Natural	
Std	Standard Compaction - 2.5kg Rammer	(¶ CBR)
Hvy	Heavy Compaction - 4.5kg Rammer	(§ CBR)
Vib	Vibratory Compaction	
CBR	California Bearing Ratio	
Sat m.c.	Saturation Moisture Content	
MCV	Moisture Condition Value	

Laboratory Symbols	**Project**	Contract
		Figure

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Natural Moisture Content/Atterberg Limits Summary

BS 1377 : Part 2 : 1990 : Clause 3

Job Ref: PC7089

Location: Monaghan Town Collection Network

Hole ID	Sample Ref	Depth (m)	Sample Type	Sample Description	MC	LL	PL	PI	% Pass 425
TP025A	B1A	0.6	B	Clayey sandy GRAVEL with many cobbles	14				
TP025A	D4A	1.5	D	Clayey sandy GRAVEL with many cobbles	12				
TP026	1	0.4	B	Slightly gravelly slightly sandy SILT	20	27	NP	NP	62.3
TP026	4	1	D	Slightly gravelly slightly sandy SILT	23				
TP027	1	0.15	B	Silty sandy GRAVEL	13				
TP028	1	0.5	B	Very silty very gravelly SAND with occasional cobbles	15				
TP028	4	1	D	Very silty very gravelly SAND with occasional cobbles	15				
TP030	1	0.6	B	Very silty very gravelly SAND with some cobbles	17				
TP030	3	1.2	B	Gravelly CLAY with cobbles	16	35	19	16	66.7
TP030	6	2	D	Slightly sandy slightly gravelly CLAY with cobbles	11				
TP031	1	0.4	B	Slightly sandy slightly gravelly CLAY with occasional cobbles	32	35	24	11	74.2
TP031	3	1.1	B	Slightly sandy slightly gravelly CLAY with some cobbles	15	31	19	12	73.8
TP031	5	2	B	Slightly sandy slightly gravelly CLAY with many cobbles	26				
TP031	6	2	D	Slightly sandy slightly gravelly CLAY with many cobbles	11				
TP032	1	0.4	B	Very gravelly very clayey SAND	28				
TP032	3	1	B	Slightly sandy slightly gravelly CLAY with cobbles	20	38	22	16	74.3
TP032	6	2	D	Slightly sandy slightly gravelly CLAY with cobbles	17				
TP032	7	2.6	B	Slightly gravelly slightly sandy CLAY with cobbles	19				
TP032	8	2.6	D	Slightly gravelly slightly sandy CLAY with cobbles	13				
TP033	1	0.4	B	Slightly gravely sandy CLAY	27				
TP033	3	0.7	B	Very silty very sandy GRAVEL with many cobbles	23				
TP033	5	2	B	Slightly gravelly slightly sandy CLAY with cobbles	18	36	20	16	76.5

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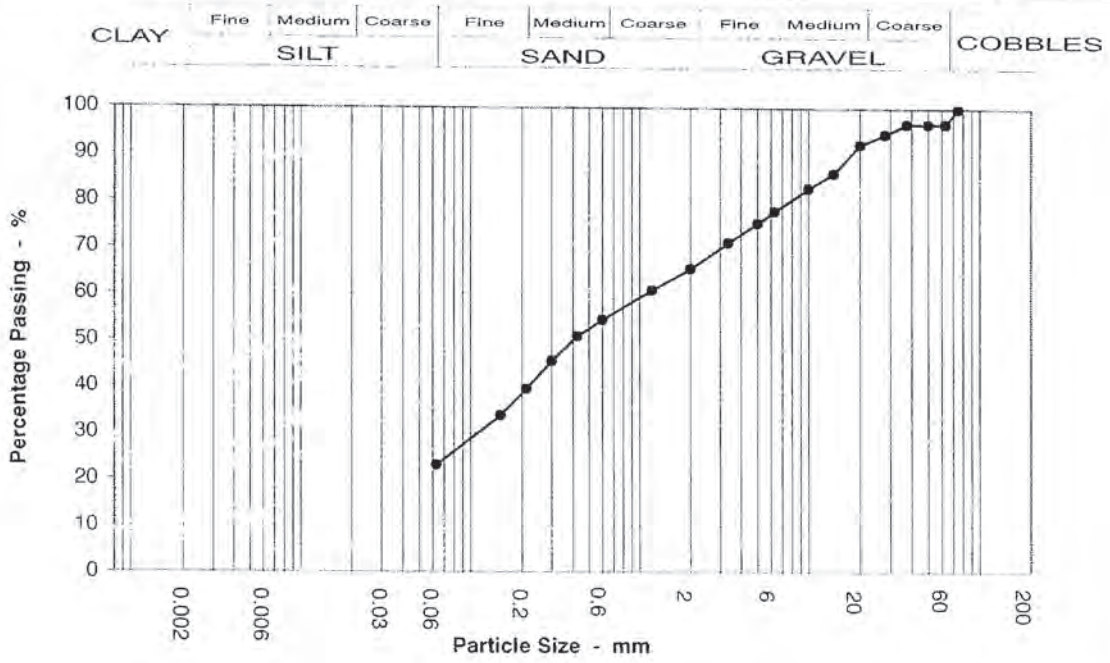
PARTICLE SIZE DISTRIBUTION

BS 1377 : Part 2 : 1990 : Clause 9

		Job Ref	PC7089
		Borehole / Pit No	TP028
Location	Monaghan Town Collection Network	Sample No	1
Soil Description	Very silty very gravelly SAND with occasional cobbles	Depth	0.50 m
		Sample type	B



Seiving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	97		
50	97		
37.5	97		
28	94		
20	92		
14	86		
10	83		
6.3	78		
5	75		
3.35	71		
2	66		
1.18	61		
0.6	55		
0.425	51		
0.3	46		
0.212	39		
0.15	34		
0.063	23		

Test Method	
BS 1377 : Part 2 : 1990	
Sieving	Clause 9.2
Sedimentation	N/A

Sample Proportions	
Cobbles	3.4
Gravel	31.0
Sand	42.6
Silt & Clay	23.0

Grading Analysis	
D100	125.000
D60	1.098
D10	
Uniformity Coefficient	N/A

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Sulphate Content & pH Value

BS 1377 : Part 3 : 1990 : Clause 5.5 & 9.5

Job Ref

Location: **Monaghan Town Collection Network**

PC7089

Hole ID	Sample Ref	Depth (m)	Sample Type	Sample Description	% < 2.0 mm	pH Value	Sulphate Content as SO3			Sulphate Content as SO4		
							GW g/L	Total Sulphate %	Water Soluble g/L	GW g/L	Total Sulphate %	Water Soluble g/L
BH1067	2	1.20	B	Very sandy very clayey GRAVEL with many cobbles	43.9	7.8			0.022			0.026
BH1067	3	2.00	B	Slightly clayey sandy GRAVEL with some cobbles	12	8.02			0.026			0.031
BH1003 A	4	1.50	B	Very clayey very gravelly SAND with occasional cobbles	69.6	8.53			0.019			0.023
BH1019 A	5	1.00	B	Slightly gravelly slightly sandy CLAY	60.2	8.2			0.073			0.088
TP018	4	1.60	D	PEAT	37.9	6.4			0.104			0.125
TP018	6	2.20	D	CLAY	92.7	8.07			0.073			0.088
TP028	4	1.00	D	Very silty very gravelly SAND with occasional cobbles	66.1	8.63			0.008			0.010
TP136	1	1.10	B	Gravelly very clayey SAND with some cobbles	30.2	7.72			0.056			0.067

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Point Load Test Results

Project: Monaghan Town Collection Network

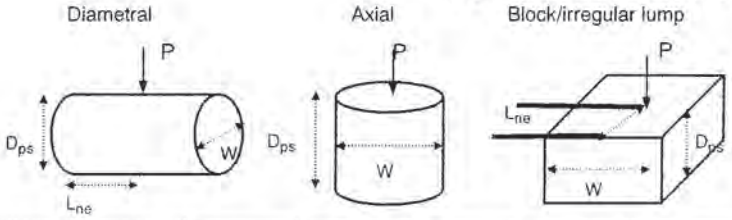
Project No: PC7089

Carried out by: RK

13/02/2008

Test Type
D - Diametral, A - Axial, I - Irregular Lump
Direction (U = unknown or random)
Par - parallel to planes of weakness
Per - perpendicular to planes of weakness
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P

Machine Ram Area, cm^2



Borehole	Sample Top, m BGL	Sample Ref	Sample Type	Sample Base, m BGL	Specimen Ref	Specimen Depth, m BGL	Description	Test Type see ISRM Fig 5 and 8		Failure Valid (Y/N)	Dimensions			Gauge reading, kN	P Failure Load, kN	De equivalent diameter, mm	Is MPa	Is(50) point load index, MPa	Remarks
								Type (D, A, I)	Direction (Par/Per/U)		L mm	Dps, mm	W mm						
BHR1	11.5			11.6		11.5	Limestone	D	Par	Y	30	67	67	11	11.00	67.0	2.45	2.80	Planar smooth
BHR1	14.35			14.55		14.35	Limestone	D	Per	Y	70	67	67	17	17.00	67.0	3.79	4.32	Undulating smooth
BHR1	18.5			18.65		18.5	Limestone	D	Par	Y	40	84	83	18	18.00	83.5	2.58	3.25	Planar smooth
BHR2	2.5			2.64		2.5	Limestone	D	Per	Y	60	67	67	15	15.00	67.0	3.34	3.81	Planar course
BHR2	11.5			11.6		11.5	Limestone	D	U	Y	50	63	63	23	23.00	63.0	5.79	6.43	Undulating rough
BHR2	14.5			14.67		14.5	Limestone	D	Per	Y	50	67	68	2	2.00	67.5	0.44	0.50	Soft rock
BHR2	16.6			17.02		16.6	Limestone	D	Per	Y	110	76	77	16	16.00	76.5	2.73	3.31	Planar coarse
BHR2	18.4			18.55		18.4	Limestone	D	Per	Y	70	68	67	8	8.00	67.5	1.76	2.01	Planar smooth
BHR2	19.85			20		19.85	Limestone	D	Par	Y	80	67	67	14	14.00	67.0	3.12	3.56	Planar smooth
BHR2	19.7			19.83		19.7	Limestone	D	Par	Y	80	67	67	13	13.00	67.0	2.90	3.30	Planar coarse
BHR3	5.5			5.75		5.5	Limestone	D	U	Y	60	76	76	17	17.00	76.0	2.94	3.55	Planar smooth
BHR3	7			7.2		7	Limestone	D	Per	Y	50	67	68	22	22.00	67.5	4.83	5.53	Planar smooth
BHR3	8.98			9.13		8.98	Limestone	D	Per	Y	60	67	68	15	15.00	67.5	3.29	3.77	Planar smooth
BHR3	10.65			10.75		10.65	Limestone	D	Per	Y	20	67	67	9	9.00	67.0	2.00	2.29	Planar coarse
BHR3	11.75			11.9		11.75	Limestone	D	Par	Y	90	67	68	17	17.00	67.5	3.73	4.27	Planar coarse
BHR3	12.23			12.34		12.23	Limestone	D	Par	Y	50	76	76	2	2.00	76.0	0.35	0.42	Soft rock
BHR3	12.5			12.65		12.5	Limestone	D	Par	Y	40	67	67	18.00	18.00	67.0	4.01	4.57	Planar coarse
BHR3	12.65			12.85		12.65	Limestone	D	Per	Y	60	67	67	13	13.00	67.0	2.90	3.30	Planar smooth
BHR3	14.1			14.3		14.1	Limestone	D	Per	Y	90	76	76	10	10.00	76.0	1.73	2.09	Planar smooth
BHR3	14.81			15		14.81	Limestone	D	Per	Y	80	77	76	19	19.00	76.5	3.25	3.93	Planar smooth
BHR4	2.8			3.02		2.8	Limestone	D	Per	Y	90	67	67	7	7.00	67.0	1.56	1.78	Planar smooth
BHR4	10.25			10.42		10.25	Limestone	D	Per	Y	60	67	67	1	1.00	67.0	0.22	0.25	Planar smooth
BHR4	12.03			12.2		12.03	Limestone	D	Par	Y	70	67	67	1	1.00	67.0	0.22	0.25	Planar coarse
BHR4	12.6			12.72		12.6	Limestone	D	Par	Y	40	67	67	2	2.00	67.0	0.45	0.51	Soft rock
BHR4	13.5			13.78		13.5	Limestone	D	Per	Y	110	83	23	23	23.00	43.7	12.05	11.34	Planar smooth
BHR5A	1.45			1.6		1.45	Limestone	D	Par	Y	60	76	76	21	21.00	76.0	3.64	4.39	Planar smooth

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Point Load Test Results

Project: Monaghan Town Collection Network

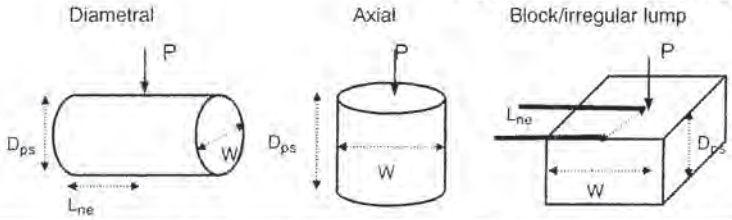
Project No: PC7089

Carried out by: RK

14/02/2008

Test Type
D - Diametral, A - Axial, I - Irregular Lump
Direction (U = unknown or random)
Par - parallel to planes of weakness
Per - perpendicular to planes of weakness
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P

Machine Ram Area, cm^2



Borehole	Sample Top, m BGL	Sample Ref	Sample Type	Sample Base, m BGL	Specimen Ref	Specimen Depth, m BGL	Description	Test Type see ISRM Fig 5 and 8		Failure Valid (Y/N)	Dimensions			Gauge reading, kN	P Failure Load, kN	De equivalent diameter, mm	Is MPa	Is(50) point load index, MPa	Remarks
								Type (D, A, I)	Direction (Par/Per/U)		L mm	Dps, mm	W mm						
BHR16	5.8			6.1		5.8	Limestone	D	Par	Y	80	75	75	28	28.00	75.0	4.98	5.97	Planar coarse
BHR16	10.1			10.28		10.1	Limestone	D	Per	Y	40	84	83	9	9.00	83.5	1.29	1.63	Planar smooth
BHR16	11			11.15		11	Limestone	D	Par	Y	70	83	84	5	5.00	83.5	0.72	0.90	Planar smooth
BHR16	11.82			11.9		11.82	Limestone	D	Per	Y	20	83	83	1	1.00	83.0	0.15	0.18	Soft rock
BHR16	11.9			12.03		11.9	Limestone	D	Par	Y	40	75	75	5	5.00	75.0	0.89	1.07	Planar smooth
BHR16	12.57			12.71		12.57	Limestone	D	Par	Y	60	83	83	10	10.00	83.0	1.45	1.82	Planar smooth
BHR17	2.7			3.06		2.7	Limestone	D	Par	Y	110	84	84	24	24.00	84.0	3.40	4.30	Undulating coarse
BHR17	5.66			5.9		5.66	Limestone	D	Per	Y	90	84	83	13.00	13.00	83.5	1.86	2.35	Undulating coarse
BHR17	6.95			7.08		6.95	Limestone	D	Par	Y	70	84	84	11	11.00	84.0	1.56	1.97	Planar smooth
BHR17	7.9			8.05		7.9	Limestone	D	Per	Y	80	84	85	9	9.00	84.5	1.26	1.60	Planar coarse
BHR18	1.46			1.76		1.76	Limestone	D	Par	Y	90	83	84	32	32.00	83.5	4.59	5.78	Planar smooth
BHR18	2.61			2.89		2.61	Limestone	D	Par	Y	110	84	84	26	26.00	84.0	3.68	4.65	Planar coarse
BHR18	5.92			6.09		5.92	Limestone	D	U	Y	30	84	84	25	25.00	84.0	3.54	4.47	Planar smooth
BHR18	10.4			10.8		10.4	Limestone	D	Per	Y	130	76	75	25	25.00	75.5	4.39	5.28	Planar smooth
BHR18	13			13.28		13	Limestone	D	Per	Y	120	84	83	29	29.00	83.5	4.16	5.24	Planar coarse
BHR18	13.28			13.46		13.28	Limestone	D	Par	Y	60	84	84	29	29.00	84.0	4.11	5.19	Planar smooth
BHR18	16.95			17.13		16.95	Limestone	D	Par	Y	40	84	84	31	31.00	84.0	4.39	5.55	Planar coarse
BHR18	18.65			18.75		18.65	Limestone	D	Par	Y	20	84	84	17	17.00	84.0	2.41	3.04	Undulating coarse
BHR18	19.18			19.27		19.18	Limestone	D	U	Y	20	67	68	13	13.00	67.5	2.85	3.27	Planar smooth
BHR18	18.65			18.75		18.65	Limestone	D	Par	Y	20	84	84	17	17.00	84.0	2.41	3.04	Undulating coarse
BHR18	5.92			6.09		5.92	Limestone	D	U	Y	30	84	84	25	25.00	84.0	3.54	4.47	Planar smooth
BHR19	7.03			7.15		7.03	Limestone	D	Per	Y	40	67	67	16	16.00	67.0	3.56	4.07	Planar smooth
BHR20	1.13			1.2		1.13	Limestone	D	Par	Y	60	67	76	20	20.00	71.4	3.93	4.61	Planar coarse
BHR20	2.91			3.08		2.91	Limestone	D	Per	Y	40	76	76	23	23.00	76.0	3.98	4.81	Planar smooth
BHR20	3.33			3.41		3.33	Limestone	D	Par	Y	20	76	76	16	16.00	76.0	2.77	3.34	Planar smooth
BHR20	8.26			8.42		8.26	Limestone	D	Par	Y	50	75	76	23	23.00	75.5	4.04	4.86	Planar smooth

Priority Geotechnical Limited

Point Load Test Results

Project: Monaghan Town Collection Network

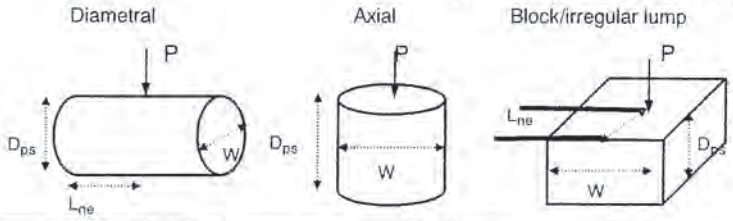
Project No: PC7089

Carried out by: RK

14/02/2008

Test Type
D - Diametral, A - Axial, I - Irregular Lump
Direction (U = unknown or random)
Par - parallel to planes of weakness
Per - perpendicular to planes of weakness
Dimensions
Dps - Distance between platens (platen separation)
Dps' - at failure
Lne - Length from platens to nearest free end
W - Width of shortest dimension perpendicular to load, P

Machine Ram Area, cm^2



Borehole	Sample Top, m BGL	Sample Ref	Sample Type	Sample Base, m BGL	Specimen Ref	Specimen Depth, m BGL	Description	Test Type see ISRM Fig 5 and 8		Failure Valid (Y/N)	Dimensions			Gauge reading, kN	P Failure Load, kN	De equivalent diameter, mm	Is MPa	Is(50) point load index, MPa	Remarks
								Type (D, A, I)	Direction (Par/Per/U)		L mm	Dps, mm	W mm						
BHR21	9.9			12.12		9.9	Limestone	D	Per	Y	80	75	76	22	22.00	75.5	3.86	4.65	Planar smooth
BHR21	10.2			10.35		10.2	Limestone	D	Par	Y	40	84	84	27	27.00	84.0	3.83	4.83	Planar smooth
BHR21	13.8			13.94		13.8	Limestone	D	Par	Y	60	83	84	3	3.00	83.5	0.43	0.54	Planar smooth
BHR21	15.1			15.28		15.1	Limestone	D	Par	Y	40	84	84	17	17.00	84.0	2.41	3.04	Planar smooth
BHR21	18.04			18.3		18.04	Limestone	D	Per	Y	110	84	83	24	24.00	83.5	3.44	4.34	Planar smooth
BHR21	18.9			19.15		18.9	Limestone	D	Par	Y	110	83	83	15	15.00	83.0	2.18	2.74	Planar smooth
BHR22	14.5			14.76		14.5	Limestone	D	U	Y	80	67	68	18	18.00	67.5	3.95	4.52	Undulating smooth
BHR22	17.5			17.63		17.5	Limestone	D	U	Y	50	67	68	19	19.00	67.5	4.17	4.77	Undulating coarse
BHR22	19.1			19.29		19.1	Limestone	D	U	Y	90	63	63	23	23.00	63.0	5.79	6.43	Undulating smooth
BHR23	5.8			5.93		5.8	Limestone	D	Par	Y	70	67	67	9	9.00	67.0	2.00	2.29	Planar smooth
BHR23	8.2			8.34		8.2	Limestone	D	Par	Y	50	67	67	1	1.00	67.0	0.22	0.25	Soft rock
BHR23	8.64			8.73		8.64	Limestone	D	U	Y	20	67	68	2	2.00	67.5	0.44	0.50	Soft rock
BHR23	9.14			9.24		9.14	Limestone	D	Par	Y	30	76	77	5	5.00	76.5	0.85	1.03	Planar smooth
BHR24	6.7			6.94		6.7	Limestone	D	Per	Y	70	67	67	2	2.00	67.0	0.45	0.51	Soft rock
BHR24	13.53			13.72		13.53	Limestone	D	Per	Y	60	67	68	8	8.00	67.5	1.76	2.01	Planar coarse
BHR24	14.94			15.11		14.94	Limestone	D	Par	Y	70	76	77	2	2.00	76.5	0.34	0.41	Sheared rough
BHR24	16			16.11		16	Limestone	D	Par	Y	30	76	76	3	3.00	76.0	0.52	0.63	Soft rock
BHR25	9.5			9.6		9.5	Limestone	D	Per	Y	30	67	67	3	3.00	67.0	0.67	0.76	Soft rock
BHR25	11.67			11.75		11.67	Limestone	D	Par	Y	20	77	77	4	4.00	77.0	0.67	0.82	Planar smooth
BHR25	12.5			12.6		12.5	Limestone	D	Per	Y	30	77	77	3	3.00	77.0	0.51	0.61	Soft Rock
BHR25	17.8			17.87		17.8	Limestone	D	Par	Y	20	67	67	3	3.00	67.0	0.67	0.76	Planar smooth
BHR26	13.43			13.63		13.43	Limestone	D	Per	Y	70	67	67	8	8.00	67.0	1.78	2.03	Planar smooth
BHR26	14.35			14.64		14.35	Limestone	D	Par	Y	20	68	68	17	17.00	68.0	3.68	4.22	Planar smooth
BHR26	15.48			15.61		15.48	Limestone	D	Per	Y	70	67	67	3	3.00	67.0	0.67	0.76	Planar smooth
BHR27	7			7.08		7	Limestone	D	Per	Y	20	67	67	3	3.00	67.0	0.67	0.76	Sheared rock
BHR27	7.3			7.45		7.3	Limestone	D	Par	Y	50	67	67	3	3.00	67.0	0.67	0.76	Soft rock

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Email: geotechnical@priority.ie

MONAGHAN TOWN COLLECTION NETWORK

REPORT ON GROUND INVESTIGATION

FACTUAL

REPORT NO. PC7089

Client: Monaghan County Council,
County Offices,
The Glen,
Monaghan,
Co. Monaghan

Engineer: T J O Connor & Associates,
Consulting Engineers,
Corrig House,
Corrig Road,
Sandyford,
Dublin 18

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VOL. 3

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Co. Monaghan

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Sandyford,
Dublin 18

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Trial Pits	TP005 TP006 TP007 TP008 TP008A TP015 TP016 TP017 TP018 TP019 TP020 TP021 TP022 TP023 TP024 TP025 TP026 TP027 TP028 TP029 TP029A TP030 TP031 TP032 TP034 TP035 TP036 TP037 TP037A TP038 TP039 TP040 TP043 TP044 TP058 TP059 TP060 TP073 TP074 TP075 TP076 TP077 TP078 TP095 TP096 TP097 TP098 TP134 TP135 TP136 TP138 TP139 TP140 TP141 TP142 TP143 TP144 TP145 TP147 TP158 TP159 TP161 TP163 TP164 TP165 TP166 TP167 TP168 TP171 TP179 TP180 TP181 TP182 TP186 TP187 TP188 and TP189
Slit Trenches	ST01A ST05 ST06 ST07 ST08 ST09 ST10.1 ST10.2 ST12 ST15.1 ST16 ST18 ST20 ST21 ST22 and ST23

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR1**	**Project**	Monaghan Town Collection Network	
		Project No	PC7089	
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers	

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR17**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR21**	**Project**	Monaghan Town Collection Network	
		Project No	PC7089	
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers	

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR21**	**Project**	Monaghan Town Collection Network	
		Project No	PC7089	
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers	

Trial Pit Photographic Record

Priority Geotechnical Limited

Trial Pit Number:	**TP28**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out	T. J. O'Connor & Associates, Consulting Engineers

Trial Pit Photographic Record

Priority Geotechnical Limited

Trial Pit Number:	**TP28**	**Project** **Project No** **Carried Out**	Monaghan Town Collection Network PC7089 T. J. O'Connor & Associates, Consulting Engineers

Trial Pit Photographic Record

Priority Geotechnical Limited

Trial Pit Number:	**TP29**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out	T. J. O'Connor & Associates, Consulting Engineers

Trial Pit Photographic Record

Priority Geotechnical Limited

Trial Pit Number:	**TP**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out	T. J. O'Connor & Associates, Consulting Engineers

Trial Pit Photographic Record

Priority Geotechnical Limited

Trial Pit Number: **TP29A**	**Project** Monaghan Town Collection Network **Project No** PC7089 **Carried Out** T. J. O'Connor & Associates, Consulting Engineers	

Trial Pit Photographic Record

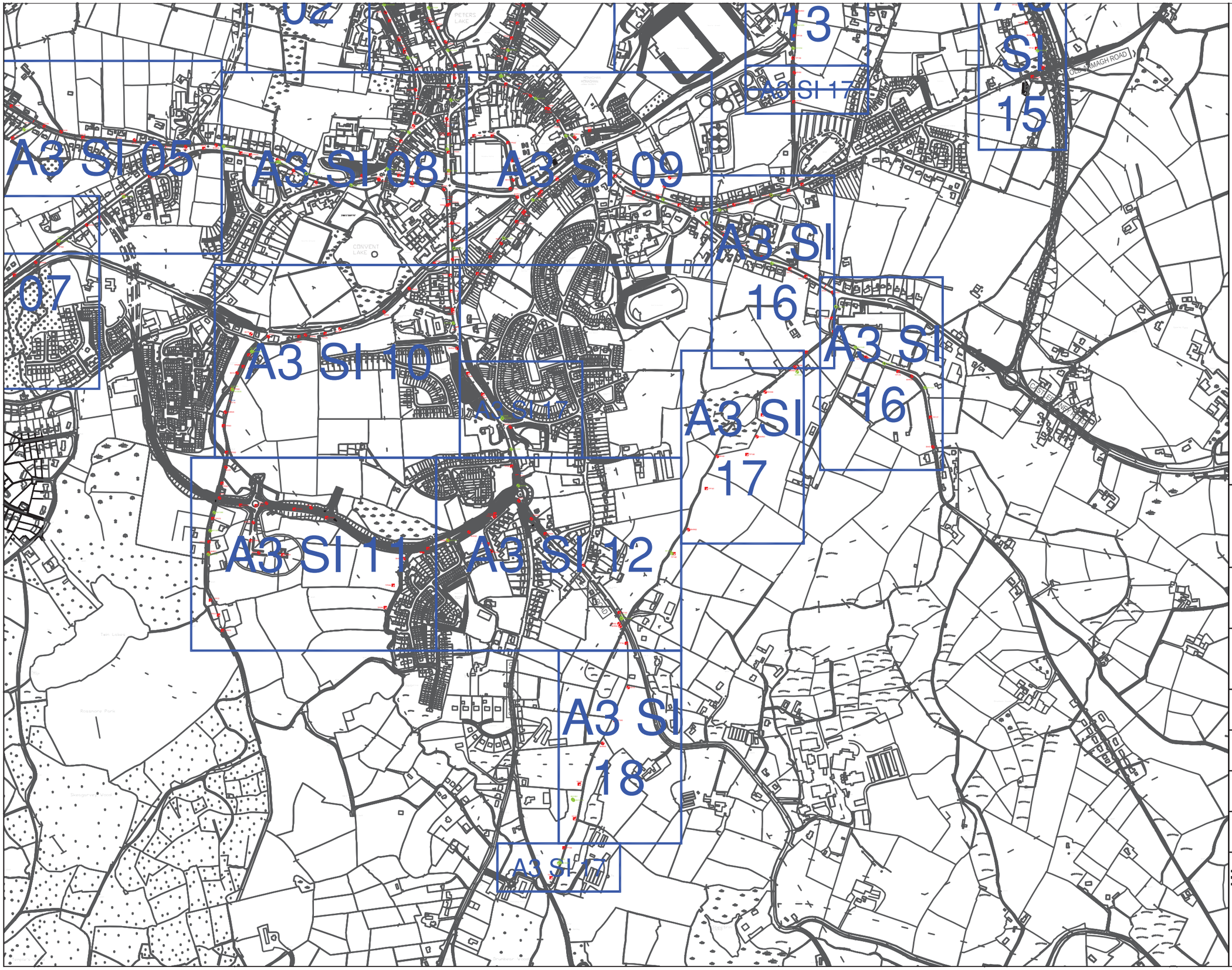
Priority Geotechnical Limited

Trial Pit Number:	**TP29A**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out	T. J. O'Connor & Associates, Consulting Engineers

APPENDIX D

EXPLORATION LOCATION PLANS

Key to Exploration Location Plans	Key
Exploration Location Plans	PC7089-SI-A to PC7089-SI-C PC7089-SI-01 to PC7089-SI-18



JOB NAME:

MONAGHAN TOWN COLLECTION NETWORK

JOB NUMBER:

PC7089

DRAWING NUMBER:

PC7089–SI–C

DRAWN BY:

Faoiltiarna Nic Chárthaigh

DATE:

20/05/2009

SCALE:

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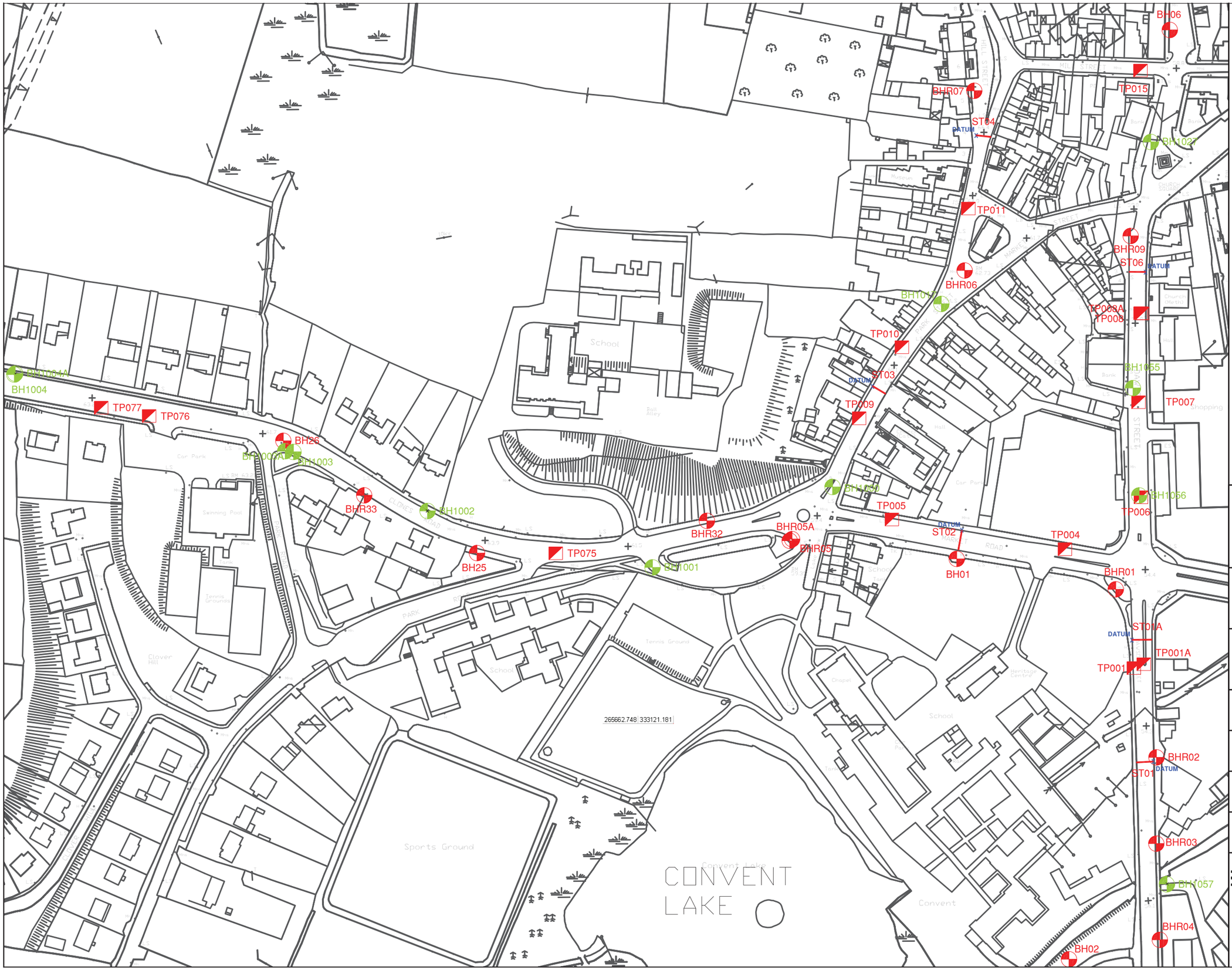
APPROVED:

GH

REVISION:

F03

PRIORITY GEOTECHNICAL



JOB NAME:

MONAGHAN TOWN COLLECTION NETWORK

JOB NUMBER:

PC 7089

DRAWING NUMBER:

PC 7089–SI–08

DRAWN BY:

Faoiltiarna Nic Chárthaigh

DATE:

20/05/2009

SCALE:

1:2000

APPROVED:

GH

REVISION:

F03

PRIORITY GEOTECHNICAL

MONAGHAN
MONAGHAN
(URBAN DISTRICT)

BH1030A
BH1030
TP024
ST09
DATUM
BHR13
BH1032
TP025
TP025A
TP026
TP027
BHR14
BH1033
TP044
TP043
TP042
BHR22
TP028
BHR17
BHR16
TP029
ST10.2
DATUM
TP029A
DATUM
ST10.1
BHR15
BH1035
TP030
BHR18
BH1041
TP034
TP036
BH10
TP041
TP037
TP037A
BH1053
BHR21
BH11
BH11A
TP038
BH12
BH1054
TP039

JOB NAME:
MONAGHAN TOWN COLLECTION NETWORK

JOB NUMBER:
PC7089

DRAWING NUMBER:
PC7089-SI-09

DRAWN BY:
Faoiltiarna Nic Chárthaigh

DATE:
20/05/2009

SCALE:
1:2000

APPROVED:
GH

REVISION:
F03

PRIORITY GEOTECHNICAL

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Slit Trenches	ST01A ST05 ST06 ST07 ST08 ST09 ST10.1 ST10.2 ST12 ST15.1 ST16 ST18 ST20 ST21 ST22 and ST23

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BH06**	**Project**	Monaghan Town Collection Network	
		Project No	PC7089	
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers	

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BH14**	**Project**	Monaghan Town Collection Network	
		Project No	PC7089	
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers	

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR1**	**Project**	Monaghan Town Collection Network	
		Project No	PC7089	
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers	

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR02**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

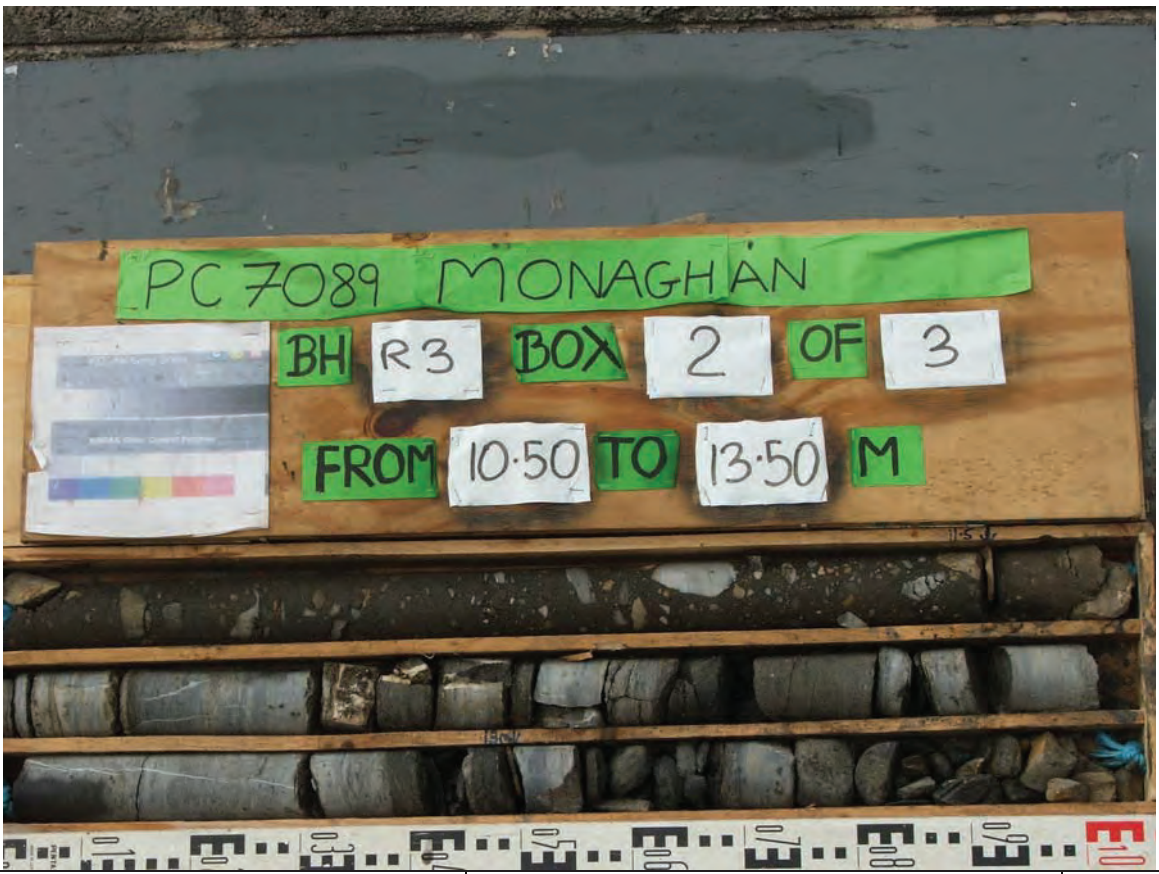
Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR02**	**Project**	Monaghan Town Collection Network	
		Project No	PC7089	
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers	

Rotary Core Photographic Record

Priority Geotechnical Limited



Rotary Borehole Number:	**BHR03**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR03**	**Project**	Monaghan Town Collection Network	
		Project No	PC7089	
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers	

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR04**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR5A**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR06**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR06**	**Project**	Monaghan Town Collection Network	
		Project No	PC7089	
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers	

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR06**	**Project**	Monaghan Town Collection Network	
		Project No	PC7089	
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers	

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR08**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR09**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR10**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR11**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

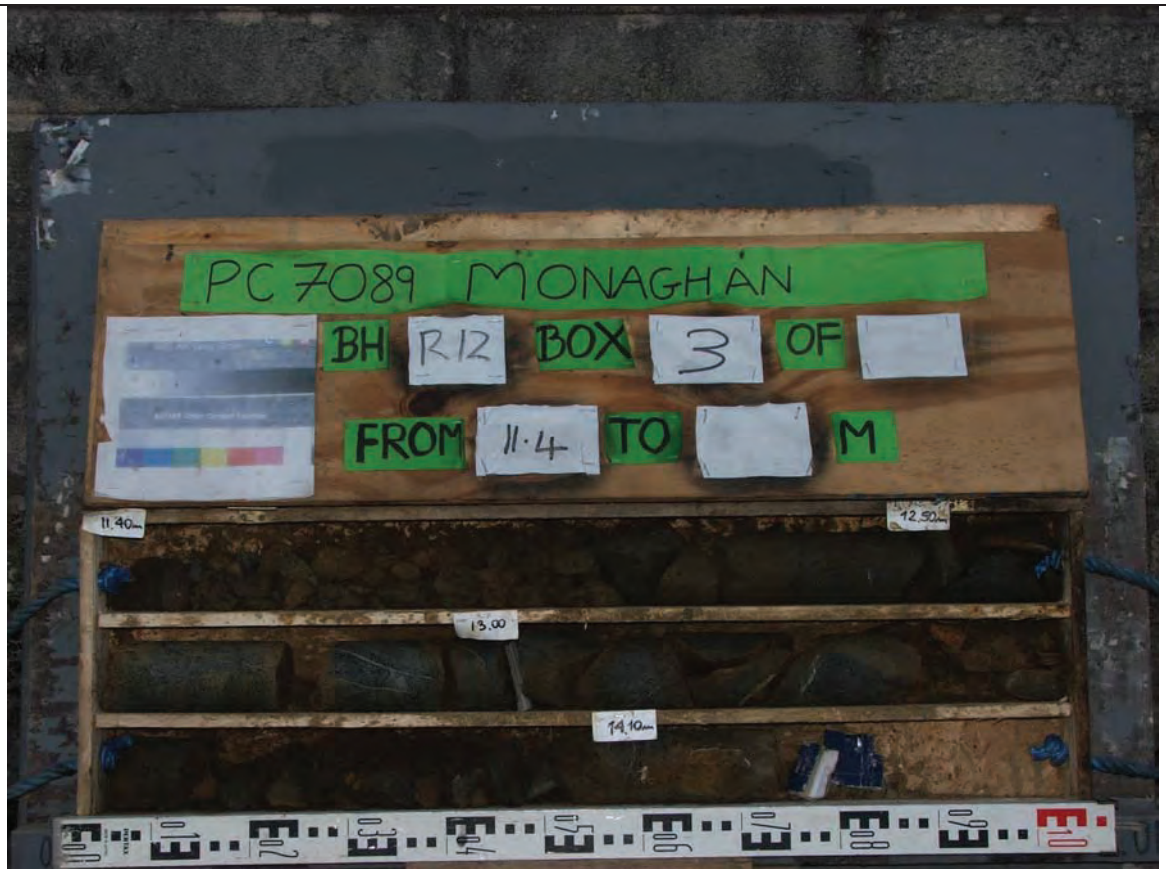
Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR12**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

Rotary Core Photographic Record

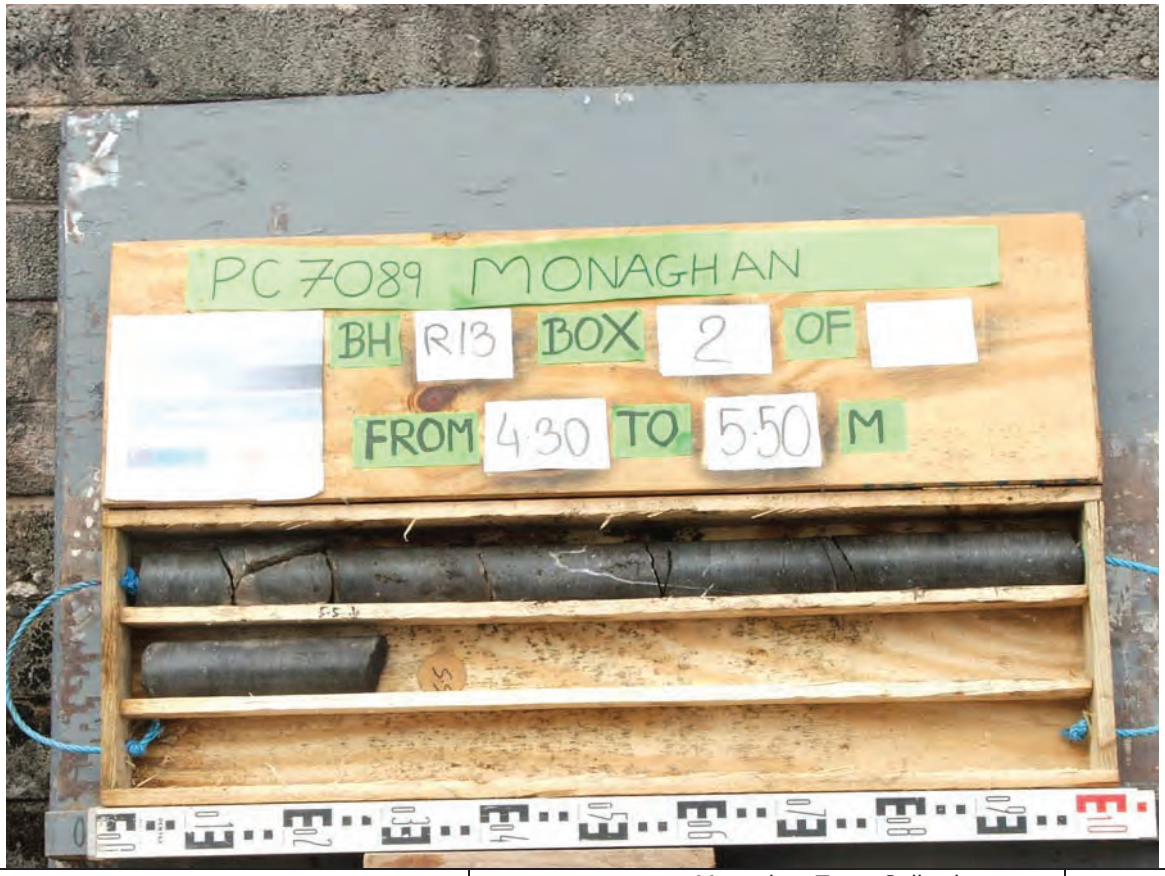
Priority Geotechnical Limited



Rotary Borehole Number:	**BHR12**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

Rotary Core Photographic Record

Priority Geotechnical Limited



Rotary Borehole Number:	**BHR13**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

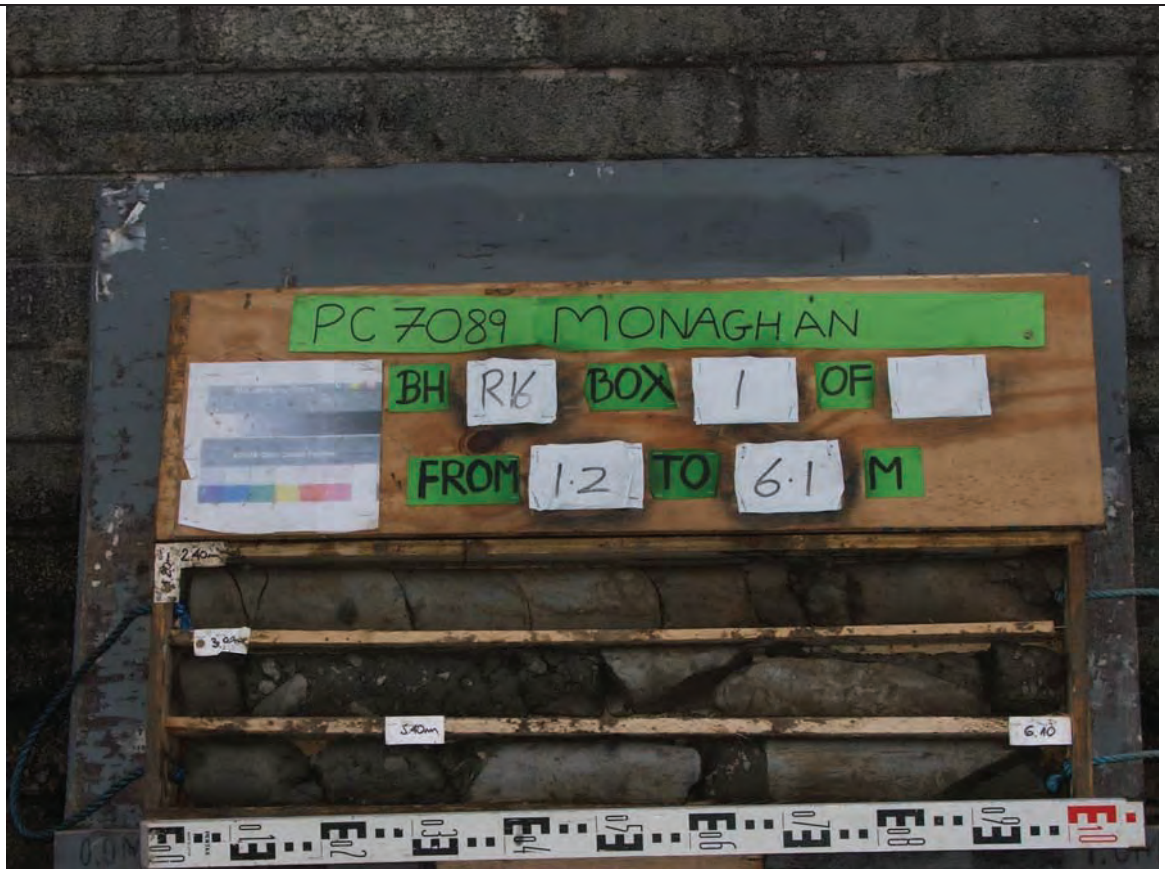
Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR14**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

Rotary Core Photographic Record

Priority Geotechnical Limited



Rotary Borehole Number:	**BHR16**	**Project**	Monaghan Town Collection Network	
		Project No	PC7089	
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers	

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR16**	**Project**	Monaghan Town Collection Network	
		Project No	PC7089	
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers	

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR17**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR18**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR18**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

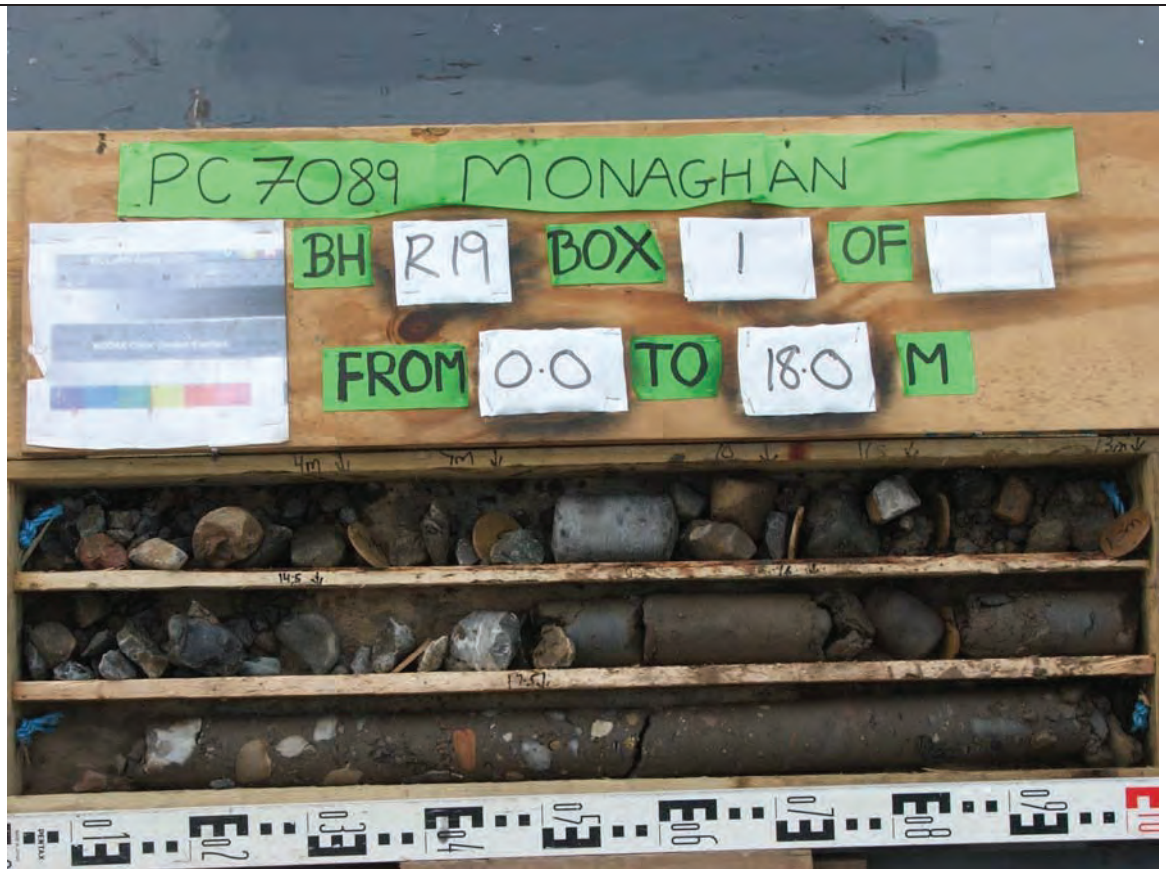
Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR18**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

Rotary Core Photographic Record

Priority Geotechnical Limited



Rotary Borehole Number:	**BHR19**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

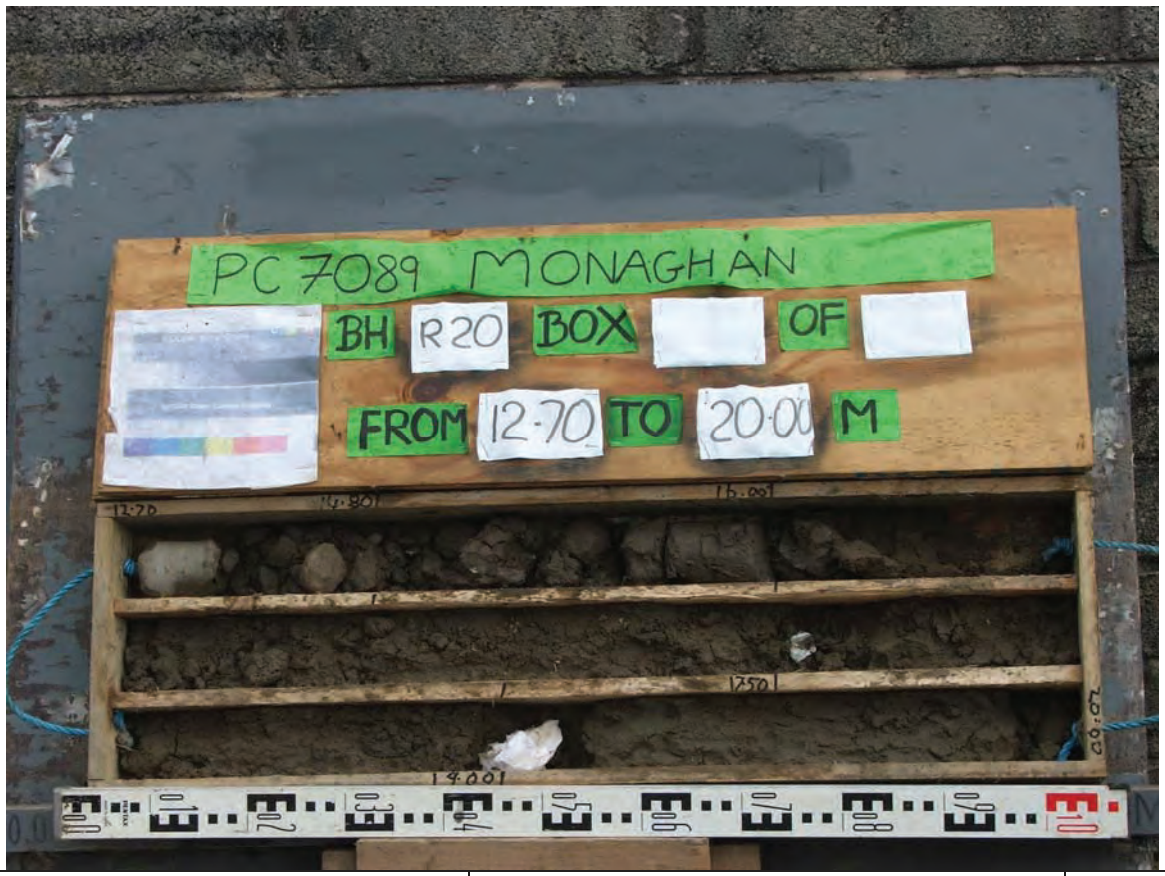
Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR20**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

Rotary Core Photographic Record

Priority Geotechnical Limited



Rotary Borehole Number:	**BHR20**	**Project**	Monaghan Town Collection Network
		Project No	PC7089
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR21**	**Project**	Monaghan Town Collection Network	
		Project No	PC7089	
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers	

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR21**	**Project**	Monaghan Town Collection Network	
		Project No	PC7089	
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers	

Rotary Core Photographic Record

Priority Geotechnical Limited

Rotary Borehole Number:	**BHR22**	**Project**	Monaghan Town Collection Network	
		Project No	PC7089	
		Carried Out for	T. J. O'Connor & Associates, Consulting Engineers	